



# **OKLAHOMA GAS and ELECTRIC COMPANY**

## **2016 Arkansas Energy Efficiency Program Portfolio Annual Report**

**Section 9: Annual Reporting Requirements, and Order No. 18 in Docket No. 06-004-R.  
Version 3.0 September 27, 2013**

**May 1, 2017**

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# 1.0 Executive Summary

Oklahoma Gas and Electric Company (“OG&E” or “Company”) hereby submits its Energy Efficiency (“EE”) program portfolio Annual Report for Program Year (“PY”) 2016 to the Arkansas Public Service Commission (“APSC” or “Commission”) pursuant to Order No. 18 in Docket 06-004-R. This report is required to be filed annually by May 1, in accordance with Order No. 7 filed in Docket 13-002-U on September 9, 2013.

## **HISTORY:**

OG&E began implementation of EE programs in Arkansas in December 2007 with its Quick Start program portfolio. The Quick Start program continued through December 31, 2009. That portfolio contained seven programs in total; five OG&E administered programs and two state administered programs. The OG&E administered programs included; the LivingWise<sup>®</sup> Student Energy Education program, the Residential Energy Audit program, the Commercial Lighting program, the Motor Replacement program, and the Compact Fluorescent Light (“CFL”) program. The two state administered programs included were the Arkansas Weatherization Program (“AWP”), and the Energy Efficiency Arkansas (“EEA”) program. The CFL program was not launched with the other Quick-Start programs and was ultimately discontinued. The Quick-Start portfolio allowed OG&E to build a program delivery framework for its customers in the Arkansas jurisdiction.

The initial Comprehensive Energy Efficiency Program (“CEEP”) was approved on February 3, 2010 for an 18-month implementation period ending on June 30, 2011. The initial CEEP included the continuation of the two statewide programs, AWP and EEA, and three OG&E programs; LivingWise<sup>®</sup> Student Energy Education, Commercial Lighting, and Motor Replacement programs. The Residential Energy Audit program was renamed the Custom Energy Report (“CER”) program and the new OG&E Weatherization program was introduced. The OG&E Weatherization program was established to offer weatherization for residential customers that would not otherwise qualify for the AWP.

The current Comprehensive Portfolio was approved on June 30, 2011 for the remainder of PY 2011. The PY’s 2012 and 2013 were subsequently approved on December 30, 2011. The two statewide programs, AWP and EEA, were continued along with OG&E’s Commercial Lighting program and the LivingWise<sup>®</sup> Student Energy Education program. The CER program was discontinued as an EE program, but is still available through OG&E’s website. The OG&E Weatherization program was modified to a collaborative program with Arkansas Oklahoma Gas Corporation (“AOG”) to take advantage of administrative efficiencies and cost sharing. The Motor Replacement Program was incorporated into the new Commercial and Industrial Standard Offer Program (“C&I SOP”). In addition, new programs were created for both residential and non-residential customers. For residential customers, the HVAC tune-up and duct repair program, the Window Unit A/C program, and the Multi-Family program were created to provide a more diverse residential portfolio of programs. After the plan was approved, it was determined the Multi-Family program could not be implemented as designed and

was discontinued. For non-residential customers, in addition to the C&I SOP, the Commercial Tune-up program was created to inspect and tune commercial HVAC systems.

In January 2013, the APSC opened Docket 13-002-U to resolve issues related to the development and implementation of the second three year cycle of EE programs in Arkansas. In Order No. 2 of that same Docket, the APSC approved the request of the Parties Working Collaboratively (“PWC”) extending the filing date for the second three year cycle of EE programs from June 1, 2013 to June 1, 2014. The Commission also directed that energy savings targets, budgets, and the incentive structure previously approved by the Commission shall also be used for PY 2014. The exception to this was if the Utilities sought Commission approval of proposed modifications to their EE portfolios.

OG&E reviewed its portfolio performance through 2013 and filed an application to modify its existing portfolio to enhance its ability to achieve Commission approved targets for 2014. OG&E’s interim filing proposed to modify its portfolio by discontinuing three programs, adding one new program, increasing the budget for industrial programs, and aligning its rebate structure with Commission approved targets. The three programs that were discontinued were the Residential HVAC program, the Commercial and Industrial HVAC program, and the Window Unit AC program. The new program added was the Multi-Family Direct Install program. On March 17, 2014, the Commission approved OG&E’s modified portfolio.

In February 2014, the APSC issued Order No. 15, in Docket 13-002-U extending for a second year, the filing date for the second three year cycle of programs to June 1, 2015. The extension was to allow time to complete efforts to develop a collaborative weatherization program, core C&I programs and complete a Potential Study. In addition the Commission approved a target increase of .90% of 2013 kWh sales for PY 2015. To meet the increased target for 2015, OG&E filed an application to increase the budgets by 40% for 3 of its programs to enhance its ability to achieve the new target. On April 1, 2015 the APSC approved OG&E’s budget increases for PY 2015.

In August 2015, the APSC issued Order No. 67, in Docket 07-075-TF approving OG&E’s PY 2016 Portfolio of Programs. Modifications made from PY 2015 to PY 2016 include the discontinuance of the AWP program and additions to the measure mix and resulting budget increase for the OG&E/AOG (Unified) Weatherization program.

Table 1-1 below summarizes historical annual incremental EE savings achieved by OG&E’s previous efforts:

**Table 1-1 Historical Annual Incremental EE Savings Achieved**

<b>Program Year</b>	<b>Energy (kWh)</b>	<b>Demand (kW)</b>
2008	2,434,738	666
2009	5,607,951	921
2010	4,143,096	1,317
2011	4,985,328	1,520
2012	7,595,741	1,840
2013	13,410,729	2,797
2014	13,794,070	2,883
2015	20,543,040	3,115

**GOALS AND OBJECTIVES:**

Order No. 15 in Docket 08-137-U established default energy savings target as a percent of 2010 energy sales. In 2016, the energy savings target increased to 0.90% of 2014 energy sales as adjusted for self-direct customers.

The annual energy savings targets as a percent of baseline sales and the corresponding filed energy savings targets and goals are shown in Table 1-2 below.

**Table 1-2 Annual Energy Savings Targets and Goals**

<b>Program Year</b>	<b>Baseline Sales Year</b>	<b>Percent of Sales</b>	<b>Energy Savings Targets (MWh)</b>	<b>Filed Energy Savings Goals (MWh)</b>
2011	2010	0.25%	6,752	6,753
2012	2010	0.50%	11,364	11,364
2013	2010	0.75%	16,844	16,844
2014	2010	0.75%	16,288	16,288
2015	2013	0.90%	18,904	19,879
2016	2014	0.90%	18,623	19,328

OG&E's filed energy savings goal for 2016 was 19,328,413 kWh. After adjusting for self-direct customers from the baseline year, the baseline target was 18,622,969 kWh. The 2016 EE portfolio actual achieved energy savings were 23,257,181 kWh or 125% of the baseline target.

**MAJOR ACCOMPLISHMENTS:**

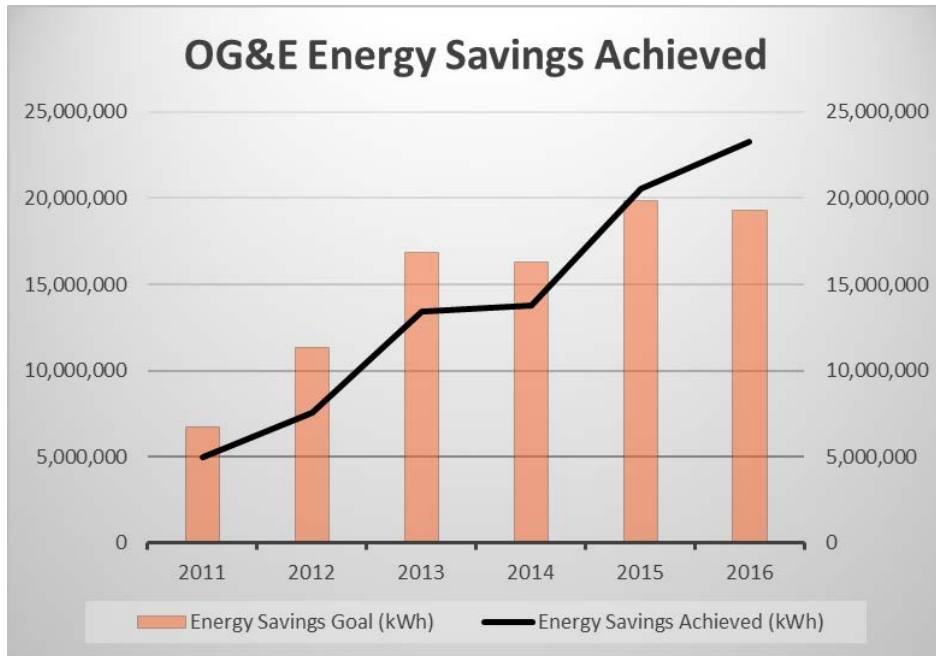
OG&E continued its success in 2016 by achieving its highest level of savings, reaching 125% of the energy target, 120% of its filed goal, and improving upon its 2015 filed goal achievement of 103%. OG&E’s Commercial and Industrial programs reached over 112% of savings goals for this program year.

**PROGRESS ACHIEVED:**

The portfolio savings continues to steadily climb year over year since 2011, while improving on the overall cost per achieved kWh savings. The historical annual energy savings to goal achievements are illustrated in Table 1-3 and Figure 1-1 below. Table 1-4 below depicts the growth in year over year kWh achieved savings and improved cost per kWh success.

**Table 1-3 Historical Annual Energy Savings to Goal Achievement**

Program Year	Energy Savings Goal (kWh)	Energy Savings Achieved (kWh)	% of Goal Achieved
2011	6,752,758	4,985,328	74%
2012	11,363,560	7,595,741	67%
2013	16,843,560	13,410,729	80%
2014	16,287,689	13,794,070	85%
2015	19,879,081	20,543,040	103%
2016	19,328,413	23,257,181	120%



**Figure 1-1 Energy Savings to Goal Achievement**

**Table 1-4 Historic kWh savings and cost per kWh achievement**

<b>Program Year</b>	<b>Energy (kWh)</b>	<b>Demand (kW)</b>	<b>Total Portfolio Costs</b>	<b>\$/kWh</b>
2011	4,985,328	1,520	2,071,159	\$ 0.42
2012	7,595,741	1,840	3,149,264	\$ 0.41
2013	13,410,729	2,797	3,714,378	\$ 0.28
2014	13,794,070	2,883	4,547,079	\$ 0.33
2015	20,543,040	3,115	6,075,144	\$ 0.30
2016	23,257,181	3,434	6,362,822	\$ 0.27

In 2015, OG&E began engaging CLEAResult to aid in closing the gaps between achieved energy savings and targets. OG&E's partnership with CLEAResult has proven to be a successful collaboration. The achieved energy savings for 2016 is 125% of the Commission approved target and a 13% increase from OG&E's 2015 achieved energy savings. This continued increase in year over year savings reflects significant enhancements in many program areas and confirms OG&E's commitment to achieve energy savings.

OG&E's achieved annual incremental savings in gigawatt hours is represented in Table 1-5 below.

**Table 1-5 OG&E's Achieved Annual Incremental Savings**

<b>Program Year</b>	<b>GWh Savings</b>	<b>% Increase from Prior Year</b>
2011	4.99	20%
2012	7.60	52%
2013	13.41	76%
2014	13.79	3%
2015	20.54	49%
2016	23.25	13%

**HIGH-LEVEL RECAP:**

The 2016 portfolio produced 23,257,181 kWh or 125% of the Commission approved target and 120% of OG&E's energy savings goal based on 2014 kWh sales as adjusted for self-direct customers. These on-going energy savings will accumulate over the life of the EE measures. The EE portfolio recoverable expenses of \$6,362,822 for 2016 were 98% of the approved annual budget of \$6,470,885. Customer incentives and rebates account for 65% of the total portfolio expenses.

## **HIGHLIGHTS OF PROGRAMS WELL-PERFORMING PROGRAMS:**

The Commercial and Industrial (“C&I”) programs saw tremendous success in 2016. The Commercial Lighting and Standard Offer programs combined achieved 112% of its savings goal while spending 100% of the revised budget<sup>1</sup>. The C&I sector savings account for 63% of the total Portfolio energy savings.

OG&E began implementation of the Multi-Family Direct Install (“MFDI”) program in 2014. In 2016, the program achieved 144% of the program goal while reaching 1,604 multi-family customers and remaining below budget. This program accounted for 48% of OG&E’s residential portfolio energy savings and also penetrates a hard to reach customer segment allowing for more customers to participate and be further educated in the energy management of their home.

The Student Energy Education program has the largest goal achievement of the portfolio at 171% of its 2016 savings goal by delivering 2,204 customized kits to 6<sup>th</sup> grade students and teachers across the OG&E Arkansas service territory. This program continues to be very well received in the classroom and offers teachers and students a unique avenue for learning about the environment and the importance of energy efficiency.

The OG&E/AOG (Unified) Weatherization program continues to achieve success by reaching 129% of the goal while remaining under budget and weatherizing 1,578 homes. It was anticipated that the number of customers reached in 2016 would be slightly less than years past due to increased contractor and measure costs. However, the number of customers reached surpassed the participant goal by 22%. The partnership between OG&E and AOG continues to ensure program success.

## **WHAT’S WORKING AND WHAT’S NOT:**

The residential portfolio of EE programs is working well. With the addition of the Multi-Family Direct Install program in 2014, OG&E continued to reach additional residential customers throughout 2015 and 2016. The residential portfolio of OG&E administered programs achieved 138% of energy savings goals while spending 98% of the total residential filed budget. The current EM&V reports validate the impact and process success of OG&E’s residential programs.

The C&I portfolio of EE programs achieved 112% of energy savings goals while spending 100% of the revised budget, This continued success can be directly attributed to the addition of CLEAResult’s resources and expertise, as well as the collaborative engagement from the evaluators.

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<sup>1</sup> Budgets were modified as needed to meet incentive obligations while remaining within the limits of Order No. 25 of Docket 13-002-U.



### **PLANNED CHANGES:**

On June 1, 2016, OG&E filed the next triennial 2017-2019 Portfolio Plan and was approved by the Commission on October 7, 2016 through Order No. 73 in docket 07-075-TF. The most significant change from the prior portfolio is the consolidation of programs into sector specific umbrella programs offering multiple marketing channels to improve accessibility to incentive funds when one channel is performing more cost effectively than another. The Commercial Lighting and Standard Offer Programs will be combined into one Commercial Energy Efficiency Program (“CEEP”) with multiple marketing channels such as Schools and Government, Large C&I, and Small Business Solutions. Multi-Family Direct Install and Schools Energy Education (LivingWise®) will both be combined into a Home Energy Efficiency Program (“HEEP”) with additional channels such as Consumer Products, Residential Solutions, and HVAC Replacement and Tune-ups to be offered. The OG&E/AOG (Unified) Weatherization Program will continue on as a stand-alone program.

### **TRAINING ACHIEVEMENTS:**

OG&E provided training to approximately 240 individuals in 2016. To accomplish this, OG&E hosted and sponsored seminars for weatherization contractors and crews to explain the benefits of the residential programs. OG&E also provided educational sessions with commercial and industrial customers on the benefits of energy efficiency.

### **EM&V ACTIVITIES:**

ADM and Associates, Inc. was selected to perform the evaluation, measurement, and verification (“EM&V”) for all of the EE programs in the portfolio. For PY 2016, the EM&V contractor performed process and impact evaluations of the programs delivering measure by measure evaluated net savings. The EM&V report details the findings and are included in Appendix A of this annual report.

### **LONG-TERM ENERGY SAVINGS:**

The current program portfolio was developed to meet the energy efficiency targets established by the APSC in Order No.31 in Docket 13-002-U. The expected kW and kWh savings delivered by this portfolio, estimated kW and kWh savings from future portfolios, and the cumulative kW and kWh savings from previous portfolios are included in the Company’s load forecast. The Integrated Resource Plan incorporates this information in its planning report.

**EE OVERVIEW:**

The following three tables provide an overview of the EE portfolio results for PY 2016:

**Table 1-6 Portfolio Summary**

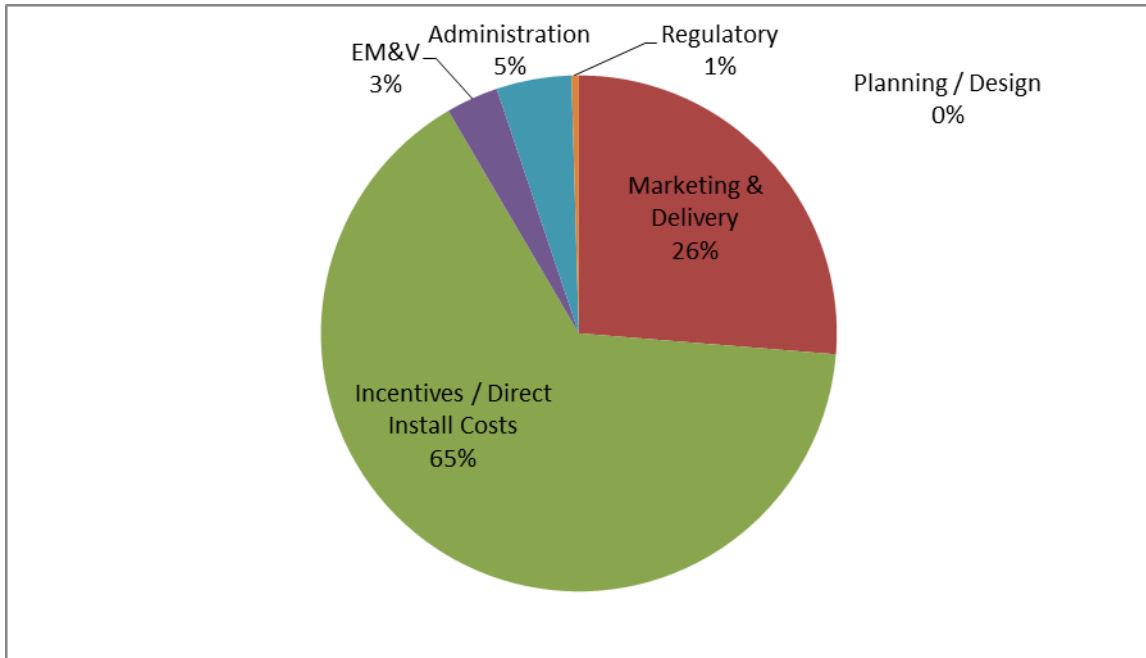
<b>2016 Portfolio Summary</b>						
<b>Net Energy Savings</b>		<b>Cost</b>			<b>Cost-Benefits</b>	
<b>Demand MW</b>	<b>Energy MWh</b>	<b>Actual Expenses</b>	<b>LCFC</b>	<b>Performance Incentives</b>	<b>TRC Net Benefits</b>	<b>TRC Ratio</b>
3	23,257	\$ 6,362,822	\$ 2,066,177	\$452,962	\$ 13,158,505	2.46

**Table 1-7 Portfolio Costs by Program Summary**

<b>EE Portfolio Cost by Program</b>					
<b>Program Name</b>	<b>Target Sector</b>	<b>Program Type</b>	<b>2016</b>		<b>% of Budget</b>
			<b>Budget (\$)</b>	<b>Actual (\$)</b>	
Multi-Family Direct Install	Residential	Market Specific/Hard to Reach	743,038	696,613	94%
OG&E - AOG Weatherization	Residential	Whole Home	2,381,529	2,381,530	100%
Student Energy Education	Residential	Behavior/Education	89,777	89,777	100%
C&I Standard Offer	Commercial & Industrial	Prescriptive/Standard Offer	1,534,222	1,534,222	100%
Commercial Lighting	Commercial & Industrial	Prescriptive/Standard Offer	1,613,318	1,613,318	100%
Energy Efficiency Arkansas (EEA) Regulatory	All Classes -	Behavior/Education -	24,000 85,000	18,411 28,950	77% 34%
		<b>Total</b>	<b>6,470,885</b>	<b>6,362,822</b>	<b>98%</b>

**Table 1-8 Portfolio Costs by Type Summary**

<b>EE Portfolio Summary by Cost Type</b>				
<b>EE Program Cost Summary</b>	<b>2016 Total Cost</b>			
	<b>Cost Type</b>	<b>% of Total</b>	<b>Budget (\$)</b>	<b>Actual (\$)</b>
Planning / Design	1%	32,578	29	0%
Marketing & Delivery	24%	1,527,745	1,672,992	26%
Incentives / Direct Install Costs	63%	4,097,906	4,152,278	65%
EM&V	6%	370,656	208,945	3%
Administration	6%	357,000	299,628	5%
Regulatory	1%	85,000	28,950	0%
	<b>100%</b>	<b>6,470,885</b>	<b>6,362,822</b>	<b>100%</b>



**Figure 1-2 Portfolio Costs by Type Summary**

Table 1-9 Company Statistics<sup>2</sup>

Company Statistics										
Program Year	Revenue and Expenses					Energy				
	Total Revenue (a) (\$000's)	Budget		Actual		Total Annual Energy Sales (d) (MWh)	Plan		Evaluated	
		Portfolio Budget (b) (\$000's)	% of Revenue (%=b/a)	Portfolio Spending (c) (\$000's)	% of Revenue (%=b/a)		Net Annual Savings (e) (MWh)	% of Energy Sales (%=b/a)	Net Annual Savings (f) (MWh)	% of Energy Sales (%=b/a)
2012	\$ 167,615	\$ 3,524	2.1%	\$ 3,149	1.9%	2,743,246	14,145	0.5%	7,596	0.3%
2013	\$ 179,047	\$ 3,938	2.2%	\$ 3,714	2.1%	2,710,927	20,848	0.8%	13,411	0.5%
2014	\$ 184,882	\$ 4,591	2.5%	\$ 4,547	2.5%	2,693,601	14,560	0.5%	13,794	0.5%
2015	\$ 168,544	\$ 6,471	3.8%	\$ 6,075	3.6%	2,604,925	19,879	0.8%	20,543	0.8%
2016	\$ 177,656	\$ 6,471	3.6%	\$ 6,363	3.6%	2,608,378	19,328	0.7%	23,257	0.9%

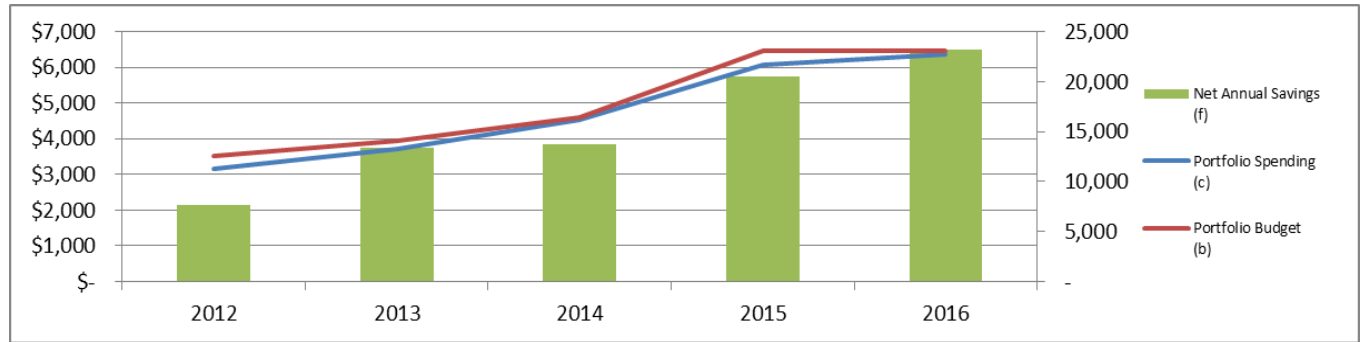


Figure 1-3 Company Statistics

<sup>2</sup> Total annual energy sales include self-direct customer sales.

## **2.0 Portfolio Programs**

### **2.1 OG&E/AOG Weatherization Program**

#### **2.1.1 Program Description**

Designed to target residential customers and allow them to participate in the program at no cost, this program provides customers the opportunity to actively manage their energy costs. The program targets residential single-family homes occupied in the past 12 months which were built 10 or more years ago, or those that are severely energy inefficient with an electricity cost per square foot more than 10 cents. Homes that meet these criteria begin with an energy audit utilizing blower door technology on the structure to capitalize on specific weatherization techniques. The program is designed to upgrade and improve the thermal envelope of the dwelling.

OG&E serves more than 55,000 residential customers in its Arkansas service territory and has estimated there are as many as 30,000 homes in need of weatherization improvements. OG&E views the weatherization program as a key component in its EE portfolio, and uses three independent contractors: DK Construction, based in Van Buren (Crawford County), Total Home Efficiency and Williams Energy, both based in south Fort Smith (Sebastian County). Each contractor has certified Building Performance Institute (“BPI”) or Residential Energy Services Network (“RESNET”), Home Energy Service Professionals (“HESP”) auditors on staff. OG&E personnel will arrange training to maintain consistent implementation practices across the weatherization program. Contractors are encouraged to attend trainings and receive additional education on weatherization of homes, both online and in classrooms, for improvement in proper home weatherization techniques.

Energy saving equipment that is installed or improvements made in the homes include: replacement of glass and/or doors, CFLs, return air cavity sealing, CO detectors, smoke detectors, attic insulation, air infiltration, water heater pipe wrap, low flow shower heads, faucet aerators, water heater jackets, and advanced power strips. Utilizing blower door and duct blaster technology, the contractors are able to locate and seal larger areas of air infiltration in the homes.

OG&E and Arkansas Oklahoma Gas Corporation (“AOG”) continue to work together with contractors to ensure program success. The partnership with AOG has proven to be a successful collaboration for the joint weatherization program. The ability to work together with other utilities is an ongoing effort to combine resources as well as to reach more customers in our over-lapping service territories. OG&E and AOG, along with the efforts of Frontier Associates, continue to fine tune the software package to meet the criteria of the most current Technical Reference Manual (“TRM”). The improvements are to help ensure the software captures more accurate field data, as well as a split payment process for each of the utilities to pay the individual contractors assigned to the program.

## 2.1.2 Program Highlights

- Civic and community presentations highlighting the program were conducted throughout communities served by OG&E promoting the Weatherization Program.
- OG&E weatherized 1,578 homes in 2016.
- The OG&E/AOG Weatherization Program is the equivalent to the Arkansas Unified Weatherization Program.

## 2.1.3 Program Budget, Savings and Number of Measures

Table 2-1 OG&E-AOG Weatherization Program Summary

<b>OG&amp;E - AOG Weatherization</b>												
Program	Cost			Energy Savings (kWh)			Demand Savings (kW)			Participants		
	Budget	Actual	%	Plan	Evaluated	%	Plan	Evaluated	%	Plan	Actual	%
Program Year 2014	\$ 2,231,745	\$ 2,231,745	100%	3,497,085	3,679,571	105%	990	1,086	110%	1,620	1,372	85%
Program Year 2015	\$ 2,351,220	\$ 2,191,244	93%	3,497,085	3,000,505	86%	990	949	96%	1,620	1,325	82%
<b>Program Year 2016</b>	<b>\$ 2,381,529</b>	<b>\$ 2,381,530</b>	<b>100%</b>	<b>3,047,238</b>	<b>3,931,322</b>	<b>129%</b>	<b>818</b>	<b>1,050</b>	<b>128%</b>	<b>1,296</b>	<b>1,578</b>	<b>122%</b>

## 2.1.4 Description of Participants

- Participants of this program must meet the following criteria:
  - home has been occupied for at least 12 months
  - home was built 10 or more years ago, or
  - has an electricity cost per square foot greater than 10 cents.

## 2.1.5 Challenges and Opportunities

- OG&E has been able to maintain a steady pace in obtaining and qualifying customers' homes in a timely manner for weatherization.
- In September of 2016, OG&E discontinued our partnership with the Community Clearinghouse as the program has grown to utilize our call center in an attempt to collect more accurate data on the front end of the customer's application. As this program matures, long term lead generation will be necessary for future success.
- The homes that were designated as AWP homes are now eligible for this program.

### **2.1.6 Planned or Proposed Changes to Program and Budget**

- The OG&E/AOG Weatherization Program will be consistent with the new statewide Unified Weatherization Program in 2017 and will remain a stand-alone program in the new triennial 2017-2019 Portfolio.

## **2.2 Student Energy Education Program (LivingWise®)**

### **2.2.1 Program Description**

The program provides 6<sup>th</sup> grade teachers and their students a curriculum on home EE. At the end of the curriculum a LivingWise® education kit provides students the opportunity to participate with their families on energy awareness. The LivingWise® education kit contains two LED bulbs, two CFL bulbs, two faucet aerators (bathroom and kitchen), one low-flow showerhead, one LED night light, a thermometer, and a student handbook on EE for the home and community. The students take the LivingWise® kit home and install the EE measures with the assistance of their parents. After completion of the curriculum, the children receive a LivingWise® wristband and a certificate of achievement for participating in the program.

OG&E provides a list of schools each semester to Resource Action Programs (“RAP”) for potential participation in the LivingWise® Program. RAP contacts the school, enrolls the teacher and quantifies the number of students. A list of enrolled schools and participation information is sent to OG&E each month. RAP mails the kits to the teachers enrolled in the program. Finally, RAP follows up with teachers on class participation during the curriculum and the students’ interaction with parents including the installation of the energy savings measures. There was an overwhelming consensus from all participating teachers that it was an informative, easy to understand curriculum.

### **2.2.2 Program Highlights**

- The LivingWise® Program provided EE and environmental awareness education for 2,204 students and teachers from January 2016 through December 31, 2016 targeting 9 school districts in Arkansas.
- An OG&E customized box was used to improve the generic look for the LivingWise® Kits.
- OG&E utilized Community Coordinators along with key contact personnel for promotion of the program.
- A report is submitted to OG&E at the end of each semester detailing the activity, the results and the participation level and acceptance of the program.
- The program achieved 171% of the energy savings goal in 2016.



### **2.2.3 Program Budget, Savings and Participants**

**Table 2-2- Student Energy Education Program Summary**

<b>Student Energy Education</b>												
Program	Cost			Energy Savings (kWh)			Demand Savings (kW)			Participants		
	Budget	Actual	%	Plan	Evaluated	%	Plan	Evaluated	%	Plan	Actual	%
Program Year 2014	\$ 88,694	\$ 88,694	100%	288,792	311,942	108%	36	39	108%	1,840	1,872	102%
Program Year 2015	\$ 88,315	\$ 83,359	94%	288,792	325,745	113%	36	41	114%	1,840	1,885	102%
Program Year 2016	\$ 89,777	\$ 89,777	100%	288,792	492,948	171%	36	63	175%	1,840	2,204	120%

### **2.2.4 Description of Participants**

- This program focuses on 6th grade students in the public school system. The kit provides several easily installed EE products for the home allowing students and parents to have conversations about using energy efficiently. This program promotes EE education to the future home owners so they will understand the impacts of energy conservation.

### **2.2.5 Challenges and Opportunities**

- OG&E's success with this program has been through key contacts in each of the school districts. Each of the participating schools within the OG&E service territory have embraced the concept and curriculum provided through RAP.
- The annual updating of the Arkansas TRM has historically presented challenges to the program's cost-effectiveness. However, with the addition of Non-Energy Benefits ("NEBs") in TRM v6.0 the current program outlook is very positive.

### **2.2.6 Planned or Proposed Changes to Program and Budget**

- OG&E plans to continue its support for the Student Energy Education program through the next triennial portfolio 2017-2019.
- The kits for 2017 will include two LED light bulbs, two faucet aerators, one low-flow showerhead, one LED night light, a thermometer, and a student handbook on EE for the home and community.
- Beginning fall of 2017, OG&E will introduce a new LED night light with the NBA Thunder approved mascot "Rumble" on the night light.
- The LivingWise<sup>®</sup> kit box cover will also display Rumble as a cartoon character hoping to bring more attention and awareness to children to save energy in a fun way.

## **2.3 Multi-Family Direct Install Program**

### **2.3.1 Program Description**

The Multi-Family Direct Install Program is intended to target multi-family complex owners and/or managers who seek assistance in improving the efficiency of individual units in their complex. The program provides energy saving measures for residential customers living in multi-family housing at no cost to the customer. Replacement measures include, but are not limited to, CFLs, LEDs, advanced power strips (“APS”), low-flow showerheads, faucet aerators, duct sealing, and air sealing.

### **2.3.2 Program Highlights**

- The MFDI Program was approved for implementation by this Commission in March of 2014. This program was part of an interim filing by OG&E to modify its EE portfolio to ensure it meets energy savings targets.
- The PY 2016 program reached 1,604 participants in the OG&E service territory and achieved 144% of the energy savings goal.
- The program was able to follow up with properties that participated in previous years and offer additional measures, such as duct sealing, air sealing, and advanced power strips.
- Outreach focused on property management companies with multiple properties which maximized opportunities and allowed the program to work directly with key decision makers.
- Several Housing and Urban Development and Section 8 properties were upgraded.
- Quality assurance processes continued to include live, in-field inspections, as well as post-installation inspections.
- Program staff focused on stakeholder communication throughout all stages of the project which mitigated property management and tenant concerns, maintained high quality installation standards, and increased customer satisfaction.
- Existing program contractors were trained and mentored to expand services to include duct sealing and air sealing. In addition, the program enrolled experienced home performance contractors to expand the contractor network.
- Contractors were transitioned from purchasing and installing CFLs to LEDs.

### 2.3.3 Program Budget, Savings and Number of Measures

Table 2-3 Multi-Family Direct Install Program Summary

<b>Multi-Family Direct Install</b>												
Program	Cost			Energy Savings (kWh)			Demand Savings (kW)			Participants		
	Budget	Actual	%	Plan	Evaluated	%	Plan	Evaluated	%	Plan	Actual	%
Program Year 2014	\$ 268,893	\$ 233,411	87%	1,914,153	1,667,071	87%	236	209	89%	2,050	1,884	92%
Program Year 2015	\$ 773,019	\$ 652,289	84%	2,851,734	3,969,881	139%	317	378	119%	2,832	1,795	63%
Program Year 2016	\$ 743,038	\$ 696,613	94%	2,851,734	4,110,838	144%	317	398	126%	2,832	1,604	57%

### 2.3.4 Description of Participants

- The participants for the MFDI Program are customers living in apartment complexes or other multi-family units and typically rent rather than own their housing. This arrangement requires OG&E to receive permission from the owner of the properties before EE measures are installed. Because of this arrangement, multi-family customers can be considered hard-to-reach when providing education and opportunities for managing energy use.

### 2.3.5 Challenges and Opportunities

- Developing relationships with property owners and management companies can be time consuming; however these relationships will result in a quicker decision making processes and larger project pipeline.
- Availability of advanced power strips was challenging in the fourth quarter of 2016, which delayed projects and in some cases required a second visit to properties.
- Lack of experienced contractors for duct sealing and air sealing measures required program staff to enroll new contractors.

### **2.3.6 Planned or Proposed Changes to Program and Budget**

- The residential program offerings will be considerably expanded in PY 2017 through 2019 to offer a more comprehensive set of measures for single-family and multi-family customers. As mentioned in the Executive Summary and further detailed below, HEEP will be made up of three channels; Residential Solutions, Consumer Products, and Residential HVAC Replacement and Tune-up.
- MFDI measures will be included with the Residential Solutions channel, which will offer measures for single-family and multi-family homes that are professionally installed by licensed contractors. The channel will include the following measures; in-home energy assessments, attic insulation, wall insulation, air sealing, duct sealing, LEDs, energy efficient faucet aerators and showerheads, APSs, ENERGY STAR pool pumps, and ENERGY STAR windows.
- The new program alignment will allow multi-family properties and customers to benefit from expanded measures such as attic insulation, wall insulation, and ENERGY STAR windows that were not previously offered.
- The Consumer Products channel will offer a point of purchase discount on ENERGY STAR LEDs as well as a mail-in rebate for smart thermostats.
- The Residential HVAC Replacement and Tune-up channel will offer rebates to single-family and multi-family customers for air conditioner and heat pump replacement and advanced A/C tune-ups that are installed and completed by an approved, licensed HVAC contractor.

## **2.4 Commercial Lighting Program**

### **2.4.1 Program Description**

The purpose of the Commercial Lighting Program is to provide incentives to OG&E Commercial and Industrial customers to install or replace lighting with more efficient equipment. The program targets commercial, public authority, schools, and industrial facilities of all sizes with a focus on the small to medium-sized facilities, where saturation rates and awareness levels of high efficiency lighting are expected to be lower than in larger commercial operations. To encourage commercial customers to participate, incentives were offered for the following upgrades; T-12, T-8, or T-5 lamps to LED fixtures or LED linear replacements, upgrading HID to high efficiency LED fixtures, installation of sensors, LED exit lighting, incandescent lighting to CFL's or LED's and the upgrade of parking lot lighting. The program also encourages new construction to upgrade their lighting above minimum standards and requirements. Incentives were based on kWh reduced on the structure and total project cost.

OG&E personnel, along with CLEAResult representatives, continued to recruit and educate commercial customers on the advantages of upgrading their lighting systems through direct outreach, educational seminars, booth displays at local vendor open houses, and lunch and learn opportunities. OG&E personnel utilized many different avenues and strategies to encourage customers to upgrade the lighting in each facility. This includes working with lighting manufacturer representatives, conducting walk through audits and detailed audits. The program was well received and provided quick reimbursement on enhanced lighting in facilities. Commercial customers benefited from both the disbursement of rebates and the education the program provided. Program staff educated customers, contractors, and community members with respect to the financial, maintenance, and facility improvement benefits of more efficient lighting and lighting controls.

### **2.4.2 Program Highlights**

- Both pre and post installation inspections were performed to ensure the program was implemented as designed and proper documentation was collected.
- Calculators developed by CLEAResult's engineers were created and released after rigorous peer reviews to ensure calculations were accurate. Periodic updates, including TRM 6.0 retroactivity, were subsequently released after the same peer review process was completed.
- CLEAResult continued to assist OG&E personnel throughout 2016 in capturing opportunities for lighting replacements with all classifications of C&I consumers.
- Presentations were provided at lighting supply and distributor warehouses throughout 2016.
- Civic and community presentations promoting the lighting program were conducted throughout OG&E's service territory.
- 142 projects were completed in 2016.

- Some program processes were streamlined to increase throughput with the same level of staff as 2015.
- The program achieved 92% of the filed energy goal in 2016. However, CLEAResult reached their internal implementation gross savings goal at 102% after modifications were made mid-year to focus on the Standard Offer Program and more cost-effective options.

### **2.4.3 Program Budget, Savings and Participants**

**Table 2-4 Commercial Lighting Program Summary**

<b>Commercial Lighting</b>												
	<b>Cost</b>			<b>Energy Savings (kWh)</b>			<b>Demand Savings (kW)</b>			<b>Participants</b>		
<b>Program</b>	<b>Budget</b>	<b>Actual</b>	<b>%</b>	<b>Plan</b>	<b>Evaluated</b>	<b>%</b>	<b>Plan</b>	<b>Evaluated</b>	<b>%</b>	<b>Plan</b>	<b>Actual</b>	<b>%</b>
Program Year 2014	\$ 900,128	\$ 958,830	107%	5,162,810	6,525,599	126%	970	1,117	115%	125	106	85%
Program Year 2015	\$ 1,561,360	\$ 1,509,288	97%	6,599,411	6,529,402	99%	976	1,076	110%	194	91	47%
Program Year 2016	\$ 1,613,318	\$ 1,613,318	100%	6,599,411	6,040,898	92%	976	817	84%	194	142	73%

### **2.4.4 Description of Participants**

- Participants in the program included all classifications of C&I customers.

### **2.4.5 Challenges and Opportunities**

- The program team is considering the effects of utilizing custom hours for every project or a subset of projects instead of deemed savings. Primary research conducted by the evaluator on deemed savings projects has resulted in savings erosion and open questions about the appropriate use of deemed savings annual operating hours.
- Many commercial lighting customers continue to delay lighting projects due to corporate budget limitations.
- CLEAResult staff was fully utilized in 2016 and had no additional bandwidth. As program design and goals change, staffing levels will need to be revisited.
- Market acceptance of LEDs has grown as incremental costs continue to decrease.

## **2.4.6 Planned or Proposed Changes to Program and Budget**

- OG&E programs will change from measure based programs (i.e. Commercial Lighting and Commercial Standard Offer Program) to a user-based program in PY 2017 through 2019. As mentioned in the Executive Summary, CEEP will offer multiple channels for end-user participation. C&I Solutions will offer direct installation of low-cost measures and both a performance and custom participation path for customers to perform energy upgrades. Technical support will also be provided to assist in project identification and development.
- Small Business Solutions will offer direct installation of low cost EE measures, facility walk-throughs and incentives for a suite of EE measures. This offer targets business customers with peak demand less than 100 kW. Direct install measures include LEDs and other low cost lighting, low-flow devices for electric water heating, HVAC upgrades, vending misers and low cost refrigeration measures. Participants are also eligible to participate in the larger C&I performance or custom pathways if the customer's needs are beyond the scope of services outlined within this outreach approach.
- Mid-Stream Lighting will allow non-residential customers within the AR service territory to purchase qualified lighting products at a discount through participating distributors.
- Schools and Government channel will offer assistance to the institutional customer segments to overcome barriers to energy improvement that are unique to their market segment, such as conflicting organizational goals, outdated specifications, limited technical knowledge, and counterproductive energy budgeting. The program will also provide benchmarking services to qualifying customers.

## **2.5 Commercial and Industrial Standard Offer Program**

### **2.5.1 Program Description**

The Commercial and Industrial Standard Offer Program is a comprehensive long-term program targeted to C&I Power and Light rate customers. The program provides incentives for the energy savings produced through EE improvements and solutions to meet requirements unique to each facility. The program has proven to be successful in helping to not only manage, but to assist in upgrading existing equipment to a higher efficiency standard. This program has an on-going opportunity to help industrial, commercial, and manufacturing customers achieve higher efficiency standards while providing incentives to help shorten payback periods. OG&E personnel, along with CLEAResult representatives provide consulting to C&I customers as well as trade allies to promote the program and facilitate the completion of eligible projects.

### **2.5.2 Program Highlights**

- The program achieved 133% of the energy savings goal in 2016.
- An in-depth HVAC training was provided to customers, contractors, and community members in the second quarter. Topics such as HVAC system overviews, operating and maintenance best practices, and typical energy savings opportunities were covered.
- OG&E promoted the program through various civic presentations across OG&E's service territory.
- OG&E successfully utilized mass media along with calls to distributors and direct mail approaches to manufacture representatives to elevate and help promote program awareness.
- OG&E contracted with CLEAResult to assist OG&E personnel in the C&I SOP program delivery.
- OG&E increased program comprehensiveness and cost-effectiveness with the addition of new direct install measures such as weather stripping and door sweeps.
- Majority of savings were realized through refrigeration, compressed air, and HVAC controls projects.
- 84 projects were completed in 2016.



### **2.5.3 Program Budget, Savings and Participants**

**Table 2-5 C&I Standard Offer Program Summary**

<b>C&amp;I Standard Offer</b>												
<b>Program</b>	<b>Cost</b>			<b>Energy Savings (kWh)</b>			<b>Demand Savings (kW)</b>			<b>Participants</b>		
	<b>Budget</b>	<b>Actual</b>	<b>%</b>	<b>Plan</b>	<b>Evaluated</b>	<b>%</b>	<b>Plan</b>	<b>Evaluated</b>	<b>%</b>	<b>Plan</b>	<b>Actual</b>	<b>%</b>
Program Year 2014	\$ 926,250	\$ 949,805	103%	3,596,963	1,606,746	45%	938	431	46%	88	144	164%
Program Year 2015	\$ 1,572,241	\$ 1,572,241	100%	6,541,238	6,717,507	103%	1,073	672	63%	233	107	46%
<b>Program Year 2016</b>	<b>\$ 1,534,222</b>	<b>\$ 1,534,222</b>	<b>100%</b>	<b>6,541,238</b>	<b>8,681,174</b>	<b>133%</b>	<b>1,073</b>	<b>1,106</b>	<b>103%</b>	<b>233</b>	<b>84</b>	<b>36%</b>

### **2.5.4 Description of Participants**

- Participants in the program included each of the classifications for C&I customers.

### **2.5.5 Challenges and Opportunities**

- CLEAResult staff was fully utilized in 2016 and had no additional bandwidth.
- EE improvements with many industrial customers continue to move at a slow pace due to the customer's budget limitations on capital improvements.
- Because distributors tend to keep little to no inventory on higher efficiency equipment, in-stock minimum efficiency equipment is often purchased in emergency situations. This leads to lower participation rates of the program in HVAC equipment below 7.5-tons.
- Many large projects have lead times of up to 18 months or longer from start to finish, which presents a challenge in trying to manage annual program budgets.
- The program team must consider the ramifications of utilizing custom hours for every project or a subset of projects instead of deemed savings. Primary research conducted by the evaluator on deemed savings projects has resulted in savings erosion and open questions about the appropriate use of deemed savings annual operating hours.
- Customers who have successfully completed projects are willing to explore deeper energy savings with other technologies.
- The manufacturing sector in Fort Smith appears to be rebounding economically, which could result in larger capital expenditure projects.

## **2.5.6 Planned or Proposed Changes to Program and Budget**

- OG&E programs will change from measure based programs (i.e. Commercial Lighting and Commercial Standard Offer Program) to a user-based program in PY 2017 through 2019. As mentioned in the Executive Summary, CEEP will offer multiple channels for end user participation.
- C&I Solutions will offer direct installation of low-cost measures and both a performance and custom participation path for customers to perform energy upgrades. Technical support will also be provided to assist in project identification and development.
- Small Business Solutions will offer direct installation of low cost EE measures, facility walk-throughs and incentives for a suite of EE measures. This offer targets business customers with peak demand less than 100 kW. Direct install measures include LEDs and other low cost lighting, low-flow devices for electric water heating, HVAC upgrades, vending misers and low cost refrigeration measures. Participants are also eligible to participate in the larger C&I performance or custom pathways if the customer's needs are beyond the scope of services outlined within this outreach approach.
- Mid-Stream Lighting will allow non-residential customers within the AR service territory to purchase qualified lighting products at a discount through participating distributors.
- Schools and Government channel will offer assistance to the institutional customer segments to overcome barriers to energy improvement that are unique to their market segment, such as conflicting organizational goals, outdated specifications, limited technical knowledge, and counterproductive energy budgeting. The program will also provide benchmarking services to qualifying customers.

## **2.6 Energy Efficiency Arkansas (EEA) Program**

### **2.6.1 Program Description**

The Energy Efficiency Arkansas (“EEA”) Program provides information to all customers, of all classes, allowing them to make informed decisions about how they use energy and to look at alternatives to improve their consumption, thereby decreasing demand and energy usage.

OG&E has continued its support of the EEA Comprehensive plan, provided by the Arkansas Energy Office (“AEO”), through three components: 1) residential education and information outreach; 2) media promotion; 3) commercial and industrial education and outreach.

The AEO provided educational pamphlets, DVDs, and training materials to homeowners throughout the OG&E service territory. Multiple classes were held throughout the State of Arkansas on residential, commercial, and industrial energy efficient usage and design. Area industry plant engineers as well as CEOs, CFOs, and purchasing agents were updated on techniques of how to manage energy consumption in their plants. Courses on refrigeration and compressed-air were held in the Fort Smith area to update individual businesses on EE operations within the C&I segment.

### **2.6.2 Program Highlights**

- The AEO provided various methods of reaching all classifications of OG&E customers through radio, print, and seminars.
- The AEO offered training through Arkansas Manufacturing Solutions throughout the year in the OG&E service territory.
- Additional information is submitted by the AEO annual report filed in docket 07-083-TF on May 1, 2017.
- The comprehensive program began February 3, 2010 and ended on June 30, 2011. The EEA program began on July 1, 2011 and continued through December 2016.
- The APSC approved through Order No. 49 of Docket 07-083-TF a Second Comprehensive Memorandum of Understanding for the EEA Program to be utilized in PY 2017 through 2019.

### **2.6.3 Program Budget, Savings and Participants**

**Table 2-6 Energy Efficiency Arkansas Program Summary**

<b>Energy Efficiency Arkansas (EEA)</b>												
<b>Program</b>	<b>Cost</b>			<b>Energy Savings (kWh)</b>			<b>Demand Savings (kW)</b>			<b>Participants</b>		
	<b>Budget</b>	<b>Actual</b>	<b>%</b>	<b>Plan</b>	<b>Evaluated</b>	<b>%</b>	<b>Plan</b>	<b>Evaluated</b>	<b>%</b>	<b>Plan</b>	<b>Actual</b>	<b>%</b>
Program Year 2014	\$ 21,600	\$ 18,319	85%	0	0	-	0	0	-	0	0	-
Program Year 2015	\$ 24,000	\$ 18,319	76%	0	0	-	0	0	-	0	0	-
<b>Program Year 2016</b>	<b>\$ 24,000</b>	<b>\$ 18,411</b>	<b>77%</b>	<b>0</b>	<b>0</b>	<b>-</b>	<b>0</b>	<b>0</b>	<b>-</b>	<b>0</b>	<b>0</b>	<b>-</b>

### **2.6.4 Description of Participants**

- Residential and C&I customers in Arkansas.

### **2.6.5 Challenges and Opportunities**

- OG&E, along with the AEO, has continued to provide updated material to all classifications of consumers throughout the OG&E Arkansas service territory. Cost-effective measures should be implemented in a timely manner to lower utility costs. Education to the customer is essential in stressing the importance of EE in all applications.
- The AEO collaborated with the PWC to develop a central website for C&I customers as part of the AR Common C&I Approach for All Investor Owned Utilities in Arkansas in 2015 and continued to be active in 2016.

### **2.6.6 Planned or Proposed Changes to Program and Budget**

- OG&E will continue its support of the EEA Program throughout the next triennial 2017-2019 Portfolio Plan.
- OG&E's planned budget for PYs 2017, 2018, and 2019 is \$18,606, \$21,958, and \$20,731 respectively.

## 3.0 Supplemental Requirements

### 3.1 Staffing

OG&E has a total of 4 Full-Time Employees (“FTEs”); 2 FTEs managing its EE programs, an EM&V Specialist and EM&V Analyst supporting the evaluation of programs, and an Administrative Clerk make up the remaining FTEs. The EM&V Specialist, EM&V Analyst, and Administrative Clerk have additional responsibilities in OG&E’s Oklahoma EE programs as well. In addition to OG&E staff, there is one contracted implementation contractor, three contractors utilized specifically for the OG&E/AOG Weatherization Program, and multiple crews.

OG&E’s implementation contractor, CLEAResult Consulting, utilized the following staffing structure for program delivery:

- C&I Standard Offer and C&I Lighting Programs – a full-time Energy Engineer and a full time Program Consultant; plus two Senior Program Managers (“SPM”) on a part-time basis. One of the SPM’s with extensive C&I program management experience was added to the team in PY 2016.
- Multi-Family Direct Install Program – a full-time Program Consultant, a part-time Program Assistant, a part-time Program Manager, and a part-time Senior Program Manager. The full-time Program Consultant position replaced a part-time Program Specialist position during PY 2016.

## 3.2 Stakeholders Activities

OG&E remains active in the PWC group, which held approximately two face-to-face meetings and approximately eight conference calls in PY 2016. The following is a high-level summary of the matters discussed during these PWC events:

- Value of Evaluation, Measurement, & Verification (Memo to Commission)
- Benchmarking of the Cost of Saved Energy (Memo to Commission)
- Commission Order Regarding the Quantification of Non-Energy Benefits (NEBs)
- EM&V Planning and TRM v6.0 Scope of Work
- Identification of Potential Measures for inclusion in TRM v6.0
- Use of the Real Economic Carrying Charge (“RECC”)
- Program Comprehensiveness
- Prospective vs. Retrospective TRM Application (PY 2017 Memo to Commission)
- Timing of the application of NEBs
- Response to Order No. 36, including a Common Cost of Carbon and the Documentation of EE Benefits

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 7, 2016, Joint Motion Requesting Extension of Submittal Deadline for the Next Energy Efficiency Cost Recovery Rider
- Docket No. 13-002-U, March 15, 2016, Commission Order No. 32 approving the Joint Motion Requesting Extension of submittal Deadline for the Next Energy Efficiency Cost Recovery Rider
- Docket No. 13-002-U, April 21, 2016, PWC Joint Recommendations regarding the Energy Efficiency Programs of the Empire District Electric Company
- Docket No. 13-002-U, May 3, 2016, Commission Order No. 33 granting the PWC Joint Recommendations regarding the recommendations for the future Energy Efficiency Programs of the Empire District Electric Company
- Docket No. 13-002-U, May 20, 2016, PWC Joint Comments and Recommendations concerning the Cost of Energy Saved
- Docket No. 13-002-U, May 25, 2016, PWC Joint Comments and Recommendations in Response to Commission Order Nos. 31 and 32
- Docket No. 13-002-U, May 31, 2016, SWEPCO Comments in response to Order Nos. 31 and 32
- Docket No. 13-002-U, August 1, 2016, Submittal of the PY 2015 Evaluation, Measurement, & Verification Findings prepared by the Independent Evaluation Monitor along with the supporting Testimony of Dr. Katherine Johnson filed on behalf of General Staff
- Docket No. 13-002-U, August 5, 2016, Audubon Arkansas submittal of Comments and Recommendations regarding Comprehensiveness and Cost-Effectiveness of EE Programs proposed for the next program cycle (PYs 2017-2019)

- Docket No. 10-100-R, August 31, 2016, PWC submittal of a Joint Motion along with the Testimonies of Matthew Klucher of General Staff and Dr. Katherine Johnson on behalf of the IEM Team in support of the approval of TRM v6.0
- Docket No. 10-100-R, October 17, 2016, Commission Order No. 30 approving TRM v6.0

In addition to the above activities, OG&E staff participated in various activities regarding EM&V of the EE Portfolio such as bi-weekly calls with the evaluators and implementers, contractor trainings, appreciation events, trade shows, continuous improvements, reviews of site visit reports, various other data requests, and correspondences with peer groups.

### **3.3 Information provided to Customer to Promote EE**

Please see Section 5.0 Appendix B for samples of promotional and educational materials used in the program year.



## 4.0 Appendix A: EM&V Contractor Reports

ADM & Associates, Inc. provided results for the EM&V results and Cost Benefit Analysis for OG&E's PY 2016 Portfolio. OG&E is providing these reports in the attached exhibits.

**Attachments:**

- Attachment A) contains ADM's Evaluation of OG&E's Energy Efficiency Programs and Cost Benefit Analysis

**Attachment A:**  
**ADM's Evaluation of OG&E's**  
**Energy Efficiency Programs and**  
**Cost Benefit Analysis**



ENERGY RESEARCH  
AND EVALUATION



## Oklahoma Gas & Electric (OG&E) Arkansas Energy Efficiency (EE) Portfolio Evaluation Report PY2016

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Pursuant to Section 9 the Rules for Conservation and Energy Efficiency Programs:  
Annual Reporting Requirements, Order No. 29, Docket No. 06-004-R, May 20, 2014

April 01, 2017

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# 1 Executive Summary

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## 1.1 Introduction

In June 2011, the Arkansas Public Service Commission (APSC) approved the Oklahoma Gas & Electric (OG&E) three-year energy efficiency Plan (the Plan), covering program years 2011-2013, filed in compliance with Order No. 25 and later in Order No. 34 of Docket No. 07-075-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 2015 (in Order No. 25 in Docket No. 13-002-U), which continued the Arkansas utilities' Plan savings targets and budgetary guidelines for PY 2015, the APSC approved a third one-year extension of the Arkansas utilities' three-year energy efficiency plans.

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, OG&E's 2016 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 2016. Only one of the programs received an increase in budget, which was the OG&E and AOG Unified Weatherization program, as the new requirements of the weatherization program increased the contractor cost per home.<sup>1</sup>

OG&E's Plan includes a portfolio of energy efficiency programs designed to facilitate reductions in electricity and peak demand in every customer class. OG&E offers retail electric service in Oklahoma and Arkansas, servicing approximately 65,000 customers in Arkansas. OG&E's Arkansas service area encompasses the City of Fort Smith and several nearby municipalities. In 2015, OG&E's Arkansas retail customer classes used 2,604,925 kWh, which is 10.8% of all OG&E energy.

In accordance with APSC Rules for Conservation and Energy Efficiency Programs (CE&E Rules), OG&E engaged ADM Associates, Inc. (ADM) and Tetra Tech to conduct an evaluation, measurement, and verification (EM&V) of its portfolio. The ADM and Tetra Tech staff, collectively referred to as the Evaluators, evaluated each program within the OG&E portfolio.

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<sup>1</sup> As was reported in the Direct Testimony of Billy D. Pollock in Docket number 07-075-TF on June 1, 2015.

## 1.2 Summary of OG&E’s Energy Efficiency Portfolio

In 2016, OG&E offered a portfolio of five energy efficiency programs, which provided a comprehensive range of customer options focused on energy efficiency and educational options. OG&E designed its programs to achieve the following objectives:

- 2016 net energy-savings goal of 19,328,413 kWh<sup>2</sup> and demand reduction target of 3,219 kW;<sup>3</sup>
- Significant energy-savings opportunities for all customers and market segments;
- Broad ratepayer benefits; and
- Comprehensiveness in seven areas (i.e., comprehensiveness factors) defined by the APSC.<sup>4</sup>

The Evaluators evaluated the results for PY2016 for three residential programs and two commercial and industrial (C&I) programs, as follows:

- Multifamily Direct Install (MFDI) program;
- Student Energy Education (SEE) LivingWise® program;
- OG&E/AOG Weatherization (Unified Wx) program;
- Commercial and Industrial (C&I) Lighting program; and
- Commercial and Industrial Standard Offer program (C&I SOP).

Through its energy efficiency portfolio, OG&E also seeks to provide customers with easy program entry points, flexible options for saving energy, and ongoing support for those who want to pursue deeper energy savings or demand reduction. Refer to Table 1-1 for a list of the OG&E programs and targeted customer segments.

Table 1-1 OG&E PY 2016 Energy Efficiency Portfolio

Program	Residential	Multi-family <sup>5</sup>	Small Business	C&I	Institutional & Municipal	Agricultural
MFDI		X				
SEE LivingWise	X	X				
Unified Wx	X					
C&I Lighting			X	X	X	X
C&I SOP			X	X	X	X

This report presents the results of the evaluation of these programs.

2 This value was based on 0.90% of OG&E’s 2014 retail sales as set forth by the APSC and includes a reduction from goal to account for commercial and industrial customers opting to self-direct.

3 These targets represent first-year net energy and demand savings at the meter.

4 As defined by the APSC in the C&EE Rules of Order No. 17 in Docket 08-144-U.

5 All multifamily are duplexes that are single-metered.

### 1.3 Evaluation Objectives

The goals of the PY2016 EM&V effort are as follows:

- For prescriptive measures, verify that savings are being calculated according to appropriate TRM guidelines. For most measures, this constitutes applying TRM version 6.0 methodologies.
- For custom measures, this effort comprises the calculation of savings according to accepted protocols (such as IPMVP). This is to ensure that custom measures are cost-effective and providing reliable savings.
- Conduct process evaluation of all programs and of the portfolio overall. This is to provide a comprehensive review of program operations, marketing and outreach, quality control procedures, and program successes relative to goals. From this, the Evaluators are to provide program and portfolio-level recommendations for OG&E. Process evaluation activities include interviews of key program actors, surveys of participants and non-participants, literature reviews and best-practices assessments, and documentation of program activities, successes, and shortcomings. The scale of these evaluation is driven by Protocol C in the TRM version 6.0.
- Conduct net-to-gross assessments. The Evaluators developed net-to-gross ratios specific to each program.

### 1.4 Evaluation Findings

OG&E’s portfolio was successful in PY2016, achieving 120.3% of planned net energy savings (kWh) and 106.6% of planned net demand reduction (kW). As in previous years, the C&I Standard Offer Program (SOP) provided most of the savings (8,681,174 kWh and 1,105.93 kW), but the C&I Lighting and the OG&E/AOG Weatherization (Unified Wx) programs also made significant contributions. In addition to verifying the savings reported by OG&E, the Evaluators calculated lifetime impacts for the programs and measures. As part of this process, in the body of the report we refer to the impacts (energy savings or peak demand reduction) accrued during the program year being evaluated (PY2016) as “first year” impacts.

Table 1-2 shows the OG&E goals, reported gross impacts, ADM evaluated first year gross energy savings (24,932,690 kWh) and gross demand reductions (3,452.21 kW), gross realization rates (95.9% for kWh, 101.7% for kW), net impacts (23,257,181 kWh, 3,433.91 kW), net-to-gross (NTG) ratios, and lifetime impacts (338,066,709 kWh).<sup>6</sup>

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<sup>6</sup> Lifetime impacts are the sum of energy savings over the course of the measure’s effective useful life (EUL) and the weighted average demand reduction across the lifetime of the measure divided by the EUL (in years).

Table 1-2 PY2016 OG&E Portfolio Evaluation Impacts

Impact	Metric	MFDI	SEE Living-Wise	OG&E/AOG Unified Wx	C&I Lighting	C&I SOP	Total
Participation (number of projects)	Goals	2,832	1,840	1,296	194	233	<b>6,395</b>
	Reported	1,604	2,204	1,578	142	84	<b>5,612</b>
Energy Savings (kWh)	Goals (Net)	2,851,734	288,792	3,047,238	6,599,411	6,541,238	<b>19,328,413</b>
	Reported (Gross)	5,431,708	464,221	3,896,262	6,248,911	8,891,588	<b>24,932,690</b>
	Evaluated (Gross)	4,576,545	478,009	3,962,154	6,101,917	8,786,673	<b>23,905,298</b>
	Realization Rate	84.3%	103.0%	101.7%	97.6%	98.8%	<b>95.9%</b>
	Evaluated (Net)	4,110,839	492,948	3,931,322	6,040,898	8,681,174	<b>23,257,181</b>
	NTG Ratio	89.8%	101.9%	99.2%	99.0%	98.8%	<b>97.5%</b>
	% of Goal (Net)	144.2%	170.7%	129.0%	91.5%	132.7%	<b>120.3%</b>
	Lifetime (Net)	64,718,652	4,860,550	57,846,533	80,041,365	130,599,609	<b>338,066,709</b>
Annual Demand Reduction (kW)	Goals (Net)	317	36	818	976	1,073	<b>3,220</b>
	Reported (Gross)	523.62	56.79	1,036.30	844.54	990.95	<b>3,452.21</b>
	Evaluated (Gross)	444.45	62.16	1,053.18	829.71	1,122.82	<b>3,512.32</b>
	Realization Rate	84.9%	109.5%	101.6%	98.2%	113.3%	<b>101.7%</b>
	Evaluated (Net)	397.98	62.95	1,049.89	817.16	1,105.93	<b>3,433.91</b>
	NTG Ratio	89.8%	101.9%	99.2%	98.5%	98.5%	<b>97.80%</b>
	% of Goal (Net)	125.5%	174.9%	128.3%	83.7%	103.1%	<b>106.6%</b>

Note: Differences between kWh and kW ratios for the same program are due to weighting free ridership by kWh and kW gross savings.



The contribution to portfolio energy (kWh) savings by program is summarized in Figure 1-1.

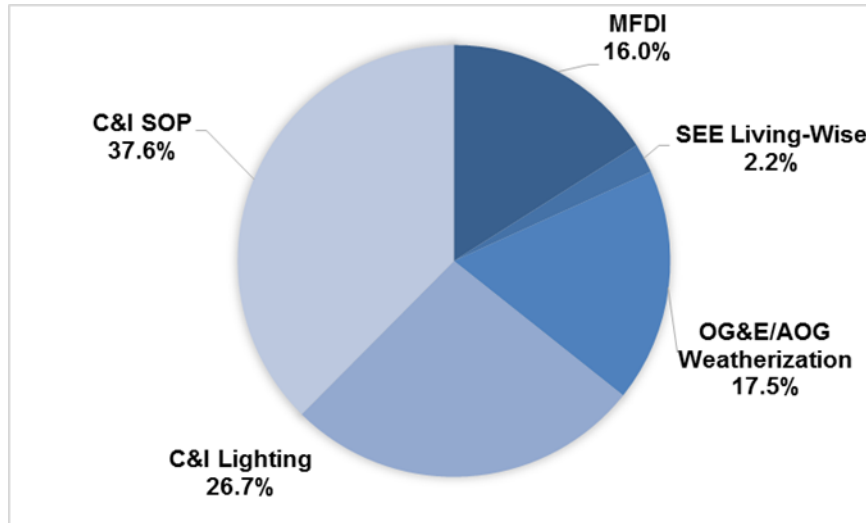


Figure 1-1 Contribution to Portfolio Net Savings by Program

Figure 1-2 summarizes the share of energy savings (kWh) by measure for residential sectors. The bars in Figure 1-2 shows energy savings (kWh) by measure for the residential sector and the line estimates the percentage of savings by measure.

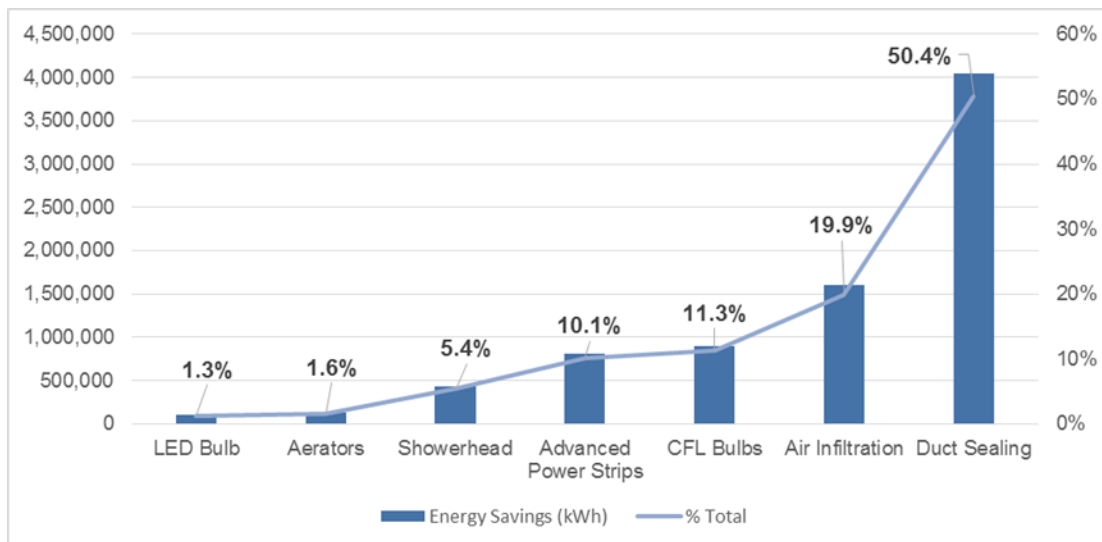


Figure 1-2 Residential Portfolio Energy Savings (kWh) Share, by Measure



Each bar in

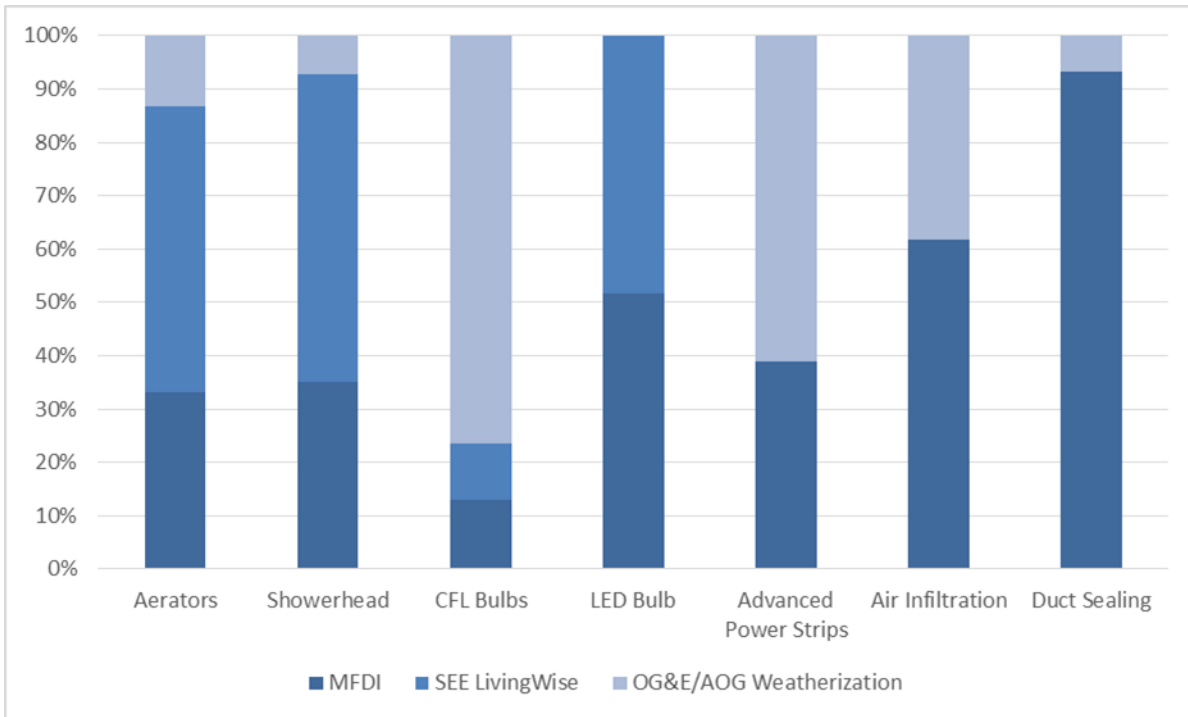


Figure 1-3 shows the percentage of savings for each measure, for each program in the residential sector.

Figure 1-3 Energy Savings (kWh) Share, by Measure, for each Residential Program

The savings share by measure was different in the C&I programs. The savings by measure type for the C&I Lighting and SOP programs are shown in the figures below.

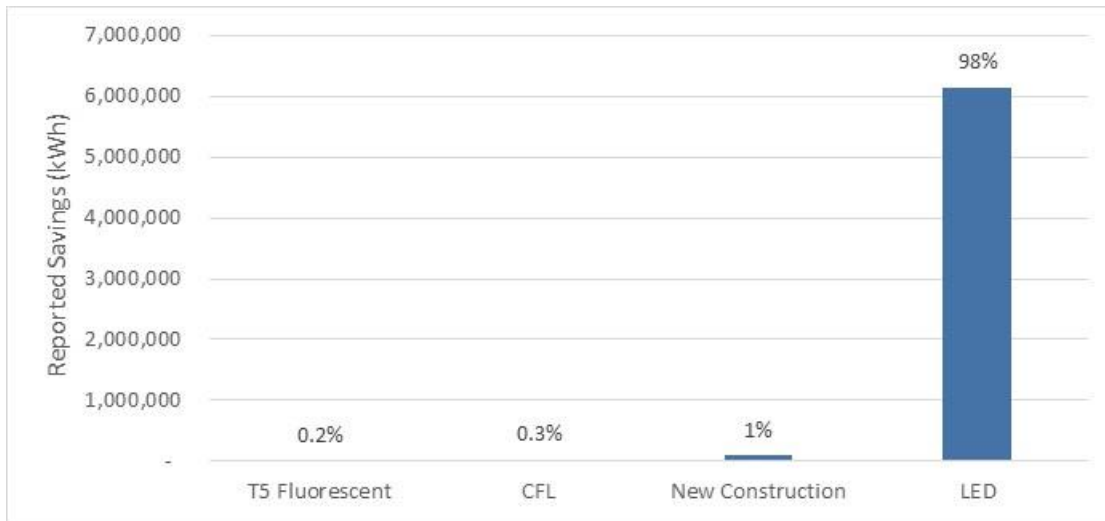


Figure 1-4 Energy Savings by Measure Commercial Lighting Program

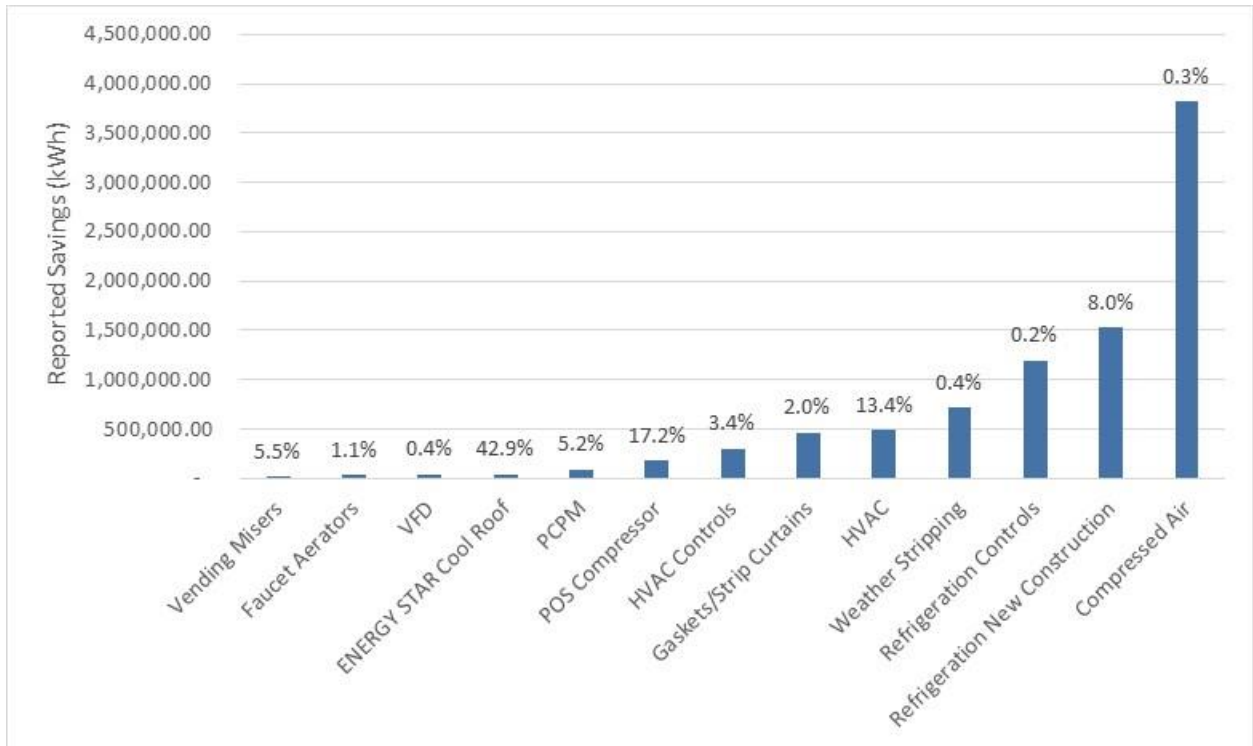


Figure 1-5 Energy Savings by Measure SOP

Further, the Evaluators put the net savings into the context of OG&E’s PY2016 goal. Table 1-3 summarizes the performance against goals of programs evaluated in this report.

Table 1-3 OG&E's 2016 Performance against Goals

Program	2016 Verified Net Savings	2016 Net Savings Goal	% of Goal Attained
MFDI	4,110,839	2,851,734	144.2%
SEE Living-Wise	492,948	288,792	170.7%
OG&E/AOG Weatherization	3,931,322	3,047,238	129.0%
C&I Lighting	6,040,898	6,599,411	91.5%
C&I SOP	8,681,174	6,541,238	132.7%
<b>Total</b>	<b>23,257,181</b>	<b>19,328,413</b>	<b>120.3%</b>

The PY2016 budgets and actual spend are summarized in Table 1-4 below.

Table 1-4 Summary of Budgets and Actual Spend in PY2016

Program	Budgeted Spend	Actual Spend
MFDI	\$743,038	\$696,613
SEE Living-Wise	\$89,777	\$89,777
OG&E/AOG Weatherization	\$2,381,530	\$2,381,530
C&I Lighting	\$1,613,318	\$1,613,318
C&I SOP	\$1,534,222	\$1,534,222
Energy Efficiency Arkansas (EEA)	\$24,000	\$18,411
Regulatory Costs	\$85,000	\$28,950
<b>Total</b>	<b>\$6,470,885</b>	<b>\$6,362,822</b>

## 1.5 Summary of Process Evaluation Findings

Following a review of present program offerings and interviews with utility and third party implementation staff, the Evaluators found that:

## 1.5.1 PY2016 Portfolio Conclusions

### 1.5.1.1 Multifamily Direct Install (MFDI) program

- Key program changes included the addition of LEDs in PY2016.
- CLEAResult has established contacts with the multi-family segment and does most of the program's outreach through cold calling and discussing the program during face-to-face meetings. Both the OG&E program manager and the implementer program manager stated that feedback from participants is very positive and that customers are highly satisfied.

### 1.5.1.2 Student Energy Education (SEE) LivingWise program

- Participation increased slightly from PY2015 to PY2016, from 1,919 total kits distributed by 34 teachers to 2,204 distributed by 44 teachers.
- Resource Action Programs (RAP) stated that there are not any challenges to keeping the program fully subscribed – the level of participation is limited by the program budget rather than challenges in teacher enrollment. To optimize the savings estimate by reducing sample bias, RAP prioritizes teacher invitations based, in part, on their demonstrated past performance, as evidenced by returns in the student surveys. Once the quota is reached each year, RAP stops recruitment. RAP confirmed that once recruited, no teacher is turned away for that year's program.
- Both teachers and students reported that they were satisfied with and enjoyed the program. Teachers noted that the program was well organized and comprehensive.

### 1.5.1.3 OG&E/AOG Weatherization (Unified Wx) program

- Feedback from the participant survey suggests that the program is increasing customer knowledge of energy efficiency (EE) equipment and EE behaviors that can be employed to conserve energy and lower utility bills. Some customers have learned about other utility offerings through the program, leading to additional energy savings.
- As with the two prior program years, AOG fully expended its program budget by late August of PY2016, and OG&E fully paid the cost of providing services to 215 participating homes that were customers of both AOG and OG&E. By comparison, OG&E completed work on 165 homes after August that were not serviced by AOG. This maintained focus on customers serviced by both sponsoring utilities allowed AOG customers to continue receiving program services, further highlights the benefits of a joint program offering.

- As the program approach design incorporated several aspects of the program’s existing structure and delivery, the transition to the statewide approach required fairly minor modifications on the part of the utilities, the installation contractors, and Frontier. The primary adjustments included incorporating aerators, showerheads, and power strips into the program measure mix, as well as slightly modifying program eligibility requirements such as residence age and square footage. It appears that the program’s resources and structure are well suited to adapting to future iterations of the statewide program as they develop.
- The Evaluators found the ex ante energy savings (kWh) values within the EnerTrek database to be accurate for nearly all measures. Additionally, Frontier Associates was very consistent in responding to data requests and correcting errors when necessary. Although some measure inputs were not initially provided, such as site-specific SEER values or HVAC cooling capacities, Frontier made these available in supplementary reports upon request.
- The spillover savings assessment conducted for PY2016 found spillover savings equal to approximately 0.4% of total gross natural gas savings for AOG and 1.2% of total gross electricity savings for OG&E. The majority of customers reporting spillover savings had purchased low cost measures including lighting and low flow measures, but a few customers also stated that they had purchased energy efficient appliances and heating and air conditioning systems as a result of information they had received through the program.

**1.5.1.4 C&I Programs: C&I Lighting and C&I SOP**

- While the majority of C&I customers were very satisfied with the communications they had with their program representative, there was a desire for more, including: information on when to expect their rebate, and how much energy savings they should expect to realize.
- C&I customers were highly satisfied with the application process and the assistance they received from the OG&E and CLEAResult team. The mean overall application satisfaction score was 9.6 out of 10.
- C&I customers were highly satisfied with all aspects of the program, with Lighting customers rating their overall satisfaction with the program a 9.7 out of 10. SOP customers scored their overall satisfaction slightly lower, with a mean score of 9.4.

**1.5.2 Progress on Previous Recommendations**

In 2015, 29 program or portfolio level recommendations were provided to OG&E as part of the EM&V of their portfolio. The Evaluators reviewed OG&E’s response to recommendations from the 2015 EM&V report and categorized them as follows:

- 1) **Adopted.** This applied to recommendations that pertained to the correction of an issue (such as using an incorrect baseline methodology) or modifications in program outreach that do not require a filing.
  - a. 22 of the 29 recommendations were adopted.
  - b. Adopted recommendations included modifications to marketing materials, program tracking databases and approaches to contractor training.
- 2) **Under consideration.** This applies most typically to larger recommendations that would require APSC approval.
  - a. There is one recommendation under consideration in the residential MFDI program.
  - b. The recommendation was to track additional supplemental data on installed advanced power strips, which is a recommendation in PY2016 as well.
- 3) **Rejected.** This applies to recommendations which are reviewed by OG&E and rejected.
  - a. Two recommendations were rejected, one in the MFDI, and the other in the SEE LivingWise program
  - b. The MFDI recommendation was to perform an in-service rate (ISR) study for the Advanced Power Strip measure. The SEE LivingWise program recommendation was to estimate heat pump water heating and HVAC technology saturations.
- 4) **Not applicable.** This would apply to recommendations which are no longer applicable to the OG&E's portfolio.
  - a. There were three recommendations deemed incompatible with the OG&E portfolio and were not adopted.
  - b. C&I Lighting program had one, that OG&E should encourage contractors to take clear photographs of nameplates of baseline and installed lamps and ballasts.
  - c. C&I SOP had two. First was that when analyzing a custom project based on logged amperage data, use the appropriate engineering algorithm to estimate true power (kW). Second, for custom measures, emphasize that demand reduction calculations be as consistent as possible with the defined OG&E system peak period.

- 5) **In Progress.** This applies to recommendations which were included in the 2015 EM&V report but have either not yet been adopted or have been explicitly rejected by OG&E.
- a. There was one recommendation in progress.
  - b. For MFDI, CLEAResult is adding more content for NEBs within the marketing materials that will be used for this market segment in PY2017. The program will be discontinued in PY2017, but the multifamily market segment will still be targeted by the new residential program.

Figure 1-6 below outlines the status of PY2015 recommendations.

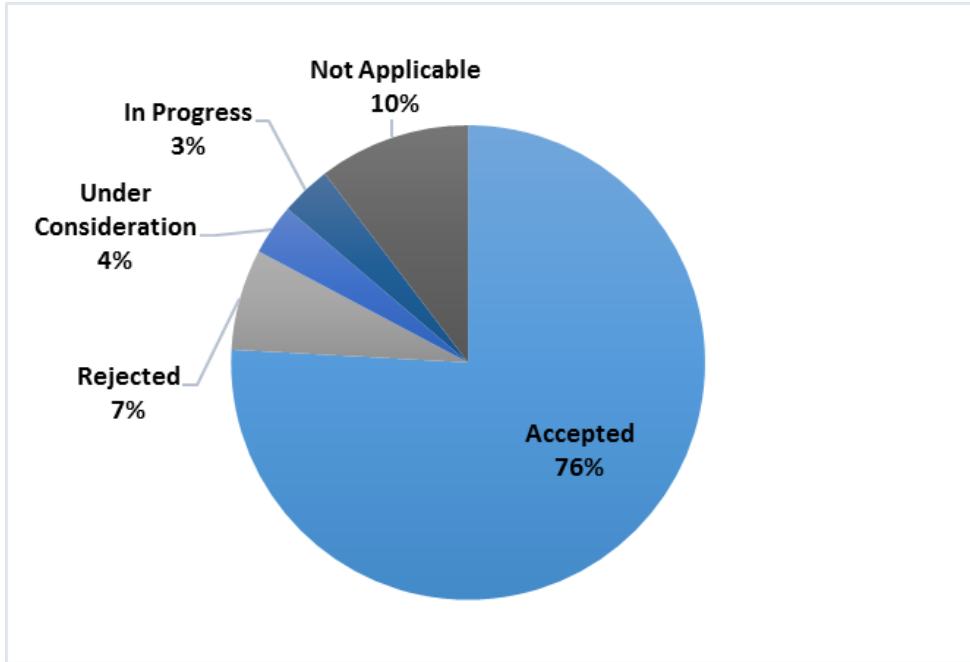


Figure 1-6 Summary of Status of PY2015 Recommendations

## 1.6 Structure of the Report

This report is structured as shown below:

- Section 1 Executive Summary;
- Section 2 General Methodology;
- Section 3 Evaluation Findings;
- Section 4 Residential Program Findings;
- Section 5 Commercial & Industrial Program Findings;
- Appendix A – Portfolio Cost-effectiveness
- Appendix B – Marketing Materials
- Appendix C – SEE LivingWise Staff Interview Guide
- Appendix D – Unified Wx Participant Survey Instrument
- Appendix E – C&I Process Evaluation Response Rate



## 2 General Methodology

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### 2.1 Introduction

This section details general impact evaluation methodologies by program-type as well as data collection methods applied. This section will present full descriptions of:

- Gross Savings Estimation;
- Sampling Methodologies;
- Free ridership determination;
- Process Evaluation Methodologies; and
- Data Collection Procedures.

### 2.2 Glossary of Terminology

As a first step to detailing the evaluation methodologies, the Evaluators provide a glossary of terms to follow:

*Deemed Savings* – An estimate of an energy savings or energy demand savings outcome (gross savings) for a single unit of an installed energy efficiency measure. This estimate (a) has been developed from data sources and analytical methods that are widely accepted for the measure and purpose and (b) is applicable to the situation being evaluated.

*Ex ante Savings Estimate* – Forecasted savings used for program and portfolio planning purposes (from the Latin for “beforehand”).

*Ex post Evaluation Estimated Savings* – Savings estimates reported by an evaluator after the energy impact evaluation has been completed (from the Latin for “from something done afterward”).

*Ex Post Net Savings* – When *Ex post Evaluation Estimated Savings* are multiplied by the *Net-to-Gross Ratio*.

*Free rider* – A program participant who would have implemented the program measure or practice in the absence of the program. Free riders can be total, partial, or deferred.

*Gross Realization Rate* – The ratio of *Ex Post Gross Savings* and *Ex Ante Savings*.

*Participant* – A consumer who received a service offered through the subject efficiency program in a given program year.

*Net-to-Gross Ratio (NTGR)* – A factor representing net program savings divided by ex Post gross program savings that is applied to Ex Post Evaluated gross program

impacts, converting them into net program load impacts after adjustments for free ridership and spillover. (1 – Free ridership % + Spillover %).

*Spillover* – Reductions in energy consumption and/or demand caused by the presence of the energy efficiency program that exceed the program-related gross savings of the participants. There can be participant and/or non-participant spillover rates depending on the rate at which participants (and non-participants) adopt energy efficiency measures or take other types of efficiency actions on their own (i.e., without an incentive being offered).

*Stipulated Values* – See “deemed savings.”

This glossary is drawn from several evaluation-related reference documents, such as the 2007 IPMVP, 2004 California Evaluation Framework, 2006 DOE EERE Guide for Managing General Program Evaluation Studies and the Arkansas Technical Reference Manual (TRM) version 6.0.

## **2.3 Overview of Methodology**

The proposed methodology for the evaluation of the 2016 OG&E portfolio is intended to provide:

- Net impact results at the 90% confidence and +/-10% precision level; and
- Program feedback and recommendations via process evaluation; and

In doing so, this evaluation will provide the verified net savings results, provide the recommendations for program improvement, and ensure cost-effective use of ratepayer funds. By leveraging experience and lessons learned from prior evaluations, the 2016 evaluation is streamlined to focus on areas in needed of research and improvement.

### **2.3.1 Sampling**

Sampling is necessary to evaluate savings for the OG&E portfolio insomuch as verification of a census of program participants is typically cost-prohibitive. As per evaluation requirements set forth by the Independent Evaluation Monitor (IEM), samples are drawn to ensure 90% confidence at the +/- 10% precision level. Programs are evaluated on one of three bases:

- Census of all participants;
- Simple random sample; or
- Stratified random sample.

### 2.3.2 Census

A census of participant data was used for select programs where such review is feasible. All program measures were evaluated. Programs that received analysis of a census of participants include the MFDI program.

For the SEE LivingWise program, where the school year and the program calendar year are not aligned, the Evaluators had to make special considerations. In PY2016, there was a review of the PY2015 survey data (fall of 2015 surveys and spring of 2016 surveys) and a review of PY2016 project data. The only reason for this delay associated with survey use has to do with timing and availability. The fall PY2016 survey data has not yet been returned from the teachers, due to the misaligned calendar year.

In PY2017, this program is being transferred and included as a participation pathway in the HEEP. Any needed true-up can occur in the PY2017 HEEP evaluation report.

### 2.3.3 Simple Random Sampling

For programs with relatively homogenous measures (largely in the residential portfolio), the Evaluators conducted a simple random sample of participants. The sample size for verification surveys is calculated to meet 90% confidence and 10% precision (90/10). The sample size to meet 90/10 requirements is calculated based on the coefficient of variation of savings for program participants. Coefficient of Variation (CV) is defined as:

$$V = \frac{\text{Mean}_x}{\text{Standard Deviation}_x}$$

Where x is the average kWh savings per participant. Without data to use as a basis for a higher value, it is typical to apply a CV of .5 in residential program evaluations.

The resulting sample size is estimated with the following:

$$n_0 = \left( \frac{1.645 * CV}{RP} \right)^2$$

Where:

1.645 = Z score for 90% confidence interval in a normal distribution

CV = Coefficient of Variation

RP = Required Precision, 10% in this evaluation

### 2.3.4 Stratified Random Sampling

For the OG&E C&I programs, Simple Random Sampling is not an effective sampling methodology as the CV values observed in business programs are typically very high because the distributions of savings are generally positively skewed. Often, a relatively

small number of projects account for a high percentage of the estimated savings for the program.

To address this situation, we use a sample design for selecting projects for the M&V sample that considers such skewness. With this approach, we select a number of sites with large savings for the sample with certainty and take a random sample of the remaining sites. To improve the precision, non-certainty sites are selected for the sample through systematic random sampling. That is, a random sample of sites remaining after the certainty sites have been selected is selected by ordering them according to the magnitude of their savings and using systematic random sampling. Sampling systematically from a list that is ordered according to the magnitude of savings ensures that any sample selected will have some units with high savings, some with moderate savings, and some with low savings. Samples cannot result that have concentrations of sites with atypically high savings or atypically low savings.

### 2.3.5 Free ridership

In determining ex post net savings for the OG&E portfolio, the Evaluators provide estimates of free ridership for individual programs. Free riders are program participants that would have implemented the same energy efficiency measures at nearly the same time absent the program. As per TRM guidelines, free riders are defined as:

*“...program participants who received an incentive but would have installed the same efficiency measure on their own had the program not been offered. This includes partial free riders, defined as customers who, at some point, would have installed the measure anyway, but the program persuaded them to install it sooner or customers who would have installed the measure anyway but the program persuaded them to install more efficient equipment and/or more equipment. For the purposes of EM&V activities, participants who would have installed the equipment within one year will be considered full free riders; whereas participants who would have installed the equipment later than one year will not be considered to be free riders (thus no partial free riders will be allowed).”<sup>7</sup>*

Given this definition, participants are defined as free riders through a binary scoring mechanism, in being either 0% or 100% free riders.

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<sup>7</sup> Arkansas TRM V3.0, Pg. 49.

### 2.3.6 Prescriptive Free ridership

The general methodology for evaluating free ridership among prescriptive program participants involved examination of four factors:

- Demonstrated financial ability to purchase high efficiency equipment absent the rebate;
- Importance of the rebate in the decision-making process;
- Prior planning to purchase high efficiency equipment; and
- Importance of the contractor in influencing the decision-making process.

In this methodology, Part (1) is essentially a gateway value, in that if a participant does not have the financial ability to purchase energy efficient equipment absent a rebate, the other components of free ridership become moot. As such, if they could not have afforded the high efficiency equipment absent the rebate, free ridership is scored at 0%. If they did have the financial capability, the Evaluators then examine the other three components. The respondent is determined to be a free rider based upon a preponderance of evidence of these three factors; that is, if the respondent's answers indicate free ridership in two or more of these three components, they are considered free riders. Specific questions and modifications to this general methodology are presented in the appropriate program chapters.

For residential programs, free ridership is calculated as the average score determined for the sample of participants surveyed. This value is then applied to the program-level savings to discount savings attributable to free ridership.

### 2.3.7 Custom Free ridership

For custom projects from the C&I programs, free ridership is assessed on a case-study basis, through which the Evaluators conduct an in-depth interview that includes a battery of questions addressing:

- The timing of learning of the program relative to the timing of the planning of the retrofit;
- The impact the program incentive has on measure payback relative to the stated payback requirements by the respondent;
- Whether the respondent learned of the energy efficiency measure from a program-funded audit; and
- Whether any influence the program had in modifying the project affected savings by greater than 50%.

In the C&I chapters, the free rider "case studies" are provided for every custom project.

### 2.3.8 Impact Evaluation Activities by Program

The Evaluators 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 6.0.

To evaluate program impacts, ADM adjusted program-reported gross savings using the results of our research, relying primarily on engineering desk reviews, TRM deemed savings calculation, and onsite verification and metering for applicable programs. To calculate deemed savings, we verified the appropriateness of savings algorithms and values in program tracking data as compared to guidelines in the TRM 6.0. Where sampling was used (for surveys and site visits), we designed a sampling plan to achieve a minimum precision of  $\pm 10\%$  of the gross realized savings estimate with 90% confidence.

For each program and measure category, the Evaluators estimated energy savings and demand reduction by applying a verified gross savings adjustment to program-reported savings. Table 2-1 lists the impact analysis activities the Evaluators performed for the 2016 EM&V.

Table 2-1 PY2016 Impact Evaluation Activities by Program

Program	MFDI	SEE Living-Wise	OG&E/AO G Unified Wx	C&I Lighting	C&I SOP
Database and Document Review	X	X	X	X	X
Engineering Desk Review				X	X
TRM Deemed Savings Calculations Review	X	X	X	X	X
Onsite Verification & Metering	X		X	X	X
Leakage Analysis					
Modeling				X	X
Billing Analysis					X
Load Data Analysis & Baseline Demand Estimation					X

**2.3.9 Net-to-Gross Approach by Program**

The previous Evaluator,<sup>8</sup> in previous years, conducted data collection and analysis to support Net-to-Gross (NTG) calculations in 2014 and 2015. For the 2016 evaluation, we relied on the results of these previous efforts for most programs. Table 2-2 shows the NTG approach the Evaluators followed 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 6.0, Protocol F.

Table 2-2 PY2016 NTG Approach by Program

NTG Approach	MFDI	SEE Living-Wise	OG&E/AOG Unified Wx <sup>9</sup>	C&I Lighting	C&I SOP <sup>10</sup>
Assigned 2015 Value	X	X		X	X
Stipulated Value			X		
New NTG Value Calculation			X		X

For the residential programs, OG&E has decided to modify residential offerings, with the exception of the OG&E and AOG Weatherization program, in the next planning period (PY2017-PY2019), and the programs will no longer be offered as standalone programs. Those delivery channels and measures will be incorporated into a larger umbrella residential program. Therefore, the Evaluators and OG&E decided that it was not an effective use of resources to perform this analysis in PY2016, and will develop new NTG estimates in PY2017.

For both C&I programs in the OG&E portfolio, there were two approaches for determining NTG. For all prescriptive measures, the NTG from PY2015 was applied to those projects. For all custom projects, projects were assigned a new NTG in PY2016.

**2.3.10 Overview of Process Evaluation**

The Evaluators took the following steps to determine the scope of the process evaluation for the PY2016 programs in OG&E’s portfolio.

<sup>8</sup> The PY2014 and PY2015 evaluations were performed by Applied Energy Group (AEG).

<sup>9</sup> For OG&E/AOG Unified Weatherization, the Evaluators applied the stipulated free ridership rate of 2% and calculated spillover savings to obtain a final net-to-gross ratio for PY2016. Thus, the 2016 evaluation incorporated both a stipulated NTG value and a new NTG value calculation.

<sup>10</sup> PY2015 values were applied to prescriptive projects and a new NTG value was calculated for custom projects. New NTG ratios were developed for custom projects because custom projects tend to be more heterogeneous than prescriptive projects and program influence may vary from year-to-year as a result.



### 2.3.11 General Approach

The Evaluator's general approach to process evaluation begins with a review of the tests for timing and appropriateness of process evaluation as defined in Protocol C of the TRM version 6.0. In this review, the Evaluators determine what aspects of the program warrant a process evaluation (due to issues identified in the 2015 evaluations). Most OG&E programs over-performed, and as such most of the 2016 process evaluation activity was focused around identifying OG&E and implementer response to 2015 recommendations.

The 2016 process overviews began with interviews of program staff. These interviews, along with guidance from IEM protocols, inform the establishment of goals for the process evaluation, provide background history of programs, and give an introduction to portfolio-level issues. From this, the Evaluators then develop a list of data collection activities. The data collection procedures for process evaluations typically included:

- *Participant Surveying.* The Evaluators surveyed statistically significant samples of participants in each program to provide feedback for the program and provide an assessment of participant satisfaction.
- *In-Depth Interviews.* The Evaluators conducted in-depth interviews with high-level program actors, including OG&E program staff, third-party implementation staff, and program Trade Allies. These interviews are semi-structured, in having general topics to be covered, without fully prescribed question and answer frameworks.
- *Review of Marketing Materials.* The Evaluators reviewed marketing materials for each program, providing feedback as to the appropriateness of the message in reaching its target audience, the breadth of the audience that the effort is attempting to reach, and identifying possible cross-promotional opportunities.

### 2.3.12 Justification for PY2016 Process Evaluation Approach

The Evaluators followed established, industry standard methods and TRM 6.0 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 OG&E program, ADM compared each program's 2015 results to the TRM Protocol C. According to the requirements listed below, not one of the programs required a full process evaluation. Those requirements are outlined in Table 2-3 below.



Table 2-3 TRM Protocol C Process Evaluation Criteria

Process Evaluation Required (Full)	Process Evaluation May Be Needed (Condensed)
<ul style="list-style-type: none"> <li>• New or modified program or a program component that has not been previously evaluated</li> <li>• No process evaluation was performed during previous funding cycle</li> </ul>	<ul style="list-style-type: none"> <li>• Program impacts lower or slower than expected</li> <li>• Program not meeting informational/educational objectives</li> <li>• Program participation lower or slower than expected</li> <li>• Operational or management structure slow to ramp up or not meeting administrative needs</li> <li>• Program cost-effectiveness lower than expected</li> <li>• Participants report problems or low satisfaction</li> <li>• Program not producing intended market effects</li> </ul>

ADM 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 2016 evaluation. This assessment led the Evaluators to conclude that a condensed level of evaluation was appropriate for all programs in terms of complying with the TRM guidelines and addressing the program needs.

Furthermore, after working with OG&E and receiving approval from the IEM, the Evaluators determined that a limited, program-level process evaluation activities would best meet OG&E’s fiscal objectives for the 2016 evaluation. The Evaluators intend on performing more in-depth and thorough process evaluations in the first year of the next triennial planning period, which will occur in PY2017.

### 3 Portfolio-Level Findings

This chapter provides a summary of the portfolio-level findings and any cross-cutting evaluation activities that occurred over the course of the 2016 EM&V effort. Specifically, this chapter includes:

- A summary of program and portfolio performance in 2016;
- A summary of EM&V activities and expenditures in 2016; and
- High-level findings that cut across programs.

#### 3.1 Summary of Evaluation Effort

Table 3-1 summarizes the EM&V expenditures by the Evaluators, total EM&V expenditures by all parties, and total program budgets.

Table 3-1 OG&E’s Portfolio 2016 EM&V Expenditures

Total EM&V Expenditures	2016 Program Expenditures	EM&V as % of Budget
\$208,945	\$6,362,822	3.28%

To facilitate a thorough evaluation, the Evaluators conducted a number of primary research and data collection activities, including interviews with program and implementer staff, customer surveys, and site visits.

The Evaluators conducted participant surveys for MFDI, C&I Lighting and C&I SOP, using the collected self-reported data to inform free ridership and spillover calculations for those programs. The results of these analyses informed our calculation of NTG values.

As this was the third year of the extensions provided from the 2011 Plan, there were no programs for which the TRM 6.0 Protocol C called for a full process evaluation. For all programs, the Evaluators performed telephone discussions with the primary OG&E program staff and the primary implementation staff for each program. Specific PY2016 primary data collection activities are included in

Table 3-2.

Table 3-2 Summary of Data Collection Efforts

Program	# Site Visits	# Surveys	# Interviews
Unified Wx	69	91	3
MFDI	54	0	2
SEE LivingWise	0	693	2
C&I Lighting	11	23	2
C&I SOP	11	19	2

### 3.2 High Impact Measures (HIMs)

HVAC measures produced most savings in the residential sector. Lighting measures produced the majority of savings in the commercial sector. This section outlines the High Impact Measures (HIMs) for each program and sector in the PY2016 OG&E portfolio of programs.

#### 3.2.1 Residential Programs

While HVAC measures such as duct sealing comprise 50.4% of the residential sector’s energy savings (kWh) and was a HIM in every residential program with the exception of SEE LivingWise, there were other measures in each of the programs that are also HIMs. Please find a brief description as follows:

- MFDI program had 18.1% of the energy savings (kWh) with envelope measures and 5.8% of the energy savings (kWh) with appliances.
- SEE LivingWise program had 68.7% of the energy savings (kWh) with hot water measures and 20.6% of the energy savings (kWh) from lighting measures.
- OG&E/AOG Weatherization program had 32.5% of the energy savings (kWh) with lighting measures, 28.9% of the energy savings (kWh) with envelope measures, then 23.3% of the energy savings (kWh) with appliances, and 12.9% of the energy savings (kWh) with HVAC measures.

Figure 3-1 outlines the ex ante energy (kWh) savings by end-use, as well as the percentage of total savings for each end-use, across all residential programs in the PY2016 portfolio.

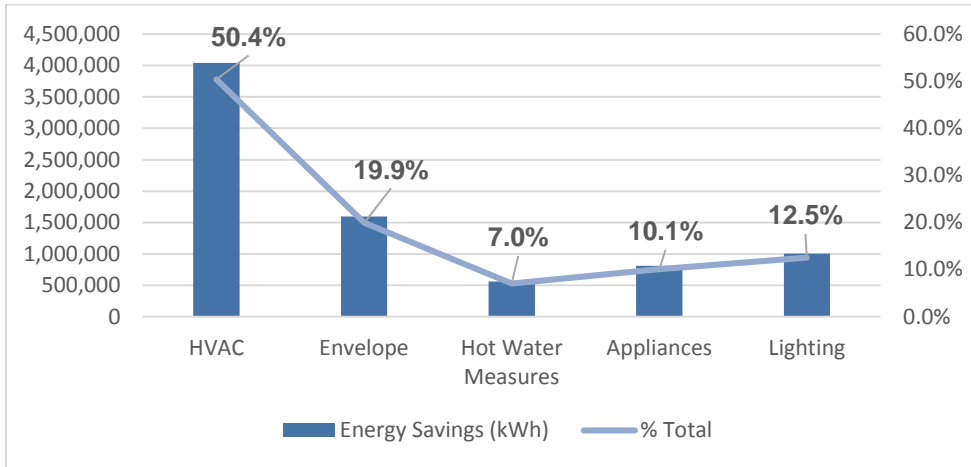


Figure 3-1 Residential Measures by End-Use

### 3.2.2 Commercial and Industrial Programs

Figure 3-2 shows the relative energy savings of measures installed through OG&E’s C&I programs. The Lighting category accounted for approximately 41.3% of C&I program energy savings. Custom measures<sup>11</sup> included in multiple categories produced the second highest C&I sector savings, at approximately 26.4% categorized under Compressed Air and an additional 17.9% categorized under Refrigeration.

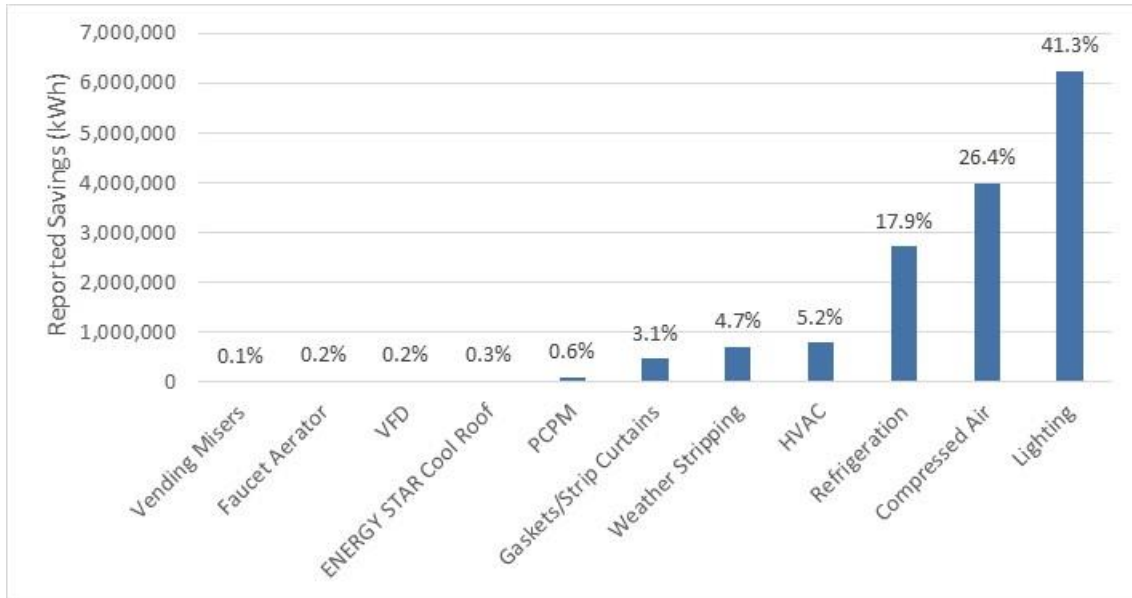


Figure 3-2 C&I Measures by End-Use

<sup>11</sup> Custom measures are identified in several measure categories, the most significant being Compressed Air and Refrigeration.

### 3.3 Tests of Portfolio Comprehensiveness

This section outlines how the OG&E portfolio performed against the seven factors developed by the Independent Evaluation Monitor (IEM) and the Parties Working Collaboratively (PWC).

The Evaluators reviewed the OG&E programs and portfolio to assess whether it was in compliance with the APSC Comprehensiveness Goals. In assessing these metrics, the Evaluators score them on numerous subcomponents. The scoring methodology is as follows:

- : Meets all requirements and is in full compliance with this performance indicator;
- ◐: Meets some requirements and is in partial compliance with this performance indicator;
- : Is not in compliance with this performance indicator; and
- NA: Performance indicator is not applicable to this program.

#### 3.3.1 Factor One: Education, Training, Marketing, and Outreach

*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.*

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

As the previous Evaluator had reported, ADM determined that OG&E met the objectives of Factor 1 in PY2016. The assumptions behind the scoring is seen below.

- : Meets all requirements and is in full compliance with this performance indicator;
- ◐: Meets some requirements and is in partial compliance with this performance indicator;
- : Is not in compliance with this performance indicator; and
- NA: Performance indicator is not applicable to this program.

##### 3.3.1.1 ***OG&E has consistently approached customer education in a comprehensive manner.***

- OG&E's programs used a range of channels to provide educational materials to their programs' target markets. The educational materials included brochures, case studies, and presentations to trade & industry groups.

- OG&E’s program staff conducts outreach and education through a wide range of potential program partners, including contractors, retailers, home builders, and local governments.

The scoring for customer education is in Table 3-3.

Table 3-3 Assessment of Customer Education by Program

Program	Provides Educational Materials	Outreach Through Multiple Channels	Education Targeted to Specific Market Barriers	Coordination of Education by Multiple Entities
MFDI	●	●	●	●
LivingWise	●	◐	●	●
Unified Wx	●	●	●	●
C&I Lighting	●	●	●	●
C&I SOP	●	●	●	●

**3.3.1.2 OG&E has consistently approached training in a comprehensive manner.**

The scoring for trade ally training is in Table 3-4. The Evaluators reviewed each OG&E program to assess whether:

- Whether the program is trade ally-driven;
- If not, is it a program that could or should be trade ally-driven;
- The program provides training classes to support their program offerings; and
- Whether the programs need trade ally certification.

For the PY2016 SEE LivingWise program, teachers were treated as trade allies. While they are more traditionally market actors and not trade allies, it was a proxy that made the program design more applicable to the scoring approach. The scoring follows the list below.

- : Meets all requirements and is in full compliance with this performance indicator;
- ◐: Meets some requirements and is in partial compliance with this performance indicator;
- : Is not in compliance with this performance indicator; and
- NA: Performance indicator is not applicable to this program.

Table 3-4 Assessment of Trade Ally Training

Program	Trade Ally Training Offered	Training Requirements Adhere to Best Practices	Trade Allies Participate in Training
MFDI	●	●	●
LivingWise	●	●	●
Unified Wx	●	●	●
C&I Lighting	●	●	●
C&I SOP	●	●	●

**3.3.1.3 OG&E has consistently approached marketing and outreach in a comprehensive manner.**

The Evaluators reviewed the marketing and outreach strategies associated with each of the OG&E programs. These strategies were reviewed to assess whether they adequately addressed the relevant participant barriers, the extent to which trade allies were actively marketing the program (where appropriate), and whether the materials were correctly targeted in marketing a comprehensive approach to energy efficiency.

For the PY2016 SEE LivingWise program, teachers were treated as trade allies. While they are more traditionally market actors and not trade allies, it was a proxy that made the program design more applicable to the scoring approach. The scoring for marketing and outreach is in Table 3-5. The assumptions behind the scoring is seen below.

- : Meets all requirements and is in full compliance with this performance indicator;
- ◐: Meets some requirements and is in partial compliance with this performance indicator;
- : Is not in compliance with this performance indicator; and
- NA: Performance indicator is not applicable to this program.

Table 3-5 Assessment of Marketing & Outreach by Program

Program	Marketing Addresses Specific Barriers	Trade Allies Promote Program	Marketing Support Provided to Trade Allies	Marketing Performed Through Diverse Channels
MFDI	◐	●	●	●
LivingWise	●	●	●	NA
Unified Wx	●	●	●	●
C&I Lighting	●	●	●	●
C&I SOP	●	●	●	●

After reviewing the marketing and outreach materials, the Evaluators concluded that:

- OG&E programs have marketing materials that address specific barriers associated with the targeted segments or technologies.
- The OG&E programs are marketed through a diverse range of channels, including mass-media advertising, online advertising, and meetings and training sessions with professional organizations and trade groups.
- In response to 2015 evaluation recommendations, OG&E and CLEAResult added additional content, such as additional information about the additional non-energy benefits provided by the measures installed in the program.

### **3.3.2 Factor Two: Budgetary, Management, and Program Delivery Resources**

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

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

ADM determined that OG&E achieved the Factor 2 objectives.

#### **3.3.2.1 In most cases, program budgets were sufficient to implement the programs.**

At a portfolio level, OG&E achieved its energy savings (kWh) and demand reduction (kW) targets while spending only 98.3% of its allocated budget, and at an overall cost of \$0.28/kWh. Additionally, all residential programs (MFDI, SEE LivingWise and Unified Wx) achieved 137.9% of their energy savings goal while spending 98.6% of their allocated budget. OG&E's energy resource acquisition cost at a portfolio level is below average for utilities across the country with programs that have been run for several years.<sup>12</sup> The OG&E/AOG Weatherization program had a higher acquisition cost than any other program, at \$0.61 /kWh. The PY2016 Plan indicated a budget of \$6,470,885 and an energy savings goal of 19,328,413, which is \$0.33 per kWh for the portfolio.

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<sup>12</sup> EPA estimates that energy efficiency programs will cost program administrators \$0.58 cents up front per kWh saved in the first year for low savings levels, with costs declining to \$0.46 and then \$0.35 cents as programs ramp up. Source: <http://aceee.org/sites/default/files/cost-of-ee.pdf>



Program and implementation staff reported that, on the whole, they had sufficient budget to cover program implementation in 2016. Table 3-6 shows the spending and energy savings percentages for each program, along with the cost per kWh of savings.

Table 3-6 Budget Allocation and Program Goal Attainment

Program	Spending (Percentage of Budget)	Energy Savings (Percentage of Goal)	Cost per kWh
MFDI	93.75%	144.2%	\$0.19
SEE Living-Wise	100.00%	170.7%	\$0.18
Unified Wx	100.00%	129.0%	\$0.61
C&I Lighting	100.00%	91.5%	\$0.27
C&I SOP	100.00%	132.7%	\$0.18
<b>Total</b>	<b>98.30%</b>	<b>120.3%</b>	<b>\$0.28</b>

The scoring for Factor Two is in Table 3-7. The assumptions behind the scoring is seen below.

- : Meets all requirements and is in full compliance with this performance indicator;
- ◐: Meets some requirements and is in partial compliance with this performance indicator;
- : Is not in compliance with this performance indicator; and
- NA: Performance indicator is not applicable to this program.

Table 3-7 Assessment of Budgetary, Management, and Program Delivery Resources by Program

Program	Budget is Sufficient to Support Program Goals	Cost per-kWh Aligns with Program Plan	Program Has Sufficient Staffing	Program Has Sufficient Trade Ally Support
MFDI	●	●	●	●
Living-Wise	●	●	●	●
Unified Wx	●	●	●	●
C&I Lighting	◐	◐	●	●
C&I SOP	●	●	●	●

### 3.3.3 Factor Three: Major End-Uses Addressed

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

To assess Comprehensiveness Checklist Factor 3, the Evaluators identified the end-uses addressed by each program. OG&E designed programs to offer customers a range of choices. While some programs are focused on single end-use measures, OG&E offers other programs that encourage participants to capture deeper energy savings through comprehensive projects.

ADM determined that OG&E continued to meet the objectives of Factor 3 in 2016.

#### **3.3.3.1 OG&E's targeted programs serve a wide range of customer sectors and end-use measure categories.**

- All major end uses in the AR TRM version 6.0 were utilized by the residential programs. While HVAC was a HIM in MFDI, lighting was a HIM in SEE LivingWise and Unified Wx, hot water was a HIM in SEE LivingWise, and envelope measures were a HIM in MFDI and the Unified Wx program.
- While all major end uses are targeted in the C&I programs, the most significant HIM was lighting. However, a wide range of measures were seen in the SOP, including faucet aerators, HVAC, building envelope, and process equipment improvement.

Table 3-8 lists the percentage of participants in each program with multiple end-use offerings who installed measures encompassing multiple end uses. In nearly all of these programs, OG&E effectively encouraged the majority of participants to install measures covering multiple end-uses.

Table 3-8 Installation of Multiple End-use Projects

Program	Onsite Assessment and/or Diverse Direct Install Measures Offered	Single End Use (% of installations)	Multiple End Use (% of installations)
MFDI	98.7%	6.9%	93.1%
SEE Living-Wise	100.0% <sup>13</sup>	0.0% <sup>14</sup>	100.0%
OG&E/AOG Unified Wx	100.0%	12.0%	88.0%
C&I Lighting	100.0%	99.0%	1.0%
C&I SOP	100.0%	81.0%	19.0%

The scoring for this factor is in Table 3-9. The assumptions behind the scoring is seen below.

- : Meets all requirements and is in full compliance with this performance indicator;
- ◐: Meets some requirements and is in partial compliance with this performance indicator;
- : Is not in compliance with this performance indicator; and
- NA: Performance indicator is not applicable to this program.

Table 3-9 Assessment of End-uses Addressed by Program

Program	HVAC	Lighting	Weatherization	Industrial Process	Behavioral
MFDI	●	●	●	NA	○
Living-Wise	○	●	○	NA	○
Unified Wx	●	●	●	NA	○
C&I Lighting	●	●	●	●	●
C&I SOP	●	●	●	●	●

<sup>13</sup> While this program does not offer assessments, it offers education materials and direct install measures.

<sup>14</sup> All participants were provided a kit that included both hot water and lighting measures.

Presently, the OG&E portfolio covers almost all end-uses. The Evaluators found that sectors where the program offerings were not providing sufficient outreach and market transformation included:

- **Behavioral.** The portfolio does not include any behavioral-based programs. However, this is likely not viable given the size of OG&E's service territory. When examining the experiences of other electric utilities, the Evaluators found that behavioral programs in Arkansas would require a recipient group of at least 25,000 households to reach cost-effectiveness (45.4% of the residential customer count<sup>15</sup>). With the need of a control group, a behavioral program would likely encompass the majority of OG&E's service territory. Behavioral marketing is likely best-driven through Energy Efficiency Arkansas (EEA) which receives funding from all Arkansas IOUs.

### 3.3.4 Factor Four: Comprehensively Address Customer Needs

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

In assessing Factor 4, the Evaluators reviewed the extent to which OG&E 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.

ADM found that OG&E met the Factor 4 objectives in PY2016.

#### **3.3.4.1 OG&E provides technical support to educate customers and encourage them to install comprehensive projects.**

The OG&E portfolio has programs that bundle onsite technical assistance with direct installation. The range of technical assistance varies by program. The programs have procedures for following up with customers after their participation, which includes thank-you calls or emails, and verification inspection. Marketing materials typically make attempts at cross-promotion of programs.

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<sup>15</sup> Per the 2015 EIA Form 861, OG&E has 55,022 residential customers in Arkansas.

**3.3.4.2 The majority of OG&E’s programs are designed to facilitate multi-measure installations.**

The OG&E portfolio has no specific requirements for installation of multiple measures. Customers are able participate to an extent of their choice. This is a program best-practice in enabling customers to engage in energy efficiency in a manner in accordance with their budget constraints. However, there is no specific encouragement in place to incentivize comprehensive projects, as seen elsewhere in Arkansas.

The OG&E portfolio has no tiered incentives for premium efficiency measures at this time.

Table 3-10 provides an overview of the scoring for this Factor. The assumptions behind the scoring is seen below.

- : Meets all requirements and is in full compliance with this performance indicator;
- ◐: Meets some requirements and is in partial compliance with this performance indicator;
- : Is not in compliance with this performance indicator; and
- NA: Performance indicator is not applicable to this program.

Table 3-10 Assessment of Project Comprehensiveness by Program

Program	Technical Assistance and/or Audits	Information Provided Comprehensive for Efficiency	Bundled Incentives for Multiple Measures	Tiered Incentives for Premium Efficiency	Trade Ally Incentives for Premium Efficiency
MFDI	●	●	○	○	○
Living-Wise	●	●	NA	NA	NA
Unified Wx	●	●	NA	NA	NA
C&I Lighting	●	●	○	○	○
C&I SOP	●	●	○	○	○

**3.3.5 Factor Five: Targeting Market Sectors & Leveraging Opportunities**

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

The Evaluators assessed the portfolio’s ability to address customers’ comprehensive needs in Factor 4, ADM assessed Factor 5 by focusing specifically on OG&E’s efforts to customize its approach for targeted customer sectors. The Evaluators also assessed OG&E’s use of external resources to promote the program and/or to improve customers’ project returns.

ADM found that OG&E met the Factor 5 objectives in PY2016.

**3.3.5.1 OG&E has taken a collaborative and comprehensive approach to leveraging internal and external resources and targeting customer sectors most likely to benefit from its programs.**

The Unified Wx program is jointly implemented with OG&E and AOG, and is a very successful example of cross-fuel coordination. The costs are split when a home is an OG&E and AOG customer, and paid in full by OG&E if they are served by another gas utility (such as a municipal or a rural co-op). AOG pays in full if the home is served by an electric utility other than OG&E

The Evaluators also found that OG&E’s programs are marketed through industry partners included professional organizations, trade groups, universities, and homeowner’s associations.

Table 3-11 summarizes the comprehensiveness of offerings for each program. The assumptions behind the scoring is seen below.

- : Meets all requirements and is in full compliance with this performance indicator;
- ◐: Meets some requirements and is in partial compliance with this performance indicator;
- : Is not in compliance with this performance indicator; and
- NA: Performance indicator is not applicable to this program.

Table 3-11 Assessment of Targeted Customer Sectors by Program

Program	Residential	Multifamily	Mobile Home	Small Commercial	Large Commercial	Industrial	Agricultural	Public Sector
MFDI	NA	●	NA					
Living-Wise	●	●	●					
Unified Wx	●	○	●					
C&I Lighting				●	●	●	●	●
C&I SOP				●	●	●	●	●

**3.3.6 Factor Six: Cost-effectiveness**

*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.*

To evaluate Factor 6 in 2016, the Evaluators assessed three key performance indicators: 1) whether programs achieved their Plan goals, 2) NTG values, and 3) program cost-effectiveness.

### **3.3.6.1 Goal Achievement**

As discussed previously, one of the energy-efficiency programs did not achieve their energy savings targets. OG&E's portfolio-level savings have increased 8.6% from PY2015 to PY2016. In PY2015, the portfolio exceeded its net energy savings (kWh) goal by 7.7%, in PY2016 the portfolio exceeded its net energy savings (kWh) goal by 16.3%.

### **3.3.6.2 Net-to-Gross (NTG)**

For the majority of programs in PY2016, ADM did not conduct new primary research to calculate NTG. However, in PY2015, the majority of OG&E's programs had NTG ratios of 95% or greater, indicating that free ridership is not a significant issue for most programs. The OG&E programs have also seen steady improvement in program NTG ratios throughout the extended planning period, indicating OG&E has implemented program modifications intended to limit free ridership. High free ridership rates have historically been limited to specific measures, primarily lighting measures, and to one specific program, MFDI. These findings are consistent with results across the country for both programs.

### **3.3.6.3 Cost-Effectiveness**

OG&E's portfolio is cost effective from all four testing perspectives (a benefit/cost ratio of 1.0 or greater is considered cost-effective). The portfolio-level Total Resource Cost (TRC) test ratio is 2.46 and all programs achieved TRC ratios above 1.0.

The portfolio achieved similar results on the Utility Cost test (UCT), which looks at cost effectiveness from the utility perspective achieving a threshold of 1.0.

Table 3-12 presents program- and portfolio-level NTG and benefit/cost ratios for each perspective. The UCT 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 3-12 Portfolio NTG and Cost Effectiveness Results

Program	Savings Goal Achieved	NTG	TRC	UCT	RIM	PCT	SCT
MFDI	Yes	89.8%	3.61	4.50	0.71	6.83	3.61
SEE Living-Wise	Yes	101.9%	13.10	2.88	0.48	8.41	13.14
Unified Wx	Yes	99.2%	2.72	1.98	0.64	3.69	2.73
C&I Lighting	No	99.0%	2.00	4.24	0.97	2.17	2.00
C&I SOP	Yes	98.8%	2.14	3.39	0.95	2.53	2.14
<b>Portfolio</b>	<b>Yes</b>	<b>97.5%</b>	<b>2.46</b>	<b>3.19</b>	<b>0.81</b>	<b>3.15</b>	<b>2.46</b>

Table 3-13 outlines the scoring for Factor Six. The assumptions behind the scoring is seen below.

- : Meets all requirements and is in full compliance with this performance indicator;
- ◐: Meets some requirements and is in partial compliance with this performance indicator;
- : Is not in compliance with this performance indicator; and
- NA: Performance indicator is not applicable to this program.

Table 3-13 Assessment of Cost Effectiveness

Program	NTGR	NTGR Within Industry Norms	Met Net Savings Goal	Program TRC
MFDI	●	●	●	●
Living-Wise	●	●	●	●
Unified Wx	●	●	●	●
C&I Lighting	●	●	◐	●
C&I SOP	●	●	●	●

### 3.3.7 Factor Seven: EM&V Procedures

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

To assess Factor 7, the Evaluators reviewed performance indicators, including: 1) whether the EM&V Plan conforms to the TRM 5.0<sup>16</sup>, 2) whether the Plan achieved IEM approval, 3) whether the EM&V implementer followed an articulated plan, and 4) the extent to which OG&E provided high quality and timely data and other support necessary to conduct EM&V.

<sup>16</sup> At the time of developing the EM&V Plans, Arkansas TRM version 6.0 had not been filed.



Below we summarize the 2016 EM&V procedures' compliance with each of these evaluation metrics.

**3.3.7.1 *The EM&V Plan conformed to the TRM 6.0***

The Evaluators drew extensively on the TRM 6.0 to calculate deemed savings. However, we deviated from specific TRM 6.0 guidelines in the few instances where tracking data did not provide information needed to apply TRM 6.0 algorithms, or when ADM had collected primary data representing conditions specific to Arkansas. We used specific deviations in our analyses of the Commercial & Industrial Lighting program

In certain instances, within the Lighting program, ADM deviated from the TRM 6.0 algorithms when primary data collected onsite varied significantly from the deemed values given in the TRM algorithms. Specifically, if ADM found that hours of use at a facility varied greatly from the TRM deemed values, ADM used the actual hours of operation for that facility. Additionally, instead of using deemed peak demand coincident factors as provided in the TRM, ADM utilized a custom lighting calculator that determined 8,760 hour/year load shapes for each facility. The peak demand savings was then determined using the 8,760 hour per year load shape, allowing for more accurate peak demand reductions that aligned with OG&E's peak system demand period.

**3.3.7.2 *The EM&V Plan was approved by the IEM.***

The Evaluators prepared a comprehensive EM&V Plan for 2016 and submitted it to OG&E 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, ADM addressed these.

**3.3.7.3 *OG&E provided timely/high quality data and support for the EM&V process.***

OG&E and its implementers were very responsive to the Evaluator's data requests, and accessing data through CLEARResult's Vault and OG&E's Saratoga database was straightforward and productive.

Specific examples of collaboration provided by OG&E and its implementation contractors to support the EM&V process include:

- **Site Visits:** All EM&V site visits were coordinated through the implementation contractor, and in some cases, CLEARResult contacted customers and scheduled visits on behalf of the evaluator. Additionally, a CLEARResult representative attended all visits.

- **Custom M&V Plans:** For custom projects implemented through the C&I programs, the implementation contractor provided M&V plans that were reviewed by the implementer prior to project implementation. The early collaboration on M&V plans and data collection activities allow both implementer and evaluator the opportunity to agree on data requirements and calculation approaches to custom projects. This collaboration reduces risk associated with differences in ex ante and ex post savings for these projects.
- **Data Transfer and Data Quality:** While there were some data integrity issues experienced, the Evaluators found that OG&E and their implementation partners, Frontier, CLEAResult, and RAP, were all incredibly collaborative and worked quickly to resolve those issues across the multiple tracking systems.

The Evaluators reviewed the quality of program tracking data to assess whether the data allowed for complete evaluation. Further, the Evaluators reviewed the extent to which individual savings calculations were performed using facility-specific inputs into the TRM version 6.0 algorithms versus the use of simplifying assumptions. The results of the review are summarized in Table 3-14.

The scoring for Factor Seven is found in Table 3-14. The assumptions behind the scoring is seen below.

- : Meets all requirements and is in full compliance with this performance indicator;
- ◐: Meets some requirements and is in partial compliance with this performance indicator;
- : Is not in compliance with this performance indicator; and
- NA: Performance indicator is not applicable to this program.

Table 3-14 Assessment of Data & QA/QC Procedures by Program

Program	Tracking Contains Necessary Fields	Savings Calculations Performed and Reported	Savings Calculations Based on Facility Data	QA/QC Inspections by Program Staff
MFDI	◐	●	○	●
Living-Wise	◐	◐	◐	●
Unified Wx	●	●	●	●
C&I Lighting	●	●	●	●
C&I SOP	●	●	●	●

### 3.4 Summary of Cost Effectiveness Results

#### 3.4.1 Cost Effectiveness Findings

Table 3-15 PY2016 Cost Effectiveness Results Table 3-15 outlines the results of the cost effectiveness results for the PY2016 portfolio.

Table 3-15 PY2016 Cost Effectiveness Results

Program	TRC	UCT	RIM	PCT	SCT	TRC Net Benefits
MFDI	3.61	4.50	0.71	6.83	3.61	\$2,582,329
SEE LivingWise	13.10	2.88	0.48	8.41	13.14	\$843,251
Unified Wx	2.72	1.98	0.64	3.69	2.73	\$3,559,920
C&I SOP	2.00	4.24	0.97	2.17	2.00	\$3,294,213
C&I Lighting	2.14	3.39	0.95	2.53	2.14	\$2,925,864
EEA	0.00	0.00	0.00	0.00	0.00	-\$18,411
Regulatory	0.00	0.00	0.00	0.00	0.00	-\$28,661
<b>Total</b>	<b>2.46</b>	<b>3.19</b>	<b>0.81</b>	<b>3.15</b>	<b>2.46</b>	<b>\$13,158,505</b>

#### 3.4.2 Cost Effectiveness Methodology

See Appendix A of this report for additional details on the Evaluators approach.

#### 3.4.3 Non-Energy Benefits (NEBs)

Below is a summary of the Non-Energy Benefits (NEBs) that were calculated in each program in PY2016.

- **Multifamily Direct Install:** water savings resulting from efficient faucet aerators and showerheads and deferred replacement costs were calculated for LED bulbs. There were no gas or propane units identified in the project data.
- **SEE LivingWise:** water savings resulting from efficient faucet aerators and showerheads, natural gas, and liquid propane savings. Deferred replacement costs were calculated for LED bulbs.
- **OG&E/AOG Weatherization (Unified Wx):** water savings resulting from efficient faucet aerators and showerheads, as well as electricity or natural gas (where either OG&E or AOG was not sponsoring the program or serving the electricity or natural gas), and liquid propane savings.
- **C&I Lighting:** natural gas impacts associated with heating/cooling interactive effects for lighting projects, as well as deferred replacement costs.
- **C&I Standard Offer:** water savings resulting from faucet aerators, as well as deferred replacement costs.

#### **3.4.4 Avoided Costs and Real Economic Carrying Charge (RECC)**

The Evaluators used the economic inputs provided by OG&E for the cost benefit analysis, this included avoided costs that were estimated using the Real Economic Carrying Charge (RECC) approach.

## 4 Residential Programs

### 4.1 Multifamily Direct Install Program

#### 4.1.1 Evaluation Findings

Table 4-1 presents the ex ante energy (kWh) and demand (kW) savings, ex post energy (kWh) and demand (kW) savings, energy (kWh) and demand (kW) realization rates for the PY2016 MFDI program, by measure.

Table 4-1 Gross Savings Summary by Measure for PY2016

Measure	Ex Ante kWh Savings	Ex Post kWh Savings	kWh Realization Rate	Ex Ante Peak kW Savings	Ex Post Peak kW Savings	Peak kW Realization Rate
Faucet Aerators	42,791	35,716	83.5%	4.47	3.71	83.1%
Showerhead	151,937	121,624	80.0%	15.91	12.65	79.5%
CFL Bulbs	117,421	92,814	79.0%	22.62	18.00	79.6%
LED Bulbs	53,332	53,063	99.5%	10.32	10.32	100.0%
Power Strip	315,250	245,054	77.7%	37.50	28.87	77.0%
Air Infiltration	984,730	854,681	86.8%	67.27	58.38	86.8%
Duct Sealing	3,766,247	3,173,592	84.3%	365.53	312.50	85.5%
<b>Total</b>	<b>5,431,708</b>	<b>4,576,545</b>	<b>84.3%</b>	<b>523.62</b>	<b>444.45</b>	<b>84.9%</b>

There were no natural gas savings identified with this program, as only all-electric units were targeted in the program for PY2016. Table 4-2 outlines the ex post lifetime energy (kWh) savings by measure for the PY2016 MFDI program.

Table 4-2 Gross Savings Summary by Measure for PY2016

Measure	Estimated Useful Lifetime (EUL) Tier One	Estimated Useful Lifetime (EUL) Tier two	Ex Post Lifetime Energy Savings (kWh)
Faucet Aerators	10		357,160
Showerhead	10		1,216,240
CFL Bulbs	7	3	649,697
LED Bulbs	7	13	798,201
Power Strip	10		2,450,540
Air Infiltration	11		9,401,495
Duct Sealing	18		57,124,655
<b>Total</b>			<b>71,997,988</b>

Table 4-3 presents the net savings summary, by measure, for the PY2016 MFDI program.

Table 4-3 Net Savings Summary

Measure	Net-to-Gross (NTG)	Net Energy Savings (kWh)	Net Demand Reductions (kW)	Net Lifetime Energy Savings (kWh)
Faucet Aerators	94.0%	33,573	3.49	335,730
Showerhead	93.0%	113,110	11.76	1,131,103
CFL Bulbs	81.0%	75,179	14.58	526,254
LED Bulbs	81.0%	42,981	8.36	646,543
Power Strip	90.0%	220,549	25.98	2,205,486
Air Infiltration	90.0%	769,213	52.55	8,461,346
Duct Sealing	90.0%	2,856,233	281.25	51,412,190
<b>Total</b>	<b>89.8%</b>	<b>4,110,839</b>	<b>397.98</b>	<b>64,718,652</b>

Figure 4-1 below, is a summary of the gross and net energy savings (kWh) impacts by measure for the MFDI program and Figure 4-2 below, is a summary of the gross and net energy savings (kWh) impacts by measure for the MFDI program.

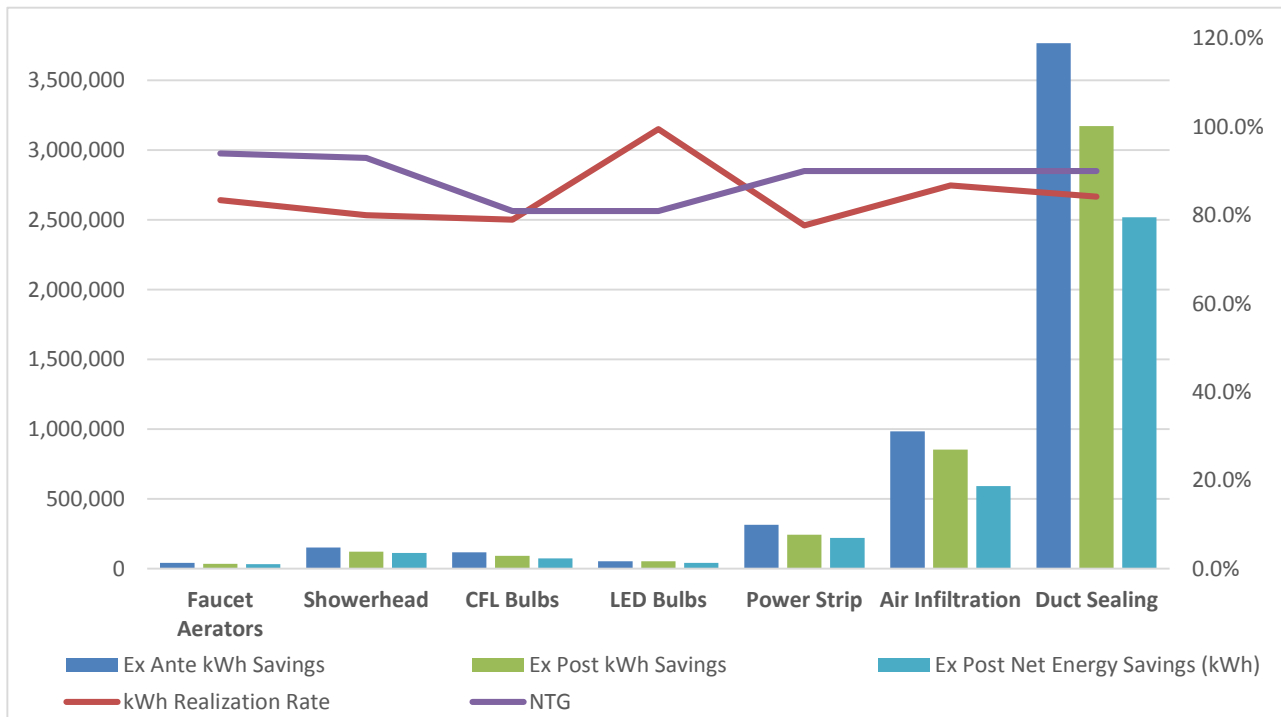


Figure 4-1 MFDI Energy Savings (kWh) Summary

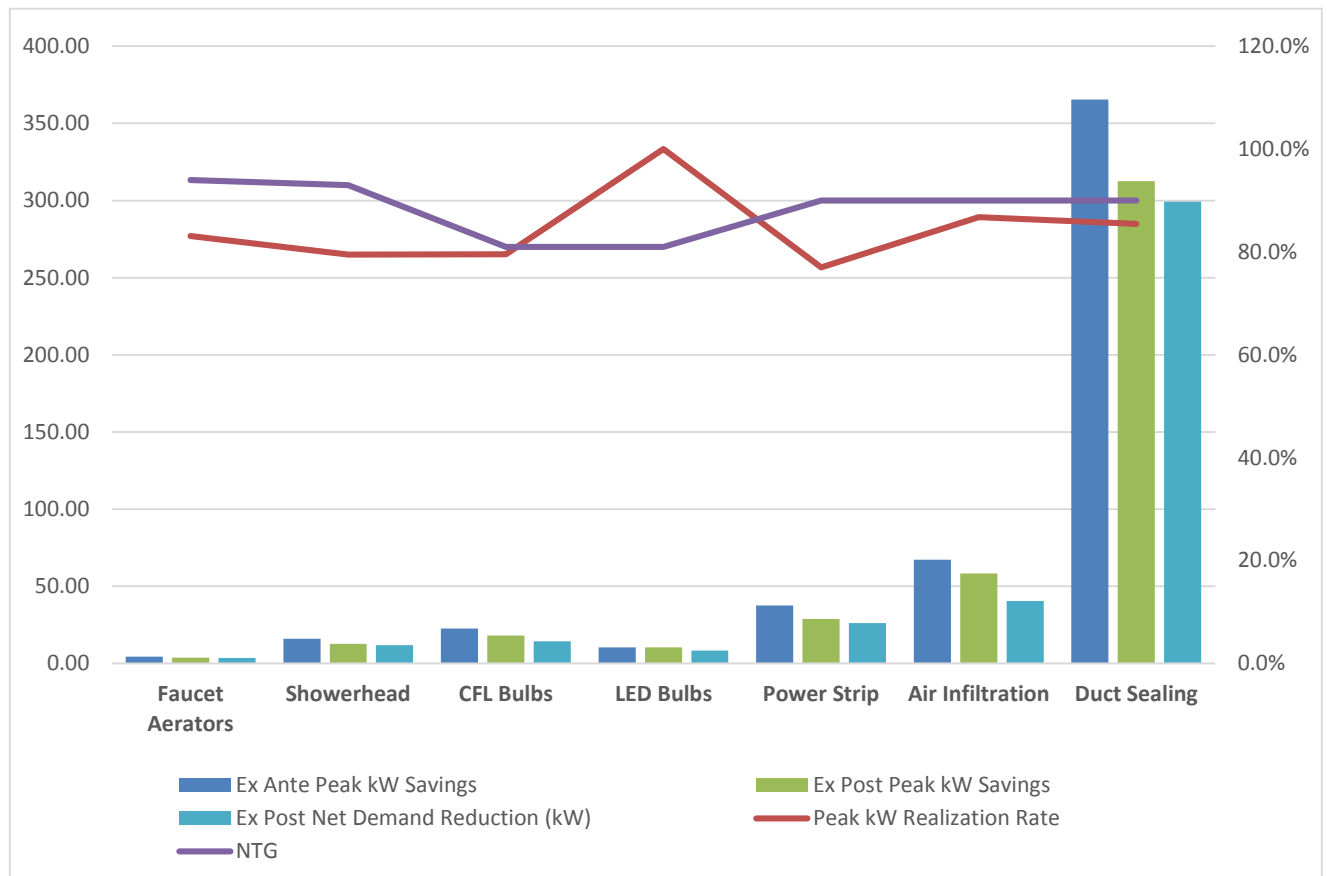


Figure 4-2 MFDI Demand Reduction (kW) Summary

Additional details, including approaches, are found in the following sections.

### 4.1.2 Program Overview

In PY2016 OG&E implemented the Multifamily Direct Install (MFDI) program targeting the underserved market of residential customers in multifamily dwellings.<sup>17</sup> OG&E identified over 13,000 multi-family units in its service area, representing almost 25% of their residential customers. OG&E engaged a third-party implementer (CLEARresult) to promote the program and reach out to property management companies, property owners, and tenants. The program provides energy saving fixtures and installation at no cost to the customer on electrically heated homes. The incentive structure includes incentive payments to the contractor covering the entire cost of measures and

<sup>17</sup> Source: In the matter of the request for approval of its quick start energy efficiency programs and the tariff related to the program by Oklahoma Gas and Electric Company, Docket no. 07-075-TF, Direct Testimony and Exhibits of Billy Dean Pollock on behalf of Oklahoma Gas and Electric Company, June 2015.

installation, and an incentive for the participating property management groups and owners. Table 4-4 shows the costs for the program measures.

Table 4-4 MFDI Incentive Levels

Measure	Contractor Incentive Per Measure	Customer Incentive Per Unit
Faucet Aerator	\$5.00	\$ 15.00 per unit
Shower Head	\$15.00	
CFL and LED Bulbs	\$5.00	
Advanced Power Strips	\$30.00	
Air Sealing	\$100.00-\$150.00	
Duct Sealing	\$225.00-\$300.00	

The implementer screens and enrolls contractors to perform work, recruits customers (property owners/management groups) to participate, coordinates project installations, processes project completion forms for payment and inspects completed work. OG&E staff and contractors actively promote the program directly to customers and a CLEAResult Account Lead recruits, educates and maintains contact with qualifying property management groups and property owners.

All work is performed by independent contractors, which promotes local businesses and allows contractors to develop relationships with property management groups and facilitate additional energy efficiency projects. CLEAResult leverages its relationships with local contractors that perform these services to recruit new contractors. Contractors complete a participation agreement and are required to maintain liability and worker’s compensation insurance and maintain high customer satisfaction ratings with OG&E’s customers. The implementer provides contractors with marketing materials and forms for project completion such as: Customer Flyer; Customer Enrollment Form/Agreement; Contractor Direct Install Participation Agreement; Contractor Direct Install Form; and Tenant Fact Sheet/Flyer.

The implementer’s Measurement and Verification (M&V) process for measures with deemed savings includes pre- and post-installation inspections on a sample of projects with pictures and information to verify installed measures and kWh and kW impacts per project. CLEAResult does pre-inspections during the initial qualification of the property to verify units eligible for replacement, document existing wattages and flow rates of eligible measures. In addition, during the pre-inspections the CLEAResult inspectors coordinate with the installing contractor, arrive on a site at random times, and sample a percentage of each type of unit.

In PY2016, 1,604 multifamily units participated in the MFDI program. Below, Table 4-5 summarizes the total number of multifamily units where a measure was installed



in/performed at, total measures installed/performed and the expected kWh and peak kW savings, by measure. The MFDI program had \$743,038 in budget allocated for PY2016, and expended \$696,613, which is 93.8% of the targeted budget.<sup>18</sup>

Table 4-5 OG&E’s PY2016 MFDI Program Summary

Measure	Number Homes	Total Quantity of Measures	Total Ex Ante kWh Savings	Total Ex Ante peak kW Savings
Faucet Aerators	1,604 <sup>19</sup>	945	42791	4.47
Showerhead		504	151,937	15.91
CFL Bulbs		5,963	117,421	22.62
LED Bulbs		2,402	53,332	10.32
Power Strip		1,250	315,250	37.5
Air Infiltration		797	984,730	67.27
Duct Sealing		702	3,766,247	365.53
<b>Total</b>			<b>12,563</b>	<b>5,431,708</b>

Figure 4-3 summarizes the rebates by month and total energy savings (kWh) for the MFDI program as determined by the date of rebate delivery in the specified month of PY2016. The left axis and bars show the number of rebates, and the right axis and dark blue line represents the total energy savings (kWh).

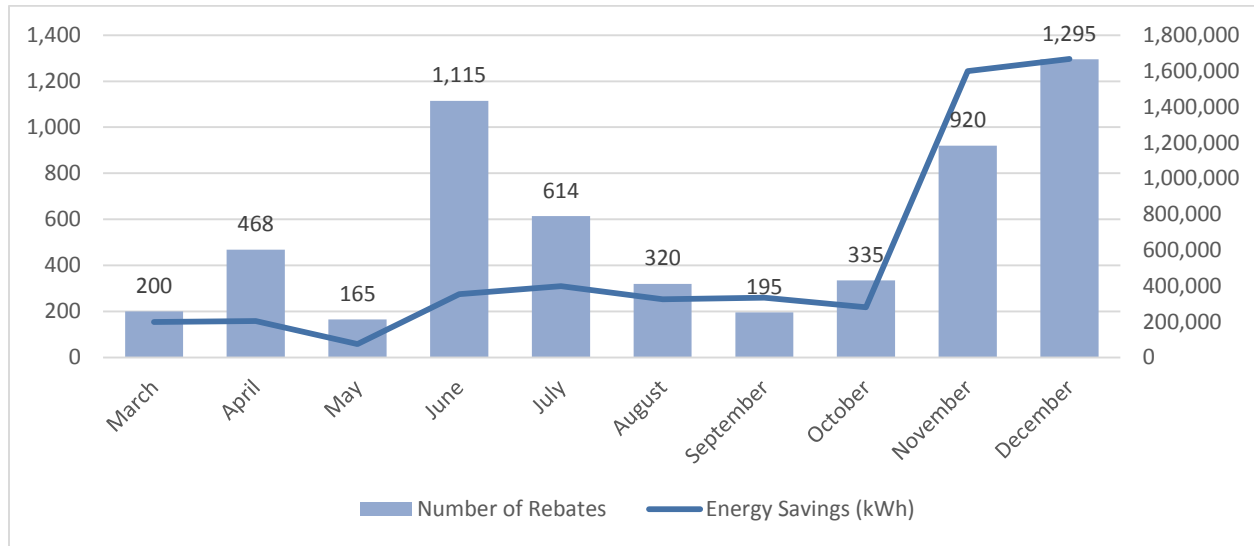


Figure 4-3 MFDI Rebates by Month

<sup>18</sup> The value reported in the RBudget, for PY2016 Abudget was \$773,019, which is within the 10% adjustment allowed with in each program year.

<sup>19</sup> Total MF unit participation is reported at the program level due to multiple measure installations within each unit.

### 4.1.3 Impact Evaluation

For equipment and retrofits rebated through the PY2016 MFDI program, calculation methodologies were performed as described in the AR TRM version 6.0. Table 4-6 identifies the sections in the TRM that were used for verification of measure-level savings under the MFDI.

Table 4-6 TRM Sections by Measure Type

Measure	Section in TRM
Air Infiltration	2.2.9
CFL and LED Bulbs	2.5.1
Duct Sealing	2.1.11
Faucet Aerators	2.3.4
Low Flow Showerhead	2.3.5
Advanced Power Strips	2.1.8

The impact evaluation effort of the MFDI program included the following:

- **Desk Review of Residential Calculations.** The Evaluators utilized TRM VERSION 6.0 values in assessing savings from residential measures.
- **Onsite Visits.** The Evaluators provided field verification in 54 residences throughout Arkansas.
- **Free ridership Estimation.** The Evaluators applied PY2015 free ridership rates to PY2016 program participants.

In addition to the TRM, the Evaluators also examined the Excel workbook utilized by implementation staff (CLEAResult) to assess savings by measure. The workbook utilizes TRM savings algorithms with trade ally inputs to calculate savings based on the measure and input parameters. The Evaluators verified the factor tables for each measure to ensure the values were appropriate.

#### 4.1.3.1 Compliance with TRM 6.0

The Evaluators replicated the savings for each measure in the PY2016 MFDI program, based on the Arkansas TRM 6.0, and found that the program is in compliance.

#### 4.1.3.2 Energy Savings Calculations

Three measures accounted for 93.3% of the gross energy savings (kWh) for the MFDI: advanced power strips, air infiltration reduction and duct sealing. The contribution to savings by measure can be found in Figure 4-4. The calculation methodologies for these measures are detailed in the following sections.

Figure 4-4 reports both total savings and percentage of total energy savings (kWh) for each measure in the MFDI program. The bars represent energy savings (kWh) and the line and data callouts represent the percentage of total program energy savings (kWh).

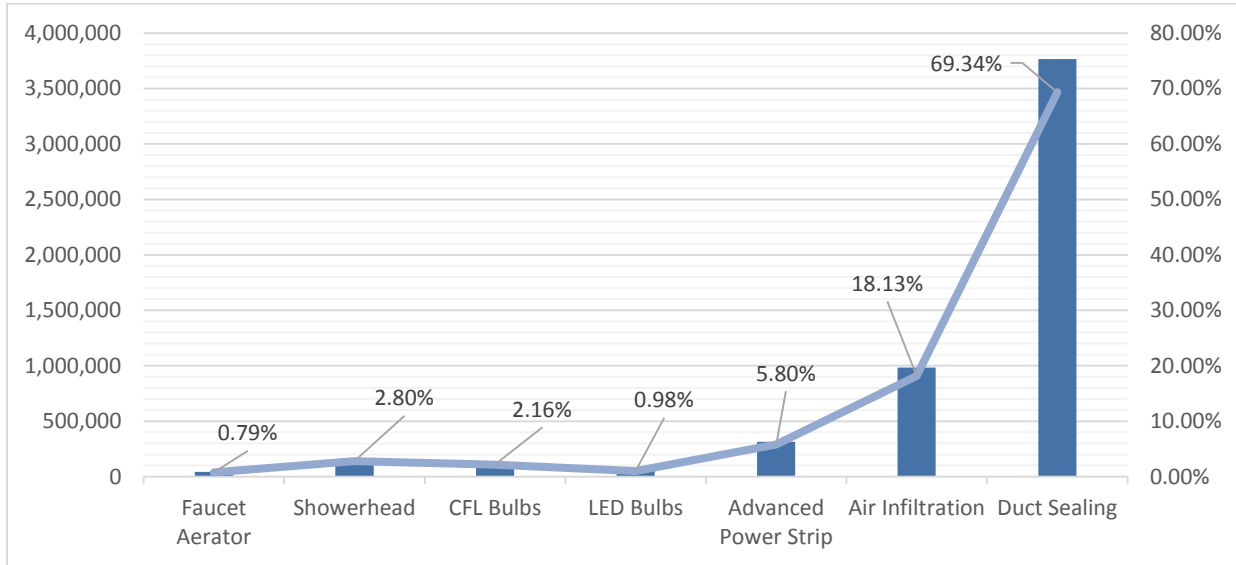


Figure 4-4 Contributions to Ex Ante Energy Savings by Measure in PY2016

#### 4.1.3.3 Advanced Power Strips

The deemed savings per installed unit depend on whole system averages for system types of Home Entertainment or Home Office. The following tables present the deemed savings for the installation of a Tier 1 advanced power strip.

Table 4-7 Advanced Power Strip Deemed Savings

System Type	Peripheral Device	kW Savings	kWh Savings
Home Entertainment	Whole System Average <sup>215</sup>	0.030	252.2
Home Office	Whole System Average <sup>216</sup>	0.008	82.5
Average APS	Whole System Average <sup>217</sup>	0.019	167.4

The defined baseline for this measure is the absence of any advanced power strip, in which peripheral devices are connected to a traditional power strip and/or wall outlet.

#### 4.1.3.4 Air Infiltration

The deemed savings algorithms in TRM 6.0 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 8.

Table 4-8 Deemed Savings Values for Air Infiltration, Zone 8

Equipment Type	kWh Savings / CFM <sub>50</sub>	kW Savings / CFM <sub>50</sub>
Electric AC with Gas Heat	0.188	0.00014
Elec. AC with Resistance heat	2.344	0.00014
Heat Pump	0.942	0.00014

For example, consider a residence with electric AC and gas heat. If the residence had a leakage rate of 16,100 CFM50 before air infiltration reduction and a leakage rate of 7,220 CFM50 after, then the residence would have an annual gross savings of 2,388 kWh.

$$Infiltration\ Savings = 0.3064 \frac{kWh\ Savings}{CFM_{50}} \cdot (16,100\ CFM_{50\ pre} - 7,220\ CFM_{50\ post})$$

$$Air\ Infiltration\ Savings = 2,388\ kWh$$

#### 4.1.3.5 Duct Sealing

Duct sealing savings was calculated using the following savings algorithms from the Arkansas TRM version 6.0.

##### 4.1.3.5.1 Cooling Savings (Electric):

$$kWh_{savings,c} = \frac{(DL_{pre} - DL_{post}) \times EFLH_c \times (h_{out}\rho_{out} - h_{in}\rho_{in}) \times 60}{1,000 \times SEER}$$

Where:

$DL_{pre}$  = Pre-improvement duct leakage at 25 Pa (ft<sup>3</sup>/min)

$DL_{post}$  = Post-improvement duct leakage at 25 Pa (ft<sup>3</sup>/min)

$\Delta DSE$  = Assumed improvement in distribution system efficiency = 5% = 0.05

$EFLH_c$  = Equivalent Full Load Hours.

$h_{out}$  = Outdoor design specific enthalpy (Btu/lb)

$h_{in}$  = Indoor design specific enthalpy (Btu/lb.)

Table 4-9 Deemed Savings Values for Duct Sealing Calculations

Parameter	Value
EFLH <sub>c</sub>	1432
HDD	3919
h <sub>out</sub>	39
h <sub>in</sub>	29
ρ <sub>in</sub>	0.076
ρ <sub>out</sub>	0.074
SEER	11.5 <sup>20</sup>

ρ<sub>out</sub> = Density of outdoor air at 95°F = 0.0740 (lb/ft<sup>3</sup>)<sup>21</sup>

ρ<sub>in</sub> = Density of conditioned air at 75°F = 0.0756 (lb./ft<sup>3</sup>)<sup>4</sup>

60 = Constant to convert from minutes to hours

CAP = Cooling capacity (Btu/hr)

1,000 = Constant to convert from W to kW

SEER = Seasonal Energy Efficiency Ratio of existing system (Btu/W·hr)

Default value for SEER = 11.5<sup>22</sup>

#### 4.1.3.5.2 Heating Savings (Heat Pump)

$$kWh_{savings,H} = \frac{(DL_{pre} - DL_{post}) \times 60 \times HDD \times 24 \times 0.018}{1,000 \times HSPF}$$

Where:

DL<sub>pre</sub> = Pre-improvement duct leakage at 25 Pa (ft<sup>3</sup>/min)

DL<sub>post</sub> = Post-improvement duct leakage at 25 Pa (ft<sup>3</sup>/min)

ΔDSE = Assumed improvement in distribution system efficiency = 5% = 0.05

EFLH<sub>H</sub> = Equivalent full load heating hours

60 = Constant to convert from minutes to hours

HDD = Heating degree days

24 = Constant to convert from days to hours

<sup>20</sup> For projects where SEER was reported, that value was used instead of the stipulated value in the TRM.

<sup>21</sup> ASHRAE Fundamentals 2009, Chapter 1: Psychometrics, Equation 11, Equation 41, Table 2

<sup>22</sup> Average of Department of Energy minimum allowed SEER for new air conditioners from 1992-2006 (10 SEER) and after January 23, 2006 (13 SEER)

0.018 = Volumetric heat capacity of air (Btu/ft<sup>3</sup>°F)

CAP = Heating capacity (Btu/hr)

1,000 = Constant to convert from W to kW

HSPF = Heating Seasonal Performance Factor of existing system (Btu/W·hr)

Default value for HSPF = 7.30.<sup>23</sup>

#### 4.1.3.5.3 Heating Savings (Electric Resistance)

$$kWh_{savings,H} = \frac{(DL_{pre} - DL_{post}) \times 60 \times HDD \times 24 \times 0.018}{3,412}$$

Where:

$DL_{pre}$  = Pre-improvement duct leakage at 25 Pa (ft<sup>3</sup>/min)

$DL_{post}$  = Post-improvement duct leakage at 25 Pa (ft<sup>3</sup>/min)

$\Delta DSE$  = Assumed improvement in distribution system efficiency = 5% = 0.05

60 = Constant to convert from minutes to hours

HDD = Heating degree days

24 = Constant to convert from days to hours

0.018 = Volumetric heat capacity of air (Btu/ft<sup>3</sup>°F)

EFLH<sub>H</sub> = Equivalent full load heating hours

CAP = Heating capacity (Btu/hr)

3,412 = Constant to convert from Btu to kWh

#### 4.1.3.5.4 Heating Savings (Gas Furnace)

$$Therms_{savings,H} = \frac{(DL_{pre} - DL_{post}) \times 60 \times HDD \times 24 \times 0.018}{100,000 \times AFUE}$$

Where:

$DL_{pre}$  = Pre-improvement duct leakage at 25 Pa (ft<sup>3</sup>/min)

$DL_{post}$  = Post-improvement duct leakage at 25 Pa (ft<sup>3</sup>/min)

$\Delta DSE$  = Assumed improvement in distribution system efficiency = 5% = 0.05

60 = Constant to convert from minutes to hours

HDD = Heating degree days

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<sup>23</sup> Average of Department of Energy minimum allowed HSPF for new heat pumps from 1992-2006 (6.8 HSPF) and after January 23, 2006 (7.7 HSPF)

24 = Constant to convert from days to hours  
 0.018 = Volumetric heat capacity of air (Btu/ft<sup>3</sup>F)  
 EFLH<sub>H</sub> = Equivalent full load heating hours  
 CAP = Heating capacity (Btu/h or Btu/hr)  
 100,000 = Constant to convert from Btu to therms  
 AFUE = Annual Fuel Utilization Efficiency of existing system  
 Default value for AFUE = 0.8.

#### 4.1.3.5.5 Demand Savings (Cooling)

$$kW_{savings,C} = \frac{kWh_{savings,C}}{EFLH_C} \times CF$$

Where:

kWh<sub>savings,C</sub> = Calculated kWh savings for cooling  
 EFLH<sub>C</sub> = Equivalent full load cooling hours  
 CF = Coincidence factor = 0.87

#### 4.1.4 Onsite Procedures and Findings

In addition to TRM verification, the Evaluators conducted onsite field verification of a sample of participant homes. This process involved reviewing tracking information and inspecting the completeness and accuracy of the implemented measures. To review a summary of the methodology used by the Evaluators to conduct the verification activity, see Sampling 2.3.1.

##### 4.1.4.1 Onsite 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 onsite 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 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.
- **Duct Sealing:** For homes receiving duct sealing measures, the field engineer conducted a duct blaster 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).

#### **4.1.4.2 Onsite Verification Results**

As described in Section 2.3 of this report, the Evaluators conducted onsite verification visits to 54 participant homes. These site visits were conducted to verify complete and proper measure installation, to conduct post-implementation measurements, and to collect information regarding residence characteristics such as square footage and heating type.

The field verification activity showed that the measures had for the most part been installed in the quantities reported within program tracking data. This section summarizes the verification findings by measure category.

Specific notes regarding the onsite verification findings include:

- **1.0 gallons per minute (GPM) Aerator:** one of 11 was found to have been removed, which resulted in a 90.9% realization rate for field verification.
- **1.5 GPM Aerator:** four of 19 was found to have been removed, which resulted in a 78.9% realization rate for field verification.



- **1.5 GPM Showerhead:** three of nineteen were found to have been removed, which resulted in an 84.2% realization rate for field verification.
- **13 watt CFL:** 61 of 299 were found to have been removed, which resulted in a 78.7% realization rate for field verification. (LEDs were introduced later in PY2016 and were not captured in site verification results; therefore, they were the same field verification results were applied to measure-level analysis.).
- **Advanced Power Strips:** seven of 50 were found to have been removed, which resulted in an 86.0% realization rate for field verification. Additionally, only 85.7% were found to be installed with entertainment devices plugged into them. Although, this may be because some multifamily units may not have both an entertainment room and an office.
- **Air infiltration:** for the 21 sites, it was determined that there was 24.3% more leakage than was estimated. This rate is then applied to projects during the desk review.
- **Duct sealing:** for the 15 sites, it was determined that there was 109.0% more leakage than was estimated. This rate is then applied to applicable projects during the desk review.
- **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).

#### 4.1.5 Verified Savings by Measure

After reviewing the tracking data and inputs for savings calculations, the Evaluators provided verified ex post savings per TRM protocols. The savings from the measures below were verified, and matched, to the calculations provided by CLEARResult:

- Faucet Aerators;
- Showerhead;
- CFL Bulbs;
- LED Bulbs;
- Advanced Power Strips;
- Air Infiltration; and
- Duct Sealing.

Factors that impacted savings are listed in individual measure sections below. The Evaluators verified measure-level savings per TRM guidelines and obtained results that differed from CLEARResult's calculations for the following measures:

#### 4.1.5.1 Duct Sealing

The primary driver for the low realization rate was the field verification results. See Section 4.1.4.2 for additional details.

Table 4-10 Expected and Realized Duct Sealing Savings

Heating Type	Ex Ante kWh Savings	Ex Post kWh Savings	kWh Realization Rate	Ex Ante Peak kW Savings	Ex Post Peak kW Savings	Peak kW Realization Rate
Electric Resistance	3,726,757	3,134,101	84.1%	358.34	305.31	85.2%
Heat Pump	39,491	39,491	100.0%	7.19	7.19	100.0%
<b>Total</b>	<b>3,766,247</b>	<b>3,173,592</b>	<b>84.3%</b>	<b>365.53</b>	<b>312.50</b>	<b>85.5%</b>

#### 4.1.5.2 Air Infiltration

The primary driver for the low realization rate was the field verification results. See Section 4.1.4.2 for additional details.

Table 4-11 Expected and Realized Air Infiltration Savings

Heating Type	Ex Ante kWh Savings	Ex Post kWh Savings	kWh Realization Rate	Ex Ante Peak kW Savings	Ex Post Peak kW Savings	Peak kW Realization Rate
Electric Resistance	972,957	844,464	86.8%	65.52	56.87	86.8%
Heat Pump	11,772	10,217	86.8%	1.75	1.52	86.8%
<b>Total</b>	<b>984,730</b>	<b>854,681</b>	<b>86.8%</b>	<b>67.27</b>	<b>58.38</b>	<b>86.8%</b>

#### 4.1.5.3 Advanced Power Strips

Room type and which devices were plugged in were not tracked, an average value was applied based on a percentage of room type verified in field visits.

Table 4-12 Expected and Realized Advanced Power Strip Savings

Ex Ante kWh Savings	Ex Post kWh Savings	kWh Realization Rate	Ex Ante Peak kW Savings	Ex Post Peak kW Savings	Peak kW Realization Rate
315,250	245,054	77.7%	37.50	28.87	77.0%

#### 4.1.6 Gross Savings Summary and Findings

Table 4-13 presents the verified ex post savings results of the PY2016 MFDI program, by measure.

Table 4-13 Gross Savings Summary by Measure for PY2016

Measure	Ex Ante kWh Savings	Ex Post kWh Savings	kWh Realization Rate	Ex Ante Peak kW Savings	Ex Post Peak kW Savings	Peak kW Realization Rate
Faucet Aerators	42,791	35,716	83.5%	4.47	3.71	83.1%
Showerhead	151,937	121,624	80.0%	15.91	12.65	79.5%
CFL Bulbs	117,421	92,814	79.0%	22.62	18.00	79.6%
LED Bulbs	53,332	53,063	99.5%	10.32	10.32	100.0%
Power Strip	315,250	245,054	77.7%	37.50	28.87	77.0%
Air Infiltration	984,730	854,681	86.8%	67.27	58.38	86.8%
Duct Sealing	3,766,247	3,173,592	84.3%	365.53	312.50	85.5%
<b>Total</b>	<b>5,431,708</b>	<b>4,576,545</b>	<b>84.3%</b>	<b>523.62</b>	<b>444.45</b>	<b>84.9%</b>

Table 4-14 outlines the verified ex post lifetime savings by measure for the MFDI program.

Table 4-14 Gross Lifetime Savings Summary by Measure for PY2016

Measure	Estimated Useful Lifetime (EUL) Tier 1	Estimated Useful Lifetime (EUL) Tier 2	Ex post Lifetime Energy Savings (kWh)
Faucet Aerators	10	n/a	357,160
Showerhead	10	n/a	1,216,240
CFL Bulbs	7	3	649,697
LED Bulbs	7	13	798,201
Power Strip	10	n/a	2,450,540
Air Infiltration	11	n/a	9,401,495
Duct Sealing	18	n/a	57,124,655
<b>Total</b>			<b>71,997,988</b>

#### 4.1.7 Net Savings Summary and Findings

The Evaluators applied net-to-gross ratios as outlined below for savings achieved through the program in PY2016. The context for and explanation of this determination is as follows. OG&E has decided to modify their residential offerings in the next planning period (PY2017-PY2019), and this program will no longer be offered as a standalone program. This delivery channel and measures will be incorporated into a larger umbrella residential program. Therefore, the Evaluators and OG&E decided that it was not an effective use of resources to perform this analysis in PY2016, and will re-evaluate this in PY2017.

The previous Evaluator, in the PY2015 evaluation report, used a benchmarking approach to determine the NTG ratios for the MFDI program. They used comparable programs in Illinois<sup>24</sup> and Maine<sup>25</sup> to determine the NTG ratio for the direct install measures used in OG&E’s program, as follows:

- CFLs and LEDs: NTG ratio = 0.81
- Aerators: NTG ratio = 0.94
- Showerhead: NTG ratio = 0.93

Since the Illinois program did not include air infiltration, duct sealing, and power strips, the average program NTG of 0.90 was used for these measures. This value was the same for the Efficiency Maine multifamily program.

The resulting net savings are presented in Table 4-15.

Table 4-15 Net Savings Summary for MFDI in PY2016

Measure	Net-to-Gross (NTG)	Ex Post Net Energy Savings (kWh)	Ex Post Net Demand Reductions (kW)	Net Lifetime Energy Savings (kWh)
Faucet Aerators	94.0%	33,573	3.49	335,730
Showerhead	93.0%	113,110	11.76	1,131,103
CFL Bulbs	81.0%	75,179	14.58	526,254
LED Bulbs	81.0%	42,981	8.36	646,543
Power Strip	90.0%	220,549	25.98	2,205,486
Air Infiltration	90.0%	769,213	52.55	8,461,346
Duct Sealing	90.0%	2,856,233	281.25	51,412,190
<b>Total</b>	<b>89.8%</b>	<b>4,110,839</b>	<b>397.98</b>	<b>64,718,652</b>

#### 4.1.8 Non-Energy Benefits (NEBs)

The resulting NEBs by measure for the PY2016 MFDI program are presented in Table 4-16. The MFDI program targets all electric homes, there were no reported units that had either natural gas or propane. Water savings came from the hot water measures (e.g., aerators and showerheads), and deferred replacements costs were determined for the LED bulbs in the program. All values in the table below were included in the cost benefit analysis.

<sup>24</sup> “Com Ed Programs NTG Approach for Programs” values were applied for EPY8.

([http://ilsagfiles.org/SAG\\_files/NTG/2015\\_NTG\\_Meetings/ComEd\\_EPY8\\_NTG\\_Summary\\_2015-01-13.pdf](http://ilsagfiles.org/SAG_files/NTG/2015_NTG_Meetings/ComEd_EPY8_NTG_Summary_2015-01-13.pdf))

<sup>25</sup> Source: Opinion Dynamics, Efficiency Maine, Multifamily Efficiency Program Evaluation, Final, March 17, 2014.

Table 4-16 Non-Energy Benefits (NEBs) Summary

Measure	Natural Gas Savings <sup>26</sup> (therms)	Water Savings (\$/gallons)	Propane Savings <sup>27</sup> (gallons)	Deferred Replacement Costs
Faucet Aerator	0.00	463,830	0.00	\$0.00
Showerhead	0.00	1,635,984	0.00	\$0.00
CFL Bulbs	0.00	0.00	0.00	\$0.00
LED Bulbs	0.00	0.00	0.00	\$7,218.96
Power Strip	0.00	0.00	0.00	\$0.00
Air Infiltration	0.00	0.00	0.00	\$0.00
Duct Sealing	0.00	0.00	0.00	\$0.00
<b>Total</b>	<b>0.00</b>	<b>2,099,814</b>	<b>0.00</b>	<b>\$7,218.96</b>

#### 4.1.9 Process Evaluation

The previous Evaluators conducted a formal process evaluation of the MFDI PY2014, and a limited process review in PY2015, and found that the program successful in meeting participation, savings, and satisfaction goals. Table 4-17 and Table 4-18 summarize the Evaluators’ review of the MFDI program in comparison to TRM version 6.0 Protocol C for timing and conditions of conducting a process evaluation.

This program will be discontinued in PY2017.

Table 4-17 Determining Appropriate Timing to Conduct a Process Evaluation

Component	Determination
New and Innovative Components	No. The program is designed in a manner consistent with similar programs elsewhere and applies deemed savings values from the TRM.
No Previous Process Evaluation	No. The program received a comprehensive process evaluation in PY2014 and a limited process review in PY2015.
New Vendor or Contractor	No. The program has been run by CLEAResult since 2014.

<sup>26</sup> This program targets all electric multifamily units.

<sup>27</sup> No projects were reported to have propane in the unit.

Table 4-18 Determining Appropriate Conditions to Conduct a Process Evaluation

Component	Determination
Are program impacts lower or slower than expected?	No, the MFDI program exceeded goals for PY2016.
Are the educational or informational goals not meeting program goals?	They are meeting program goals.
Are the participation rates lower or slower than expected?	No, the participation was higher than planned.
Are the program's operational or management structure slow to get up and running or not meeting program administrative needs?	While there was a key program staff change in PY2016, which caused mid-year delays, the new staff person was able to pick up and achieve the goals by the completion of the program year.
Is the program's cost-effectiveness less than expected?	Yes, this program is cost effective.
Do participants report problems with the programs or low rates of satisfaction?	No. In PY2015 program satisfaction was high, there were no indications that this changed in PY2016.
Is the program producing the intended market effects?	Unsure. These were not measured in PY2016.

On this basis, the Evaluators concluded that process evaluation activities for PY2016 would be limited to a review of prior-year recommendations and program staff interviews with both OG&E staff, and the staff at the third-party implementer, CLEARResult.

**4.1.9.1 Data Collection Activities**

The process evaluation of the MFDI program included the following data collection activities:

- Program Staff Interviews; and
- Implementation Staff Interviews.

Table 4-19 summarizes the data collection for this process evaluation effort. This includes the titles, role, sample sizes, timeframe of data collection.

Table 4-19 MFDI Data Collection Summary

Target	Component	N
Program Staff	OG&E program management staff	1
Implementation Staff	CLEARResult program management staff	1

#### **4.1.9.2 Program Staff Interviews Results and Findings**

As part of the PY2016 evaluation, the Evaluators completed two in-depth interviews: One with the OG&E MFDI program manager, and one with the CLEAResult staff working to implement this program. These interviews helped the evaluation team assess any updates or changes the program experienced in PY2016 compared to available documentation. Further, these interviews explored energy efficiency staff roles and responsibilities, program communications and marketing, and the overall program delivery processes in place during PY2016. Below are key takeaways from the evaluation team’s in-depth interviews with the program manager and the implementation staff.

- **Staff roles and responsibilities:** The OG&E MFDI program manager has been working to deliver the program since its inception and plays an active role in program audits, quality assurance and quality control. CLEAResult, the program implementer, is responsible for most of the day-to-day program activities, including program promotion and communication with property owners, managers, and program-affiliated contractors. CLEAResult works actively onsite with contractors on the actual installation of direct install measures within tenant units, performs QA/QC, and fulfills program incentive requests.

This program experienced a change in key program staffing when a CLEAResult staff member who took a leave of absence mid-program year, which was noted in both interviews within this evaluation as a program barrier this year. While interviewees confirmed this leave of absence was a challenge during the program year and caused some mid-year delays, these same program staff also stated that a focused, end-of-the-year activity push – largely by an additional CLEAResult team member brought on to finish the year -- was key to rebooting program activity and ultimately achieving the program goals.

- **Program communication and marketing:** This program is primarily promoted to both new and returning customers through program word-of-mouth. Other marketing strategies program staff mentioned using in the past year were limited, but included targeted program contacts through zip code sampling.
- **Program delivery:** The program manager and the implementation staff were asked to identify key program areas that went well this past year and to state what could be improved. Communication across all program channels was the number one item mentioned by both the program manager and the implementation staff that went well last year.



Opportunities for program improvement relating to contractors were raised in both interviews. Specifically, program implementers reported that they had experienced some performance challenges among program-affiliated contractors this past year, especially around air and duct sealing projects. Further, interviewees indicated that the role of contractors helping to promote the program could be more tightly managed to assure a higher program benefit.

Going forward, the standalone MFDI program as evaluated in 2016 will no longer be offered; but rather, will be a component of the 2017-2019 Residential Solutions program (a new program) will contain a multifamily customer participation path. Further, the program will implement a shift away from the program's offering of CFL bulbs, and move instead to offering LED light bulbs as its main, lighting direct install measure.

Residential Solutions program will retain a component dedicated to serving the multifamily market in the OG&E territory for PY2017 and beyond.

#### **4.1.9.3 Review of PY2015 Evaluation Recommendations**

The recommendations made in the PY2015 evaluation of the MFDI program, along with an update on the progress, are found in this section. Changes may not have been implemented due to the discontinuation of this program in PY2017.

- **Recommendation 1:** Continue to emphasize non-energy benefits such as water savings in all marketing materials.
  - **Rationale:** Water savings is a large benefit of the program and including this in marketing materials could help increase participation in the program.
  - **Update – Accepted:** The CLEAResult program team worked with OG&E marketing to confirm that outreach materials do reflect the additional water saving benefits associated with program participation.
- **Recommendation 2:** Ensure the consistent application of embedded peak demand impacts for measures with water savings.
  - **Rationale:** In PY2014 and PY2015, the previous Evaluators found that the embedded demand reductions (kWh savings multiplied by a factor of 0.000104 kW/kWh) for all installations were calculated using energy savings that already included the embedded energy savings. This is incorrect; embedded demand reductions should be calculated based on the direct energy impacts only.
  - **Update – Accepted:** This was corrected in PY2016.



- **Recommendation 3:** Use Fort Smith-specific values for embedded water impacts.
  - **Rationale:** In prior years, the weighted average embedded energy and demand intensity values for OG&E’s service territory were used for the MFDI program evaluations. The previous Evaluator has provided OG&E with location-specific factors for indirect water impacts in Fort Smith<sup>28</sup>, which should be used going forward. This approach will lead to more accurate impact estimates since most Arkansas participants are in Fort Smith. It will also allow for greater consistency across the programs, since the Fort Smith values are already being used for water saving measures in the SEE LivingWise program.
  - **Update – Accepted:** Fort Smith embedded energy values were used for all water saving measures.
- **Recommendation 4:** Ensure the absence of rounding errors in parameters that are recorded and tracked in the tracking databases.
  - **Rationale:** Reported values for the “HVAC HSPF” and “HVAC Tonnage” fields in the tracking database were shown as rounded or truncated integer values; this resulted in replication errors for duct sealing measures. The previous Evaluator recommends reporting full values as recorded in the direct install measure calculators.
  - **Update – Accepted:** This has been corrected in the PY2016 data.
- **Recommendation 5:** Determine in-service rate for advanced power strips.
  - **Rationale:** There was a significant increase in the amount of advanced power strip units installed from PY2014 (only 2 units) to PY2015 (1,373 units). The previous Evaluator recommends that OG&E investigate and develop in-service rate factors for advanced power strips. An in-service rate (ISR) study would help quantify persistence of the measure, including assessing if customers use the advanced power strips for applications other than home entertainment systems.

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<sup>28</sup> The previous Evaluator was using embedded rates for Fort Smith results in realization rates of 98% and 93% for energy savings and demand reduction values, respectively, for faucet aerators; these realization rates would be 98% and 94% for low-flow showerheads. The realization rates quoted are based on the PY2015 reported savings that include the double-counting error present in demand reduction calculations.

- **Update – Rejected:** The MFDI program is no longer going to be implemented in PY2017, so there was not an in-service rate (ISR) study performed in PY2016. Site data was used to inform ISRs for PY2016.
- **Recommendation 6:** Record system and device type plugged into installed advanced power strip.
  - **Rationale:** OG&E targets installations of advanced power strips on home entertainment systems. However, the AR TRM version 6.0 has deemed savings for a wide variety of peripheral devices on two general system types: 1) home entertainment, and 2) home office. The TRM also has average deemed values that represent an application with average kWh and kW impacts. Because the deemed savings vary significantly with system and device type, and since the impacts are considerably smaller for the home office and “average” system applications, actively recording and tracking the system application for all installations will streamline the evaluation process and will lead to more accurate reported and evaluated savings estimates.
  - **Update – In Progress:** These data points were not yet tracked in PY2016. An average value from the Arkansas TRM version 6.0 was used in its place.

#### 4.1.10 Adherence to Protocol A

The tracking system in the database conforms reasonably well to the tracking system protocol developed for use in Arkansas. These bullets below show a summary of how well the program tracking systems meets the components of the protocol.

- Participating Customer Information – includes all information required including customer contact information, customer identifier (account number), location of building, and date completed. There were some issues with accurate contact information.
- Measure Specific Information – includes type and quantity of measures installed. Could capture type of lighting replaced with CFL and location in the home, and where the advanced power strip was plugged in, and what devices were plugged into it.
- Measure Codes – this was not applicable; description fields could be used for a measure description such as aerator, CFL, or others.
- Vendor Specific Information – this was included in the dataset.

- Marketing and Outreach Activities – One-on-one outreach made by implementation contractor with building owners/property managers continues to be effective form of marketing.

#### 4.1.11 Planned Program Changes

OG&E plans to remove this program from the portfolio in PY2017. The measures and delivery channel will be added to another, more comprehensive residential program for the next planning cycle.

#### 4.1.12 Conclusions & Program Recommendations

##### 4.1.12.1 Conclusions

Based on the findings from the PY2016 evaluation, ADM has developed the following conclusions based on the impact and process evaluations for PY2016:

- Program ex post energy (kWh) savings increased slightly from 4,408,073 kWh in PY2015 to 4,576,545 kWh in PY2016. Net energy savings (kWh) totaled 4,110,839 kWh, exceeding the program goal by 44.2% above goal.
- Duct sealing accounted for roughly the same share of expected energy savings (kWh) in PY2016 as in PY2015 (69.3% vs 64.9%). Air sealing saw an increase in energy savings (kWh) from PY2015 to PY2016 (8.8% vs. 18.1%).
- Key program changes included the addition of LEDs in PY2016. In PY2015, CFLs comprised 4.4% of the energy savings (kWh), and in PY2016 the energy savings (kWh) associated with CFLs dropped to 2.2%, and LEDs were 1.0% of the expected energy savings (kWh).
- CLEAResult has established contacts with the multi-family segment and does most of the program's outreach through cold calling and discussing the program during face-to-face meetings. Both the OG&E program manager and the implementer program manager stated that feedback from participants is very positive and that customers are highly satisfied.

##### 4.1.12.2 Recommendations

Based on the findings from the PY2016 evaluation, ADM has developed the following recommendations based on the impact and process evaluations for PY2016:

- **Increase and refine marketing activities in PY2017.** Program marketing was limited during PY2016 and primarily consisted on direct outreach performed by the implementation contractor. To continue to serve new multifamily customers or update previous participants on new program offerings, the evaluation team recommends that the MFDI program staff explore fresh marketing approaches within the new Residential Solutions program concept. Possibilities could include

as a stronger web site presence, or actively marketing to past participants to raise awareness of program changes and new available measures. There is also an opportunity for CLEAResult to work with contractors to implement improved program promotion strategies in the upcoming program years.

- **Record system and device type plugged into installed advanced power strip.** The lack of this data point led to lower realization rates for this measure in PY2016.
- **Focus on increasing the completeness of customer contact information.** Strategies may include incorporating data validation elements in the Catalyst system, periodic reviews of records by staff, and trade ally training that emphasizes the importance of providing complete information.
- **In PY2017 consider adding attic insulation.** This measure may be a cost-effective addition to the program, as it is also included in the OG&E/AOG Weatherization (Unified Wx) program.
- **Develop an approach to ensure full documentation is collected as part of standard program practices.** Examples of documentation to collect include the application, invoice, and pre- and post-installation photos. Ensure that applications are included for all available measures, and that they are filled out correctly, and completed in a consistent manner by trade allies.
- **Focus on creating a uniform approach to site visits to improve site verification findings on duct sealing and air insulation.** Create a uniform approach to site assessment and measure installation performance standards to ensure that trade allies, program QA/QC procedures, and evaluator site visit data collection procedures are aligned. Alignment of these standards will improve the consistency and quality of program projects and improve realization rates. It will also improve the overall efficiency of the program by reducing the number of issues program QA/QC staff identify that require correction.

The table below presents the above items, outlining the relevant issue, potential consequences, and associated recommendations.

Table 4-20 Recommendations from PY2016 Evaluation

Issue	Consequences	Recommendation
Program marketing was limited during PY2016	Potential missed opportunity with new program participants and previous program participants	Increase and refine marketing activities in PY2017
Data not provided on which appliances power strips are used with	The lack of this data point led to lower realization rates for this measure in PY2016.	Record system and device type plugged into installed advanced power strip
Participant contact information incomplete	Restricts evaluators ability to collect needed information from all participants and may negatively impact sample size or lead to sample bias.	Focus on increasing the completeness of customer contact information
Attic insulation not included in the program	Potential missed energy efficiency opportunity. ADM recognizes that this measure may not be a cost-effective measure for this program.	Consider adding attic insulation in PY2017
Trade allies provided incomplete project documents	Potential missing information affecting savings calculations	Develop an approach to ensure full documentation is collected as part of standard program practices
Inconsistent quality of work performed and highly variable project realization rates.	Potential for customer dissatisfaction and poor program performance. Inefficiency resulting from corrections needed to address identified issues.	Create a uniform approach to site visits to improve site verification findings on duct sealing and air insulation

## 4.2 Student Energy Education – LivingWise® Program

### 4.2.1 Evaluation Findings

Table 4-21 outlines the ex ante and verified ex post lifetime energy (kWh) savings by measure for the PY2016 Student Energy Education (SEE) LivingWise program.

Table 4-21 Gross Electric Savings Summary by Measure for PY2016

Measure	Ex Ante Energy (kWh) Savings	Ex Post Energy (kWh) Savings	kWh Realization Rate	Ex Ante Peak kW Savings	Ex Post Peak kW Savings	kW Realization Rate
CFL Bulbs	95,431	103,608	108.6%	15.52	17.75	114.4%
LED Bulbs	49,836	81,177	162.9%	8.10	13.91	171.7%
Showerhead	249,942	229,771	91.9%	25.99	23.90	92.0%
Kitchen Aerator	26,728	24,839	92.9%	2.78	2.58	92.8%
Bathroom Aerator	42,284	38,614	91.3%	4.40	4.02	91.4%
<b>Total</b>	<b>464,221</b>	<b>478,009</b>	<b>103.0%</b>	<b>56.79</b>	<b>62.16</b>	<b>109.5%</b>

Table 4-22 outlines the estimates for natural gas savings (therms) by measure for the PY2016 SEE LivingWise program. Propane savings (gallons) are reported in Section 4.2.7, which focuses on the NEBs for this program.

Table 4-22 Gross Gas Savings Summary by Measure for PY2016

Measure	Ex Ante Therm Savings	Ex Post Therm Savings	Therms Realization Rate	Ex Ante Peak Therm Savings	Ex Post Peak Therm Savings
CFL Bulbs	0.00	0.00	n/a	0.00	0.00
LED Bulbs	0.00	0.00	n/a	0.00	0.00
Showerhead	6,332.00	5,837.00	92.2%	0.00	17.51
Kitchen Aerator	677.00	631.00	93.2%	0.00	1.89
Bathroom Aerator	1,071.00	981.00	93.2%	0.00	2.94
<b>Total</b>	<b>8,080.00</b>	<b>7,449.00</b>	<b>91.6%</b>	<b>0.00</b>	<b>22.34</b>

Table 4-23 outlines the ex ante and verified ex post lifetime energy (kWh) savings by measure for the PY2016 SEE LivingWise program.

Table 4-23 Gross Lifetime Savings Summary by Measure for PY2016

Measure	Estimated Useful Lifetime (EUL) Tier One	Estimated Useful Lifetime (EUL) Tier two	Ex Post Lifetime Energy Savings (kWh)
CFL Bulbs	7	3	864,806
LED Bulbs	7	13	909,656
Showerhead	10	n/a	2,297,713
Kitchen Aerator	10	n/a	248,387
Bathroom Aerator	10	n/a	386,140
<b>Total</b>			<b>4,706,702</b>

Table 4-24 presents the net energy savings (kWh) summary, by measure, for the PY2016 SEE LivingWise program. The overall program NTG ratio is 101.9%.

Table 4-24 Net Savings Summary

Measure	Net-to-Gross (NTG)	Ex Post Net Energy Savings (kWh)	Ex Post Net Demand Savings (kW)	Net Lifetime Energy Savings (kWh)
CFL Bulbs	93.90%	97,287	16.67	812,053
LED Bulbs	93.90%	76,201	13.06	853,894
Showerhead	107.70%	247,372	25.73	2,473,718
Kitchen Aerator	113.60%	28,219	2.93	282,192
Bathroom Aerator	113.60%	43,869	4.56	438,693
<b>Total</b>	<b>101.90%</b>	<b>492,948</b>	<b>62.95</b>	<b>4,860,550</b>

Figure 4-5 below is a summary of the gross and net energy savings (kWh) impacts by measure for the SEE LivingWise program and Figure 4-6 below is a summary of the gross and net demand reduction (kW) impacts by measure for the LivingWise program

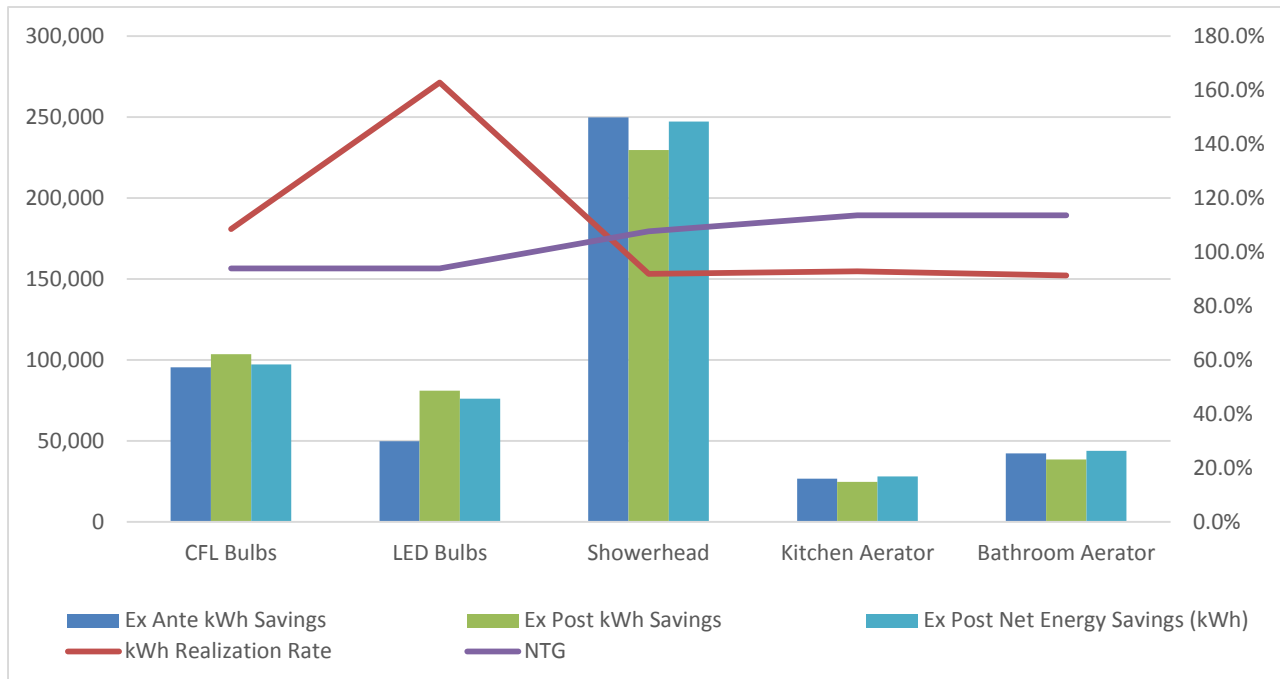


Figure 4-5 Energy Savings (kWh) Summary for PY2016

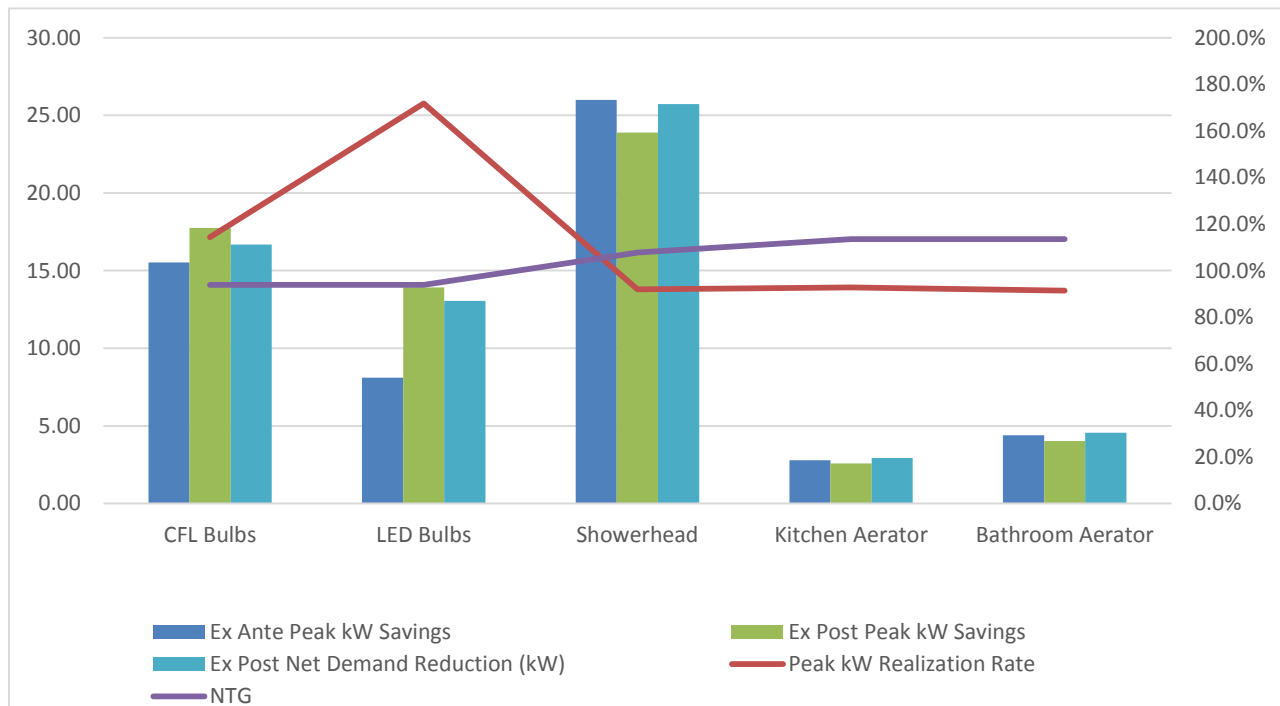


Figure 4-6 Demand Reduction (kW) Summary for PY2016

Additional details, including approaches, are found in the following sections.



#### 4.2.2 Program Overview

The Student Energy Education LivingWise® (SEE LivingWise) program is a turnkey program, with all activities managed directly by the provider, Resource Action Programs (RAP). Nothing in the structure or delivery of the program in PY2016 changed from the previous years and the items in the kit remained the same as PY2015. So, our description of the program and its compliance with Arkansas guidelines are the same. For completeness, we largely repeat that here from our previous evaluation reports, with updates as appropriate. Additional details about the program implementation are included in the process and impact evaluation discussion later in this report.

The purpose of the SEE LivingWise program is to shape household behaviors about resource (energy and water) use and encourage reduced energy use through a combination of information about resource efficiency and access to efficient products. The program has been in operation since 2008. Under the program, 6<sup>th</sup> grade students in participating schools are each provided with a take-home kit containing energy and water efficiency devices and are exposed to information about energy efficiency, both in the classroom and through materials in the kit.

RAP implements its LivingWise® program by enrolling schools and furnishing the materials and training to teachers who then conduct the in-classroom lessons and provide the students with take-home kits that contain several energy and water savings devices, along with additional information about how to install the devices and save resources.

The PY2016 LivingWise® kits included:

- One low-flow showerhead;
- Two 23 watt CFL Bulbs;
- Two 9 watt LED Bulbs;
- One kitchen and one bathroom faucet aerator;
- One LED nightlight; and
- Other items designed to help families check for energy inefficiencies in their homes, and a curriculum for teachers.

Both the kits and the RAP website contain explicit instructions on how to install each of the items. A participant is defined as a student. Under the program, each participant is issued a kit with the above noted items. The impacts the program expects to realize and that OG&E is reporting, derive from the installation of four item types (seven individual items) in the kit:

- One low-flow showerhead;
- Two 23 watt CFL Bulbs;
- Two 9 Watt LED Bulbs; and
- One kitchen and one bathroom faucet aerator.

OG&E claims no impacts for the other items in the kit.

To meet the program objectives and impact goals, OG&E provides RAP with a list of potential schools eligible to participate. Each year, RAP researches the number of eligible students/schools in the area. Teachers may enroll in any of several ways—via telephone, email, or website. RAP also mails letters to and calls the schools each year. Teachers can also contact RAP or OG&E to request inclusion of their classes in the program. RAP confirmed that they have no trouble enrolling teachers into the program to meet the goal for number of kits distributed. The number of kits available is limited by the program budget. To optimize savings, RAP prioritizes teacher invitations based, in part, on their demonstrated past performance, as evidenced by returns in the student surveys. Once the quota is reached each year, RAP stops recruitment. RAP confirmed that once recruited, no teacher is turned away. The RAP manager told us that the company keeps in contact with the enrolled teachers.

In PY2016, 2,204, 2,160 students and 44 teachers, received kits in the SEE LivingWise program. Below, Table 4-25 summarizes the total number of kits were installed, total measures distributed and the expected kWh and peak kW savings, by measure. The SEE LivingWise program had \$89,777 in budget allocated for PY2016, and expended \$89,777, exactly 100% of the budget.<sup>29</sup>

Table 4-25 OG&E’s PY2016 SEE LivingWise Program Summary

Measure	# of Measures to Students	# of Measures to Teachers	# of kits	Ex Ante Energy (kWh) Savings	Ex Ante Peak kW Savings
CFL Bulbs	4,320	88	2,160 students & 44 teachers	95,431	15.52
LED Bulbs	4,320	88		49,836	8.10
Showerhead	2,160	44		249,942	25.99
Kitchen Aerator	2,160	44		26,728	2.78
Bathroom Aerator	2,160	44		42,284	4.40
<b>Total</b>	<b>15,120</b>	<b>308</b>	<b>2,204</b>	<b>464,221</b>	<b>56.79</b>

<sup>29</sup> The value reported in the RBudget, for PY2016 Abudget was \$88,315, which is well within the 10% adjustment allowed with in each program year.

Figure 4-7 summarizes the both number of units and energy savings (kWh) by month as determined by the date of kit delivery. The left axis and the line represent the total number of kits distributed, and the right axis and the bars represent the total energy savings (kWh) in the specified month of PY2016.

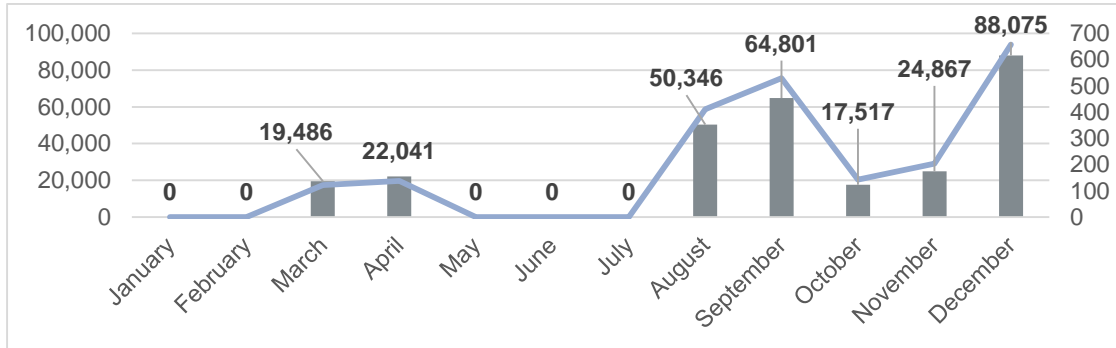


Figure 4-7 SEE LivingWise Number of Rebates and Ex Ante Savings by Month

The drop-in kits during the summer months reflects the months in which students are enrolled in school.

### 4.2.3 Impact Evaluation

At the outset of each program year, RAP calculates an average per-kit savings based on the then most current TRM<sup>30</sup> and some assumptions about installation and net -to-gross rates. Later in the year, RAP updates the estimates to make use of guidelines in the new TRM issued during the program year. RAP sends electronic reports to OG&E throughout the year on the number of kits delivered to classrooms and the associated impacts. RAP provides OG&E with a final report after the program year is complete that shows the number of kits delivered, as well as their final estimates of annual kWh and kW impacts for the program year.

OG&E maintains a tracking system that shows the number of participants in the program each year and recorded impacts. The data are provided by RAP and transferred into the Saratoga tracking system by OG&E. OG&E uses the participation information and impact estimates provided by RAP as the reported amounts for the program year.

For measures rebated through the PY2016 SEE LivingWise program, calculation methodologies were performed as described in the AR TRM version 6.0. Table 4-26 identifies the sections in the TRM that were used for verification of measure-level savings under the SEE LivingWise.

<sup>30</sup> The current version of the Arkansas TRM is version 6.0 found here: [www.apscservices.info/EEInfo/TRM6.pdf](http://www.apscservices.info/EEInfo/TRM6.pdf)

Table 4-26 TRM Sections by Measure Type

Measure	Section in TRM
CFL and LED Bulbs	2.5.1
Faucet Aerators	2.3.4
Low Flow Showerhead	2.3.5

The impact evaluation effort of the SEE LivingWise program included the following:

- **Desk Review of Residential Calculations.** The Evaluators utilized TRM VERSION 6.0 values in assessing savings from residential measures found within each kit.
- **Net-to-Gross Estimation.** The Evaluators applied 2015 Net-to-Gross (NTG) rates to 2016 program participants.

In addition to the TRM, the Evaluators also examined the Excel workbook utilized by implementation staff (RAP) to assess savings by project. The workbook utilizes TRM savings algorithms to estimate per kit savings based on input parameters, and was reported in net numbers. The Evaluators verified the project savings for each kit to ensure the values were appropriate, and applied those values to the number of kits that were distributed in the program for PY2016.

**4.2.3.1 Compliance with TRM 6.0**

The Evaluators replicated the example results in the most recently published Arkansas TRM version 6.0, for each of the measures, ensuring we could properly apply them. We then used the algorithms to estimate the impacts in OG&E’s Arkansas service territory, using default input values for Fort Smith and program-specific data from participants. The TRM version 6.0 algorithms and resulting estimates in Table 4-27 represent energy and demand impacts per measure installed.

Table 4-27 Average TRM-Calculated Impacts by Measure, Per Unit Installed

Measure	Annual kWh Savings	Annual kW Reduction	Annual Therms	Peak Therms
Kitchen Aerator	15.26	0.004	1.45	0.004
Bathroom Aerator	25.50	0.006	2.42	0.007
Showerhead	305.67	0.040	12.94	0.030
CFL Bulb #1	41.90	0.002	n/a	n/a
CFL Bulb #2	41.90	0.004	n/a	n/a
LED Bulb #1	29.10	0.004	n/a	n/a
LED Bulb #2	29.10	0.004	n/a	n/a

The electrical impacts for aerators and showerheads in Table 4-27 are a weighted average of TRM-derived results for electric resistance (53%) and heat pump (3.1%) water heaters.

The student surveys from PY2015<sup>31</sup> were used to estimate the average percent of electric resistance water heaters across the population. As the surveys did not identify heat pumps separately from electric resistance, the following method was employed to calculate the estimated heat pump shares.

For aerator and showerhead measures, an assumed 2.9% heat pump water heater (HPWH) saturation across all fuel types in single family homes was used to estimate the saturation of HPWH within the electric water heater population. To do so, 2.9% of the 650 PY2016 survey responses regarding water heater fuel were assumed to be HPWH; the rounded value was then taken out of the number of total electric water heater responses for each teacher's sample resulting in an average 3.1% HPWH saturation across all water heaters and an average 5.8% saturation across electric water heaters.

For the CFL measures, data from the 2009 Residential Energy Consumption Survey (RECS)<sup>32</sup> was analyzed to determine the relative saturation of heat pump HVAC systems among homes with electric resistance heating and AC.<sup>33</sup> This 11.5% saturation was then used to break out heat pump HVAC systems from the total LivingWise survey respondents that identified their HVAC system as electric resistance heating with AC (central or otherwise). The resultant relative weights for each type of HVAC system in TRM 6.0 were then used to determine weighted interactive effects factors (IEF) for electrical energy and demand impacts for systems with electric and direct-fuel space heating, as seen in Table 4-27. The impacts for CFL installations in Table 4-28 also consider the relative fuel share of electric versus direct-fuel (i.e., non-electric) space heating.

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<sup>31</sup> This was pulled from the PY2015 Evaluation Report performed by the previous Evaluator, this survey data was not provided in PY2016.

<sup>32</sup> Residential Energy Consumption Survey. U.S. Energy Information Administration. RECS Public Use Microdata File (Data for AR, LA, OK States). 2009. Accessed at: <http://www.eia.gov/consumption/residential/data/2009/>

<sup>33</sup> HVAC equipment saturations in tables B.1 and B.2 of the 2015 Arkansas Energy Efficiency Potential Study were provided for three segments (single family, multi-family and manufactured homes) and provided saturation values for both heating and cooling systems. While the values did not contradict the RECS 2009 data, they did not provide analogous equipment breakdowns to allow for using the potential study values in the derivation of IEFs.

Table 4-28 Derivation of Weighted Interaction Factors for CFL Impacts

Fuel Type	HVAC System Type from TRM 6.0	IEF Energy	IEF Demand	Survey Weights	IEF Energy	IEF Demand
Gas, Oil, Wood, Propane, Other	Gas Heat with AC	1.10	1.29	17%	1.09	1.27
	Gas Heat with No AC	1.00	1.00	3%		
Electric	Electric Resistance with AC	0.83	1.29	58%	0.84	1.28
	Electric Resistance with no AC	0.73	1.00	1%		
	Heat Pump	0.96	1.29	8%		

We show how the algorithms were applied in the results for each measure in the following subsection. To estimate the overall program impacts and those realized per participant, following guidelines from the IEM about using as much reliable program-specific data as possible to inform the impact estimates. We used the following data from the participant surveys to estimate the per-participant and total program impacts by measure reported below:

- Wattage of the existing lamps replaced by each of the CFLs in the kit (included in the per-unit impacts in Table 4-28);
- Share of heating and cooling system types, with electric resistance/ AC system types broken out to include heat pump systems, electric versus natural gas space heating, and electric versus natural gas water heating; and
- Installation rate of each measure.

**4.2.3.2 Energy Savings Calculations**

Three measures accounted for 85.1% of the gross savings for the SEE LivingWise program: showerheads, CFL Bulbs, and LED Bulbs. The contribution to savings by measure can be found in Figure 4-4. The calculation methodologies for these measures are detailed in the following sections.

Figure 4-8 Contributions to Ex Ante Energy Savings by Measure in PY2016 reports both total savings and percentage of total savings for each measure in the SEE LivingWise program. The bars represent ex ante energy savings (kWh) and the line and data callouts represent the percentage of total program energy savings (kWh).

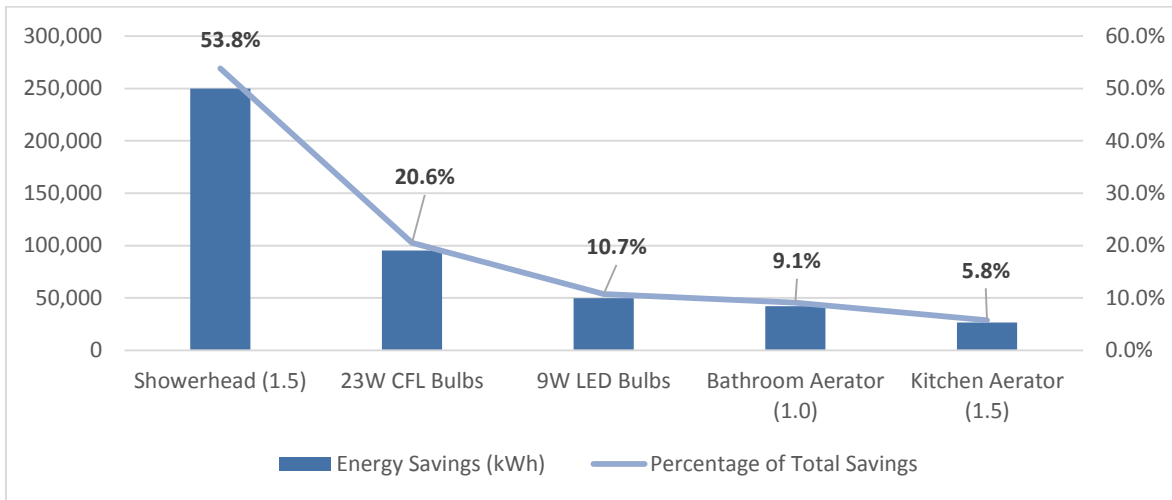


Figure 4-8 Contributions to Ex Ante Energy Savings by Measure in PY2016

#### 4.2.3.3 CFL Bulbs

CFL bulb savings were calculated using the following savings algorithms from the Arkansas TRM version 6.0 document. This measure provides a method for calculating savings for replacing an incandescent lamp with a standard CFL in residential applications.

##### 4.2.3.3.1 Baseline

The baseline equipment is assumed to be an incandescent or halogen lamp with adjusted baseline wattages compliant with EISA 2007 regulations dictate higher efficiency baseline lamps.

The first Tier of EISA 2007 regulations were phased in from January 2012 to January 2014. Beginning January 2012, a typical 100W lamp wattage was reduced to comply with a maximum 72W lamp wattage standard for a rated lumen output range of 1,490-2,600 lumens. Beginning January 2013, a typical 75W lamp wattage was reduced to comply with a maximum 53W lamp wattage standard for a rated lumen output range of 1,050-1,489 lumens. Beginning January 2014, typical 60W and 40W lamp wattages were reduced to comply with maximum 43W and 29W lamp wattage standards for rated lumen output ranges of 750-1,049 and 310-749 lumens.

The second Tier of EISA 2007 regulations go into effect beginning January 2020. At that time, general service lamps must comply with a 45 lumen per watt efficacy standard.



Since the EUL of some lamps in this measure extend beyond that date, the baseline should be adjusted to the second Tier for any years after 2022.<sup>34</sup>

**4.2.3.3.2 Estimated Useful Life (EUL)**

The measure life assumes an average daily use of 2.17 blended hours for indoor/outdoor applications and applies a 0.688224 degradation factor to indoor residential CFLs.

Note that the EUL for CFLs are incremented each program year so that the first-tier values do not exceed 2023 minus the program year. For PY 2016, the first-tier measure life cannot exceed the result of 2023 - 2016, which is equal to 7 years. The remainder of the measure life is applied to the second tier.

**4.2.3.3.3 Coincidence Factor**

Cadmus performed a residential light logging study in 2013 in Arkansas on behalf of Entergy. This study estimated a mean coincidence factor of 10 percent for non-holiday summer weekdays from 3:00 p.m. to 7:00 p.m.

**4.2.3.3.4 Energy Savings**

$$kWh_{savings} = \left( (W_{base} - W_{post}) / 1000 \right) \times Hours \times ISR \times IEF_E$$

Where:

*Wbase* = Based on wattage equivalent of the lumen output of the purchased CFL lamp and the program year purchased/installed

*Wpost* = Actual wattage of CFL purchased/installed

*Hours* = Average hours of use per year

*IEFE* = Interactive Effects Factor to account for cooling energy savings and heating energy penalties; this factor also applies to outdoor and unconditioned spaces

*ISR* = In Service Rate, or percentage of rebate units that get installed, to account for units purchased but not immediately installed

When the EISA 2007 standard goes into effect for a CFL, the reduced wattage savings should be claimed for the rest of the measure life. For example, up until 2022, a 20W

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<sup>34</sup> First tier EISA compliant halogens have a lifetime of 4 years (3,000 hours at 2.17 hours per day). The last year these lamps are available is 2019, and they will need replacement at the end of 2022. Thus, the new standard must be used after 2022.



CFL with 1200 lumens may claim a 53W baseline. After 2022, the baseline becomes 27W for the remainder of the measure life.

**4.2.3.3.5 Summer Peak Demand Savings**

$$kW_{savings} = \left( (W_{base} - W_{post}) / 1000 \right) \times CF \times ISR \times IEF_D$$

Where:

*CF* = Summer Peak Coincidence Factor for measure

*IEFD* = Interactive Effects Factor to account for cooling demand savings; this factor also applies to outdoor and unconditioned spaces

**4.2.3.4 Aerator**

Aerator savings were calculated using the following savings algorithms from the Arkansas TRM version 6.0 document. This measure involves retrofitting aerators on kitchen and bathroom water faucets. The savings values are per faucet aerator installed. It is not a requirement that all faucets in a home be treated for the deemed savings to be applicable.

The deemed savings values are for residential, retrofit-only installation of kitchen and bathroom faucet aerators.

**4.2.3.4.1 Effect of Weather Zones on Water Usage and Water Main Temperature**

Average water main temperatures for weather zone 8 for Ft. Smith Arkansas weather zones is 66.1.

The water main temperature data was approximated using the following formula.<sup>35</sup>

$$T \text{ of water main} = T_{avg \text{ ambient}} + R \times \Delta T_{amb}$$

Where:

*R* = 0.05

*Tavg ambient* = the average annual ambient dry bulb temperature

$\Delta T_{amb}$  = the average of maximum and minimum ambient air dry bulb temperature for the month  $(T_{max} + T_{min}) / 2$  where  $T_{max}$  = maximum ambient dry bulb temperature for the month and  $T_{min}$  = minimum ambient dry bulb temperature for the month

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<sup>35</sup> Burch, J. & Christensen, C. 2007. "Towards Development of an Algorithm for Mains Water Temperature" Proceedings of the 2007 ASES Annual Conference, Cleveland, OH.

Baseline and efficiency standard water usages per capita were derived from an analysis of metered studies of residential water efficiency retrofit projects conducted for Seattle, WA, the East Bay Municipal Utility District (CA), and Tampa, FL. Table 4-30 provides the estimates for derivation of water usage values.

**4.2.3.4.2 Estimated Hot Water Usage Reduction**

$$Water\ consumption = \frac{\frac{Faucet\ Use\ per\ Person}{Day} \times Occupants\ per\ Home \times \frac{365\ Days}{Year}}{Faucets\ per\ Home}$$

Applying the formula to the values used for Arkansas returns the following values for baseline and post water consumption.

Baseline (2.2 gpm):  $9.7 \times 2.69 \times 365 / 3.86 = 2,467$

Post (1.5 gpm):  $8.2 \times 2.69 \times 365 / 3.86 = 2,086$

Post (1.0 gpm):  $7.2 \times 2.69 \times 365 / 3.86 = 1,831$

Gallons of water saved per year can be found by subtracting the post consumption in gallons per year per aerator from the baseline consumption.

Gallons of water saved per year (1.5 gpm):  $2,467 - 2,086 = 381$

Gallons of water saved per year (1.0 gpm):  $2,467 - 1,831 = 636$

Table 4-29 Estimated Aerator Hot Water Usage Reduction

Assumption Type	Value used
Faucet use gallons/person/day (baseline)	9.70
Faucet use gallons/person/day (1.5 gpm)	8.20
Faucet use gallons/person/day (1.0 gpm)	7.20
Occupants per home	2.69
Faucets per home	3.86
Gal./yr./faucet (baseline)	2,467.00
Gal./yr./faucet (1.5 gpm)	2,086.00
Gal./yr./faucet (1.0 gpm)	1,831.00
Percent hot water	66.9%
Water gallons saved/yr./faucet (1.5 gpm)	381.00
Water gallons saved/yr./faucet (1.0 gpm)	636.00

Based on the average percentage hot water shown in Table 4-30, the average mixed water temperature across all weather zones was determined. The hot water temperature was assumed to be 120°F.<sup>36</sup>

**4.2.3.4.3 Energy Savings – Faucet Aerators**

$$Annual\ Energy\ Savings = \frac{\rho \times C_P \times V \times (T_{Mixed} - T_{Supply}) \times \left(\frac{1}{RE}\right)}{Conversion\ Factor}$$

Where:

$\rho$  = Water density = 8.33 lb/gal

$C_P$  = Specific heat of water = 1 BTU/lb·°F

$V$  = gallons of water saved per year per faucet

$T_{Mixed}$  = Mixed water temperature, 102.6°F (average for Arkansas)

$T_{Supply}$  = Average supply water temperature

$RE$  = Recovery Efficiency (or in the case of HPWH, EF); if unknown, use 0.98 as a default for electric resistance water heaters, 2.2 for heat pump water heaters, or 0.79 for natural gas water heaters

$Conversion\ Factor$  = 3,412 Btu/kWh for electric water heating or 100,000 Btu/Therm for gas water heating

**4.2.3.4.4 Demand Savings – Faucet Aerators**

Demand savings for homes with electric water heating were calculated using the following formula:

$$kW_{savings} = kWh_{savings} \times Ratio_{Annual\ kWh}^{Peak\ kW}$$

Where:

$Ratio_{Annual\ kWh}^{Peak\ kW} = 0.000104$

This value is taken from the DOE domestic hot water use study. The DOE domestic hot water use study provided values for the share of daily water use per hour in a profile for shower bath, and sink hot water use. An average was calculated using peak hours of 3

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<sup>36</sup> Review of water heater information from Rheem and GE shows that most water heaters are usually at the factory setting of 120F120°F. Note that the temperature of the water at faucet is likely to be lower, due to thermal losses in the water pipe system within the home, and tempering of the water temperature by the user.

PM to 6 PM to generate an average hourly share of daily water use during peak hours. That value was divided by 365 to generate a ratio of peak share to annual use.

For homes with gas water heaters, peak day therm savings were calculated as follows:

$$Peak\ Therms_{savings} = Annual\ Therm_{savings} \times Ratio_{\frac{Peak\ Therms}{Annual\ Therms}}$$

Where:

$$Ratio_{\frac{Annual\ Therms}{Peak\ Therms}} = 0.003$$

This value is based on DOE’s Domestic Hot Water Event Schedules. The ratio was developed by identifying the coldest average water main temperature day for the year. Then the corresponding hot water consumption for that day was used to calculate a ratio related to annual therms consumption.

#### 4.2.3.5 Showerhead 1.50 GPM

Showerhead savings were calculated using the following savings algorithms from the Arkansas TRM version 6.0 document. This measure consists of removing existing showerheads and installing low-flow showerheads in residences. This measure applies to all residential applications.

##### 4.2.3.5.1 Effect of Weather Zones on Water Usage and Water Main Temperature

Average water main temperatures for weather zone 8 for Ft. Smith<sup>37</sup> Arkansas weather zones is 66.1. The water main temperature data was approximated using the following formula.<sup>38</sup>

$$T\ of\ water\ main = T_{avg\ ambient} + R \times \Delta T_{amb}$$

Where:

$$R = 0.05$$

$T_{avg\ ambient}$  = the average annual ambient dry bulb temperature

$\Delta T_{amb}$  = the average of maximum and minimum ambient air dry bulb temperature for the month  $(T_{max} + T_{min})/2$  where  $T_{max}$  = maximum ambient dry bulb temperature for the month and  $T_{min}$  = minimum ambient dry bulb temperature for the month

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<sup>37</sup> All projects are assumed to be in weather zone 8 for the OG&E residential programs.

<sup>38</sup> Burch, J. & Christensen, C. 2007. “Towards Development of an Algorithm for Mains Water Temperature” Proceedings of the 2007 ASES Annual Conference, Cleveland, OH.

**4.2.3.5.2 Estimated Hot Water Usage Reduction**

Baseline and efficiency standard water usages per capita were derived from an analysis of metered studies of residential water efficiency retrofit projects conducted for Seattle, WA<sup>39</sup>, the East Bay Municipal Utility District (CA)<sup>40</sup>, and Tampa, Florida. Table 4-30 provides the estimates for derivation of water usage values.

Table 4-30 Estimated Showerhead Hot Water Usage Reduction

Assumption Type	Value used
Gallons/shower @ 2.5 gpm (baseline)	20.7
Gallons/shower @ 2.0 gpm	16.5
Gallons/shower @ 1.5 gpm	12.4
Showers/person/day (baseline)	0.69
Showers/person/day (post)	0.72
Occupants per home	2.69
Showerheads per home	1.62
Water gal./yr./showerhead @ 2.0 gpm saved	1,457
Water gal./yr./showerhead @ 1.75 gpm saved	2,351
Water gal./yr./showerhead @ 1.5 gpm saved	3,246
Percent hot water	70.1%

To determine water consumption, the following formula was used:

$$\frac{\text{Gallons}}{\text{Shower}} \times \frac{\text{Showers per Person}}{\text{Day}} \times \frac{365 \text{ Days}}{\text{Year}} \times \frac{\text{Occupants per Home}}{\text{Showerheads per Home}}$$

Applying the formula to the values for Arkansas from Table 4-30 returns the following baseline and post water consumption.

Baseline (2.5 gpm):  $20.7 \times 0.69 \times 365 \times 2.69 / 1.62 = 8,657$

Post (2.0 gpm):  $16.5 \times 0.72 \times 365 \times 2.69 / 1.62 = 7,200$

Post (1.5 gpm):  $12.4 \times 0.72 \times 365 \times 2.69 / 1.62 = 5,411$

Although the referenced studies do not provide data on 1.75 gpm showerheads, the consumption values for 2.5, 2.0, and 1.5 gpm roughly follow a linear pattern. Taking a

<sup>39</sup> Seattle Study: Average of pre-retrofit percent shower hot water 73.1% on page 35, and post-retrofit percent shower hot water 75.5% on p. 53.

<sup>40</sup> East Bay Study: Average of pre-retrofit percent shower hot water 71.9% on page 31 and post-retrofit shower hot water percentage 60.0% on p. 54.

simple average of the consumption for 2.0 and 1.5 gpm showerheads returns a value for a 1.75 gpm showerhead:

Post (1.75 gpm):  $(7,200 + 5,411) / 2 = 6,306$

Gallons of water saved per year can be found by subtracting the post consumption in gallons per year per showerhead from the baseline consumption. These values are also in Table 4-31.

Gallons of water saved per year (2.0 gpm):  $(8,657 - 7,200) = 1,457$

Gallons of water saved per year (1.75 gpm):  $(8,657 - 6,306) = 2,351$

Gallons of water saved per year (1.5 gpm):  $(8,657 - 5,411) = 3,246$

Table 4-31 Estimated Showerhead Hot Water Usage Reduction

Assumption Type	Value used
Gallons/shower @ 2.5 gpm (baseline)	20.7
Gallons/shower @ 2.0 gpm	16.5
Gallons/shower @ 1.5 gpm	12.4
Showers/person/day (baseline)	0.69
Showers/person/day (post)	0.72
Occupants per home	2.69
Showerheads per home	1.62
Water gal./yr./showerhead @ 2.0 gpm saved	1,457
Water gal./yr./showerhead @ 1.75 gpm saved	2,351
Water gal./yr./showerhead @ 1.5 gpm saved	3,246
Percent hot water	70.1%

Based on the average percentage hot water shown in Table 4-31, the average mixed water temperature across all weather zones was determined. The hot water temperature was assumed to be 120°F.<sup>41</sup>

<sup>41</sup> Review of water heater information from Rheem and GE shows that most water heaters are usually at the factory setting of 120°F. Note that the temperature of the water at faucet is likely to be lower, due to thermal losses in the water pipe system within the home, and tempering of the water temperature by the user.

Table 4-32 Mixed Water Temperature Calculation

Weather Zone	Average Water Main Temperature (°F)	Percent Hot Water	Mixed Water Temperature (°F)
8 – Fort Smith	66.1	70.10%	103.9
Average for Arkansas (TMixed)			104.3

**4.2.3.5.3 Energy Savings**

$$Annual\ Energy\ Savings = \frac{\rho \times C_p \times V \times (T_{Mixed} - T_{Supply}) \times \left(\frac{1}{RE}\right)}{Conversion\ Factor}$$

Where:

$\rho$  = Water density = 8.33 lb/gallon

$CP$ = Specific heat of water = 1 BTU/lb·°F

$V$  = 2.0, 1.75, or 1.5 gpm showerhead water gallons saved per year

$TMixed$ = Mixed water temperature, 104.3°F, (average for Arkansas)

$TSupply$ = Average supply water temperature (Water main temperature)

$RE$  = Recovery Efficiency (or in the case of HPWH, EF); if unknown, use 0.98 as a default for electric resistance water heaters, 2.2 for heat pump water heaters, or 0.79 for natural gas water heaters<sup>42</sup>

$Conversion\ Factor$  = 3,412 Btu/kWh for electric water heating or 100,000 Btu/Therm for gas water heating

**4.2.3.5.4 Demand Savings**

Demand savings were calculated using the US Department of Energy’s “Building America Performance Analysis Procedures for Existing Homes”<sup>43</sup> combined domestic hot water use profile which resulted in a ratio of 0.000104 Peak kW to Annual kWh. The DOE domestic hot water use study provided values for the share of daily water use per hour in a profile for shower, bath, and sink hot water use. An average was calculated using peak hours of 3pm to 6pm to generate an average hourly share of daily water use

<sup>42</sup> Default values based on median recovery efficiency of residential water heaters by fuel type in the AHRI database, at [http://cafs.ahrinet.org/gama\\_cafs/sdpsearch/search.jsp?table=CWH](http://cafs.ahrinet.org/gama_cafs/sdpsearch/search.jsp?table=CWH)

<sup>43</sup> U.S. DOE’s 2006, “Building America Performance Analysis Procedures for Existing Homes”. National Renewable Energy Laboratory. May. [www.nrel.gov/docs/fy06osti/38238.pdf](http://www.nrel.gov/docs/fy06osti/38238.pdf)

during peak hours. That value was divided by 365 to generate a ratio of peak share to annual use.<sup>44</sup>

$$kW_{savings} = kWh_{savings} \times Ratio_{Annual kWh}^{Peak kW}$$

**4.2.3.5.5 Peak Day Therm Savings**

The peak day therm ratio was calculated using the US Department of Energy Domestic Hot Water Event Schedules.<sup>45</sup> The ratio was developed by identifying the coldest average water main temperature day for the year. Then the corresponding hot water consumption for that day (0.361 therms) was used to calculate a ratio related to annual therm consumption (105 therms). The resulting ratio was 0.003 Peak Day Therms to Annual Therms (0.361 coldest main temperature therms ÷ 105 annual therms = 0.003 therms savings ratio).

$$Peak Therms_{savings} = Annual Therms_{savings} \times Ratio_{Annual Therms}^{Peak Therms}$$

**4.2.3.6 In-Service Rates (ISR)**

In-Service Rates (ISR) for the program were based on student surveys results. Those ISRs can be found in Table 4-33.

Table 4-33 Measure-level ISRs

Measure	ISR
Bathroom Aerator	56%
Kitchen Aerator	60%
Showerhead	63%
LED Bulb #1	77%
LED Bulb #2	73%
CFL Bulb #1	68%
CFL Bulb #2	64%

<sup>44</sup> At 3pm, the hourly share of daily water use is 0.022, at 4pm is 0.03, at 5pm is 0.04, and at 6pm is 0.06. The average of these values is 0.038. Divided by 365 days, the result is a 0.000104 ratio of peak share to annual use.

<sup>45</sup> Burch, J. & Hendron, R. 2007, U.S. DOE, 2007. Development of Standardized Domestic Hot Water Event Schedules for Residential Builders. June. [www.nrel.gov/docs/fy08osti/40874.pdf](http://www.nrel.gov/docs/fy08osti/40874.pdf)



#### 4.2.4 Verified Savings by Measure

After reviewing the tracking data and inputs for savings calculations, the Evaluators provided verified ex post savings per TRM protocols. The savings from the measures below were verified, and matched, to the calculations provided by RAP:

- Faucet Aerators;
- Showerhead;
- LED Bulbs, and
- CFL Bulbs.

Factors that impacted savings are listed in individual measure sections below. The Evaluators verified measure-level savings per TRM guidelines and obtained results that differed from RAP’s calculations for the following measures:

##### 4.2.4.1 CFL Bulbs (23 Watt, two per kit)

- Each kit included two CFL bulbs
- ISR: CFL 1 (68%), CFL 2 (64%)

Table 4-34 Expected and Realized CFL Savings

Ex Ante kWh Savings	Ex Post kWh Savings	kWh Realization Rate	Ex Ante Peak kW Savings	Ex Post Peak kW Savings	Peak kW Realization Rate
95,431	103,608	108.6%	15.52	17.75	114.4%

##### 4.2.4.2 LED Bulbs (9 Watt, two per kit)

- Each kit included two LED bulbs
- ISR: LED 1 (77%), LED 2 (73%)

The high realization rate for LED bulbs is due to the method for estimating gross energy savings (kWh). Those savings were estimated, for the year, by dividing the lifetime savings by the EUL of the measure. As there are two tiers for LEDs, calculating as such resulted in a low expected savings value and a high realization rate. Although, there is only one tier/baseline for the other measures in the program, so this method of gross value calculation did not weight the other savings values.

Table 4-35 below shows the impact of that approach.

Table 4-35 Expected and Realized LED Savings

Ex Ante kWh Savings	Ex Post kWh Savings	kWh Realization Rate	Ex Ante Peak kW Savings	Ex Post Peak kW Savings	Peak kW Realization Rate
49,836	81,177	162.9%	8.10	13.91	171.7%

**4.2.4.3 Aerators (one 1.0 GPM and one 1.5 GPM per kit)**

- Each kit included one 1.5 GPM kitchen aerator and one 1.0 GPM bathroom aerator
- ISR: Kitchen 1.5 GPM (60%), Bathroom 1.0 GPM (56%)

Table 4-36 Aerator Expected and Realized Electric Savings by GPM

GPM	Ex Ante kWh Savings	Ex Post kWh Savings	kWh Realization Rate	Ex Ante Peak kW Savings	Ex Post Peak kW Savings	Peak kW Realization Rate
Kitchen Aerator	26,728	24,839	92.9%	2.78	2.58	92.9%
Bathroom Aerator	42,284	38,614	91.3%	4.40	4.02	91.3%
<b>Total</b>	<b>69,012</b>	<b>63,453</b>	<b>91.9%</b>	<b>7.18</b>	<b>6.60</b>	<b>91.9%</b>

Table 4-37 Aerator Expected and Realized Gas Savings by GPM

GPM	Ex Ante Therm Savings	Ex Post Therm Savings	Therms Realization Rate	Ex Ante Peak Therm Savings	Ex Post Peak Therm Savings
Kitchen Aerator	677	631	93.2%	0.00	1.89
Bathroom Aerator	1,071	981	91.6%	0.00	2.94
<b>Total</b>	<b>1,748</b>	<b>1,612</b>	<b>92.2%</b>	<b>0.00</b>	<b>4.84</b>

**4.2.4.4 Showerheads (one 1.5 GPM per kit)**

- One showerhead 1.5 GPM is included within each kit
- ISR is 63%

Table 4-38 Showerhead Expected and Realized Electric Savings by GPM

Ex Ante kWh Savings	Ex Post kWh Savings	kWh Realization Rate	Ex Ante Peak kW Savings	Ex Post Peak kW Savings	Peak kW Realization Rate
249,942	229,771	91.9%	25.99	23.90	91.9%

Table 4-39 Showerhead Expected and Realized Gas Savings by GPM

Ex Ante Therm Savings	Ex Post Therm Savings	Therms Realization Rate	Ex Ante Peak Therm Savings	Ex Post Peak Therm Savings
6,332	5,837	92.2%	0.00	17.51

#### 4.2.5 Gross Savings Summary and Findings

Table 4-40 presents the verified ex post energy savings (kWh) results of the PY2016 SEE LivingWise program, by measure.

Table 4-40 Gross Electric Savings Summary by Measure for PY2016

Measure	Ex Ante Energy (kWh) Savings	Ex Post Energy (kWh) Savings	kWh Realization Rate	Ex Ante Peak kW Savings	Ex Post Peak kW Savings	kW Realization Rate
CFL Bulbs	95,431	103,608	108.6%	15.52	17.75	114.4%
LED Bulbs	49,836	81,177	162.9%	8.10	13.91	171.7%
Showerhead	249,942	229,771	91.9%	25.99	23.90	92.0%
Kitchen Aerator	26,728	24,839	92.9%	2.78	2.58	92.8%
Bathroom Aerator	42,284	38,614	91.3%	4.40	4.02	91.4%
<b>Total</b>	<b>464,221</b>	<b>478,009</b>	<b>103.0%</b>	<b>56.79</b>	<b>62.16</b>	<b>109.5%</b>

Table 4-41 presents the gross natural gas savings (therms) by measure for the PY2016 SEE LivingWise program.

Table 4-41 Gross Gas Savings Summary by Measure for PY2016

Measure	Ex Ante Therm Savings	Ex Post Therm Savings	Therms Realization Rate	Ex Ante Peak Therm Savings	Ex Post Peak Therm Savings
CFL Bulbs	0.00	0.00	n/a	0.00	0.00
LED Bulbs	0.00	0.00	n/a	0.00	0.00
Showerhead	6,332.00	5,837.00	92.2%	0.00	17.51
Kitchen Aerator	677.00	631.00	93.2%	0.00	1.89
Bathroom Aerator	1,071.00	981.00	93.2%	0.00	2.94
<b>Total</b>	<b>8,080.00</b>	<b>7,449.00</b>	<b>91.6%</b>	<b>0.00</b>	<b>22.34</b>

Table 4-42 outlines the verified ex post lifetime energy savings (kWh) by measure for the SEE LivingWise program.

Table 4-42 Gross Lifetime Savings Summary by Measure for PY2016

Measure	Estimated Useful Lifetime (EUL) Tier One	Estimated Useful Lifetime (EUL) Tier two	Ex Post Lifetime Energy Savings (kWh)
CFL Bulbs	7	3	864,806
LED Bulbs	7	13	909,656
Showerhead	10	N/A	2,297,713
Kitchen Aerator	10	N/A	248,387
Bathroom Aerator	10	N/A	386,140
<b>Total</b>			<b>4,706,702</b>

#### 4.2.6 Net Savings Summary and Findings

Section 2.3.9 of this report further describes the approach for NTG for this program in PY2016.

The past Evaluator, in the PY2015 evaluation report, used a benchmarking approach to determine the NTG ratios for the SEE LivingWise program. As in past years, they did not conduct an independent assessment of net -to-gross (NTG) ratios to calculate net impacts for SEE LivingWise.

In PY2014, with approval of the IEM, they utilized NTG estimates from another, comparable, student education program in Indiana. The programs in Indiana supplied student take-home kits and teaching curriculum the same as the OG&E program and were implemented by the same contractor. These results were used for this PY2016 evaluation as well.

The Indiana report<sup>46</sup> provides NTGs by measure, based on collection of primary data and considerable analysis. The values incorporate estimates of both free ridership and spillover, as shown in Table 4-43. The free ridership values for showerheads and aerators confirm widespread agreement that few residential customers install them in the absence of a program that provides them. The 22% spillover rate supports the hypothesis that providing education and no-cost kits to students encourages households to take additional energy efficiency actions on their own.

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<sup>46</sup> “2012 Energizing Indiana: EM&V Report,” prepared by The Indiana Statewide Core Program Evaluation Team, June 20, 2013.

Table 4-43 Energizing IN Program Free Ridership, Spillover, and NTG Summary

Measure	Free ridership	Spillover	NTG Ratio
Showerhead	13.80%	21.50%	107.70%
Aerators	7.90%	21.50%	113.60%
CFL Bulbs	27.60%	21.50%	93.90%
LED Bulbs	27.60%	21.50%	93.87%

Since the NTG values differ by measure type, we applied them to the first year SEE LivingWise measure impact totals and calculated the net impacts for the program as the sum of the net measure impacts. Table 4-44 shows the effects of applying these NTG ratios to the evaluated gross impact estimates for each measure and the total program. The overall program NTG ratio is 101.9%.

Table 4-44 Net Savings Summary

Measure	Net-to-Gross (NTG)	Ex Post Net Energy Savings (kWh)	Ex Post Net Demand Savings (kW)	Net Lifetime Energy Savings (kWh)
CFL Bulbs	93.9%	97,287	16.67	812,053
LED Bulbs	93.9%	76,201	13.06	853,894
Showerhead	107.7%	247,372	25.73	2,473,718
Kitchen Aerator	113.6%	28,219	2.93	282,192
Bathroom Aerator	113.6%	43,869	4.56	438,693
<b>Total</b>	<b>101.9%</b>	<b>492,948</b>	<b>62.95</b>	<b>4,860,550</b>

#### 4.2.7 Non-Energy Benefits (NEBs)

The resulting NEBs, by measure, for the PY2016 SEE LivingWise program are presented in Table 4-45.

Table 4-45 Non-Energy Benefits (NEBs) Summary

Measure	Natural Gas Savings (therms)	Water Savings (gallons)	Propane Savings (gallons)	Deferred Replacement Costs
CFL Bulbs	0	0	0	\$0.00
LED Bulbs	0	0	0	\$22,341.26
Showerhead	5,837	7,141,200	64	\$0.00
Kitchen Aerator	631	838,200	6	\$0.00
Bathroom Aerator	981	1,399,200	11	\$0.00
<b>Total</b>	<b>7,449</b>	<b>9,378,600</b>	<b>81</b>	<b>\$22,341.26</b>

In the PY2016 SEE LivingWise program, to determine NEBs, the Evaluators reviewed the survey data from the participants and the program data provided by RAP to determine the percentage of homes that natural gas and propane savings. These NEBs were then estimated using Protocol L of the Arkansas TRM version 6.0. Water savings were estimated for the hot water measures (e.g., aerators and showerheads) in the program using Protocol L. Deferred replacements costs were estimated for LEDs in the program. These values were utilized in the cost benefit analysis for PY2016.

#### 4.2.8 Process Evaluation

The previous Evaluators conducted a full process evaluation of the SEE LivingWise program in PY2015, and found that the program was successful in meeting participation, savings, and satisfaction goals. Table 4-46 and Table 4-47 summarize the Evaluators’ review of the SEE LivingWise program in comparison to TRM version 6.0 Protocol C for timing and conditions of conducting a process evaluation.

Table 4-46 Determining Appropriate Timing to Conduct a Process Evaluation

Component	Determination
New and Innovative Components	No. The program is designed in a manner consistent with similar programs elsewhere and applies deemed savings values from the TRM.
No Previous Process Evaluation	No. The program received a comprehensive process evaluation in PY2015.
New Vendor or Contractor	No. The program has been run by RAP since 2011.

Table 4-47 Determining Appropriate Conditions to Conduct a Process Evaluation

Component	Determination
Are program impacts lower or slower than expected?	No, the SEE LivingWise program exceeded goals for PY2016.
Are the educational or informational goals not meeting program goals?	They are meeting program goals.
Are the participation rates lower or slower than expected?	No, the participation was higher than planned.
Are the program’s operational or management structure slow to get up and running or not meeting program administrative needs?	No, the program was successfully administered in PY2016.
Is the program’s cost-effectiveness less than expected?	Yes, this program is cost effective.
Do participants report problems with the programs or low rates of satisfaction?	No. In PY2015 program satisfaction was high, there were no indications that this changed in PY2016.
Is the program producing the intended market effects?	Yes, the program is producing the intended market effects.

On this basis, the Evaluators concluded that process evaluation activities for PY2016 would be limited to a review of prior-year recommendations and program staff interviews with both OG&E staff, and the staff at the third-party implementer, RAP.

**4.2.8.1 Data Collection Activities**

The process evaluation of the SEE LivingWise program included the following data collection activities.

- Program Staff Interview;
- Implementation Staff Interview; and
- Review results from ongoing survey efforts that RAP conducts with participating student and teachers to inform program design components.

Table 4-48 summarizes the data collection for this process evaluation effort. This includes the titles, role, and sample sizes of data collection.

Table 4-48 MFDI Data Collection Summary

Target	Component	N
Program Staff	OG&E program management staff	1
Implementation Staff	RAP program management staff	1
Market Actor Survey	Teacher Surveys (Results provided by RAP)	42
Participant Survey	Student Surveys (Results provided by RAP)	693

**4.2.8.2 Process Results and Findings**

This section will present the results and key findings from the data collection activities. These findings are based upon interviews with utility staff, implementation staff, and surveys with both students and teachers.

Below, we present the methodology used for the process-related data collection activities the Evaluators performed in association with the PY2016 SEE LivingWise program evaluation.

**4.2.8.3 Program Staff Interviews**

As part of the PY2016 evaluation, the Evaluators completed two in-depth interviews: One with the OG&E program manager, and one with the RAP staff working to implement this program. These interviews helped the evaluation team assess any updates or changes the program experienced in PY2016 compared to available documentation. Further, these interviews explored energy efficiency staff roles and responsibilities, program communications and marketing, and the overall program delivery processes in place during PY2016. Below are key takeaways from the



evaluation team's in-depth interviews with the program manager and the implementation staff.

- **Staff roles and responsibilities:** The OG&E SEE LivingWise program manager has been working to deliver the program for the last program year, meets with the RAP program manager once a week, and plays an active role in quality marketing, customer satisfaction assurance and other quality control measures. RAP, the program implementer, is responsible for most of the day-to-day program activities, including program promotion and communication with school administrative staff, teachers and other program stakeholders. RAP works actively with schools, performs QA/QC on the data, and fulfills program incentive requests.
- **Program communication and marketing:** This program is primarily promoted to both new and returning schools through program word-of-mouth. Other marketing strategies program staff mentioned using in the past year were limited, but included e-mails and faxes to the school, with follow-up to the teachers to ask if they want to participate. The program team normally sends out marketing materials in January, which usually results in a fully subscribed program by March.
- **Program delivery:** The program manager and the implementation staff were asked to identify key program areas that went well this past year and to state what could be improved. Communication across all program channels was the number one item mentioned by both the program manager and the implementation staff that went well last year. The RAP implementation manager was identified as critical to the program's success. Staff noted that he does an excellent job of sharing everything he knows because he's been doing it for so long. Opportunities for program improvement relating to survey feedback were raised in both interviews. Specifically, program implementers reported that they had experienced some performance challenges in getting those results back quickly enough this past year.
- **SEE LivingWise will be a component of the new Residential Solutions Program in 2017:** Going forward, the standalone SEE LivingWise program as evaluated in 2016 will no longer be offered within the energy efficiency program portfolio; but rather, a portion of the 2017-2019 Residential Solutions program (a new program) will contain a student participation path. Further, the program will implement a shift away from the program's offering of CFL bulbs, and move instead to offering LED light bulbs as its main lighting measure.



Nevertheless, the student portion of the Residential Solutions program will continue to operate within a finite, single-family and multi-family market in the OG&E territory.

**4.2.8.4 Student and Teacher Survey Feedback**

As a part of the PY2016 evaluation of the SEE LivingWise program, the Evaluators reviewed the survey responses provided by RAP, the implementer. Those surveys are implemented by RAP as a part of delivering the program. The section below provides an overview of those survey responses.

**Student Survey Responses:** 693 students provided feedback on this program. Overall, the students reported satisfaction with the program, an increased awareness of the energy and a change in the way they, and their family, used energy. They did report that additional feedback that the in-classroom activities are hard to understand and follow and that it may be useful to have online classes available.

A sample of responses from students after the curriculum can be found in Table 4-49, Table 4-50 and Table 4-51 below.

Table 4-49 Student Responses on Program Satisfaction

How would you rate the OG&E LivingWise Program? (n=639)		
Great	359	56%
Pretty Good	172	27%
Okay	91	14%
Not So Good	17	3%

Table 4-50 Student Response on Student and Parent Coordination

Did you work with your family on this program? (n=634)		
Yes	481	76%
No	153	24%

Table 4-51 Student Responses on the Energy and Water Nexus

Conserving water also conserves energy. (n=622)					
Pre Survey (n=655)			Post Survey (n=622)		
Yes	533	84%	Yes	543	88%
No	102	16%	No	73	12%

**Teacher Survey Responses:** Forty-two teachers provided feedback on the SEE LivingWise program. The teachers found the program to be well-organized and very comprehensive. They reported positive feedback about the showerhead, that the program was full of a lot of important and useful information and that "the students liked getting to take the kits home to their parents and being able to help their families save energy and money."<sup>47</sup> One issue noted was that the aerators did not fit all faucets, but overall, they thought it was fun installing each of the measures.

#### **4.2.8.5 Review of PY2015 Evaluation Recommendations**

The recommendations made in the PY2015 evaluation of the SEE LivingWise program, along with an update on the progress, are found in this section. Changes may not have been implemented due to the discontinuation of this program in PY2017.

- **Recommendation 1:** Conduct an independent survey of teacher activities to obtain better information on the likely installation of the measures in the take-home kits.
  - **Rationale:** Overall, the student survey response rate each year is over 50%, with responses for many classes in PY2015 each exceeding 80%. Each year, however, many teachers do not return any surveys. The previous Evaluator has not been able to confirm that students in these classes are taught the curriculum, are given kits, and install measures at rates similar to those who did return surveys. A teacher survey could provide evidence to support the claim or information to develop more accurate installation rate estimates.
  - **Update – Accepted:** The OG&E and RAP teams performed a teacher survey and get feedback from those teachers who participate in the program. ADM was provided those results to review.
- **Recommendation 2:** Consider developing more complete heat pump water heating and HVAC technology saturations, all from the same source and for all residents served by OG&E in Arkansas.
  - **Rationale:** While OG&E was able to provide some information for PY2015, we could not determine consistent saturations for HVAC heat pumps. Therefore, we had to use a different source to determine saturations for HVAC heat pumps in the service territory. To fully comply with the TRM specifications for measure savings, OG&E needs to develop

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<sup>47</sup> This was a quote from a participating teacher at Westside Elementary.

information on these electric technology HVAC shares consistent with the technology classifications for HVAC systems.

- **Update – Rejected:** The OG&E and RAP team decided that this line of questions was too complicated for the students to be able to answer.

#### 4.2.9 Adherence to Protocol A

The tracking system in the database conforms reasonably well to the tracking system protocol developed for use in Arkansas. The bullets below show a summary of how well the SEE LivingWise program tracking systems met the components of the Protocol.

- **Participating Customer Information** – this is not provided for individual participants; only for teachers. Customer milestone tracked is the date kits are shipped.
- **Measure Specific Information** – this is not applicable as all kits the same and info provided by implementer on spec sheets. Estimated savings are included as well as equipment useful life. Kits are provided by OG&E at no cost to participants. Reported measure type of equipment replaced is tracked by participant surveys from implementer.
- **Measure Codes** – individual measures are not currently identified; all kits provided to participants are supposed to be the same.
- **Vendor Specific Information** – this is not applicable as measures are self-installed.
- **Program Tracking Information** – date of the initial program contact provided. Rebate information is not applicable for this program; provided at no cost to participants.
- **Marketing and Outreach Activities** – RAP conducts a well-established pattern of outreach activities. It is not known whether OG&E keeps records of how many outreach letters the staff sends each year or to whom. RAP handles all other marketing.

#### 4.2.10 Planned Program Changes

OG&E plans to remove this program from the portfolio in PY2017. The measures and delivery channel will be added to another, more comprehensive residential program for the next planning cycle.

## 4.2.11 Conclusions & Program Recommendations

### 4.2.11.1 Conclusions

Based on the findings, ADM has developed the following conclusions based on the impact and process evaluations for PY2016:

- Participation increased slightly from PY2015 to PY2016, from 1,919 total kits distributed by 34 to 2,204 distributed by 44 teachers.
- Ex ante energy savings (kWh) also increased in PY2016. In PY2015 the program claimed 325,745 kWh, in PY2016 the program claimed 464,221 kWh, an increase of 42.5%.
- For PY2016 RAP provided net ex ante program-level impacts. The Evaluators were unable to recreate these ex ante saving estimates. Instead, ADM estimated gross ex ante savings by applying RAP's per measure gross savings estimates to the number of kit items. The program realization rate of 103.0% reflects the difference in savings between the ADM estimated ex ante savings and the verified ex post savings.
- RAP stated that there are not any challenges to keeping the program fully subscribed – the level of participation is limited by the program budget rather than challenges in teacher enrollment. To optimize the savings estimate by reducing sample bias, RAP prioritizes teacher invitations based, in part, on their demonstrated past performance, as evidenced by returns in the student surveys. Once the quota is reached each year, RAP stops recruitment. RAP confirmed that once recruited, no teacher is turned away for that year's program.
- The NTGR ratio for PY2015 was applied to the PY2016 ex post gross savings.
- Both teachers and students reported that they were satisfied with and enjoyed the program. Teachers noted that the program was well organized and comprehensive.

**4.2.11.2 Recommendations for PY2016**

Based on the findings, ADM has developed the following recommendations based on the impact and process evaluations for PY2016:

- **Increase follow-up contacts with low-response teachers.** The additional communication and follow-ups with teachers may help them stay on schedule.
- **Modify the survey instrument utilized by RAP to gather additional market data.** Consider adding questions to collect data on HVAC technology saturations, (e.g., heat pump systems, natural gas furnaces, central air conditioners).
- **Report more detailed measure-level information for the measures within the kit.** RAP reports net savings for the program, total number of kits, but no detail on the measures within the kits. It would be useful to have ex ante savings per measure reported for each school with the program year data set.

Table 4-51 presents the above items, outlining the relevant issue, potential consequences, and associated recommendations.

Table 4-51 Recommendations from PY2016 Evaluation

Issue	Consequences	Recommendation
Survey results are delivered in relation to the school year, instead of the program year. This is a byproduct of the delivery channel.	The results from PY2016 will be applied to PY2017, and there may be some need for a true-up due to this offset.	Increase follow-up contacts with non-responding teachers.
Lack of information on types of HVAC equipment in customer residences	Potentially less accurate evaluated savings due to assumptions made about HVAC equipment	Modify the survey instrument utilized by RAP to gather additional data one HVAC equipment types and other useful information.
Kit measure specifications not provided.	Unable to correct estimate ex ante savings per measure reported for each school with the program year data set	Report more detailed measure-level information for the measures within the kit.

### 4.3 OG&E/AOG Weatherization Program (Unified Wx)

#### 4.3.1 Evaluation Findings

Table 4-52 outlines the ex ante and verified ex post lifetime energy (kWh) savings by measure for the PY2016 OG&E/AOG Weatherization (Unified Wx) program.

Table 4-52 Gross Electric Savings Summary, by Measure, for PY2016

Measure	Ex Ante Annual Energy Savings (kWh)	Ex Post Gross Annual Savings (kWh)	Realization Rate (kWh)	Ex Ante Peak Demand Reduction (kW)	Ex Post Gross Peak Demand Savings (kW)	Realization Rate (kW)
CFL Bulbs	688,688	749,719	108.9%	99.83	115.36	115.6%
Attic Insulation	1,771,226	1,770,395	100.0%	626.03	625.78	100.0%
Air Infiltration	612,443	618,565	101.0%	172.90	174.52	100.9%
WH Insulation	8,483	8,485	100.0%	0.54	0.54	100.0%
Showerhead	31,124	30,806	99.0%	3.24	3.20	98.8%
Faucet Aerator	16,957	16,779	99.0%	1.76	1.74	98.9%
Duct Sealing	273,232	273,296	100.0%	73.76	73.80	100.1%
Power Strip	494,109	494,109	100.0%	58.24	58.24	100.0%
<b>Total</b>	<b>3,896,262</b>	<b>3,962,154</b>	<b>101.7%</b>	<b>1,036.30</b>	<b>1,053.18</b>	<b>101.6%</b>

Table 4-53 outlines the estimates for natural gas savings (therms) claimed by OG&E, by measure, for the PY2016 OG&E/AOG Weatherization (Unified Wx) program.

Table 4-53 Gross Gas Savings Summary by Measure for PY2016

Measure	Ex Ante Annual Energy Savings (Therms)	Ex Ante Peak Demand Reduction (Therms)
CFL Bulbs	-2.00	0.00
Attic Insulation	37,669.00	619.77
Air Infiltration	25,511.00	722.99
WH Insulation	62.00	0.34
Showerhead	183.00	0.55
Faucet Aerator	98.00	0.29
Duct Sealing	7,441.00	0.00
Power Strip	0.00	0.00
<b>Total</b>	<b>70,962.00</b>	<b>1,343.94</b>

Table 4-54 outlines the ex ante and ex post lifetime energy (kWh) savings, by measure, for the PY2016 OG&E/AOG Weatherization (Unified Wx) program.

Table 4-54 Gross Lifetime Savings Summary by Measure for PY2016

Measure	Estimated Useful Lifetime (EUL) Tier One	Estimated Useful Lifetime (EUL) Tier two	Ex Post Gross Lifetime Energy Savings (kWh)
CFL Bulbs	7	3	5,503,704
Attic Insulation	20	n/a	35,407,896
Air Infiltration	11	n/a	6,804,219
WH Insulation	13	n/a	110,216
Showerhead	10	n/a	308,059
Faucet Aerator	10	n/a	167,787
Duct Sealing	18	n/a	4,919,328
Power Strip	10	n/a	4,941,093
<b>Total</b>			<b>58,162,302</b>

Table 4-55 presents the net savings summary, by measure, for the PY2016 OG&E/AOG Weatherization (Unified Wx) program. The overall program NTG ratio is 99.2%.

Table 4-55 Net Savings Summary

Measure	Net-to-Gross (NTG)	Ex Post Net Energy Savings (kWh)	Ex Post Net Demand Savings (kW)	Net Lifetime Energy Savings (kWh)
CFL Bulbs	99.20%	743,885	115.00	5,473,824
Attic Insulation	99.20%	1,756,619	623.83	35,215,664
Air Infiltration	99.20%	613,752	173.97	6,767,278
WH Insulation	99.20%	8,419	0.53	109,617
Showerhead	99.20%	30,566	3.19	306,386
Faucet Aerator	99.20%	16,648	1.74	166,876
Duct Sealing	99.20%	271,169	73.57	4,892,621
Power Strip	99.20%	490,264	58.06	4,914,267
<b>Total</b>	<b>99.20%</b>	<b>3,931,322</b>	<b>1,049.89</b>	<b>57,846,533</b>

Figure 4-9 is a summary of the gross and net energy savings (kWh) for the program and Figure 4-10 is a summary of the gross and net demand reduction (kW) savings for the PY2016 program.



Figure 4-9 Unified Wx Energy Savings (kWh) Summary

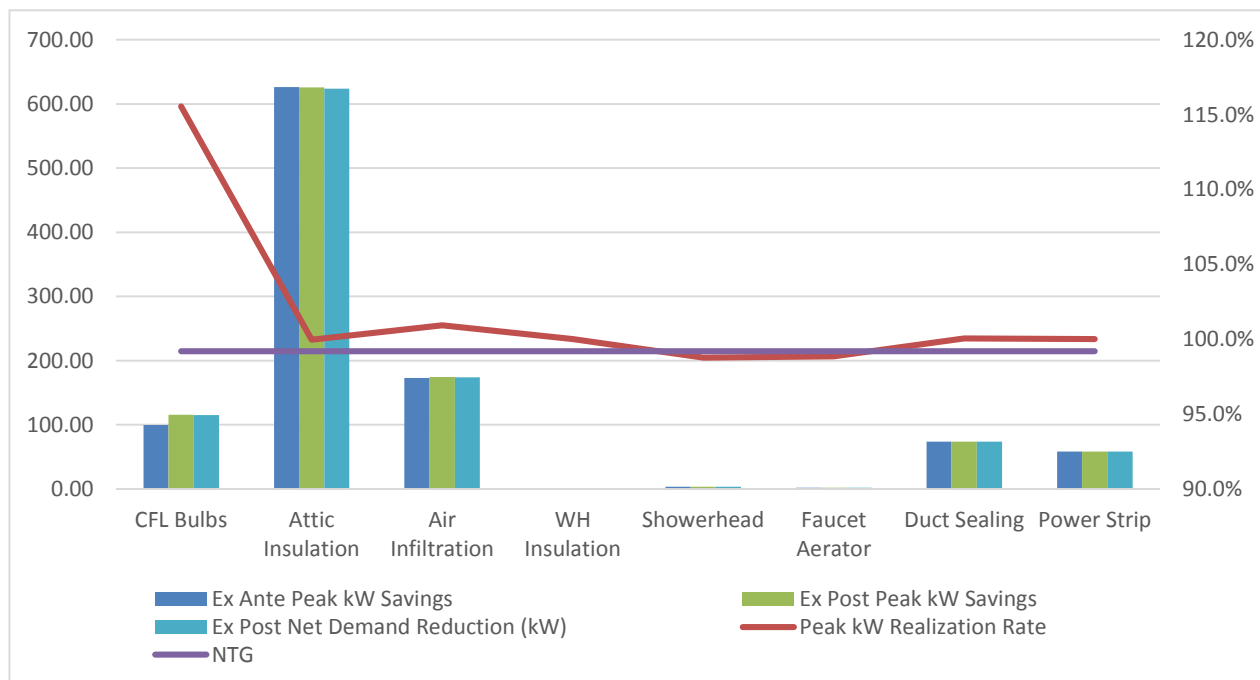


Figure 4-10 Unified Wx Demand Reduction (kW) Summary



Additional details, including approaches, are found in the following sections.

#### **4.3.2 Program Overview**

The Unified Weatherization Program as operated by OG&E and AOG is a joint utility offering that provides residential energy audits and energy efficiency installations to customers within the Arkansas territories of OG&E and Arkansas Oklahoma Gas (AOG).

The program is designed to use both gas utility and electric utility funds to provide customers in-home audit and energy efficient measures at no additional cost. The program is designed to provide utility funds to customers to fully offset the costs of energy efficiency audits and resulting energy efficiency measures and installations. Eligible customers receive funds from both AOG and OG&E in this co-funded program.

Although the overall structure and delivery of the OG&E/AOG Weatherization Program in PY2016 is consistent with prior years, PY2016 marks the first year that the Arkansas Investor Owned Utilities (IOUs) are offering weatherization programs under the Unified Weatherization Program approach.

The Unified Weatherization Program approach was developed by the Parties Working Collaboratively (PWC) Weatherization Collaborative comprised of Arkansas investor-owned-utilities (IOUs) and other stakeholders to provide a consistent and comprehensive weatherization offering across the state of Arkansas.

The IOUs are responsible for delivering the Unified Weatherization Program, and each IOU has a separate program budget and may use its own Building Performance Institute (BPI) or Residential Energy Services Network (RESNET) certified contractors or trained private contractors. Each IOU must follow the guidelines of the statewide Unified Weatherization Program approach when delivering weatherization services, but is able to supplement the Unified Weatherization Program approach with complementary program elements such as additional measure offerings. While all IOUs are required to offer weatherization services under the Unified Weatherization Program framework, each IOU offers its own iteration of the framework and may or may not deliver weatherization through a joint utility offering. The OG&E/AOG Weatherization Program is an example of a joint utility version of the Unified Weatherization Program, where OG&E and AOG are the joint sponsors and share the costs of weatherizing participant homes.

The program targets energy-inefficient homes by requiring that participating residences must either be at least 10 years old, or have had an electric utility bill in the past 12 months equal to or greater than \$0.10 per square foot of the home.

The program is designed to facilitate the installation of a wide range of cost-effective weatherization measures that have been approved as “core measures” to be provided under the Unified Weatherization Program framework, including:

- Attic Insulation;
- Floor Insulation;
- Wall Insulation;
- Air Sealing;
- Duct Sealing;
- Advanced Power Strips;
- Lighting (CFLs and LEDs);
- Heat Pump Water Heaters;
- Water Heater Pipe Wrap;
- Low Flow Shower Heads; and
- Faucet Aerators.

Measures are selected for individual homes through a contractor assessment which identifies a list of cost-effective improvements. As with prior program years, the program contracts with three installation contractors who perform the weatherization and measure implementation services. After the measures are installed, utility staff members perform post-inspections on a sample of homes to verify that all measures have been properly implemented.

In PY2016, the OG&E/AOG Weatherization Program provided direct install and weatherization services in a total of 1,804 homes. This is a consistent participation rate with prior years. Participants received in-home energy audits and one or more of the following measure types:

- 13-17 Watt CFLs;
- Advanced power strips;
- Attic insulation;
- Duct Sealing;
- Water heater pipe wrap;
- Water heater jacket; and
- Air infiltration reduction improvements.

Depending on the location of customers and the fuel sources used in their homes, services for each customer are funded by AOG, OG&E, or both AOG and OG&E. Table 4-56 cross-tabulates the number of participating homes by utility. As participants were only required to be customers of one of the two sponsoring utilities, some residences in the program were serviced by utilities other than AOG and OG&E. These utilities

included municipal utilities, co-ops, propane service providers, or other investor-owned utilities that do not pass into the OG&E/AOG Weatherization Program.<sup>48</sup>

Table 4-56 Participation by Associated Utility

Electric Utility	Gas Utility	
	AOG	Other/None
OG&E	1,037	541
Other	226	-
<b>OG&amp;E Total</b>	<b>AOG Total</b>	<b>Total Homes</b>
1,578	1,263	1,804

Figure 4-11 displays the month of weatherization for homes serviced during PY2016, based on the weatherization date listed in program tracking data. Program participation was evenly distributed during PY2016 through August, and then declined steadily. This is likely related to the fact that AOG expended its program funds by late August of PY2016, and the remaining work was fully funded by OG&E.

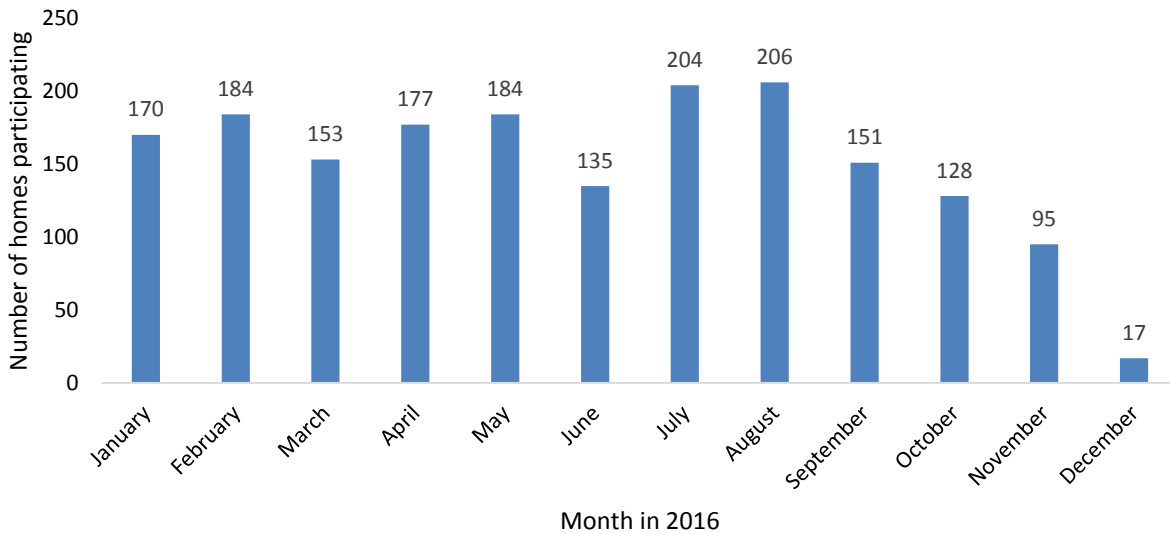


Figure 4-11 Homes Participating by Month, PY2016

<sup>48</sup> The AOG total of 1,263 homes includes the 215 AOG-serviced homes for which OG&E paid the full project cost.

Table 4-57 displays the number of PY2016 measure installations by measure type for each utility, arranged by the most commonly installed measures.<sup>49</sup> CFLs were the most common measure type, followed by attic insulation and air infiltration measures.

There were only minor variations in measure distribution and measure types implemented in PY2016 compared to prior years. At the newly added program measures, the notable differences between PY2016 and PY2015 measure counts include a substantial decrease in the number of water heater jacket and pipe wrap measures installed in OG&E serviced homes (in PY2015 there were 714 such installations). Overall, the number of instances of measure installation increased by 283 for AOG and 1,000 for OG&E.

Table 4-57 Total Implementations by Measure

Measure	Number of attributable installations generating savings	
	AOG	OG&E
CFL Bulbs	0	1,413
Attic Insulation	904	1,134
Air Infiltration	879	1,144
Power Strips	0	1,014
WH Insulation	485	168
Aerators	316	150
Duct Sealing	174	206
Showerheads	170	86
<b>Total</b>	<b>3,994</b>	<b>5,315</b>

### 4.3.3 Gross Impact Evaluation Approach

This section presents the methodologies for, and key findings from, for the gross impact evaluation of the PY2016 OG&E/AOG Weatherization program. Ex post gross savings are summarized in Section 4.3.2.

For measures implemented through the PY2016 program, savings verification was performed according to methodologies described in TRM version 6.0. Table 4-58 identifies the sections in the TRM that were used for verification of measure-level savings under the OG&E/AOG Weatherization Program.

<sup>49</sup> The values represent the number of homes receiving the measure, rather than the total number of measures installed at all homes. Thus, the values for CFLs do not present the total number of bulbs installed, but the total number of participants receiving at least one of that measure type.

Table 4-58 TRM Sections by Measure Type

Measure Type	TRM Section(s)
Air Infiltration	2.2.9
Attic Insulation	2.2.2
CFLs	2.5.1.1
Water Heater Insulation	2.3.2, 2.3.3
Showerheads	2.3.5
Faucet Aerators	2.3.4
Duct Sealing	2.1.11
Advanced Power Strips	2.4.4

The calculation methodologies for these measures are detailed in the following sections. In these examples, energy units are expressed in kWh.

**4.3.3.1 Compliance with TRM 6.0**

This program was found to be in compliance with the Arkansas Technical Reference Manual (TRM) version 6.0.

**4.3.3.2 Air Infiltration Reduction Savings Calculations**

The deemed savings algorithms in TRM version 6.0 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 4-59 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

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<sub>50</sub> before air infiltration reduction and a leakage rate of 7,220 CFM<sub>50</sub> after, then the residence would have an annual gross savings of 1,687 kWh.

$$\text{Air Infiltration Savings} = 0.190 \frac{\text{kWh Savings}}{\text{CFM}_{50}} \cdot (16,100 \text{ CFM}_{50 \text{ pre}} - 7,220 \text{ CFM}_{50 \text{ post}})$$

$$\text{Air Infiltration Savings} = 1,687 \text{ kWh}$$

TRM version 6.0 also specifies Minimum Final Ventilation Rates (MVR) and Maximum Pre-Installation Infiltration Rates 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.

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.

#### 4.3.3.3 Attic Insulation Savings Calculations

The deemed savings algorithms in TRM VERSION 6.0 for attic 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 using both R-38 and R-49 insulation in developing savings values denominated in deemed savings per square footage of ceiling area. Table 4-60 summarizes the deemed savings values for R-38 Weather Zone 8.

Table 4-60 Deemed Savings Values for R-38 Attic Insulation, Zone 8 (per sq.ft.)

Attic 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 <sup>50</sup> (therms)
0 to 1	1.8642	0.2203	0.3060	8.734	4.572	0.001393	0.00539
2 to 4	1.0497	0.1215	0.1687	4.846	2.495	0.000765	0.00284
5 to 8	0.6330	0.0728	0.1011	2.909	1.495	0.000461	0.00165
9 to 14	0.3909	0.0446	0.0618	1.784	0.917	0.000293	0.00099
15 to 22	0.1847	0.0216	0.0299	0.858	0.439	0.000131	0.00048

<sup>50</sup> 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).

The following example considers a residence in Weather Zone 8 with a heat pump, and a pre-retrofit R-value of attic 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.

$$\text{Ceiling Insulation Savings} = 0.917 \frac{kWh}{ft^2} \cdot (1,200 ft^2) = 1,100 kWh$$

TRM version 6.0 specifies an efficiency standard of R-38, meaning that to qualify for deemed savings the combined R-value of existing and added insulation should be at least R-38.

#### 4.3.3.4 Compact Fluorescent Lamps (CFLs) Savings Calculations

The deemed savings for compact fluorescent lamps can be calculated by using the following equation.

$$kWh_{savings} = ((Watts_{base} - Watts_{post})/1,000) \times Hours \times ISR \times IEF_E$$

The inputs, which assume the following prerequisite knowledge, can be found in Section 2.5.1 of TRM version 6.0:

- The quantity and wattages of both pre-and post-fixtures;
- Whether 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 2016 (5) 13W CFLs were directly installed to replace (5) 60W incandescent lamps in a residence with gas heating, the residence would have an annual gross savings of 198 kWh.

$$kWh_{savings} = ((5 \cdot 60 - 5 \cdot 13)/1,000 \cdot 792.6 \cdot 0.98 \cdot 1.10 = 198 kWh$$

TRM version 6.0 includes specifications for heating penalties from CFLs in natural gas heated homes, calculated as follows:

$$Therms_{penalty} = ((W_{base} - W_{post})/1000) \times ISR \times IEF_G$$

Where:

IEFg = Interactive Effects Factor to account for gas heating penalties

TRM version 6.0 also accounts for future changes in lighting baselines as per EISA 2007 guidelines. Specifically, TRM VERSION 6.0 specifies that the 1<sup>st</sup> Tier EISA 2007

baselines come into effect in January 2014, and that the 2<sup>nd</sup> Tier EISA 2007 baselines come into effect in January 2022. These baseline changes affect lifetime savings calculations for CFLs.

**4.3.3.5 Water Heater Jacket Insulation Savings Calculations**

The deemed savings per installed unit depend on jacket thickness, water heating type, and water heater tank size. The following tables present the deemed savings, which depend on water heater type, for the installation of a water heater jacket.

Table 4-61 Electric Water Heating Deemed Savings

Approximate Tank Size (gal)	Electric Water Heating					
	kWh Savings			kW Savings		
	40	52	80	40	52	80
2" WHJ savings kWh	68	76	101	0.005	0.006	0.008
3" WHJ savings kWh	94	104	139	0.007	0.008	0.011

Table 4-62 Gas Water Heating Deemed Savings

Approximate Tank Size (gal)	Gas Water Heating					
	Therms Savings			Peak Therms		
	30	40	50	30	40	50
2" WHJ savings kWh	3.38	3.96	4.41	0.006	0.007	0.008
3" WHJ savings kWh	4.67	5.46	6.09	0.009	0.010	0.011

The defined baseline for this measure is assumed to be a post-1991, storage-type water heater. The minimum efficiency standards require water heater jackets to have insulation of R-6.7 or greater and to be installed on storage water heaters with a capacity of at least 30 gallons.

**4.3.3.6 Water Heater Pipe Insulation Savings Calculations**

The deemed savings for the installation of water heater pipe insulation can be calculated by using the following equation:

$$\begin{aligned}
 & \text{Annual Energy Savings} \\
 & = (U_{pre} - U_{post}) \times A \times (T_{Pipe} - T_{ambient}) \times \left(\frac{1}{RE}\right) \times \frac{Hours_{Total}}{Conversion\ Factor}
 \end{aligned}$$



The inputs, which assume the collected inputs, can be found in Section 2.3.3 of TRM version 6.0:

- The length and diameter of water heater pipe;
- The R-value of installed insulation;
- The space type (condition or unconditioned);
- The weather zone of the residence; and
- The water heating type of the residence.

For example, if a home located in Weather Zone 8 had water heater pipe insulation with an R-value of 3 installed on an electric resistance water heater with a ½” diameter water heater pipe and a length of 1 foot, the measure would have annual electricity savings of approximately 3 kWh.

$$Annual\ kWh_{savings} = (0.49 - 1/(5.03)) \times 0.1309 \times (90 - 60.1) \times \left(\frac{1}{0.98}\right) \times \frac{8760}{3412} = 3\ kWh$$

TRM version 6.0 includes specifications for demand (kW) savings from water heater pipe insulation, calculated as follows:

$$kW_{savings} = (U_{pre} - U_{post}) \times A \times (T_{Pipe} - T_{ambientMAX}) \times \left(\frac{1}{RE}\right) \times \frac{1}{3,412\ Btu/kWh}$$

Where:

$T_{ambientMAX}$  = For water heaters installed in unconditioned basements, use an average ambient temperature of 75°F; for water heaters inside the thermal envelope, use an average ambient temperature of 78°F

TRM version 6.0 also includes specifications for peak day therm savings from water heater pipe insulation calculated as follows:

$$Peak\ Therms_{savings} = (U_{pre} - U_{post}) \times A \times (T_{Pipe} - T_{ambientMIN}) \times \left(\frac{1}{RE_t}\right) \times \frac{1}{100,000\ Btu/therm}$$

Where:

$T_{ambientMIN}$  = For water heaters not installed in conditioned space, use the minimum annual ambient temperatures in table 148 (section 2.3.3 of TRM VERSION 6.0); for water heaters inside the building envelope, use the conditioned space temperature of 70°F

$RE_t$  = Recovery Efficiency; if unknown, use 0.77 as a default

#### 4.3.3.7 Low-flow Showerheads Savings Calculations

The deemed savings for low-flow showerheads can be calculated by using the following equation:

$$\text{Annual Energy Savings} = \frac{\rho \times C_p \times V \times (T_{\text{Mixed}} - T_{\text{Supply}}) \times \left(\frac{1}{RE}\right)}{\text{Conversion Factor}}$$

The inputs, which require the following collected data, can be found in Section 2.3.5 of TRM version 6.0:

- The quantity and flow rate of the installed efficient measure;
- The weather zone of the residence; and
- The water heating type of the residence.

For example, if a 2.0 gpm low-flow showerhead was directly installed to replace the assumed baseline showerhead (2.5 gpm) in a residence with electric resistance water heating that was in Weather Zone 9, the residence would have deemed annual gross savings of 140 kWh.<sup>51</sup>

$$\text{Annual kWh}_{\text{savings}} = \frac{8.33 \times 1 \times 1,457 \times (104.3^\circ\text{F} - 65.6^\circ\text{F}) \times \left(\frac{1}{0.98}\right)}{3,412} = 140 \text{ kWh}$$

TRM version 6.0 includes specifications for demand (kW) savings from low-flow showerheads, calculated as follows:

$$\text{kW}_{\text{savings}} = \text{kWh}_{\text{savings}} \times \text{Ratio}_{\text{Annual kWh}}^{\text{Peak kW}}$$

Where:

$$\text{Ratio}_{\text{Annual kWh}}^{\text{Peak kW}} = 0.000104 \text{ Peak kW to Annual kWh}$$

TRM version 6.0 also includes specifications for peak day therm savings from low-flow showerheads, calculated as follows:

$$\text{Peak Therms}_{\text{savings}} = \text{Annual Therms}_{\text{savings}} \times \text{Ratio}_{\text{Annual Therms}}^{\text{Peak Therms}}$$

Where:

$$\text{Ratio}_{\text{Annual Therms}}^{\text{Peak Therms}} = 0.003 \text{ Peak Day Therms to Annual Therms}$$

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<sup>51</sup> Savings algorithm inputs such as supply temperature vary by weather zone and therefore depend on the location of installation, as specified in the TRM.

**4.3.3.8 Low-flow Faucet Aerators Savings Calculations**

The deemed savings for low-flow faucet aerators can be calculated by using the following equation:

$$Annual\ Energy\ Savings = \frac{\rho \times C_p \times V \times (T_{Mixed} - T_{Supply}) \times \left(\frac{1}{RE}\right)}{Conversion\ Factor}$$

The inputs, which assume the following prerequisite knowledge, can be found in Section 2.3.4 of TRM version 6.0:

- The quantity and flow rate of the installed efficient measure;
- The weather zone of the residence; and
- The water heating type of the residence.

For example, if a 1.5 gpm low-flow faucet aerator was directly installed to replace the assumed baseline showerhead (2.2 gpm) in a residence with electric resistance water heating that was in Weather Zone 9, the measure would have annual energy savings of 35 kWh.<sup>52</sup>

$$Annual\ kWh_{savings} = \frac{8.33 \times 1 \times 381 \times (102.6^\circ F - 65.6^\circ F) \times \left(\frac{1}{0.98}\right)}{3,412} = 35\ kWh$$

TRM version 6.0 includes specifications for demand (kW) savings from low-flow showerheads, calculated as follows:

$$kW_{savings} = kWh_{savings} \times Ratio_{Annual\ kWh}^{Peak\ kW}$$

Where:

$$Ratio_{Annual\ kWh}^{Peak\ kW} = 0.000104\ Peak\ kW\ to\ Annual\ kWh$$

TRM version 6.0 also includes specifications for peak day therm savings from low-flow showerheads, calculated as follows:

$$Peak\ Therms_{savings} = Annual\ Therms_{savings} \times Ratio_{Annual\ Therms}^{Peak\ Therms}$$

Where:

$$Ratio_{Annual\ Therms}^{Peak\ Therms} = 0.003\ Peak\ Day\ Therms\ to\ Annual\ Therms$$

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<sup>52</sup> Savings algorithm inputs such as supply temperature vary by weather zone and therefore depend on the location of installation, as specified in the TRM.

**4.3.3.9 Duct Sealing Savings Calculations**

The annual savings for the installation of duct sealing in a residence, which depend on the home’s cooling and heating type, can be calculated by using the following equations:

Cooling Savings (Electric):

$$kWh_{savings,C} = \frac{(DL_{pre} - DL_{post}) \times EFLH_C (h_{out}\rho_{out} - h_{in}\rho_{in}) \times 60}{1,000 \times SEER}$$

Heating Savings (Heat Pump):

$$kWh_{savings,H} = \frac{(DL_{pre} - DL_{post}) \times 60 \times HDD \times 24 \times 0.018}{1,000 \times HSPF}$$

Heating Savings (Electric Resistance):

$$kWh_{savings,H} = \frac{(DL_{pre} - DL_{post}) \times 60 \times HDD \times 24 \times 0.018}{3,412}$$

Heating Savings (Gas Furnace):

$$kWh_{savings,H} = \frac{(DL_{pre} - DL_{post}) \times 60 \times HDD \times 24 \times 0.018}{100,000 \times AFUE}$$

The inputs, which require the following collected data, can be found in Section 2.1.11 of TRM version 6.0:

- The pre-and post-improvement duct leakage;
- The weather zone of the residence; and
- The cooling and heating type of the residence.

For example, if an air-conditioned home in Weather Zone 7 had a pre-improvement leakage of 360 CFM and post-improvement leakage of 90 CFM, the annual cooling savings from the installation of duct sealing would be approximately 1,543 kWh, using the assumed SEER of 11.5. To calculate total savings from the installation of duct sealing, these cooling savings would need to be summed with the home’s annual gross heating savings, which depends on the heating type of the residence.

$$kWh_{savings,C} = \frac{(360 - 90) \times 1,583 (40 \times 0.074 - 30 \times 0.0756) \times 60}{1,000 \times 11.5} = 1,543 \text{ kWh per year}$$

TRM version 6.0 includes specifications for demand (kW cooling) savings from duct sealing, calculated as follows:

$$kW_{savings} = \frac{kWh_{savings}}{EFLH_C} \times CF$$

Where:

$CF = \text{Coincidence factor} = 0.87$

**4.3.3.10 Advanced Power Strips Savings Calculations**

The deemed savings per installed unit depend on whole system averages for system types of Home Entertainment or Home Office. The following tables present the deemed savings for the installation of a Tier 1 advanced power strip.

Table 4-63 Advanced Power Strip Deemed Savings

System Type	Peripheral Device	kW Savings	kWh Savings
Home Entertainment	Whole System Average <sup>215</sup>	0.030	252.2
Home Office	Whole System Average <sup>216</sup>	0.008	82.5
Average APS	Whole System Average <sup>217</sup>	0.019	167.4

The defined baseline for this measure is the absence of any advanced power strip, in which peripheral devices are connected to a traditional power strip and/or wall outlet.

**4.3.3.11 Onsite Procedures and Findings**

**4.3.3.11.1 Sampling Plan for the Impact Evaluation**

The Evaluators conducted two separate sampling activities for the evaluation of the program; one for the telephone survey effort and one for the onsite verification effort.<sup>53</sup> In both cases, the Evaluators’ sample approach was designed to achieve a minimum 10% precision and 90% confidence level (90/10).

The sample size to meet 90/10 requirements is calculated based on the coefficient of variation of savings for program participants. Coefficient of Variation (CV) is defined as:

$$CV(x) = \frac{\text{Standard Deviation}(x)}{\text{Mean}(x)}$$

Where x is the average savings per participant. Without data to use as a basis for a higher value, it is typical to apply a CV of .5 in residential program evaluations. The resulting sample size is estimated at:

$$n_0 = \left( \frac{1.645 * CV}{RP} \right)^2$$

Where,

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<sup>53</sup> OG&E provided the Evaluators with a do-not-call list of customers who had opted out of non-essential utility-related communications. These customers were removed from the sampling frame for both sampling efforts.

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.

#### **4.3.3.11.2 Sampling for Telephone Surveys**

Tetra Tech conducted the sampling for the telephone survey effort, drawing a random sample of 340 participants with an assumed response rate of 25% to reach a target sample of 85 completed telephone surveys. Selecting a target of 85 completions allowed for a margin of error in the survey recruitment effort, such that the minimum sample of 68 customers would still likely be reached or exceeded in cases of higher than expected disqualification rates or instances of non-responsive customers. The actual response rate for the telephone survey was approximately 27%, resulting in 91 completions.

#### **4.3.3.11.3 Sampling for Onsite Verifications**

ADM conducted the sampling for the onsite verification effort. The sample for onsite visits was structured such that the sampled customers for the telephone survey effort were not removed from the onsite visit sampling frame, to allow for dual verification for a subset of customers. Sampling for the onsite verification effort was conducted in two phases. First, the Evaluators drew a random sample of 160 sites from an initial tracking data export that contained all participants from January through June of PY2016.

The Evaluators were able to schedule onsite visits with 42 of these 160 customers. To supplement the first phase of onsite sampling, a second random sample of 200 customers was drawn from a second tracking data export that contained additional customers through November of PY2016. The Evaluators scheduled 37 onsite visits with customers from this second sampling phase, for a total of 79 scheduled onsite visits. Of these 79 scheduled sites, 10 sites were not visited due to customer cancellations, customers not being present at the time of the visit, or unsuccessful attempts to reschedule appointments with customers due to logistical issues. With these sites removed, the Evaluators completed onsite verification visits at 69 participant homes.

Twelve participants received both an onsite visit and completed the telephone survey, while 79 participants completed the telephone survey only and 57 participants received a site visit only. In total, the Evaluators collected data from 148 unique program participants.

#### **4.3.3.12 Verification Procedure**

This section describes the verification procedure that the Evaluators conducted during both the telephone survey effort and onsite effort.

##### **4.3.3.12.1 Telephone Verification Procedure**

While the participant telephone survey also served to inform the process evaluation and net impact analysis of the evaluation effort, the survey informed the gross impact analysis by verifying the presence of reported tracking data measures.

First, the survey prompted respondents with a list of measures that the tracking data listed as having been installed in that respondent's home, and asked the respondent to indicate whether they recalled these measures being installed. Respondents could indicate any specific differences between the reported list of measures and the measures they recalled receiving. Next, respondents were asked to indicate whether they had received any measures other than what had been reported in program tracking data.

Finally, respondents who received CFLs were asked to verify that the quantity of CFLs reported in program tracking data matched the quantity that they recalled receiving. The results of the telephone survey suggest that reported measure installations very closely match actual measures received by participants, with only a few minor discrepancies.

##### **4.3.3.12.2 Onsite Verification Procedure**

The primary goal of the onsite verification effort was to ensure that the reported measures were installed and operating correctly in participant homes. Participants were given Walmart or Target gift cards for their time; these were in the amount of \$25. During the onsite visits, the Evaluators' field technicians accomplished the following:

- Verified the implementation status of the measures; verified that the measures were indeed 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 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 technician documented the heating type and water heating type for each visited home.

- **Measure Quantity Verification:** The technician documented reported vs. actual quantities of each measure type (i.e. CFLs, water heater measures) and any applicable notes regarding burnt out bulbs or non-operational equipment.
- **Insulation Assessment:** The field technician recorded the presence of attic insulation as well as the R-value or inches of added insulation.
- **Leakage Assessment:** For homes receiving air infiltration or duct sealing measures, the field technician conducted a blower door and/or duct blaster test and recorded ex-post leakage for comparison with reported leakage values.

#### 4.3.3.13 **Onsite Verification Findings**

The onsite field verification showed that the weatherization measures had for the most part been installed in the quantities reported within program tracking data. Specific notes illustrating the accuracy of program tracking data include:

- **Contact information:** All residences were located at the addresses provided within the tracking data. Although most telephone numbers were found to be accurate during the appointment scheduling and field visit activities, the Evaluators identified a few telephone numbers that were either disconnected or reached someone other than the participating customer. However, this was the case for only six percent of attempted calls, which is a slight improvement over the nine percent of calls that reached disconnected or incorrect numbers in PY2015. Overall, contact information was sufficient for EM&V purposes.
- **Air infiltration:** For the 44 homes receiving blower door testing for air infiltration during verification site visits, the reported CFM leakage value was within 10% of the measured leakage value in approximately 39% of cases. The reported CFM leakage value was within 25% of the measured leakage value in approximately 70% of cases. There were four instances where measured leakage was more than 50% greater than reported leakage. Overall, the Evaluators found that post CFM leakage rates were lower than reported post CFM leakage rates, with total measured CFM leakage averaging to 94% of total reported CFM leakage among sampled homes.
- **Attic insulation:** There were no verification issues associated with the 37 visited homes that reported attic insulation. The average thickness of the verified insulation was approximately 13 inches. Any identified discrepancies between reported insulation levels and measured insulation levels were very minor and infrequent.
- **CFLs:** Of the 50 reported instances of CFL installation, 49 were verified. There were no significant differences between the reported quantity and verified



quantity of CFLs installed, after accounting for the 97% in-service-rate specified in the TRM. The specific in-service rate for CFLs identified during these site visits was 96%.

- **Duct sealing:** There were no verification issues associated with the five visited homes that reported duct sealing. On average, the post CFM leakage values measured by the field technician were lower than the reported post CFM values from program tracking data. Overall, the Evaluators found post CFM leakage to be approximately 88% of reported post CFM leakage for the sampled sites.
- **Power strips:** All instances of advanced power strips were verified.
- **Water heater measures:** Of the 11 reported instances of water heater insulation, 10 were verified; the remaining customer had removed their water heater insulation. All instances of low-flow showerheads and faucet aerators were verified.

As with prior program years, the measure implementation data reported by the installation contractors were found to be accurate and few discrepancies were identified. However, as the measured CFM leakage value for air infiltration significantly varied both above and below reported CFM leakage rates, there may be some differences between the Evaluators' and the contractors' blower door testing methodology. Moving forward, it may be useful to obtain specific field data forms as filled out by installation contractors for a sample of homes to confirm any site-specific details that should be considered during blower door testing.

#### **4.3.4 Net Impact Evaluation Approach**

This section presents the methodologies for, and key findings from, the net impact evaluation of the PY2016 OG&E/AOG Weatherization Program. Ex post net savings are summarized in Section 4.3.6.

##### **4.3.4.1 Free ridership Determination**

The program framework specifies a default free ridership rate of 2% for programs under the Unified Weatherization program approach. This value is based on prior evaluations of the joint weatherization offering implemented by OG&E and AOG, and the Evaluators applied the 2% free ridership rate to the program for the PY2016 evaluation.

##### **4.3.4.2 Spillover Savings**

Although there is a stipulated free ridership rate of 2%, there is no stipulated spillover savings value for the program approach. Therefore, the Evaluators used the participant survey to conduct a spillover savings assessment for program participants in PY2016.

#### 4.3.4.2.1 Spillover Savings Description

While free ridership represents the portion of gross savings that would still have been realized in the absence of the program, spillover refers to reductions in energy consumption or demand that are attributable to program influences beyond those directly associated with program participation. Participant spillover represents the energy savings that are achieved when a program participant—because of the program’s influence—installs energy efficiency measures outside the efficiency program after having participated. Spillovers are not recorded in the program tracking system, but may be assessed during the evaluation effort through a variety of methods including participant surveying.

#### 4.3.4.2.2 Spillover Assessment Methodology

The Evaluators included a series of questions in the participant survey to inform the spillover savings assessment for PY2016. These questions were designed to gather information regarding:

- Whether program participants have purchased and installed additional, non-incentivized energy saving measures since participating in the program;
- Which additional, non-incentivized energy saving measures program participants have purchased and installed since participating in the program; and
- The extent to which the AOG-OG&E Weatherization Program influenced the purchase of these additional non-incentivized energy saving measures.

Survey respondents were first asked the following question:

- S1 “Since participating in the program, have you bought and installed any additional energy efficient items on your own without a rebate or discount from a utility-sponsored program?”

Respondents answering “Yes” to the above question were then provided with a list of common residential energy efficiency measures such as energy efficient LED or CFL lighting and Energy Star® appliances, and are asked to indicate which of these items they have purchased, and how many they have purchased, since participating in the program.<sup>54</sup> The survey also asks when the customer purchased and installed the items in order to confirm that the purchasing decision was made after the weatherization work was conducted.

Respondents who indicate that they have installed at least one additional energy efficient measure since participating in the program were then asked two questions to

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<sup>54</sup> A full list of the energy efficiency measures included in this question can be found in the participant survey instrument presented in Appendix A.

determine the level of influence that the AOG-OG&E Weatherization Program may have had on the decision to purchase and install the item(s).

The two questions used to assess program influence on the purchase and installation of additional energy saving measures are as follows:

- S17 “On a scale of 0 to 10, where 0 represents “Not at all important” and 10 represents “Extremely important”, how important was your experience with the program in your decision to purchase the items you just mentioned?”
- S18 “On a scale of 0 to 10, where 0 represents “Not at all likely” and 10 represents “Extremely likely”, how likely would you have been to purchase those additional items if you had not participated in the program?”

The Program Influence Score (PI Score) is then calculated as the average of the responses to these two questions, where the numeric scale from S18 is reversed by subtracting the Q15-D score from 10 total possible points:

$$PI\ Score = ((Q79\ Score) + (10 - Q80\ Score))/2$$

For example, a respondent providing a rating of 9 to S17 and a rating of 3 to S18 would receive a PI Score as follows:

$$PI\ Score = (9 + 10 - 3) / 2$$

$$PI\ Score = 8$$

Respondents whose PI Scores are greater than 5 are considered to have made additional energy efficiency purchases that were significantly influenced by the program.

The spillover methodology described above represents a threshold approach, where additional energy efficiency measures implemented by program participants are either 100% attributable to program influence or 0% attributable.

Savings for additional measures purchased and installed by these respondents are then calculated using deemed savings methods or average savings for that measure type in the participant population (if applicable). The total spillover savings are then distributed across the participant survey sample by fuel source (e.g. OG&E or AOG vs. non-participating IOUs or municipal utilities) to determine per-participant spillover rates. The per-participant spillover rate by utility provider is then applied to the population of program participants.

After applying free ridership rates and participant spillover rates, the resulting program-level net savings are divided by program-level gross savings to calculate the program-level net-to-gross ratio.

**4.3.4.2.3 Spillover Assessment Results**

The participant survey was administered to 91 customers who participated in the program during PY2016. Of these 91 respondents, 24 indicated that they had installed additional, non-incentivized energy efficiency measures since participating in the program. However, two of these participants later clarified that their purchases had occurred prior to their participation in the program, and these participants were removed from the spillover savings assessment. Of the remaining 22 respondents, seven respondents met the attribution criteria specified above by achieving a Program Influence score of greater than five.

The energy efficiency measures identified by these seven respondents consisted of the following items, shown in Table 4-64.

Table 4-64 Measures Eligible for Spillover Savings

Measure Name	Electric Provider	Gas Provider	Eligible Spillover Quantity from Survey Sample
CFL	OG&E	AOG	12
LED	OG&E	AOG	22
	AR Valley	AOG	6
	OG&E	Black Hills	10
	OG&E	Black Hills	4
Faucet Aerator	OG&E	Black Hills	1
Low Flow Showerhead	OG&E	Black Hills	2
Refrigerator Replacement	OG&E	Black Hills	1
Dishwasher Replacement	OG&E	Black Hills	1
Clothes Washer Replacement	OG&E	AOG	1
Central AC Replacement	OG&E	AOG	1
	AR Valley	AOG	1
Gas Furnace Replacement	OG&E	AOG	1
Gas Water Heater Replacement	OG&E	AOG	1
<b>Total</b>			<b>63</b>

The Evaluators calculated electric and/or gas savings for the above items based on the fuel type(s) of the individual respondents who identified the spillover measures. Spillover savings for direct install measures that were implemented by OG&E and AOG during PY2016 were calculated using the average ex post gross savings for that measure type. Spillover savings for measures that were not implemented by OG&E or AOG during PY2016 were calculated using the Arkansas TRM version 6.0. The

evaluators applied conservative assumptions when calculating savings for these measures, such as assuming 15 SEER for efficient air conditioners and 90% AFUE for gas furnace replacement. These calculations resulted in sampled spillover savings by utility service provider. These savings were then applied, by utility service provider, from the survey sample of 91 respondents to the program population of 1,804 participants. Table 4-65 presents a summary of the total spillover savings resulting from the participant sample, prior to application to the population. The total spillover savings identified through the participant survey sample were 3,519 kWh and 66 therms.

Table 4-65 Summary of Sampled Spillover Savings

Utility Provider	Peak Demand Reduction (kW) Spillover	Annual Energy Savings (kWh) Spillover	Peak Demand Reduction (Therms) Spillover	Annual Energy Savings (Therms) Spillover
AOG	0.00	0.00	0.47	43.00
OG&E	0.84	2,301.00	0.00	0.00
Black Hills	0.00	0.00	0.07	22.00
Arkansas Valley	0.68	1,218.00	0.00	0.00
<b>Total</b>	<b>1.52</b>	<b>3,519.00</b>	<b>0.54</b>	<b>66.00</b>

After applying the sampled spillover savings to the participant population, total spillover savings attributed to the OG&E/AOG Weatherization Program were 66,964 kWh and 1,216 Therms. Gas spillover savings directly attributed to AOG were 744 Therms, while electricity spillover savings directly attributed to OG&E were 48,412 kWh. This represents approximately 0.4% of ex post gross gas savings for AOG and approximately 1.2% of ex post gross electricity savings for OG&E for PY2016.

### 4.3.5 Gross Evaluation Summary and Findings

After reviewing the tracking data and inputs for savings calculations, the Evaluators provided ex post gross savings according to protocols from the TRM. Ex post gross electricity and gas savings were within 2% of ex ante estimates for all measures implemented through the program.<sup>55</sup>

Table 4-66 presents the ex post gross savings achieved from participating homes receiving gas utility service from AOG. These savings do not include the 215 AOG homes whose project cost was fully paid by OG&E.

<sup>55</sup> Apart from Therms savings for CFL lighting, which is associated with a very slight negative savings value.

Table 4-66 Ex Post Gas Savings, AOG

# of homes	Ex Post Gross Peak Demand Savings (Therms)	Ex Post Gross Annual Savings (Therms)	Ex Post Gross Lifetime Savings (Therms)	Ex Post Gross Realization Rate
1,048	3,706.95	199,663	3,263,859	100%

Table 4-67 presents the ex post gross energy savings (kWh) achieved from participating homes receiving electric utility service from OG&E.

Table 4-67 Ex Post Gross Electricity Savings, OG&E

# of homes	Ex Post Gross Peak Demand Savings (kW)	Ex Post Gross Annual Savings (kWh)	Ex Post Gross Lifetime Savings (kWh)	Ex Post Gross Realization Rate
1,578	1,053.19	3,962,154	58,162,301	102%

Table 4-68 summarizes the ex post gross natural gas savings (therms) and both energy (kWh) and demand (kW) savings for AOG and OG&E, by measure, for PY2016.

Table 4-68 Ex Post Gross Savings by Measure, AOG and OG&E

Measure	Ex Post Gross Annual Savings (Therms)	Ex Post Gross Peak Demand Savings (Therms)	Ex Post Gross Lifetime Savings (Therms)	Ex Post Gross Annual Savings (kWh)	Ex Post Gross Lifetime Savings (kWh)	Ex Post Gross Peak Demand Savings (kW)
CFL Bulbs	-7.00	0.00	-51.00	749,719.00	5,503,704.00	115.36
Attic Insulation	103,320.00	1,685.33	2,066,395.00	1,770,395.00	35,407,896.00	625.78
Air Infiltration	71,239.00	2,008.44	783,629.00	618,565.00	6,804,219.00	174.52
WH Insulation	495.00	0.16	5,492.00	8,485.00	110,216.00	0.54
Showerhead	2,871.00	8.61	28,709.00	30,806.00	308,059.00	3.20
Faucet Aerator	1,466.00	4.40	14,660.00	16,779.00	167,787.00	1.74
Duct Sealing	20,279.00	0.00	365,025.00	273,296.00	4,919,328.00	73.80
Power Strip	0.00	0.00	0.00	494,109.00	4,941,093.00	58.24
<b>Total</b>	<b>199,663.00</b>	<b>3,706.95</b>	<b>3,263,859.00</b>	<b>3,962,154.00</b>	<b>58,162,301.00</b>	<b>1,053.19</b>

Table 4-69 presents overall energy savings (kWh) and natural gas (therms) ex post gross realization rates by measure. These ex post gross realization rates are representative of all program savings, including all gas and electric savings presented above.

Table 4-69 Overall Gross Realization Rates by Measure

Measure	Ex Post Gross Realization Rate (kWh)	Ex Post Gross Realization Rate (Therms)
CFLs	101%	104%
Attic Insulation	100%	100%
Air Infiltration	101%	101%
Water Heater Insulation	100%	100%
Showerhead	99%	99%
Faucet Aerator	99%	99%
Duct Sealing	100%	99%
Advanced Power Strip	100%	N/A

**4.3.6 Impact Evaluation Summary and Findings**

Table 4-70 and Table 4-71 present the overall ex ante savings for OG&E and AOG by measure, respectively. These values were obtained from the EnerTrek program tracking database exports that were provided to the Evaluators by Frontier Associates.

These tables include all ex ante gas savings for participating homes serviced by AOG where AOG paid at least a portion of the project cost, and all ex ante electric savings for participating homes serviced by OG&E where OG&E paid at least a portion of the project cost.

Table 4-70 Ex Ante Savings by Measure, OG&E

Measure	Ex Ante Annual Energy Savings (kWh)	Ex Ante Peak Demand Reduction (kW)
CFL Bulbs	688,688	99.83
Attic Insulation	1,771,226	626.03
Air Infiltration	612,443	172.90
WH Insulation	8,483	0.54
Showerheads	31,124	3.24
Faucet Aerators	16,957	1.76
Duct Sealing	273,232	73.76
Power Strips	494,109	58.24
<b>Total</b>	<b>3,896,262</b>	<b>1,036.30</b>



Table 4-71 Ex Ante Savings by Measure, AOG

Measure	Ex Ante Annual Energy Savings (Therms)	Ex Ante Peak Demand Reduction (Therms)
CFL Bulbs	-6	0.00
Attic Insulation	103,415	1,686.77
Air Infiltration	70,547	1,988.32
WH Insulation	495	2.88
Showerheads	2,901	8.70
Faucet Aerators	1,482	4.45
Duct Sealing	20,549	0.00
Power Strips	0	0.00
<b>Total</b>	<b>199,382</b>	<b>3,691.12</b>

The following table presents the remaining ex ante natural gas and electricity savings that were not included in the two tables above. This consists of natural gas and electric savings attributable to municipal utilities, co-op utilities, or other investor owned utilities, which are not sponsors of this program, as well as gas savings from the 215 homes serviced by AOG where OG&E paid the full project cost.

Table 4-72 Ex Ante Savings by Measure – Non-Program and AOG Homes Paid by OG&E

Measure	Ex Ante Annual Energy Savings (kWh)	Ex Ante Peak Demand Reduction (kW)	Ex Ante Annual Energy Savings (Therms)	Ex Ante Peak Demand Reduction (Therms)
CFL Bulbs	112,069	15.11	-2.00	0.00
Attic Insulation	144,772	90.80	37,669.00	619.77
Air Infiltration	39,196	25.40	25,511.00	722.99
WH Insulation	0.00	0.00	62.00	0.34
Showerheads	0.00	0.00	183.00	0.55
Faucet Aerators	0.00	0.00	98.00	0.29
Duct Sealing	14,101	5.30	7,441.00	0.00
Power Strips	757	0.09	0.00	0.00
<b>Total</b>	<b>310,895</b>	<b>136.69</b>	<b>70,962.00</b>	<b>1,343.94</b>

Table 4-73 presents the ex ante gas savings associated with homes that were listed as having no gas service provider. As there are no municipal gas utilities in the OG&E or AOG service territories, and based on feedback from the utilities and Frontier, the Evaluators categorized these homes as propane customers. Although the ex ante gas savings for these customers were reported in units of therms, the Evaluators converted



these savings to gallons of propane using a conversion rate of 0.91 therms per gallon of propane.<sup>56</sup>

Table 4-73 Ex Ante Propane Savings by Measure

Measure	Ex Ante Annual Savings (Gallons Propane)
CFL Bulbs	-0.20
Attic Insulation	4,109.00
Air Infiltration	2,330.00
WH Insulation	0.00
Showerheads	0.00
Faucet Aerators	0.00
Duct Sealing	555.00
Power Strips	0.00
<b>Total</b>	<b>6,994.00</b>

#### 4.3.7 Net Evaluation Summary and Findings

The following tables present the ex post net savings results of the evaluation of the PY2016 OG&E/AOG Weatherization Program. Table 4-74 includes ex post net savings for AOG, incorporating the free ridership rate of 2% and spillover savings. This consists of all gas savings for participating homes serviced by AOG where AOG paid at least a portion of the project cost.

Table 4-74 Ex Post Net Gas Savings Attributable to AOG

# of homes	Ex Post Net Peak Demand Savings (Therms)	Ex Post Net Annual Savings (Therms)	Ex Post Net Lifetime Savings (Therms)	Net-to-Gross Ratio
1,048	3,640.90	196,414	3,211,780	98.4%

Table 4-75 includes ex post net savings for OG&E, incorporating the free ridership rate of 2% and spillover savings. This consists of all electric savings for participating homes serviced by OG&E where OG&E paid at least a portion of the project cost.

<sup>56</sup> Based on 1 gallon of propane = 91,000 BTU, and 1 Therm ~100,000 BTU.

Table 4-75 Ex Post Net Electricity Savings Attributable to OG&E

# of homes	Ex Post Net Peak Demand Savings (kW)	Ex Post Net Annual Savings (kWh)	Ex Post Net Lifetime Savings (kWh)	Net-to-Gross Ratio
1,578	1,049.89	3,931,323	57,846,534	99.2%

Table 4-76 summarizes ex post net gas and electricity savings by measure for OG&E and AOG. This table includes all gas savings directly attributable to AOG and all electricity savings directly attributable to OG&E for PY2016.

Table 4-76 Ex Post Net Savings by Measure, OG&E and AOG

Measure	Ex Post Net Peak Demand Savings (Therms)	Ex Post Net Annual Savings (Therms)	Ex Post Net Lifetime Savings (Therms)	Ex Post Net Peak Demand Savings (kW)	Ex Post Net Annual Savings (kWh)	Ex Post Net Lifetime Savings (kWh)
CFL Bulbs	0.00	-7.00	-50	115.00	743,885	5,473,824
Attic Insulation	1,655.30	101,638.00	2,033,423	623.83	1,756,619	35,215,664
Air Infiltration	1,972.66	70,080.00	771,125	173.97	613,752	6,767,278
WH Insulation	0.16	487.00	5,404	0.53	8,419	109,617
Showerhead	8.46	2,824.00	28,251	3.19	30,566	306,386
Faucet Aerator	4.32	1,442.00	14,426	1.74	16,648	166,876
Duct Sealing	0.00	19,949.00	359,201	73.57	271,169	4,892,621
Power Strip	0.00	0.00	0	58.06	490,264	4,914,267
<b>Total</b>	<b>3,640.90</b>	<b>196,414.00</b>	<b>3,211,780</b>	<b>1,049.89</b>	<b>3,931,323</b>	<b>57,846,534</b>

#### 4.3.8 Non-Energy Benefits (NEBs)

Protocol L of the Arkansas TRM VERSION 6.0 states that EM&V of demand-side management (DSM) programs in Arkansas must account for non-energy benefits (NEBs) resulting from each program. Specifically, the categories of NEBs that are to be calculated for each DSM program are as follows:

- Benefits of electricity, natural gas, and liquid propane energy savings (i.e. other fuels);
- Benefits of public water and wastewater savings; and
- Benefits of avoided and deferred equipment replacement costs.

As discussed below, the NEBs applicable to the OG&E/AOG Weatherization Program in PY2016 are electricity, natural gas, and liquid propane energy savings, and water savings.

**4.3.8.1 Electricity, Natural Gas, and Liquid Propane Energy Savings**

In the OG&E/AOG Weatherization Program, the participating utilities are AOG and OG&E. Typically, the amount that either utility pays for a participating home depends on whether the utility is serviced by AOG, by OG&E, or by both utilities. Weatherization of a home receiving both gas service from AOG and electric service from OG&E would typically be paid for by both AOG and OG&E. However, in PY2016, AOG expended its full program budget by late August and OG&E began to pay the full project cost for homes receiving utility service from both AOG and OG&E. This was done for 215 AOG-serviced homes.

Table 4-77 presents the ex post net natural gas and electricity savings that were not directly attributed to AOG or OG&E, but that can be claimed as NEBs for cost-effectiveness purposes. This consists of natural gas and electric savings attributable to municipal utilities, co-op utilities, or other investor owned utilities which are not sponsors of this program, as well as gas savings from the 215 homes serviced by AOG where OG&E paid the full project cost. These tables do not include gas savings attributable to propane customers.

Table 4-77 Ex Post Net Savings by Measure, Other Providers and AOG Homes Paid by OG&E

Measure	Ex Post Net Peak Demand Savings (Therms)	Ex Post Net Annual Savings (Therms)	Ex Post Net Lifetime Savings (Therms)	Ex Post Net Peak Demand Savings (kW)	Ex Post Net Annual Savings (kWh)	Ex Post Net Lifetime Savings (kWh)
CFL Bulbs	0.00	-2.00	-14	17.82	121,764.00	904,884
Ceiling Insulation	608.60	37,048.00	741,200	91.33	143,481.00	2,876,433
Air Infiltration	714.84	25,256.00	277,906	25.64	39,244.00	432,706
WH Insulation	0.01	61.00	667	0.00	0.00	0
Showerhead	0.53	178.00	1,782	0.00	0.00	0
Faucet Aerator	0.29	95.00	953	0.00	0.00	0
Duct Sealing	0.00	7,256.00	130,644	5.28	14,055.00	253,594
Power Strip	0.00	0.00	0	0.09	751.00	7,525
<b>Total</b>	<b>1,324.28</b>	<b>69,892.00</b>	<b>1,153,138</b>	<b>140.17</b>	<b>319,295.00</b>	<b>4,475,142</b>

The Evaluators identified 38 OG&E customer homes in the PY2016 tracking data that received propane service and achieved gas savings because of measures implemented through the program. Although the ex ante gas savings for these customers were reported in units of Therms, the Evaluators converted these savings to gallons of propane using a conversion rate of 0.91 Therms per gallon of propane.<sup>57</sup>

Table 4-78 presents the ex post net propane savings, in gallons, attributed to these customers.

Table 4-78 Ex Post Net Savings, Propane

Measure	Ex Post Net Annual Propane Savings (Gallons)
CFL Bulbs	-0.23
Attic Insulation	4,027.00
Air Infiltration	2,293.00
WH Insulation	0.00
Showerheads	0.00
Faucet Aerators	0.00
Duct Sealing	544.00
Power Strips	0.00
<b>Total</b>	<b>6,864.00</b>

#### 4.3.8.2 Water Savings

During PY2016 the water saving measures implemented through the OG&E/AOG Weatherization Program included faucet aerators and energy saving showerheads. The program tracking data included flow rates for these measures, and the Evaluators applied these flow rates to the AR TRM algorithms for faucet aerators and showerheads to calculate annual gallons of water saved.

For homes receiving utility service from only one of the sponsoring utilities (AOG or OG&E), all water savings resulting from program measures were attributed to the sponsoring utility, regardless of water heater fuel type. For homes receiving utility service from both AOG and OG&E, water savings were attributed based on water heater fuel type. For example, water savings for a home receiving gas service from AOG and electricity service from OG&E would be attributed to OG&E if the home had an electric water heater, and to AOG if the home had a gas water heater. Table 4-79 presents water savings in gallons for AOG and OG&E by water heater fuel type.

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<sup>57</sup> Based on 1 gallon of propane = 91,000 BTU, and 1 Therm ~100,000 BTU.

Table 4-79 Ex Post Net Water Savings by Measure Type

Utility	Showerheads (Gallons)	Faucet Aerators (Gallons)	Total
OG&E	310,636	103,475	414,110
AOG	549,227	187,418	736,645
<b>Total</b>	<b>859,863</b>	<b>290,892</b>	<b>1,150,755</b>

**4.3.8.3 NEBs Summary**

Table 4-80 summarizes the NEBs attributable to OG&E for the PY2016 OG&E/AOG Weatherization Program, including natural gas savings, water savings, and propane savings.

Table 4-80 Non-Energy Benefits (NEBs) Summary, OG&E

Measure	Natural Gas Savings (Therms)	Water Savings (Gallons)	Propane Savings (Gallons)
CFL Bulbs	-2.00	0	0
Attic Insulation	37,048.00	0	4,027
Air Infiltration	25,256.00	0	2,293
WH Insulation	61.00	0	0
Showerheads	178.00	310,636	0
Faucet Aerators	95.00	103,475	0
Duct Sealing	7,256.00	0	544
Power Strips	0.00	0	0
<b>Total</b>	<b>69,892.00</b>	<b>414,110</b>	<b>6,864</b>

Table 4-81 summarizes the NEBs attributable to AOG for the PY2016 OG&E/AOG Weatherization Program, including electricity savings and water savings.

Table 4-81 Non-Energy Benefits (NEBs) Summary, AOG

Measure	Electricity Savings (kWh)	Water Savings (Gallons)
CFL Bulbs	121,764	0
Attic Insulation	143,481	0
Air Infiltration	39,244	0
WH Insulation	0	0
Showerheads	0	549,227
Faucet Aerators	0	187,418
Duct Sealing	14,055	0
Power Strips	751	0
<b>Total</b>	<b>319,295</b>	<b>736,645</b>

### 4.3.9 Process Evaluation

The Arkansas TRM version 6.0 Protocol C addresses the criteria used to determine the timing and conditions needed for a process evaluation, and the following tables summarize the program in the context of these requirements.

Table 4-82 Determining Process Evaluation Timing

Variable Name	Variable Type
New and Innovative Components	Partially. The program continues to incorporate a set list of measures that is similar to prior years with a few additions.
No Previous Process Evaluation	The Unified Weatherization Program has not received a prior process evaluation but OG&E's joint weatherization program with AOG, upon which much of the Unified Weatherization Program framework was based, received process evaluations during prior years.
Less than Expected Energy Savings or Accomplishments	No. OG&E weatherization offerings have exceeded energy savings expectations in prior years.
Participant Reported Problems or Low Participant Satisfaction	No. There have been few reported incidences of customer dissatisfaction for OG&E weatherization offerings.
New Vendor or Contractor	No. The program continues to be implemented by OG&E and uses installation contractors who were previously involved in the joint OG&E/AOG Weatherization Program.
Energy Savings are being Achieved Slower than Expected	No. Energy savings are being achieved at a rate that is consistent with program expectations.

Table 4-83 Determining Process Evaluation Conditions

Component	Status
Impact problems	No. Savings for OG&E weatherization offerings are not substantially lower than expected for most measures although M&V activities will verify the accuracy of savings estimates and TRM guidelines.
Informational/educational objectives	Addressed. The participant surveys for the OG&E weatherization offering in the past determined that customers are more aware of energy efficiency options and energy-saving methods after participating.
Participation problems	No. The prior OG&E weatherization offering gained substantial customer participation during its initial years and is expected to continue to perform at or above participation targets.
Operational challenges	None identified thus far.
Cost-effectiveness issues	No. The program is designed to implement the most cost-effective measures for each participating customer, and historical cost-effectiveness for the OG&E weatherization offering has been adequate.
Negative feedback	No. Response to the OG&E weatherization offering has been highly positive.
Market effects	Addressed. Staff interviews and contractor interviews determined that the OG&E weatherization offering resulted in minor market effects where contractors promote energy saving measures to the broader customer market.

Based on these criteria, the OG&E/AOG Weatherization Program did not call for a full process evaluation in PY2016. The process evaluation activities conducted for the current program year were focused on assessing the extent to which the program’s transition to the Unified Weatherization Program framework has affected program design and performance, and the extent to which any prior program recommendations or issues have been addressed. Specifically, the process evaluation was designed to answer the following research questions:

- What changes have been made to program design, operation, and/or delivery with the transition to the Unified Weatherization Program? How have measure offerings and program eligibility requirements been affected?
- Did the transition to the Unified Weatherization Program result in any delays in program delivery?



- Have there been any issues with program performance, either for specific measures or overall, since the transition took place? What benefits, challenges, and opportunities have program staff perceived or experienced because of the change?

To address these questions, the Evaluators conducted interviews with program staff and telephone surveys with program participants.

#### **4.3.9.1 Data Collection Activities**

As part of the PY2016 evaluation of the OG&E/AOG Weatherization Program, the Evaluators completed in-depth interviews with program staff working on the program: the program managers from OG&E and AOG, and a program representative from Frontier Associates. The Evaluators used the information gleaned in these interviews identify program updates or changes experienced in PY2016 compared to available documentation. Further, these interviews explored energy efficiency staff roles and responsibilities, program communications and marketing, and the overall program delivery processes in place during PY2016.

Telephone surveys were completed with OG&E/AOG Weatherization Program participants through Tetra Tech's in-house survey lab. Surveys collected process evaluation information, including gathering respondent feedback on program communication and offerings, evaluating changes in participant energy efficiency awareness and behaviors due to program participation, and verifying measure installation. The survey also collected household characteristics and limited demographic information. Tetra Tech received and reviewed program population data queried from tracking data received through Frontier Associates. The program tracking data provides contact information on participating customers and measure descriptions of equipment installed through the program.

Tetra Tech spoke to 91 program participants from a random sample of 340 participants and stratifying by participating utility to retain a survey respondent distribution that most closely mirrored the participant population distribution across the participating utilities over the course of the program year. This sampling strategy was designed to achieve an overall 90/10 level of precision at the program level. The final sample distribution and response rate for this survey can be found in Appendix A.

Tetra Tech mailed an advance letter to sampled participants on Monday, November 14, 2016. On November 16, 2016, Tetra Tech fielded the survey. Data collection ended on November 23, 2016.

Table 4-84 below summarizes the survey and interview data collection for the PY2016 program evaluation, including data collection type and number of respondents.



Table 4-84 Interview and Survey Data Collection Summary

Target	Component	Activity	N	Details
Program Staff	AOG Program Staff	Interview	1	The program manager and operational staff are responsible for coordinating program data, managing program resources, directing installation contractors, and communicating with AOG or OG&E staff as needed during the program process.
	OG&E Program Staff	Interview	1	
	Frontier Associates Staff	Interview	1	
Program Participants	Telephone Survey	Survey	91	This consisted of a satisfaction questionnaire and a series of questions related to program and energy efficiency awareness and engagement.

**4.3.9.2 Process Results and Findings**

This section presents the results and key findings from the process evaluation activities. These findings are based upon interviews with utility staff, implementation staff, and surveys with participating customers. The findings presented pertain to program communications and marketing, program delivery, participant energy efficiency awareness and behaviors, and customer characteristics.

**4.3.9.2.1 Program Communication and Marketing**

Each utility is responsible for its own program marketing. Utility staff indicated that their marketing strategies for the year included the use of bill inserts, radio ads, email and direct mail program promotion (including some targeted efforts by zip code), conference appearances and community presentations, and general word of mouth. The utility staff confirmed in staff interviews that program marketing has been more effective this past program year, as the AR marketing effort coordinated with the OK Weatherization program marketing efforts to stagger campaigns at unique times.

Participants overall most frequently reported (59%) that they heard about this program through word of mouth, such as through a friend or family member. Participants could name all manners in which they heard about the program, and many indicated multiple methods. A summary of the participant responses appears in Table 4-85.

Table 4-85 How Participants Learned of Program

Response	OG&E /AOG	OG&E	AOG	Total
Word of mouth from friends, relatives, or others	61.4%	58.8%	50.0%	58.9%
Information that came in the mail	24.6%	5.9%	0.0%	16.7%
Radio ad	10.5%	35.3%	18.8%	16.7%
Utility bill message	14.0%	35.3%	6.3%	16.7%
Yard signage	12.3%	29.4%	12.5%	15.6%
TV ad	14.0%	5.9%	12.5%	12.2%
Newspaper or magazine article / add	7.0%	0.0%	12.5%	6.7%
Other	7.0%	0.0%	12.5%	6.7%
Utility website	3.5%	5.9%	0.0%	3.3%
Contractor	1.8%	0.0%	0.0%	1.1%
Other website	1.8%	0.0%	0.0%	1.1%
Email	1.8%	0.0%	0.0%	1.1%
Local community action agency	0.0%	0.0%	0.0%	0.0%
Respondents (n)	57	17	16	90

Source: Question a1

Note: Totals may not sum to 100 percent as respondents could select more than one answer

Survey respondents were also asked why they ultimately opted to participate in the program. Respondents could identify multiple reasons for program participation, and respondents named a wide variety of participation motivations. For example, 35% indicated they wanted to save money on their electricity bill, while another 24% indicated they hoped to realize gas bill savings. Another 23% reported wanting to save energy within their home. Finally, when respondents who had given more than one reason for participating were asked to identify the primary reason, nearly half (43%) indicated that they wanted to save money on an energy bill.

Table 4-86 Reasons for Program Participation

Response	OG&E/AOG	OG&E	AOG	Total
To reduce my monthly electric bill	32.8%	58.8%	18.8%	35.2%
To reduce my monthly gas bill	27.6%	11.8%	25.0%	24.2%
Save energy	25.9%	23.5%	12.5%	23.1%
The program paid for some or all of the improvements	24.1%	23.5%	12.5%	22.0%
Recommendation from a friend, relative, neighbor	5.2%	5.9%	6.3%	5.5%
It is the right thing to do	1.7%	0.0%	0.0%	1.1%
Help save the environment	0.0%	5.9%	0.0%	1.1%
Contractor recommendation	0.0%	0.0%	0.0%	0.0%
Utility recommendation or information	0.0%	0.0%	0.0%	0.0%
Other	60.3%	47.1%	68.8%	59.3%
Respondents (n)	58	17	16	91

Source: Question a4

Note: Totals may not sum to 100 percent as respondents could select more than one answer

**4.3.9.2.2 Program Delivery**

The primary focus for the PY2016 process evaluation was on two key program delivery items related to the transition into the Unified Weatherization Program approach: 1) identify program delivery aspects that may have changed within the past year and 2) verify that the actual program measures and equipment offered through the program were installed.

*Program Delivery Changes*

According to the interviews with program staff, the utility customer participant experience went through two key changes this year. First, as part of complying with the Unified Weatherization Program approach, the program offered some direct install measures to customers this year even if their home was disqualified (DQ) from receiving other program measures such as insulation or air sealing. Direct install measures offered to DQ customers included faucet aerators, showerheads, CFL bulbs, or an advanced power strips.

The second program delivery change this year was made to customer processes for program enrollment. Previously, customers of either AOG or OG&E who made calls to inquire about or enroll in the program had their call answered by the Community Clearinghouse. Program staff originally saw the partnership with the Community Clearinghouse as a good fit, as the agency typically interacted with customers and housing stock that were good program candidates. In return for handling program

inquires with customers, OG&E provided the Community Clearinghouse with a small incentive for each program lead.

Community Clearinghouse relied on account number-fueled customer data accuracy. However, given that Community Clearinghouse did not have complete customer account information at their disposal, it created issues servicing customers and/or providing contractors working with the program with accurate information – especially as program demand grew among the customer base. This past program year, AOG and OG&E made the change to handle all customer program enrollment requests in-house, which has improved the accuracy of customer data collection on front-end during the initial request for program services. Utility staff from OG&E indicated that this appears to have cut down on wait times.

Utility staff identified two challenges related to program delivery that were present during PY2016:

- The program continued to deliver CFLs to program participants as direct install measures; however, customer demand for LEDs are increasing and the utilities receive continued requests for this measure type.
- The program was on track to exhaust its incentive dollars for the program year in November of this year, which could result in a customer service lag for customers who requested service in the last quarter of the year. This may be an issue in future years depending on how implementation budgets are managed throughout the year.

### *Measure Installation*

Through the telephone survey effort, participants were asked to verify whether the measures listed in the program tracking data were actual measures they received through the program. Ninety-six percent of customers indicated that they had received all measures reported in the tracking data, while four percent indicated that the measures they received were different than what was reported. Among those four percent indicating there was something incorrect about the program tracking data, they indicated they did not receive these three measures: a light bulb, a faucet aerator, and pipe wrap. One response was unclear.

Further, participants were asked to confirm that measures recorded in the program tracking database associated with their project was originally installed by the energy specialist rather than left with them to install on their own. Table 4-87 displays the responses to this question, where four out of every five (82%) respondents indicated that all items received through the program were installed. Eleven percent of our respondents indicated that some, but not all, measures were installed, while

approximately seven percent indicated their energy specialist did not install any of the program measures or equipment.

Table 4-87 Installation of Measures by Energy Specialist

Response	OG&E/AOG	OG&E	AOG	Total
The energy specialist installed all of the items you received.	82.5%	76.5%	87.5%	82.2%
The energy specialist installed some of the items but not all of them.	10.5%	17.6%	6.3%	11.1%
The energy specialist did not install any of the items.	7.0%	5.9%	6.3%	6.7%
Respondents (n)	57	17	16	90

Source: Question m6

Note: Totals may not sum to 100 percent due to rounding

Respondents were also asked whether the measures that were installed through the program have been removed or replaced since participating. Overall, 19% of respondents confirmed they have removed or replaced the measure that they received through the program, while four out of five overall (81%) have kept program-related items installed in their homes. Participants most commonly remove direct install measures such as CFLs or faucet aerators.

Table 4-88 Participant Removal or Replacement of Measures

Response	OG&E/AOG	OG&E	AOG	Total
Yes	17.5%	17.6%	25.0%	18.9%
No	82.5%	82.4%	75.0%	81.1%
Respondents (n)	57	17	16	90

Source: Question m8

Note: Totals may not sum to 100 percent due to rounding

Respondents provided a wide variety of reasons for removing or replacing their program-provided measures. Forty percent of respondents indicated the items were no longer working properly – the most frequently mentioned answer. Twenty percent of respondents indicated they just liked their old (original) items better than the energy efficient option.

#### 4.3.9.2.3 Overall Customer Feedback

To assess customer satisfaction with the current program as offered, respondents were asked whether they would like to see additional equipment or measure options to the program. Most respondents (64%) indicated they did not have suggestions for additional

program options. Windows was the most frequently mentioned additional program measure respondents would like to see the program offer in future years. Other items mentioned by those customers who would like to see the program offer additional measures included more air sealing / duct work, LEDs, more insulation, ceiling fans, and solar panels.

It is also worth noting that – upon conclusion of the participant survey – over half of the survey respondents indicated they wanted to comment further about the program. When reviewing those comments, 39 of 52 were positive comments about the value of the program to the customer. A small sampling of the verbatim comments recorded from participants are as follows:

*“I appreciated the program, and the people are very nice. It is a very good experience all around.”*

*“I will tell you the field rep was very knowledgeable. Our air conditioning and heating bills have been much lower.”*

*“I saved hundreds of dollars from this [program].”*

*“I wish more people would take advantage of it because I think that they would be more comfortable in their home and save them money.”*

#### **4.3.9.2.4 Program Influence on Energy Saving Knowledge and Behavior**

Utility program staff indicated that one of the biggest program challenges is educating customers while onsite during the home visit. Staff indicated that there is an opportunity for customers to better understand the blower door assessments within the home, and understanding why some homes ultimately work for the program, and other homes do not qualify.

Regarding this issue, respondents were asked questions to assess how much energy efficiency knowledge of equipment and activities customers had before participating in the program, compared to how much that base of knowledge may have changed due to the program. First, respondents were asked how familiar they were with the benefits of energy efficiency improvements, such as purchasing energy efficient equipment, before participating in the program. Almost half of the total participants surveyed (47%) indicated they are “somewhat familiar”, while just over a quarter of the total participants confirmed they are very familiar with the benefits of energy efficiency improvements.

Table 4-89 Familiarity with Benefits of EE Improvements Prior to Assessment

Response	OG&E/AOG	OG&E	AOG	Total
Very familiar	26.3%	17.6%	33.3%	25.8%
Somewhat familiar	52.6%	47.1%	26.7%	47.2%
Neither familiar nor unfamiliar	1.8%	11.8%	0.0%	3.4%
Somewhat unfamiliar	12.3%	17.6%	13.3%	13.5%
Very unfamiliar	7.0%	5.9%	26.7%	10.1%
Respondents (n)	57	17	15	89

Source: Question e1

Note: Totals may not sum to 100 percent due to rounding

Participants decidedly more familiar with energy saving activities and behaviors, as 69% of them indicated that they are “very familiar”. When adding in the additional 30% who identified that they are “somewhat familiar” with energy saving activity benefits, nearly all respondents felt they had some baseline knowledge of the benefits of energy saving activities.

Table 4-90 Familiarity with Benefits of Energy Saving Behaviors Prior to Assessment

Response	OG&E/AOG	OG&E	AOG	Total
Very familiar	68.4%	64.7%	75.0%	68.9%
Somewhat familiar	29.8%	35.3%	25.0%	30.0%
Somewhat unfamiliar	1.8%	0.0%	0.0%	1.1%
Respondents (n)	57	17	16	90

Source: Question e2

Note: Totals may not sum to 100 percent due to rounding

Respondents were also asked whether they had performed energy saving activities prior to their assessment; three of every four survey respondents indicated they had. The most frequently mentioned activities included, “Turn off lights when not in the room” (49 %) and “Wash clothes in cold water” (32%).

The survey also included questions regarding whether the program had increased the customer’s energy efficiency knowledge or changed their actions. Focusing first on knowledge, Table 4-91 highlights that 31% of survey respondents indicate they are “much more” knowledgeable than before participating, while just over half (52%) of respondents report being somewhat more knowledgeable about energy efficiency because of their program experience.



Table 4-91 Relative Knowledge of EE after Assessment

Response	OG&E and AOG	OG&E	AOG	Total
Much more knowledgeable than before participating	36.8%	29.4%	12.5%	31.1%
Somewhat more knowledgeable than before participating	47.4%	64.7%	56.3%	52.2%
Slightly more knowledgeable than before participating	12.3%	0.0%	18.8%	11.1%
Not more knowledgeable than before participating	3.5%	5.9%	12.5%	5.6%
Respondents (n)	57	17	16	90

Source: Question e5

Note: Totals may not sum to 100 percent due to rounding

A few participants also reported that the program has also changed their actual energy savings behaviors. Sixty percent of survey respondents confirm they have taken additional actions to save energy in home since participating in the program.

Despite the reported program influence on participants' energy savings knowledge and activities around their home, the survey results suggest that the program is not currently acting as a gateway to additional energy efficiency program participation. Only a few program participants (seven percent) report moving forward with participation in other energy efficiency programs.

Table 4-92 Participation in Other Utility Programs since the Weatherization Program

Response	OG&E/AOG	OG&E	AOG	Total
Yes	8.6%	5.9%	0.0%	6.6%
No	91.4%	94.1%	100.0%	93.4%
Respondents (n)	58	17	16	91

Source: Question e8

Note: Totals may not sum to 100 percent due to rounding

#### 4.3.9.2.5 General respondent characterization

Table 4-93 summarizes basic home information as collected from participant survey respondents. Among surveyed participants, nearly all customers report living in a single-family home and owning that home, while three percent rent. Over half of the survey respondents live in home built before 1980 (59%), and nearly all of the respondents live in their home year-round.



Table 4-93 Survey Respondent Home Characteristics

Question	Response	OG&E and AOG	OG&E	AOG	Total
Best description of type of building you live in	A single family detached house	98.3%	88.2%	100.0%	96.7%
	A townhouse, duplex or row house	1.7%	11.8%	0.0%	3.3%
	Total	58	17	16	91
Do you own or rent your home	Own / Buying	96.6%	94.1%	100.0%	96.7%
	Rent	3.4%	5.9%	0.0%	3.3%
	Total	58	17	16	91
When was your home built	Before 1970's	43.1%	43.8%	12.5%	37.8%
	1970's	20.7%	31.3%	12.5%	21.1%
	1980's	10.3%	12.5%	25.0%	13.3%
	1990-1994	5.2%	6.3%	6.3%	5.6%
	1995-1999	13.8%	6.3%	25.0%	14.4%
	2000-2005	6.9%	0.0%	12.5%	6.7%
	2006 or newer	0.0%	0.0%	6.3%	1.1%
Total	58	16	16	90	
Do you live in this home year-round	Yes	96.6%	94.1%	93.8%	95.6%
	No	3.4%	5.9%	6.3%	4.4%
	Total	58	17	16	91

Source: Question d1 d2 d3 d4

Note: Totals may not sum to 100 percent due to rounding

#### 4.3.9.3 Review of PY2015 Evaluation Recommendations

The Evaluators provided recommendations for program improvements as part of the PY2015 evaluation. .

Table 4-94 summarizes the status of these issues and recommendations. All prior recommendations were adopted by program staff.

Table 4-94 Status of PY2015 Evaluation Recommendations

Issue	Consequences	Recommendation	Program Response	Status
Tracking data do not include specific measure details for some items (i.e. whether door sweeps, window sealing, etc. were installed, whether lighting was installed indoors or outdoors)	<p>Difficult to completely inspect measure installation</p> <p>Limits level of detail possible for measure tracking</p>	Depending on programming costs, include an itemized list of all air infiltration reduction measures installed in each home.	Program staff indicate that all air infiltration measure data are collected and available in the EnerTrek system.	Adopted
The “Gas Utility” field within the tracking data uses the classification of “None” to refer to both all-electric and propane customers.	Difficult to distinguish between a tracking data error and a propane customer.	Collect and report specific utility providers and identify propane customers within the program tracking database.	The designation has not been added, but program staff have indicated that customers with a gas utility of “None” and reported Therms savings should be classified as propane customers. This is the Evaluators’ approach moving forward.	Adopted
Some customers expressed that their contractor did not fully explain the services provided or could have been more knowledgeable	Negatively effects customer satisfaction, reduces spillover potential.	Consider working with contractors to ensure that they provide sufficient customer service and are able to sufficiently answer questions about energy efficiency options and provide recommendations.	The program added educational efforts and additional contractor training for PY2016.	Adopted

#### 4.3.10 Adherence to Protocol A

The EnerTrek database system managed by Frontier Associates includes a full list of all AOG-OG&E Weatherization Program participants, the measures that were installed in their homes, and the kWh and Therms savings associated with each measure.

During PY2016, the Evaluators received periodic tracking data updates as well as final tracking exports.

The EnerTrek system was updated to include necessary inputs as per TRM VERSION 6.0. Other than these updates, there were no major updates to the structure or content of program tracking data. The Evaluators previously reviewed program tracking data in PY2015 to assess its compliance with Protocol A of the TRM, 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 PY2016 tracking data except for marketing and outreach activities as these are outside the scope of EnerTrek reporting.

#### **4.3.10.1 Customer, Premise, Cost, and Vendor Information**

Each of these factors was assessed individually based on the guidelines stated in TRM version 6.0. Overall, the Evaluators conclude the following regarding tracking data completeness:

- Participating customer information was complete for nearly all participants. This included Job IDs, telephone numbers, addresses, full names, and utility account numbers for AOG and OG&E. The exceptions to this included two customers did not have full names while two other customers did not have complete addresses listed. Additionally, three customers were missing area codes from their listed phone numbers, and one customer had a listed phone number that was too few digits to be accurate.
- All participant records included the name of the installation contractor who performed the implementation as well as the invoice date and weatherization date.
- Tracking data included the measure and project costs for each home.
- As with the prior program year, premise characteristics such as home heating type, cooling type, and ceiling square footage were present for all participants where appropriate and needed. However, 599 participants were listed as having a water heating type of "N/A". This also occurred in PY2015, although the water heater type was included for all participants who received at least one of the

water heater measures, which include, water heater jackets, water heater pipe insulation, low-flow showerheads, and faucet aerators.

#### **4.3.10.2 Measure Specific Information**

The content of tracking data was found to include sufficient information for all measures in PY2016. The Evaluators identified two minor issues with measure inputs: one with the water heater jacket and pipe insulation measure where the final tracking data did not include the location of the water heaters in customers' homes, and one with the air infiltration measure where the number of bedrooms for a customer was listed as 1,194 (the home's square footage). Other than these minor items, there were no issues with measure specific information in the PY2016 program tracking data.

#### **4.3.11 Planned Program Changes**

There are no significant changes anticipated for this program in PY2017.

#### **4.3.12 Conclusions and Recommendations**

##### **4.3.12.1 Conclusions**

The key conclusions from the PY2016 process and impact evaluations of the OG&E/AOG Weatherization Program are as follows:

- **Demonstrated Education Effects:** Feedback from the participant survey suggests that the program is increasing customer knowledge of energy efficiency equipment and energy efficiency behaviors that can be employed to conserve energy and lower utility bills. Some customers have learned about other utility offerings through the OG&E/AOG Weatherization Program, leading to additional energy savings.
- **Continued Cross-Fuel Coordination:** As with the two prior program years, AOG fully expended its program budget by late August of PY2016, and OG&E fully paid the cost of providing services to 215 participating homes that were customers of both AOG and OG&E. By comparison, OG&E completed work on 165 homes after August that were not serviced by AOG. This maintained focus on customers serviced by both sponsoring utilities allowed AOG customers to continue receiving program services, further highlights the benefits of a joint program offering.
- **Minor Transitional Effects from Unified Weatherization Approach:** As the Unified Weatherization Program approach design incorporated several aspects of the OG&E/AOG Weatherization Program's existing structure and delivery, the transition to the statewide approach required minor modifications on the part of

the utilities, the installation contractors, and Frontier. The primary program adjustments included incorporating aerators, showerheads, and smart power strips into the program measure mix, as well as slightly modifying program eligibility requirements such as residence age and square footage. Although it is expected that the Unified Weatherization Program will continue to change over time as the Arkansas IOUs and PWC identify new opportunities or areas for improvement, it appears that the OG&E/AOG Weatherization Program's resources and structure are well suited to adapting to future iterations of the statewide program as they develop.

- **Maintained Database Quality:** The Evaluators found the ex ante savings values within the EnerTrek database to be accurate for nearly all measures. Additionally, Frontier Associates was very consistent in responding to data requests and correcting errors when necessary. Although some measure inputs were not initially provided, such as site-specific SEER values or HVAC cooling capacities, Frontier made these available in supplementary reports upon request.
- **Moderate Spillover Effects:** The spillover savings assessment conducted for PY2016 found spillover savings equal to approximately 0.4% of total gross natural gas savings for AOG and 1.2% of total gross electricity savings for OG&E. Most customers reporting spillover savings had purchased low cost measures including lighting and low flow measures, but a few customers also stated that they had purchased energy efficient appliances and heating and air conditioning systems because of information they had received through the program. Spillover rates for PY2016 were much higher than PY2015, although it is not clear whether this is due to specific program delivery changes such as increased educational efforts, or due to random variations that are likely to occur across EM&V years. Future spillover assessments may provide insight into whether a predictive spillover rate for the Unified Weatherization Program can be established.

#### **4.3.12.2 Recommendations**

The OG&E/AOG Weatherization program was very successful in PY2016. The Evaluators identified few specific, systematic or persistent issues with program operation and design. As the utilities plan to continue offering similar services and maintaining their current operational structure under the Unified Weatherization Program, consideration of the following recommendations may be useful moving forward:

- **Collect HVAC Characteristics for Each Site with Duct Sealing:** The AR TRM algorithm for duct sealing energy savings requires inputs related to HVAC characteristics such as SEER, HSPF, and AFUE. If unknown, the TRM includes assumed values for these parameters, but optimally these data would be collected and recorded by contractors during the onsite assessment. Frontier was able to provide the Evaluators site-specific HVAC parameters for homes for which these characteristics were collected, but it appears that the default TRM values were applied in many cases. To increase the precision of duct sealing savings calculations moving forward, the Evaluators recommend that installation contractors collect all relevant HVAC characteristics in each case of duct sealing moving forward.
- **Consider Adding LEDs as a Direct Install Measure:** Feedback from program staff and participants suggests that the demand for LED lighting is increasing among the utilities' customer base. As the market for residential lighting is decreasing the price point of LED lighting such that some LEDs are comparably priced to CFLs, the Evaluators recommend that the program consider including LEDs as a direct install measure for OG&E homes during future program years.
- **Assess Potential for Increased Duct Sealing Activity:** During PY2016, approximately 17% of participating homes received duct sealing improvements, while approximately 71% of participating homes received air sealing improvements. As duct sealing is one of the highest impact measures per residence for both gas and electric energy savings, there is likely remaining potential to increase the rate of duct sealing improvements among the participant population. The Evaluators recommend that program staff work with contractors to identify the extent of this potential, and encourage contractors to more actively implement duct sealing work in homes that are eligible for envelope improvements.
- **Manage Marketing Efforts Based on Budget:** Program staff noted that the popularity of the OG&E/AOG Weatherization Program has faster than expected budget expenditures in some years, and that there is a possibility that the implementation budget for both utilities will be exhausted prior to the end of the calendar year moving forward. As customer response to recent marketing efforts appears to have been high, the Evaluators recommend that the program gauge the need for direct mailings and other marketing tools throughout the year, and possibly limit program marketing to word of mouth after the first half of the year if participation rates remain high. This will help to avoid oversubscription and potential customer satisfaction issues, while ensuring that the OG&E and AOG customer base continues to learn about the program.

Table 4-95 presents the above items, outlining the relevant issue, potential consequences, and associated recommendations.

Table 4-95 Recommendations from PY2016 Evaluation

Issue	Consequences	Recommendation
Residential lighting offered by program is limited to CFLs	Possible missed opportunity for increased customer satisfaction  Possible missed opportunities for additional savings	Assess costs and savings potential associated with adding LEDs to program measure mix as a direct install item in future years
Some duct sealing sites use TRM defaults rather than actual collected HVAC parameters	Reduced precision in duct sealing savings estimates	Collect site-specific HVAC parameters such as SEER, HSPF, and AFUE for each instance of duct sealing
Duct sealing is conducted much less frequently than air sealing	Potential missed opportunity for additional savings for a high impact measure	Work with contractors to identify the extent of additional duct sealing potential and encourage increased frequency of duct sealing at eligible homes
Program implementation budgets may be exhausted prior to the end of the calendar year due to popularity	Potential customer satisfaction issues related to program wait list	Gauge the need for marketing efforts based on subscription rates during the first half of the year, potentially limiting marketing if program enrollment appears that it will to meet or exceed goals



## 5 Commercial and Industrial (C&I) Programs

### 5.1 Commercial Lighting Program

#### 5.1.1 Evaluation Findings

The verified ex post kWh and kW savings for the PY2016 CLP are summarized by sampling stratum in Table 5-1<sup>58</sup>. Overall, the gross ex post kWh savings of 6,101,917 kWh are equal to 98% of the ex ante savings for the program. The gross ex post kW impacts of 829.71 kW are equal to 98% of the ex ante savings.

Table 5-1 Ex Ante and Ex Post Gross kWh Savings by Sampling Stratum

Stratum Name	Ex Ante kWh Savings	Ex Post Gross kWh Savings	Gross kWh Realization Rate	Ex Ante kW Savings	Ex Post Gross kW Savings	Gross kW Realization Rate
Lighting 1	678,204	672,487	99.2%	125.09	122.66	98.1%
Lighting 2	1,386,284	1,380,357	99.6%	194.51	194.75	100.1%
Lighting 3	1,068,501	1,077,219	100.8%	141.05	140.45	99.6%
Lighting 4	2,071,073	1,935,640	93.5%	335.44	319.00	95.1%
Lighting 5	1,021,464	1,011,579	99.0%	46.02	50.60	110.0%
Direct Install 1	23,385	24,635	105.3%	2.44	2.26	92.6%
<b>Total</b>	<b>6,248,911</b>	<b>6,101,917</b>	<b>97.6%</b>	<b>844.54</b>	<b>829.71</b>	<b>98.2%</b>

Table 5-2 and Table 5-3 presents the net kWh and kW savings summary, by program pathway, for the PY2016 CLP program, respectively.

Table 5-2 CLP Net kWh Savings Summary

Program Pathway	Gross Annual Energy Savings (kWh)		Gross Realization Rate	Net-to-Gross (NTG)	Net Ex Post Energy Savings (kWh)
	Ex Ante	Ex Post			
Lighting	6,225,526	6,077,282	97.6%	99.0%	6,016,509
Direct Install	23,385	24,635	105.3%	99.0%	24,389
<b>Totals</b>	<b>6,248,911</b>	<b>6,101,917</b>	<b>97.6%</b>	<b>99.0%</b>	<b>6,040,898</b>

<sup>58</sup> As per IEM guidance, ex post gross realization rates for sampled projects are not extrapolated to those sites not included in the MV sample. For non-sampled sites ex post savings is equal to ex ante savings.



Table 5-3 CLP Net kW Savings Summary

Program Pathway	Gross Peak Demand Reduction (kW)		Gross Realization Rate	Net-to-Gross (NTG)	Net Ex Post Peak Demand Reduction (kW)
	Ex Ante	Ex Post			
Lighting	842.10	827.45	98.3%	98.5%	815.06
Direct Install	2.44	2.26	92.6%	92.9%	2.10
<b>Totals</b>	<b>844.54</b>	<b>829.71</b>	<b>98.2%</b>	<b>98.5%</b>	<b>817.16</b>

Table 5-4 outlines the verified ex post lifetime energy (kWh) savings by stratum for the PY2016 CLP program.

Table 5-4 CLP Gross Lifetime Savings by Stratum

Stratum	Ex Post Savings (kWh)	Effective Useful Life (years)	Ex post Lifetime Energy Savings (kWh)	Ex Post Net Lifetime Energy Savings (kWh)
Lighting 1	672,487	15	9,753,920	9,656,381
Lighting 2	1,380,357	11	15,806,331	15,648,268
Lighting 3	1,077,219	13	13,769,209	13,631,517
Lighting 4	1,935,640	15	28,114,934	27,833,784
Lighting 5	1,011,579	13	13,324,831	13,191,583
Direct Install 1	24,635	3	80,638	79,832
<b>Total</b>	<b>6,101,917</b>	<b>13.25</b>	<b>80,849,863</b>	<b>80,041,365</b>

Additional details on the evaluation of the CLP are provided in the following sections.

### 5.1.2 Program Overview

OG&E’s 2016 Commercial Lighting Program (CLP) was implemented to generate energy savings for commercial and industrial customers who purchase and install energy efficient lighting systems, including indoor and outdoor lighting, LED exit signs, and/or lighting controls. The program offers incentives that include direct installed projects through qualified trade allies as well as incentives paid directly to customers. For 2016, trade allies were recruited to participate by submitting rebate applications on behalf of customers implementing qualifying energy efficiency measures.

The program offers incentives of \$0.12/kWh based on calculated energy savings. The program offers both prescriptive and custom incentives for high efficiency lighting

projects. Incentives are provided for qualified equipment installed as a retrofit or equipment replacement, and as new construction or major refurbishment.

OG&E engaged a third-party implementer, CLEAResult, to promote and manage the program, including; identification of projects, identification and training of trade allies, processing of project applications, determination of incentive levels, and calculation of ex ante energy and peak demand savings. As the implementer of the program, CLEAResult conducts initial verification of project energy savings by processing customers’ program applications and conducting pre-installation inspections to determine baseline conditions. After projects have been complete, the implementer again visits to the site to verify completion of the measures and to document their findings through collection of invoices and equipment specifications from the customers as well as documenting the installation of high efficiency measures with photos of the newly installed equipment.

In PY2016, the CLP resulted in 142 projects being implemented, with 124 unique customers participating in the program. The reported performance of the program is summarized in Table 5-25. The 142 projects completed during PY2016 resulted in a gross ex ante savings of 6,248,911 kWh and a peak demand reduction of 844.54 kW. The 2016 program had a budget of \$1,613,318 and spent a total of \$1,613,318.

Table 5-5 OG&E’s PY2016 CLP Program Summary

Program Pathway	Number of Projects	Total Gross Ex Ante kWh Savings	Total Gross Ex Ante peak kW Savings
Commercial Lighting	138	6,225,526	842.10
Direct Install	4	23,385	2.44
<b>Total</b>	<b>142</b>	<b>6,248,911</b>	<b>844.54</b>

Figure 5-1 below shows the gross ex ante savings and completed projects by month for the PY2016 CLP.

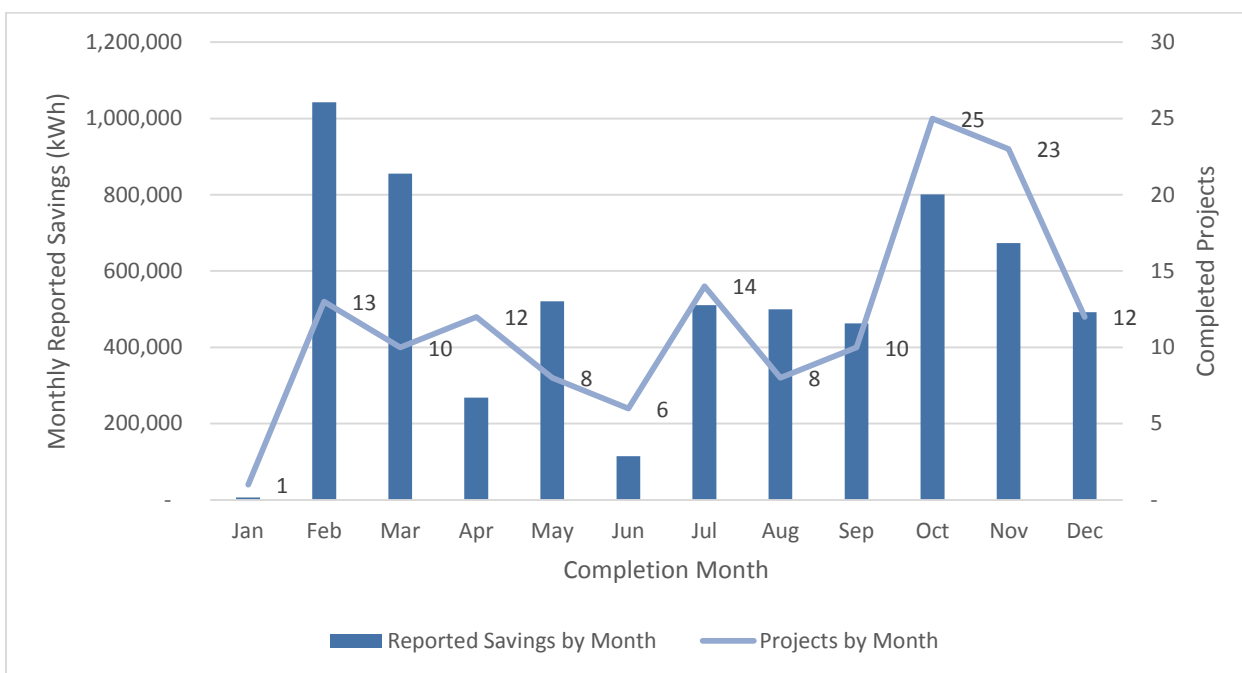


Figure 5-1 PY2016 CLP Savings and Project by Month

The PY2016 CLP included projects from four different measure categories. One category, LED, accounted for 98% of the gross ex ante savings. The remaining three measures, New Construction, T5 Fluorescent, and CFL accounted for 1%, 0.2% and 0.4%, respectively.

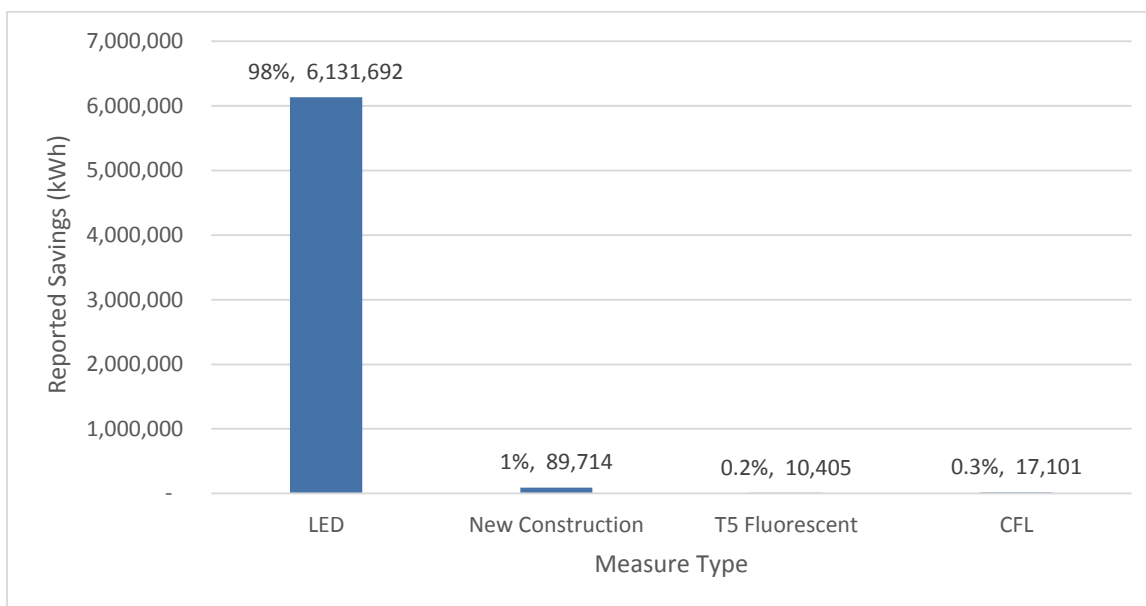


Figure 5-2 Contributions to Savings by Measure

### 5.1.3 Impact Evaluation

For projects rebated through the PY2016 CLP, the algorithms provided in *Section 3.6.3 Lighting Efficiency* of the Arkansas TRM were used to calculate ex post savings for the sampled sites. The evaluation of gross energy savings and peak demand reduction from projects rebated through the CLP can be broken down into the following steps:

- First, the Implementation Contractor's program tracking database was reviewed to determine the scope of the program and to ensure there were no duplicate project entries. The tracking database was used to define a discrete set of rebated projects that made up the PY2016 program population. A random sample of projects was then drawn from the population established in the tracking system review. For PY2016, a total of 31 projects were selected for the M&V sample.
- Next, a detailed desk review was conducted for each project sampled for measurement and verification. The desk review process includes a thorough examination of all project materials including: invoices, equipment cut sheets, pre- and post-inspection reports, and estimated savings calculators. This review process informed ADM's fieldwork by identifying potential uncertainties, missing data, and sites where monitoring equipment was needed to verify key inputs to the reported savings calculations. Additionally, the review process involved assessing the reasonableness of deemed savings values given in the AR TRM and calculation input assumptions.
- After reviewing the project materials, onsite verification and data collection visits were scheduled for selected sampled projects. The visits were used to collect data for savings calculations, to verify measure installation, and to determine measure operating parameters. A total of 11 site visits were conducted as part of the 2016 evaluation.
- Next, the data collected during the onsite verification visits were used to revise savings calculations as necessary. For example, if the reported savings calculations relied on certain measure operating hours that were determined inaccurate based on the facility type or the facilities' actual schedule, changes were made to more accurately reflect actual operating conditions.
- Finally, after determining the ex post savings impacts for each sampled project, results were applied to the program population using project specific sampling weights. This allows for the estimation of program level gross ex post energy (kWh) savings with a given amount of sampling precision and confidence. For the CLP, the sample was designed to ensure  $\pm 10\%$  or better relative precision at the 90% confidence level for kWh reductions.

### **5.1.3.1 Impact Data Collection Activities**

Data for the evaluation were collected through review of program materials, onsite inspections, end-use metering, and interviews with participating customers and service providers. Based on program tracking data provided by OG&E's implementation contractor, CLEAResult (CR), a sample design was developed for M&V data collection. The central program database, where program activities are tracked and project documentation is stored, was developed and managed by CR. The verification and data collection samples were drawn to provide gross impact estimates with  $\pm 10\%$  precision or better at the 90% confidence level for the program. Within this, precision by program channel was addressed as well. Overall the sample was designed to meet the  $\pm 10\%$  precision for the overall program population as well as for the large commercial, standard offer pathway. The direct install component was sampled to meet a minimum  $\pm 15\%$  precision. This difference in precision level by channel reflects that the standard offer pathway was both the largest contributor, as well as the most uncertain program channel, and thus was the focus of evaluation resources.

Onsite visits and desk reviews of project documentation were used to collect data for gross impact calculations, to verify measure installation, and to determine measure operating parameters. For those sites with installed measures included in the Arkansas Technical Reference Manual (TRM), Version 6.0, ADM collected all data necessary to calculate energy and demand impacts using the algorithms in the TRM. During site visits, facility staff members were interviewed to determine the operating hours of the installed systems and provide any additional operational characteristics relevant to calculating energy savings. Table 5-6 below shows the sample design that was used. Stratum classifications were based on verified measure installations. The 31 projects that were sampled for measurement and verification account for approximately 47% of reported ex ante program kWh savings.

Table 5-6 Sample Design

Stratum Name	Ex Ante kWh Savings	Strata Minimum (kWh)	Strata Maximum (kWh)	Population of Projects	Design Sample Size	On Site Data Collection
Lighting 1	678,204	1,047	20,979	67	10	1
Lighting 2	1,386,284	21,310	50,093	43	6	2
Lighting 3	1,068,501	52,675	108,381	15	4	2
Lighting 4	2,071,073	134,178	289,175	11	7	3
Lighting 5	1,021,464	447,910	573,554	2	2	2
Direct Install 1	23,385	4,593	6,285	4	2	1
<b>Total</b>	<b>6,248,911</b>			<b>142</b>	<b>31</b>	<b>11</b>

In addition to the onsite data collection and desk review activities, in-depth interviews with OG&E and implementation staff members, as well as customer surveys were conducted to provide additional perspectives for the process evaluation. Table 5-7 shows the achieved sample sizes for the different types of data collection employed for this study.

Table 5-7 Sample Sizes for Data Collection Efforts

Data Collection Activity	Achieved Sample Size
Onsite M&V visits	11
Desk Review of Project Documentation	20
In-depth Interviews with Implementation Staff	2
In-depth Interviews with Program Staff	1

**5.1.3.2 Gross Impact Findings**

The achieved sample design resulted in gross ex post kWh estimates with  $\pm 6.53\%$  relative precision at the 90% confidence interval. Gross ex post energy savings were relatively close to the original reported values at the program level (98% realization rate).

The achieved sample design also resulted in gross ex post kW estimates with  $\pm 16.33\%$  relative precision at the 90% confidence interval. The elevated level of uncertainty associated with peak kW reductions is due to the significant amount of variance from project to project. Much of the difference between ex ante and ex post demand reduction, is explained by either, 1) use of stipulated coincidence factors (CF) that did not align well with actual equipment schedules or 2) calculating peak demand reduction without considering the OG&E defined peak period of 2 – 7 PM, weekday non-holidays, June through September.

The sampling frame used to determine program level savings was divided between the two programs channels with projects stratified based on ex ante energy savings. Stratum “Lighting 1” contained the projects with the smallest ex ante savings, while “Lighting 5” contained the projects with the highest ex ante savings. Strata Lighting 1 and Lighting 4 had the lowest kWh realization rates due to one project in each stratum having a realization rate of 55%.

The project in stratum Lighting 4, project PRJ-861834 had lower ex post savings due to discrepancies found during ADM’s onsite inspection. The ex ante energy savings for this project were calculated using deemed hours from TRM version 5.0 for a manufacturing facility. However, during the onsite inspection, it was found that this site operated far fewer hours than the TRM V5.0 deemed hours for a manufacturing facility. Thus, ADM used custom operating hours based on primary data collected during the site visit to determine ex post savings.

For the project in Stratum 1 with the low realization rate, project PRJ-861872, ADM found a data entry error in the implementer’s calculator. The Excel-based calculator contained empty cells where the quantity of post-installation fixtures was supposed to be recorded. Having these cells blank led to the reported savings being calculated as if all fixtures had been removed. However, through a desk review of project documentation, including invoices and implementer post inspection photos, it was determined that the project included a one-for-one replacement of lighting fixtures. The data entry error in the implementer’s calculator also led to a 55% realization rate for peak kW impacts for this project as well.

Of the 31 projects included in the M&V sample, ADM found 22 that had gross realization rates between 98% and 102% with 17 of those projects having a realization rate of 100%. Each of these projects had either very small discrepancies or the M&V evaluation found reported quantities and hours of operation to be accurate. Of those projects that had small discrepancies, most were due to slight variations in fixture or lamp wattages, or reported savings that were based on the older Arkansas TRM version 5.0 algorithms.

Overall, there was more variability in the peak kW gross realization rates. ADM found 13 of the 31 sampled projects had kW realization rates between 98% and 102%, with 9 projects have a 100% realization rate. Many of the sampled projects that had kW realization rates below 100% were due to out of data coincident factors being used in the implementer’s calculator. In some instances, a coincident factor from version 4.0 of the Arkansas TRM was being used as opposed to the updated values from version 6.0.



**5.1.3.3 Net Impact Results and Findings**

For PY2016, ADM applied a net-to-gross ratio of 0.99 for all projects completed through the CLP. This NTG ratio was based on evaluation work done by a previous evaluator in PY2014, and used again in PY2015. Because no significant changes were made to the program design in PY2016, ADM applied the same NTG ratio that had been used in the two previous program years.

The resulting net kWh savings are summarized in Table 5-2. The net savings kWh savings for the 2016 program of 6,040,898 kWh are 92% of the program net goal of 6,599,411 kWh.

The program level net kW savings are summarized in

Program Pathway	Gross Annual Energy Savings (kWh)		Gross Realization Rate	Net-to-Gross (NTG)	Net Ex Post Energy Savings (kWh)
	Ex Ante	Ex Post			
Lighting	6,225,526	6,077,282	97.6%	99.0%	6,016,509
Direct Install	23,385	24,635	105.3%	99.0%	24,389
<b>Totals</b>	<b>6,248,911</b>	<b>6,101,917</b>	<b>97.6%</b>	<b>99.0%</b>	<b>6,040,898</b>

Table 5-3. The verified net peak demand savings of 821.41 kW is 84% of the program goal of 976.00 kW.

**5.1.4 Non-Energy Benefits (NEBs)**

Per Protocol L of the Arkansas TRM version 6.0 the Evaluators must account for non-energy benefits (NEBs) resulting from the implementation of each program. Specifically, the categories of NEBs that are to be calculated for each program are as follows:

- Benefits of electricity, natural gas, and liquid propane energy savings (i.e. other fuels);
- Benefits of public water and wastewater savings; and
- Benefits of avoided and deferred equipment replacement costs.

During PY2016, limited data associated with NEBs was collected by the implementation contractor. Due to the limited data available, a discussion of recommended methodologies and data to be collected in future years is provided in the following sections. Where possible, a limited analysis of potential NEBs associated with the 2016 program is also presented.



**5.1.4.1 Electricity, Natural Gas, and Liquid Propane Energy Savings**

All projects completed through the CLP include lighting efficiency measures. Because high efficiency lighting emits less heat into a facility, a heating fuel energy penalty can be calculated for any site where high efficiency lighting is installed in a conditioned space. For a space using gas heating, the therms penalty is calculated per the TRM<sup>59</sup> as:

$$therms_{penalty} = kWh_{savings} \times IEF_G$$

Where,

kWh<sub>savings</sub> = Total reported electrical energy savings

IEF<sub>G</sub> = Interactive effects factor for gas heating

Per the TRM, the IEF<sub>G</sub> for sites with known natural gas heating is -0.008 therms/kWh, for those sites where the heating source is unknown, the IEF<sub>G</sub> is -0.004 therms/kWh.

To accurately calculate other fuel NEBs associated with the CLP, the heating fuel type and fixture location (e.g. interior or exterior) for each facility would need to be recorded and included in the implementation contractor’s database. This would need to be recorded for each fixture type for projects that include multiple fixtures installed in various space types within a facility. While these data were not available for all sites in PY2016, the location of fixtures and space heating type were known or could be assumed for the sites included in the EM&V sample. This sample included 31 sites of which, 18 had gas heating, 1 had an unknown heat source, and the remaining 12 were either exterior lighting projects, used electrical energy as a heating fuel, or were in non-heated facilities. Using the TRM algorithm described above, the sample of sites results in a total Natural Gas penalty of -8,620.56 therms for PY2016. However, these negative gas impacts were not applied to any program level savings or cost benefit analyses during the PY2016 evaluation.

**5.1.4.2 Water Savings**

Because the CLP only includes high efficiency lighting projects, no water savings would be expected from any projects or measures implemented through the program.

**5.1.4.3 Deferred Replacement Costs**

Protocol L of the TRM provides direction on estimating the deferred replacement costs associated with high efficiency measures that may have a longer Effective Useful Life (EUL) than the baseline technology. This is applicable to LED lamps or fixtures that

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<sup>59</sup>TRM Version 6.0 Volume 2: Deemed Savings, Section 3.6.3 Lighting Efficiency, Equation 288, page 410.

have an EUL that is longer than the baseline CFL or linear T8 lamp they replace. The deferred cost NEB accounts for the longer life of the installed technology by allowing the incremental cost calculations of the efficient measure to be reduced by the value of future baseline technology replacements. To determine deferred replacement NEBs, several data points are required for each fixture or lamp installed through the CLP. These data include; high efficiency technology EUL, baseline technology EUL, real discount rate, measure type (Replace on Burnout vs. Early Replacement), and installed cost of both high efficiency and baseline technologies. While EULs and discount rates can be estimated using algorithms and deemed values from the TRM, the installed costs of both high efficiency and baseline technologies should be determined using data collected within the utility territory to accurately account for economies of scale associated with larger projects. Due to the lack of data collected during PY2016 on incremental costs and specific baseline technology costs, as well as the TRM providing the same EULs for both linear LEDs and T8 lamps, no deferred replacement NEBs were determined for the program.

### 5.1.5 Adherence to Protocol A

The tracking system in the database conforms reasonably well to the tracking system protocol developed for use in Arkansas. While the data included in the tracking system is relatively limited, it does include key data points required for the evaluation. The bullets below show a summary of how well the CLEAResult program tracking systems meets the components of the protocol.

- **Participating Customer Information** – includes all information required including customer contact information, customer identifier (account number), location of project, and date completed.
- **Measure Specific Information** – includes type of measures installed, but did not include quantity of each measure.
- **Measure Codes** – did not include measure codes.
- **Vendor Specific Information** – No vendor specific information was provided in the database.
- **Marketing and Outreach Activities** – One-on-one outreach made by implementation contractor with OG&E customers continues to be effective form of marketing.

### 5.1.6 Approach to Process Evaluation

The Evaluators conducted a formal process evaluation of the CLP program in 2014 and a limited process review in 2015, and found that the program was successful in meeting participation, savings, and satisfaction goals. Table 5-8 and Table 5-9 summarize the

Evaluators’ review of the CLP in comparison to TRM version 6.0 Protocol C for timing and conditions of conducting a process evaluation.

Table 5-8 Determining Appropriate Timing to Conduct a Process Evaluation

Component	Determination
New and Innovative Components	No. The program is designed in a manner consistent with similar programs elsewhere and applies deemed savings values from the TRM.
No Previous Process Evaluation	No. The program received a comprehensive process evaluation in 2014 and a limited process review in 2015.
New Vendor or Contractor	No. There was no change to the implementation contractor

Table 5-9 Determining Appropriate Conditions to Conduct a Process Evaluation

Component	Determination
Are program impacts lower or slower than expected?	Yes, CLP kWh savings were slightly lower than goals in 2016
Are the educational or informational goals not meeting program goals?	Yes
Are the participation rates lower or slower than expected?	Yes, program participation was lower than expected in 2016.
Are the program’s operational or management structure slow to get up and running or not meeting program administrative needs?	No
Is the program’s cost-effectiveness less than expected?	No
Do participants report problems with the programs or low rates of satisfaction?	No
Is the program producing the intended market effects?	Not Applicable, as market effects were not measured in 2016.

On this basis, the Evaluators concluded that process evaluation activities for PY2016 would be limited in scope and would not include a full-scale process evaluation. The PY2016 process evaluation activities include interviews with OG&E and implementation staff, as well as limited customer surveys. No net-to-gross analysis was performed for PY2016.

Due to the limited sample size and similarities in participating customers, the process evaluation for the CLP was conducted in conjunction with the SOP. The combined process evaluation approach, findings and recommendations are included in section 0.

**5.1.7 Review of PY2015 Evaluation Recommendations**

The recommendations made in the PY2015 evaluation of the CLP program, along with an update on the progress, are summarized in found in Table 5-10.

Table 5-10 PY2015 Evaluation Recommendations and Updates

Number	Description	Rationale	Status
1	Increase number of significant digits included in the tracking database	Sufficient significant digits will improve the accuracy of the reported results	Accepted - the recommended number of significant digits is included in the tracking database
2	Include key parameters for new construction projects in tracking database	If parameters are included in tracking database, the evaluator can use this for the entire population, while relying on project documentation to fine-tune results	Accepted - New construction application has been updated to include suggested parameters
3	Include more photographs of installations in project documentation	More informative photographs would assist evaluator in verifying measures, thereby improving the accuracy of the results.	Accepted - Representative photos are included in project documentation

Number	Description	Rationale	Status
4	Correct online rebate application space temperature designations to align with AR TRM.	Ensuring the space temperature designations align with the TRM will allow for more accurate savings calculations.	Accepted - In PY2016 online application was no longer in use. The new calculator, developed by CLEAResult, utilizes TRM values
5	Consider the direct installation of LEDs instead of CFLs	LEDs offer several advantages over CFLs including better long term savings	Accepted - This option is being considered for implementation.

### 5.1.8 Planned Program Changes

In PY2017, the CLP will be combined with, what in PY2016 was referred to as the Standard Offer Program, to create a single, comprehensive commercial and industrial program offering. The combined program, referred to as the Commercial Energy Efficiency Program (CEEP), will allow OG&E to offer improved support to customers who are implementing comprehensive projects that include lighting as well as other measures not currently incentivized through the CLP. The PY2017 CEEP has been designed to offer four program channels or pathways for participation:

- **Midstream Lighting:** The Midstream Lighting component of CEEP encourages customers to participate by providing point of sale (POS) discounts on selected products through local lighting distributors. Through this channel, the financial incentives are paid to the lighting distributor to allow reduced costs for the end customer.
- **Schools and Government Agencies (SAGE):** The SAGE component of CEEP is marketed towards public school districts, private schools, universities and colleges, and all government agencies. This component includes financial incentives for both lighting and non-lighting measures and both prescriptive and custom projects.
- **Large C&I:** The Large C&I component of CEEP offers incentives to customers with peak demand of greater than 100 kW. Incentives are paid directly to customers who install energy efficiency equipment. This component focuses on four key areas; lighting, retrofit of existing equipment, HVAC replacement, and retro commissioning.

- **Small Business Direct Install (SBDI):** The SBDI component offers incentives to customers with a peak demand of less than 100 kW. The SBDI component provides lighting audits and equipment installation through approved trade allies.

### 5.1.9 Conclusions & Program Recommendations

Based on the findings from the PY2016 impact and process evaluations of the CLP, ADM has developed the following conclusions:

- **Program Participation Increased:** The CLP achieved a higher participation in PY2016 than in previous program years. In PY2015, 91 projects were incentivized through the program, compared to 142 in PY2016, representing a 56% increase in participation. However, the higher participation did not result in higher ex ante savings. In PY2015, the CLP gross ex ante kWh savings of 6,821,191 kWh, averaging 74,958 kWh per incentivized project. In PY2016, the gross ex ante savings of 6,248,911 kWh resulted in an average project savings of 44,006 kWh.
- **Overall Program Design Remains Unchanged:** Overall, the program design remained unchanged from 2015. The program offerings and incentive levels were unchanged from the previous program year. However, significant changes are planned for the program for the 2017 program year.

Based on the findings from the 2016 evaluation of the CLP program, ADM has developed the following recommendations:

- **Update Reported Savings Calculator Tools:** Through the evaluation of sampled sites, ADM found errors in the calculators used to develop reported energy savings. These errors included incorrect coincidence factors for certain building types, deemed savings values from previous versions of the Arkansas TRM, and in one case errors in the calculations used for determining blended annual operating hours for new construction sites. Many of these errors led to only slight differences between reported and verified savings, but correcting these would ensure compliance with the latest version of the Arkansas TRM and improve the accuracy of the reported savings calculations.
- **Conduct Quality Control Review on Project Invoices:** Several projects reviewed by ADM had incomplete, missing, or incorrect invoices provided in the supporting documentation. Often, invoices are used to verify installed quantities of lamps and/or fixtures. Having incomplete or incorrect invoices associated with projects increases uncertainty in the evaluation and can lead to significantly lower verified savings.

- **Initiate a Pre-Construction Review Process:** ADM recommends a pre-construction review process be designed and implemented for large or custom projects. The pre-construction review should be designed to allow both implementer and evaluator access to project documentation and ex ante savings calculations prior to projects being completed and incentives being paid. The purpose of the review process would be to identify any potential M&V related issues, determine data collection requirements, and establish project timelines prior to funding being reserved for customers. This proposed process can help minimize uncertainty and risk associated with large or custom projects.
- **Develop NEB data collection and calculation protocol:** ADM recommends that the implementer and evaluator coordinate on the development of data collection and calculation protocols to allow for the efficient determination of NEBs at the measure level. The protocol should include all data points that will be required to determine the three types of NEBs as described by the TRM as well as calculation methodologies using parameters or deemed values from the TRM when available and industry accepted values when not available through the TRM.

## 5.2 Commercial and Industrial (C&I) Standard Offer Program (SOP)

### 5.2.1 Evaluation Findings

OG&E offered two energy efficiency programs in Program Year 2016 that served Arkansas Commercial and Industrial customers: Lighting and Standard Offer. Because of the small AR market within this segment (approximately 3,000 eligible OG&E C&I customers) and the limited number of participants in these program tracks, the process report examines these two programs together. Differences are noted between programs where they exist. Both the Lighting and the Standard Offer programs had the same program manager at OG&E and were implemented by the same CLEARResult team members in PY16.

The verified gross energy savings (kWh) and demand reductions (kW) savings for the PY2016 SOP are summarized by sampling stratum in Table 5-11<sup>60</sup>. Overall, the gross ex post kWh savings of 8,786,673 kWh are equal to 98.8% of the ex ante savings for the program. The gross ex post kW impacts of 1,122.82 kW are equal to 113% of the ex ante savings.

Table 5-11 Gross Ex Ante and Ex Post kWh Savings by Sampling Stratum

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<sup>60</sup> As per IEM guidance, ex post gross realization rates for sampled projects are not extrapolated to those sites not included in the MV sample. For non-sampled sites ex post savings is equal to ex ante savings.



Stratum Name	Ex Ante kWh Savings	Ex Post Gross kWh Savings	Gross kWh Realization Rate	Ex Ante kW Savings	Ex Post Gross kW Savings	Gross kW Realization Rate
SOP 1	588,241	589,765	100.3%	152.77	150.87	98.8%
SOP 2	1,544,849	1,554,949	100.7%	264.15	241.62	91.5%
SOP 3	699,254	685,408	98.0%	79.80	69.00	86.5%
SOP 4	2,714,799	2,586,613	95.3%	309.91	295.10	95.2%
SOP 5	2,584,373	2,635,368	102.0%	149.74	335.34	223.9%
Direct Install 1	90,195	90,195	100.0%	13.56	13.59	100.2%
Direct Install 2	414,864	405,562	97.8%	13.12	12.14	92.5%
Direct Install 3	255,013	238,813	93.6%	7.91	5.16	65.2%
<b>Total</b>	<b>8,891,588</b>	<b>8,786,673</b>	<b>98.8%</b>	<b>990.95</b>	<b>1,122.82</b>	<b>113.3%</b>

Table 5-12 and Table 5-13 presents the net kWh and kW savings summary, by program pathway, for the PY2016 SOP program, respectively.

Custom projects accounted for a significant portion of ex post net savings in PY2016. The fifteen custom projects incentivized through the program resulted in an ex post net kWh savings of 6,970,718.77 kWh and a net peak demand savings of 816.99 kW.

Table 5-12 SOP Net kWh Savings Summary

Program Pathway	Gross Annual Energy Savings (kWh)		Gross Realization Rate	NTG	Net Annual Energy Savings (kWh)
	Ex Ante	Ex Post			
SOP	8,131,516	8,052,104	99.0%	98.7%	7,946,605
DI	760,072	734,570	96.6%	100.0%	734,570
<b>Totals</b>	<b>8,891,588</b>	<b>8,786,673</b>	<b>98.8%</b>	<b>98.8%</b>	<b>8,681,174</b>

Table 5-13 SOP Net kW Savings Summary

Program Pathway	Gross Peak Demand Reduction (kW)		Gross Realization Rate	NTG	Net Peak Demand Reduction (kW)
	Reported	Verified			
SOP	956.36	1,091.93	114.2%	98.5%	1,075.04
DI	34.59	30.89	89.3%	100.0%	30.89
<b>Totals</b>	<b>990.95</b>	<b>1,122.82</b>	<b>113.3%</b>	<b>98.5%</b>	<b>1,105.93</b>

Table 5-14 outlines verified ex post lifetime energy (kWh) savings by stratum for the PY2016 SOP program.



Table 5-14 SOP Gross Lifetime Savings by Stratum

Stratum	Ex Post Savings (kWh)	Effective Useful Life (years)	Ex post Lifetime Energy Savings (kWh)	Ex Post Net Lifetime Savings (kWh)
SOP 1	589,765	11.4	6,751,321	6,514,336
SOP 2	1,554,949	9.6	14,912,926	14,316,409
SOP 3	685,408	11.8	8,068,746	7,745,996
SOP 4	2,586,613	16.0	41,385,801	41,385,801
SOP 5	2,635,368	20.0	52,707,367	52,707,367
Direct Install 1	90,195	9.7	872,527	872,527
Direct Install 2	405,562	10.9	4,439,898	4,439,898
Direct Install 3	238,813	11.0	2,617,275	2,617,275
<b>Total</b>	<b>8,786,673</b>	<b>15.0</b>	<b>131,755,861</b>	<b>130,599,609</b>

Additional details on the evaluation of the SOP are provided in the following sections.

### 5.2.2 Program Overview

In December 2007, OG&E began implementation of a portfolio of Demand Side Management (DSM) Quick Start programs in Arkansas. Those programs were the starting point for many of the programs that were implemented in OG&E's first Comprehensive Energy Efficiency Portfolio, which was approved and implemented on February 3<sup>rd</sup>, 2010 and ended on June 30<sup>th</sup>, 2011. The portfolio of programs was expanded in 2011 to include the newly developed Commercial and Industrial Standard Offer Program. The SOP was developed to offer C&I customers incentives for installing more efficient equipment or making process improvements that result in reduced energy usage. The SOP does not offer incentives for high efficiency lighting, as these are offered through a separate Commercial Lighting program offered by OG&E.

OG&E's SOP seeks to generate energy and demand savings for large and small commercial and industrial customers through promotion of high efficiency electric end use products including (but not limited to) air compressors, HVAC, freezer door gaskets and strip curtains, and high efficiency motors. The program provides OG&E's C&I customers with flexibility in choosing how to participate, either self-sponsoring or by working through a third-party service provider to leverage technical expertise. The program offers financial inducements and technical assistance to all eligible C&I customers who are seeking to improve the efficiency of existing facilities, as well as the efficiency of new equipment purchases, facility modernization, new construction projects, and industrial improvement projects. Both prescriptive and custom inducement

structures are available to maximize customer participation across a variety of energy efficiency measures.

In PY2016, the SOP was implemented with two program pathways. These pathways include:

- **Standard Offer:** The Standard Offer component of the SOP provides incentives to large individual customers, energy service companies, and qualified contractors. Incentives are provided for the installation of a wide range of measures that reduce energy usage or peak demand in non-residential facilities.
- **Direct Install (DI):** The DI component offers no-cost water and energy saving measures and no cost measure installation to customers. The DI component provides equipment installation through the implementation contractor.

In 2016, the SOP provided cash inducements for 63 projects completed by customers and another 21 direct install projects completed through the implementation contractor. As a program, the SOP resulted in 84 projects being implemented, with 70 unique customers participating. The reported performance of the program is summarized in Table 5-15. The 84 projects completed during PY2016 resulted in an ex ante gross savings of 8,891,588 kWh and a peak demand reduction of 990.95 kW. The 2016 program had a budget of \$1,534,222 and spent a total of \$1,534,222.

Table 5-15 OG&E’s PY2016 SOP Program Summary

Program Pathway	Number of Projects	Total Expected kWh Savings	Total Expected peak kW Savings
SOP	63	8,131,516	956.36
Direct Install	21	760,072	34.59
<b>Total</b>	<b>84</b>	<b>8,891,588</b>	<b>990.95</b>

Figure 5-3 below shows the ex ante gross savings and completed projects by month for the PY2016 SOP.

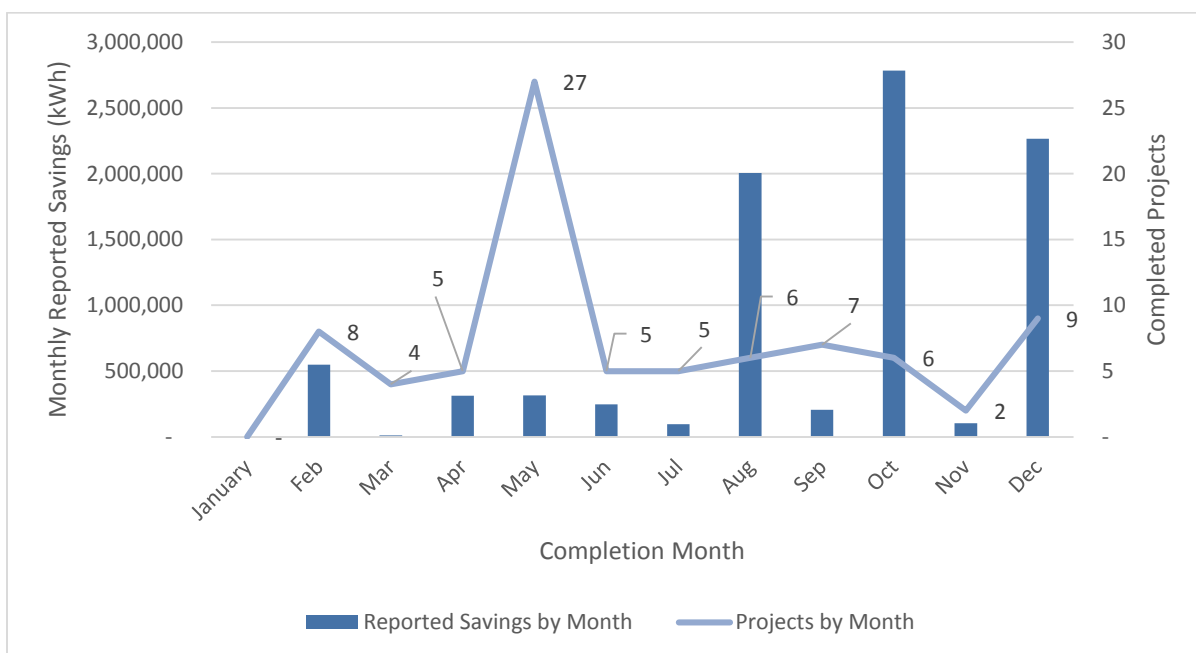


Figure 5-3 PY2016 SOP Savings and Projects by Month

The PY2016 SOP included projects from thirteen different measure categories. The largest category, Compressed Air, accounted for 42.9% of reported energy savings. The next two largest categories, Refrigeration New Construction, and Refrigeration Controls, accounted for 17.2% and 13.4% of ex ante savings, respectively. The ex ante savings from these two categories resulted from a single project in each category, with both projects being implemented by a single customer at one facility. Figure 5-4 below shows savings and percent contribution to savings for each identified measure category.

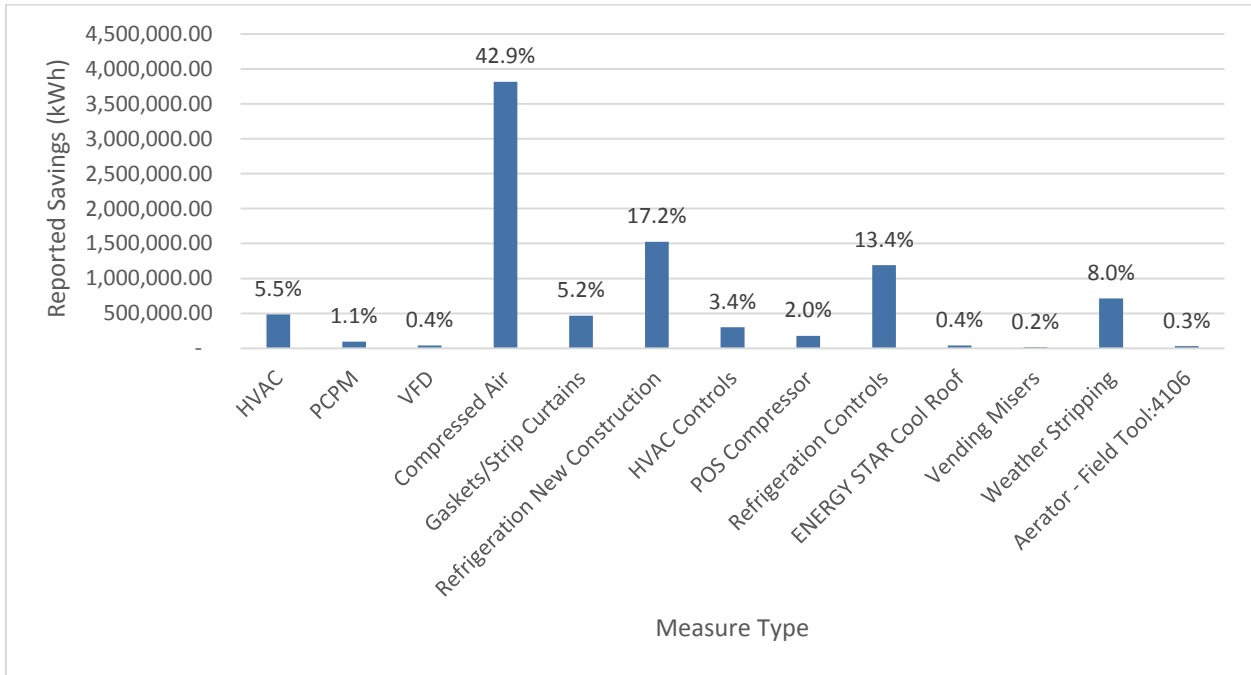


Figure 5-4 Contributions to Savings by Measure

### 5.2.3 Impact Evaluation

For projects rebated through the PY2016 SOP, the algorithms provided in Section 3 Commercial & Industrial Deemed Savings Measures of the Arkansas TRM version 6.0 were used to calculate verified savings for the sampled sites, where applicable. For projects that included measures not included in the TRM, ADM performed custom savings calculations that follow protocols described in the International Performance Measurement and Verification Protocol (IPMVP) or in the Uniform Methods Project (UMP) as applicable.

The overall evaluation of gross energy savings and peak demand reduction from projects rebated through the SOP can be broken down into the following steps:

- First, the Implementation Contractor’s program tracking database was reviewed to determine the scope of the program and to ensure there were no duplicate project entries. The tracking database was used to define a discrete set of rebated projects that made up the PY2016 program population. A random sample of projects was then drawn from the population established in the tracking system review. For PY2016, a total of 24 projects were selected for the M&V sample.
- Next, a detailed desk review was conducted for each project sampled for measurement and verification. The desk review process includes a thorough examination of all project materials including: invoices, equipment cut sheets,

pre- and post-inspection reports, and estimated savings calculators. This review process informed ADM's fieldwork by identifying potential uncertainties, missing data, and sites where monitoring equipment was needed to verify key inputs to the reported savings calculations. Additionally, the review process involved assessing the reasonableness of deemed savings values given in the AR TRM and calculation input assumptions.

- After reviewing the project materials, onsite verification and data collection visits were scheduled for selected sampled projects. The visits were used to collect data for savings calculations, to verify measure installation, and to determine measure operating parameters. A total of 11 site visits were conducted as part of the 2016 evaluation.
- Next, the data collected during the onsite verification visits was used to revise savings calculations as necessary. For example, if the reported savings calculations relied on certain measure operating hours that were determined inaccurate based on the facility type or the facilities' actual schedule, changes were made to more accurately reflect actual operating conditions.
- Finally, after determining the verified savings impacts for each sampled project, results were extrapolated to the program population using project specific sampling weights. This allows for the estimation of program level gross verified energy (kWh) savings with a given amount of sampling precision and confidence. For the SOP, the sample was designed to ensure  $\pm 10\%$  or better relative precision at the 90% confidence level for kWh reductions.

### **5.2.3.1 Impact Data Collection Activities**

Data for the evaluation were collected through review of program materials, onsite inspections, end-use metering, and interviews with participating customers and service providers. Based on program tracking data provided by OG&E's implementation contractor, CLEAResult (CR), a sample design was developed for M&V data collection. The central program database, where program activities are tracked and project documentation is stored, was developed and managed by CR. The verification and data collection samples were drawn to provide gross impact estimates with  $\pm 10\%$  precision or better at the 90% confidence level for the program. Within this, precision by program channel was addressed as well. Overall the sample was designed to meet the  $\pm 10\%$  precision for the overall program population as well as for the large commercial, standard offer pathway. The direct install component was sampled to meet a minimum  $\pm 15\%$  precision. This difference in precision level by channel reflects that the standard offer pathway was both the largest contributor, as well as the most uncertain program channel, and thus was the focus of evaluation resources.

Onsite visits and desk reviews of project documentation were used to collect data for gross impact calculations, to verify measure installation, and to determine measure operating parameters. For those sites with installed measures included in the Arkansas Technical Reference Manual (TRM), Version 6.0, ADM collected all data necessary to calculate energy and demand impacts using the algorithms in the TRM. During site visits, facility staff members were interviewed to determine the operating hours of the installed systems and provide any additional operational characteristics relevant to calculating energy savings. Table 5-16 below shows the sample design that was used. The 24 projects that were sampled for measurement and verification account for approximately 82% of ex ante program kWh savings.

Table 5-16 Sample Design

Stratum Name	Ex Ante kWh Savings	Strata Minimum (kWh)	Strata Maximum (kWh)	# of Projects	Design Sample Size	On Site Data Collection
SOP 1	588,241	234	57,186	49	9	1
SOP 2	1,544,849	88,806	301,097	10	4	2
SOP 3	699,254	699,254	699,254	1	1	1
SOP 4	2,714,799	1,189,594	1,525,205	2	2	2
SOP 5	2,584,373	2,584,373	2,584,373	1	1	0
Direct Install 1	90,195	479	29,580	14	3	1
Direct Install 2	414,864	47,396	96,009	6	3	3
Direct Install 3	255,013	255,013	255,013	1	1	1
<b>Total</b>	<b>8,891,588</b>			<b>84</b>	<b>24</b>	<b>11</b>

In addition to the onsite data collection and desk review activities, in-depth interviews with OG&E and implementation staff members, as well as customer surveys were conducted to provide additional perspectives for the process evaluation. Table 5-17 shows the achieved sample sizes for the different types of data collection employed for this study.

Table 5-17 Sample Sizes for Data Collection Efforts

Data Collection Activity	Achieved Sample Size
Onsite M&V visits	11
Desk Review of Project Documentation	13
Customer Decision Maker Survey	6
In-depth Interviews with Implementation Staff	2
In-depth Interviews with Program Staff	1

### **5.2.3.2 Estimation of Net Savings**

Participant survey responses were used to estimate the net energy impacts of custom projects completed through the Standard Offer Program (SOP). For non-custom projects, those that use AR TRM algorithms to calculate savings, the evaluators applied the net-to-gross (NTG) ratios used in the 2015 evaluation. Specifically, an NTG ratio of 96% was applied to standard projects and a ratio of 100% was applied to direct install projects.

The follow sections summarize the methodology used to estimate custom project net savings. The program net savings are equal to gross savings, less savings associated with free ridership, plus participant spillover savings.

In total, 6 program participants completed the survey and responded to questions about 9 custom projects implemented during 2016.

### **5.2.3.3 Estimation of Free Ridership**

Several criteria were used for determining what portion of a customer's savings for a project should be attributed to free ridership. See 2.3.5 for more details on the methodology for free ridership.

For decision makers that indicated that they could undertake energy efficiency projects without financial assistance from the program, three factors were analyzed to determine what percentage of savings may be attributed to free ridership. The three factors were:

- Plans and intentions of firm to install a measure even without support from the program;
- Influence that the program had on the decision to install a measure; and
- A firm's previous experience with a measure installed under the program.

For each of these factors, rules were applied to develop binary variables indicating if a participant's behavior showed free ridership.

The first factor requires determining if a participant stated that his or her intention was to install an energy efficiency measure even without the program. The answers to a combination of several questions were used with a set of rules to determine whether a participant's behavior indicates likely free ridership. Two binary variables were constructed to account for customer plans and intentions: one, based on a more restrictive set of criteria that may describe a high likelihood of free ridership, and a second, based on a less restrictive set of criteria that may describe a relatively lower likelihood of free ridership.

The first, more restrictive criteria indicating customer plans and intentions that likely signify free ridership are as follows (Definition 1):



- The respondent answers “yes” to the following two questions: “Did you have plans to install energy efficient [Measure/Equipment] at the location before deciding to participate in the program?” and “Would you have gone ahead with this planned project if you had not received the rebate through the program?”
- The respondent answers “definitely would have installed” to the following question: “If the rebates from the program had not been available, how likely is it that you would have installed energy efficient [Measure/Equipment] at the location anyway?”
- Either the respondent answers “no, program did not affect timing of purchase and installation” to the following question: “Did you purchase and install energy efficient [Measure/Equipment] earlier than you otherwise would have without the program?” or the respondent indicates that while program information and financial incentives did affect the timing of equipment purchase and installation, in the absence of the program they would have purchased and installed the equipment within the next two years.
- The respondent answers “no, program did not affect level of efficiency chosen for equipment” in response to the following question: “Did you choose equipment that was more energy efficient than you would have chosen had you not participated in the program?”

The second, less restrictive criteria indicating customer plans and intentions that likely signify free ridership are as follows (Definition 2):

- The respondent answers “yes” to the following two questions: “Did you have plans to install energy efficient [Measure/Equipment] at the location before participating in the program?” and “Would you have gone ahead with this planned installation even if you had not participated in the program?”
- Either the respondent answers “definitely would have installed” or “probably would have installed” to the following question: “If the rebates from the program had not been available, how likely is it that you would have installed energy efficient [Measure/Equipment] at the location anyway?”
- Either the respondent answers “no, program did not affect timing of purchase and installation” to the following question: “Did you purchase and install energy efficient [Measure/Equipment] earlier than you otherwise would have without the program?” or the respondent indicates that while program information and financial incentives did affect the timing of equipment purchase and installation, in the absence of the program they would have purchased and installed the equipment within the next two years.
- The respondent answers “no, program did not affect level of efficiency chosen for equipment” in response to the following question: “Did you choose equipment



that was more energy efficient than you would have chosen had you not participated in the program?”

The second factor requires determining if a customer reported that a recommendation from a program representative or past experience with the program was influential in the decision to install a particular piece of equipment or measure.

The criterion indicating that program influence may signify a lower likelihood of free ridership is that either of the following conditions is true:

- The respondent answers “very important” to the following question: “How important was previous experience with the program in making your decision to install energy efficient [Measure/Equipment] at the location?”
- The respondent answers “probably would not have” or “definitely would not have” to the following question: “If the program representative had not recommended [Measure/Equipment], how likely is it that you would have installed it anyway?”

The third factor requires determining if a participant in the program indicates that he or she had previously installed an energy efficiency measure similar to one that they installed under the program without an energy efficiency program incentive during the last three years. A participant indicating that he or she had installed a similar measure is considered to have a likelihood of free ridership.

The criteria indicating that previous experience may signify a higher likelihood of free ridership are as follows:

- The respondent answers “yes” to the following question: “Before participating in the Program, had you installed any equipment or measure similar to energy efficient [Measure/Equipment] at the location?”
- The respondent answers “yes” to the following question: “Has your organization purchased any significant energy efficient equipment in the last three years at the location?” and answered “yes” to the question: “Did you install any of that equipment without applying for a financial incentive through an energy efficiency program?”

The four sets of rules described above were used to construct four different indicator variables that address free ridership behavior. For each customer, a free ridership value was assigned based on the combination of variables. With the four indicator variables, there are 11 applicable combinations for assigning free ridership scores for each respondent, depending on the combination of answers to the questions creating the indicator variables. Table 5-18 shows these values.

Table 5-18 Free ridership for Combinations of Indicator Variable Responses

Indicator Variables				Free Ridership Score
Had Plans and Intentions to Install Measure without Program? (Definition 1)	Had Plans and Intentions to Install Measure without Program? (Definition 2)	Program had influence on Decision to Install Measure?	Had Previous Experience with Measure?	
Y	N/A	Y	Y	100%
Y	N/A	N	N	100%
Y	N/A	N	Y	100%
Y	N/A	Y	N	100%
N	Y	N	Y	100%
N	N	N	Y	0%
N	Y	N	N	0%
N	Y	Y	N	0%
N	N	N	N	0%
N	N	Y	N	0%
N	N	Y	Y	0%

**5.2.3.4 Estimation of Spillover**

Program participants may implement additional energy saving measures without receiving a program incentive because of their participation in the program. The energy savings resulting from these additional measures constitute program participant spillover effects.

To assess participant spillover savings, survey respondents were asked if they implemented any additional energy saving measures for which they did not receive a program incentive. Respondents that indicated that they did install additional measures were asked two questions to assess if the associated savings are attributable to the program. Specifically, respondents were asked:

- “How important was your experience with the <PROGRAM> in your decision to implement this Measure, using a scale of 0 to 10, where 0 is not at all important and 10 is extremely important?”
- “If you had not participated in the <PROGRAM>, how likely is it that your organization would still have implemented this measure, using a 0 to 10 scale, where 0 means you definitely WOULD NOT have implemented this measure and 10 means you definitely WOULD have implemented this measure?”

The energy savings associated with the measure are considered attributable to the program if the average of the rating for the first question, and 10 – the rating for the

second question, is greater than five, the savings are counted as attributable to the program.

### **5.2.3.5 Gross Impact Results and Findings**

The achieved sample design resulted in verified gross kWh estimates with  $\pm 6.78\%$  relative precision at the 90% confidence interval. Verified gross energy savings were relatively close to the original reported values at the program level (99% realization rate). There was however, a wide range of kWh realization rates at the sample project level.

The achieved sample design also resulted in verified gross kW estimates with  $\pm 22.83\%$  relative precision at the 90% confidence interval. The elevated level of uncertainty associated with peak kW reductions is due to the significant amount of variance from project to project. Much of the difference between reported and verified demand reduction, is explained by either, 1) use of stipulated coincidence factors (CF) that did not align well with actual equipment schedules, 2) using CFs from previous version of the AR TRM, or 3) calculating peak demand reduction without considering the OG&E defined peak period of 2 – 7 PM, weekday non-holidays, June through September.

The sampling frame used to determine program level savings was divided between the two programs channels with projects stratified based on reported energy savings. Stratum “SOP 1” contained the projects with the smallest reported savings, while “SOP 5” contained the projects with the highest reported savings. Four of the eight program strata had realization rates at or above 100%. Of those that were below 100%, strata SOP 4 and Direct Install 3 had the lowest kWh realization rates of 95% and 94%, respectively. The lower GRR for SOP 4 resulted from a single project in that strata receiving a site level realization rate of 89%. Strata Direct Install 3 included a single project that received a 94% realization rate.

The project in stratum SOP 4, project PRJ-1078916 had lower verified savings due to discrepancies found during ADM’s onsite inspection. During the site visit, it was found that one measure included in the project, the installation of a VFD on a fan, had not been properly commissioned and was operating at full speed. Thus, ADM did not include savings associated with this measure in the verified energy savings.

For the project in stratum Direct Install 3 with the low realization rate, project RBT-667028, ADM calculated savings using the TRM version 6.0 algorithms for both measures implemented at the facility, weather stripping and vending misers. For this project, ADM conducted a site visit and verified the installation of the incentivized measures. However, the project documentation did not include a calculator or data

showing how the reported savings were calculated. Due to the lack of data provided, a cause of the low realization rate could not be fully determined.

Of the 24 projects included in the M&V sample, ADM found 15 that had gross realization rates between 98% and 102% with 11 of those projects having a realization rate of 100%. Each of these projects had either very small discrepancies or the M&V evaluation found reported quantities and hours of operation to be accurate. Of those projects that had small discrepancies, most were due to slight variations in reported savings that were based on the older Arkansas TRM version 5.0 algorithms.

Overall, there was more variability in the peak kW gross realization rates. ADM found 9 of the 24 sampled projects had kW realization rates between 98% and 102%, with 8 projects having a 100% realization rate. Many of the sampled projects that had kW realization rates below 100% were due to out of date coincident factors being used in the implementer’s calculator.

**5.2.3.6 Net Impact Results and Findings**

Table 5-19 summarizes the results of the free ridership scoring of custom projects. Free ridership for the custom projects was estimated by weighting each participant’s response by the associated realized gross kWh savings or peak kW reductions for the measure. Nearly all respondents, 97%, were influenced by the program and none provided responses that indicated that they had prior plans to make the efficiency improvements.

Table 5-19 Free ridership Scoring Results

Had Plans and Intentions to Install Measure without C&I Program? (Definition 1)	Had Plans and Intentions to Install Measure without C&I Program? (Definition 2)	C&I Program had influence on Decision to Install Measure?	Had Previous Experience with Measure?	Percentage of Total Ex Post Gross kWh Savings	Free Ridership Score
N	N	N	N	4%	0%
N	N	Y	N	96%	0%
Required program to implement measures.				0%	0%
Total				100%	0%

None of the participants that implemented custom projects reported implementing additional spillover measures.

Table 5-20 and Table 5-21 summarize the ex post net kWh savings and peak kW demand reductions of the program. These results are based on applying the evaluated NTG ratio to custom projects and the NTG ratios of 96% and 100% to standard and direct install measures, respectively.

Net kWh savings totaled to 8,681,174 kWh and equal 99% of gross program savings and 133% of the program goal.

Table 5-20 Net kWh Savings Summary

Program Pathway	Gross Annual Energy Savings (kWh)		Gross Realization Rate	NTG <sup>61</sup>	Net Annual Energy Savings (kWh)
	Ex Ante	Ex Post			
SOP	8,131,516	8,052,104	99.0%	98.8%	7,946,605
DI	760,072	734,570	96.6%	100.0%	734,570
<b>Totals</b>	<b>8,891,588</b>	<b>8,786,673</b>	<b>98.8%</b>	<b>98.9%</b>	<b>8,681,174</b>

The program level net kW savings are summarized in Table 5-21 below. The verified net peak demand savings of 1,105.93 kW is 100% of the program goal of 1,073.00 kW.

Table 5-21 Net kW Savings Summary

Program Pathway	Gross Peak Demand Reduction (kW)		Gross Realization Rate	NTG <sup>62</sup>	Net Peak Demand Reduction (kW)
	Reported	Verified			
SOP	956.36	1,091.93	114.2%	98.5%	1,075.04
DI	34.59	30.89	89.3%	100.0%	30.89
<b>Totals</b>	<b>990.95</b>	<b>1,122.82</b>	<b>113.3%</b>	<b>98.5%</b>	<b>1,105.93</b>

#### 5.2.4 Non-Energy Benefits (NEBs)

Per Protocol L of the Arkansas TRM version 6.0 Evaluators account for non-energy benefits (NEBs) resulting from each program. Specifically, the categories of NEBs that are to be calculated for each DSM program are as follows:

- Benefits of electricity, natural gas, and liquid propane energy savings (i.e. other fuels);
- Benefits of public water and wastewater savings; and

<sup>61</sup> kWh and kW savings have differing NTG ratios due to ADM weighting respondent free ridership scores by the associated project savings.

<sup>62</sup> Ibid.

- Benefits of avoided and deferred equipment replacement costs.

During PY2016, limited data associated with NEBs was collected by the implementation contractor. Due to the limited data available, a discussion of recommended methodologies and data to be collected in future years is provided in the following sections. Where possible, a limited analysis of potential NEBs associated with the 2016 program is also presented.

The PY2016 SOP provided rebates covering a wide range of measure categories, only some of which would result in the three categories of NEBs identified in the AR TRM. Table 5-22 shows the measures that were included in the PY2016 SOP along with reported gross energy savings and potential NEB categories. Of the 13 measure categories included in the PY2016 program, 10 offer potential NEBs.

Table 5-22 PY2016 SOP Measure Categories and Potential NEBs

Measure	Reported kWh Savings	Other Fuel	Water Reduction	Deferred Replacement Costs
HVAC	486,152	X		X
PCPM	93,553			
VFD	37,667			X
Compressed Air	3,816,457			X
Gaskets/Strip Curtains	465,089			
Refrigeration New Construction	1,525,205			X
HVAC Controls	301,097			X
POS Compressor	177,462			X
Refrigeration Controls	1,189,594			X
ENERGY STAR Cool Roof	39,240	X		
Vending Misers	16,120			
Weather Stripping	713,543	X		
Faucet Aerators	30,410		X	

**5.2.4.1 Electricity, Natural Gas, and Liquid Propane Energy Savings**

The three measure categories in the PY2016 SOP that could potentially result in other fuel NEBs are HVAC, ENERGY STAR cool roof, and weather stripping. Each of these measures is primarily designed to result in cooling energy savings through installing high efficiency equipment or through reducing cooling loads. However, these measures could also result in heating fuel savings.

The HVAC measure category typically includes the installation of a high efficiency air conditioning or roof top packaged unit. Packaged units include both air conditioning and heating sections. It is possible that the heating section of these units could be more

efficient than a baseline unit, resulting in natural gas or propane savings. To quantify NEBs associated with these units, the heating efficiency and capacity of the new unit, as well as the building type and location, would need to be recorded for each project. These data would allow algorithms and deemed Equivalent Full-Load Hours for Heating (EFLH<sub>H</sub>) from the TRM to be used to estimate NEBs.

### 5.2.4.2 Water Savings

One measure, Faucet Aerators, included in the PY2016 SOP would result in water savings NEBs. This measure is designed to reduce water heating energy through decreased use of water at the faucet. While this measure results in electric energy savings in facilities with electric water heaters, it also results in quantifiable water reductions. The TRM algorithm used to determine energy savings associated with this measure is:

$$\Delta kWh = \frac{\rho \times C_p \times U \times (F_B - F_P) \times (T_H - T_{supply}) \times \frac{1}{E_t} \times Days/Year}{3,412 BTU/kWh}$$

Where,

$\rho$  = Density of water, 8.33 lb/gallon

$C_p$  = Heat capacity of water – 1 BTU/lb-°F

$U$  = Baseline water usage duration (min/day/unit), deemed per TRM

$F_B$  = Average baseline flow rate of water (GPM), deemed per TRM, 2.2

$F_P$  = Average post measure flow rate of aerator (GPM)

$T_H$  = Average mixed water (after aerator) temperature (°F)

$T_{supply}$  = Average supply of (cold) water temperature (°F), deemed per TRM

$E_t$  = Thermal efficiency of water heater, deemed per TRM

Days/Year = Annual building type operating days, deemed per TRM

Using the parameters,  $U$ ,  $F_B$ ,  $F_P$ , and Days/Year from this equation, the water savings associated with this measure can be calculated.

The M&V sample included two projects that had faucet aerators installed, accounting for a reported gross savings of 23,113 kWh. In all, the program included four faucet aerator projects, totaling 30,409.72 kWh. Using the parameters above and the reported gross kWh savings for the two sampled projects, ADM determined that an average of 10.32 gallons/kWh are saved for faucet aerator projects. Extrapolating to the program population, ADM calculated a total water savings of 313,800 gallons per year. Using the



combined cost for water and sewage rates of \$0.0078/gallon for commercial facilities, the expected NEBs associated with water reductions is \$2,447.64.

### **5.2.4.3 Deferred Replacement Costs**

Of the 13 measures included in PY2016 SOP, 7 could potentially lead to NEBs through deferred replacement costs, if it can be shown that high efficiency equipment has a longer useful life than baseline equipment. Protocol L of the TRM provides direction on estimating the deferred replacement costs associated with high efficiency measures that may have a longer Effective Useful Life (EUL) than the baseline technology. This is applicable to any measure that has an EUL longer than the baseline technology they replace. The deferred cost NEB accounts for the longer life of the installed technology by allowing the incremental cost calculations of the efficient measure to be reduced by the value of future baseline technology replacements. To determine deferred replacement NEBs, several data points are required for each measure installed through the SOP. These data include; high efficiency technology EUL, baseline technology EUL, real discount rate, measure type (Replace on Burnout vs. Early Replacement), and installed cost of both high efficiency and baseline technologies. While EULs are easily determined for different lighting fixtures installed through other C&I programs, they can be more difficult to determine when evaluating measures that include HVAC or process related equipment. Additionally, the installed costs of both high efficiency and baseline technologies should be determined using data collected within the utility territory to accurately account for economies of scale associated with larger projects.

### **5.2.5 Adherence to Protocol A**

The tracking system in the database conforms reasonably well to the tracking system protocol developed for use in Arkansas. While data included in the tracking system is relatively limited, it does provide the data necessary for the evaluation. The bullets below show a summary of how well the CLEAResult program tracking systems meets the components of the protocol.

- **Participating Customer Information** – includes all information required including customer contact information, customer identifier (account number), location of project, and date completed.
- **Measure Specific Information** – includes type of measures installed, but did not include quantity of each measure.
- **Measure Codes** – this was not applicable; fields could be used for a measure description.
- **Vendor Specific Information** – No vendor specific information was provided in the database.



- **Marketing and Outreach Activities** – One-on-one outreach made by implementation contractor with OG&E customers continues to be effective form of marketing.

### 5.2.6 Approach to Process Evaluation

The Evaluators conducted a formal process evaluation of the SOP program in 2014 and a limited process review in 2015, and found that the program was successful in meeting participation, savings, and satisfaction goals. Table 5-23 and Table 5-24 summarize the Evaluators’ review of the SOP in comparison to TRM VERSION 6.0 Protocol C for timing and conditions of conducting a process evaluation.

Table 5-23 Determining Appropriate Timing to Conduct a Process Evaluation

Component	Determination
New and Innovative Components	No. The program is designed in a manner consistent with similar programs elsewhere and applies deemed savings values from the TRM.
No Previous Process Evaluation	No. The program received a comprehensive process evaluation in 2014 and a limited process review in 2015.
New Vendor or Contractor	No. There was no change to the implementation contractor

Table 5-24 Determining Appropriate Conditions to Conduct a Process Evaluation

Component	Determination
Are program impacts lower or slower than expected?	No, SOP met kWh savings goals in 2016
Are the educational or informational goals not meeting program goals?	Yes
Are the participation rates lower or slower than expected?	Yes, program participation was lower than expected in 2016.
Are the program’s operational or management structure slow to get up and running or not meeting program administrative needs?	No
Is the program’s cost-effectiveness less than expected?	No
Do participants report problems with the programs or low rates of satisfaction?	No
Is the program producing the intended market effects?	Not Applicable, as market effects were not measured in 2016.

On this basis, the Evaluators concluded that process evaluation activities for PY2016 would be limited in scope and would not include a full-scale process evaluation. The PY2016 process evaluation activities include interviews with OG&E and implementation staff, as well as limited customer surveys. No net-to-gross analysis was performed for PY2016, except for custom projects as described in previous sections.

Due to the limited sample size and similarities in participating customers, the process evaluation for the SOP was conducted in conjunction with the CLP. The combined process evaluation approach, findings and recommendations are included in section 0.

**5.2.7 Review of PY2015 Evaluation Recommendations**

The recommendations made in the PY2015 evaluation of the SOP program, along with an update on the progress, are summarized in this section.

Table 5-25 PY2015 Evaluation Recommendations and Updates

Number	Description	Rationale	Status
1	Tracking database missing key parameters	Key parameters should be available in the tracking database to allow for more efficient impact evaluation	Accepted - Queries from tracking database can be modified to include all necessary parameters
2	Include non-energy benefits in reported energy savings database	Non-energy benefits increase the program's overall energy and demand savings	Accepted - Implementation contractor will begin determining non-energy benefits with directives included in TRM version 6.0

Number	Description	Rationale	Status
3	Increase implementer conducted EM&V during project planning stages	EM&V conducted by the implementer that can demonstrate savings helps convince customers to move forward with upgrades.	Accepted - CLEAResult regularly interacts with customers during planning stages.
4	Develop documentation checklists to ensure consistent documentation across all projects	Adequate project documentation allows the evaluator to better determine impact savings.	Accepted - A final documentation checklist is included as part of the final approval by CLEAResult program managers
5	Provide additional documentation to support Early Retirement	Additional documentation to support Early Retirement will improve defensibility of reported savings.	Accepted - No Early Retirement incentives are paid. In the case where the RUL = 0, incentives are based on minimum required baselines per TRM.
6	Follow TRM rules for Early Retirement and Replace on Burnout	Following the TRM rules will improve realization rates.	Accepted - No Early Retirement incentives are paid. In the case where the RUL = 0, incentives are based on minimum required baselines per TRM.
7	Only provide rebates for equipment that exceeds the minimum efficiency requirements	Not providing incentives to projects that meet minimum efficiency requirements will result in a significant improvement in lifetime savings.	Accepted - only projects that exceed minimum requirements are incentivized

Number	Description	Rationale	Status
8	Ensure savings from door gaskets are consistent with TRM algorithms	Implementing this recommendation would ensure savings are consistent with TRM algorithms	Accepted - All algorithms currently use TRM version 5.0
9	Ensure algorithms used for calculator motor replacement impacts are accurate	Errors in calculators' impact realization rates and overall energy and peak demand savings	Accepted - This measure is no longer incentivized; thus, the calculator is no longer used
10	Provide complete documentation for custom projects, including analysis calculations, documentation of all assumptions, and raw, unprocessed monitoring data	Providing requested data for custom projects would allow the evaluator to follow and replicate the original analysis while improving estimation methods wherever possible.	Accepted - M&V reports, data, etc. is provided for all custom projects
11	Calculate peak demand reductions for custom projects using OG&E defined peak period	This would ensure calculated demand impacts are representative of the impact on OG&E's system peak demand	Not Applicable - the full recommendation provided peak demand period that is inconsistent with OG&E's published peak period
12	Use correct engineering equation to calculate kW	Evaluator found a project where they believed the incorrect formula was used for calculating kW from logged data.	Not Applicable - the equation used by the implementer was correct on the project in question.

Number	Description	Rationale	Status
13	Follow industry best practices for regression analyses, including weather normalization and peak demand impacts corresponding to OG&E published peak periods	This would ensure implementer's calculation methods are consistent with best practices.	Accepted - weather normalization has been included in regression analyses during 2016.

### 5.2.8 Planned Program Changes

In PY2017, the SOP will be combined with, what in PY2016 was referred to as the Commercial Lighting Program, to create a single, comprehensive commercial and industrial program offering. The combined program, referred to as the Commercial Energy Efficiency Program (CEEP), will allow OG&E to offer improved support to customers who are implementing comprehensive projects that include both lighting and non-lighting measures. The PY2017 CEEP has been designed to offer four program channels or pathways for participation:

- **Midstream Lighting:** The Midstream Lighting component of CEEP encourages customers to participate by providing point of sale (POS) discounts on selected products through local lighting distributors. Through this channel, the financial incentives are paid to the lighting distributor to allow reduced costs for the end customer.
- **Schools and Government Agencies (SAGE):** The SAGE component of CEEP is marketed towards public school districts, private schools, universities and colleges, and all government agencies. This component includes financial incentives for both lighting and non-lighting measures and both prescriptive and custom projects.
- **Large C&I:** The Large C&I component of CEEP offers incentives to customers with peak demand of greater than 100 kW. Incentives are paid directly to customers who install energy efficiency equipment. This component focuses on four key areas; lighting, retrofit of existing equipment, HVAC replacement, and retro commissioning.
- **Small Business Direct Install (SBDI):** The SBDI component offers incentives to customers with a peak demand of less than 100 kW. The SBDI component provides lighting audits and equipment installation through approved trade allies.

## 5.2.9 Conclusions & Program Recommendations

Based on the findings from the PY2016 process and impact evaluations of the SOP, ADM has developed the following conclusions:

- **Program Participation Decreased:** The SOP achieved a smaller participation in PY2016 than in previous program years. In PY2015, 107 projects were incentivized through the program, compared to 84 in PY2016, representing a 21% decrease in participation. However, the lower participation did not result in lower ex ante savings. In PY2015, the SOP ex ante gross kWh savings of 7,772,630 kWh, averaging 72,641 kWh per incentivized project. In PY2016, the ex ante gross savings of 8,891,588 kWh resulted in an average project savings of 105,852 kWh.
- **Overall Program Design Remains Unchanged:** Overall, the program design remained unchanged from 2015. The program offerings and incentive levels were unchanged from the previous program year. However, significant changes are planned for the program for the 2017 program year.

Based on the findings from the 2016 evaluation of the SOP program, ADM has developed the following recommendations:

- **Update Ex Ante Savings Calculator Tools:** Through the evaluation of sampled sites, ADM found errors in the calculators used to develop ex ante energy savings. For the SOP, these errors mainly were due to deemed values from previous versions of the TRM being used. Many of these errors led to only slight differences between reported and verified savings, but correcting these would ensure compliance with the latest version of the Arkansas TRM and improve the accuracy of the reported savings calculations.
- **Initiate a Pre-Construction Review Process:** ADM recommends a pre-construction review process be designed and implemented for large or custom projects. The pre-construction review should be designed to allow both implementer and evaluator access to project documentation and ex ante savings calculations prior to projects being completed and incentives being paid. The purpose of the review process would be to identify any potential M&V related issues, determine data collection requirements, and establish project timelines prior to funding being reserved for customers. This proposed process can help minimize uncertainty and risk associated with large or custom projects and may be especially useful with the planned program changes in PY2017.
- **Develop NEB data collection and calculation protocol:** ADM recommends that the implementer and evaluator coordinate on the development of data collection and calculation protocols to allow for the efficient determination of

NEBs at the measure level. The protocol should include all data points that will be required to determine the three types of NEBs as described by the TRM as well as calculation methodologies using parameters or deemed values from the TRM when available and industry accepted values when not available through the TRM.

### **5.3 Commercial and Industrial Process Evaluation**

OG&E offered two energy efficiency programs in Program Year 2016 that served Arkansas Commercial and Industrial customers: Lighting and Standard Offer. Because of the small AR market within this segment (approximately 3,000 eligible OG&E C&I customers) and the limited number of participants in these program tracks, this process report examines these two programs together. Differences are noted between programs where they exist. Both the Lighting and the Standard Offer programs had the same program manager at OG&E and were implemented by the same CLEAResult team members in PY16.

#### **5.3.1 Process Evaluation Findings**

The following sections detail the findings from the process evaluation pertaining to program communications and marketing, program delivery, program satisfaction, and customer characteristics.

##### ***5.3.1.1 Program Communications and Marketing***

OG&E was responsible for AR C&I program marketing in PY16; the interviews with the program manager and the implementers revealed that personal relationships and communications between OG&E and their business customers were frequently responsible for those customers enrolling in either the Lighting or Standard Offer programs. Customers often began their OG&E C&I program experience by enrolling through the Lighting program, and then they moved on to implement additional projects available through the Standard Offer program. OG&E also reported using their website to promote the program, along with radio and occasionally, print ads. Finally, OG&E and CLEAResult both took opportunities to present at nonprofits, social / civic activities or meetings, and seminars. CLEAResult is expected to play a larger role in program marketing in PY17.

Thirty-eight percent of participants reported hearing about this program through a source “other” than those we asked about within our survey. Thirty-one percent confirmed they first heard about the program through a contractor or vendor. A summary of the participant responses appears in Table 5-26.



Table 5-26 How learned of program

Category	Lighting	Standard Offer	Total
Other	30%	47%	38%
Contractor/Vendor	35%	26%	31%
Colleague/Another business	13%	11%	12%
Account representative	4%	5%	5%
Mail from OG&E	4%	5%	5%
OG&E website	9%	0%	5%
Conference/Trade Show/ Expo	4%	0%	2%
Radio/Print Advertising	0%	5%	2%
Total	100%	100%	100%
	N=23	N=19	N=42

Source: Question A1

Note: Totals may not sum to 100 percent due to rounding

Respondents were divided among specific program lines about whether they received enough information about the program when they first heard about it. Eighty-four percent of Standard Offer program respondents confirmed they received enough information about the program through their communication channel; these respondents most often heard about the program directly from a resource at OG&E or CLEAResult they named as “other”. Meanwhile only 48 percent of Lighting respondents indicated they received enough program information through their communication method. Lighting respondents most frequently reported hearing about the program through a contractor or vendor.

Table 5-27 Method learned of program provided enough information

Category	Lighting	Standard Offer	Total
Yes	48%	84%	64%
No	52%	16%	36%
Total	100%	100%	100%
	N=23	N=19	N=42

Source: Question A2

Note: Totals may not sum to 100 percent due to rounding

When we asked respondents what kind of additional information they would have liked, answers varied. However, clear themes about more information – especially about program measures, available incentives, and the amount of savings a customer could expect when implementing a program project – were repeatedly mentioned by respondents. As one Lighting customer put it: *“Contact information, phone numbers, brochures, or even a website that gives you the ins and outs; and a better understanding of how the program works, you get x amount of lights and then get x amounts of savings returned.”*

Respondents indicated that program enrollment was not often automatic after hearing of the AR C&I program offerings. Only 10 percent immediately enrolled with the program upon hearing about it, and another 10 percent said they heard about it and enrolled in less than a week. Other respondents indicated some time passed for them between hearing about the program and enrolling – with “1 month to less than 3 months” being the most popular length of time between learning about the program and initiating participation.

Table 5-28 Length of time between learning of program and initiating participation

Category	Lighting	Standard Offer	Total
You learned about the program and initiated participation at the same time	9%	11%	10%
More than 1 day but less than 1 week	9%	11%	10%
1 week to less than 1 month	17%	11%	14%
1 month to less than 3 months	35%	37%	36%
3 months to less than 6 months	13%	16%	14%
6 months to less than 1 year	4%	11%	7%
1 year or more	13%	5%	10%
Total	100%	100%	100%
	N=23	N=19	N=42

Source: Question A7

Note: Totals may not sum to 100 percent due to rounding

### **5.3.1.2 Program Delivery**

The PY16 AR C&I programs had oversight through an OG&E program manager and were implemented by CLEARResult. CLEARResult worked directly with customers and contractors in the field to assess project sites, make project recommendations, and process program paperwork and rebate payments. CLEARResult worked to develop a formal progress report for both programs that reported to OG&E progress towards program goals, assessed active projects, and provided details about the upcoming project pipeline. Both OG&E and CLEARResult regularly communicated with each other through email, by phone, and occasionally, in person.

OG&E C&I customers initiated program participation by making an inquiry on the OG&E website or calling an OG&E or CLEARResult representative. After that initial contact, a participant takes these participation steps:

- 1) A customer (typically an owner or a facilities manager within this process) has their facility assessed. The assessment helps identify energy efficiency improvement options, and the customer receives these recommendations for improvements.
- 2) The customer also receives an estimate of potential energy efficiency savings worked up through a program calculator and incentive amount estimates to help them calculate net project costs (post-incentives).
- 3) A customer may select a contractor to help implement their energy efficient project.
- 4) If a contractor is selected to work with a customer, CLEARResult follows up with the customer to be sure that the contractor is being helpful and that the project is moving forward.
- 5) After project work is complete, CLEARResult performs a project post-inspection and if applicable, pays the customer their incentive.

The programs did not maintain a specific contractor list or network of contractors to recommend to C&I customers in PY16; however, CLEARResult did interact with contractors working with the program to provide them with energy savings calculators to assess and recommend program-incented equipment to customers. CLEARResult offers these contractors informal program training on the calculators, through meeting them directly in the field, or inviting them to their offices in Fort Smith. CLEARResult offers additional contractor training through hosting “Lunch and Learn” sessions which presented program details and workings to the contractors.

We asked program participants we surveyed whether they worked with an AR contractor to complete their Lighting or Standard Offer project. Most (55 percent) respondents confirmed working with a contractor or vendor, while 24 percent of the respondents indicated they relied on an internal resource directly at their place of business. Twenty-one percent reported they used a combination of internal resources

and outside contractors. Standard Offer participants were more likely to say they only worked with a contractor/vendor.

Table 5-29 Worked with contractor / vendor / internal staff to implement project

Category	Lighting	Standard Offer	Total
Worked with a contractor / vendor	47%	64%	55%
Internal staff at company	33%	14%	24%
Both the contractor and internal staff	20%	21%	21%
Total	100%	100%	100%
	N=15	N=14	N=29

Source: Question A4

Note: Totals may not sum to 100 percent due to rounding

Not all survey respondents could recall the program application or other paperwork processes. Among those who could, 41 percent indicated that an OG&E or CLEAR result representative filed the program paperwork on their behalf. Thirty-three percent confirmed that program paperwork was a team effort, completed by multiple parties listed in our survey.

Table 5-30 Parties involved in submitting program application or paperwork

Category	Lighting	Standard Offer	Total
Respondent	13%	9%	11%
Someone else at my company	6%	0%	4%
An OG&E or CLEAR result representative	44%	36%	41%
Contractor / Vendor	19%	0%	11%
A combination of those answers	19%	55%	33%
Total	100%	100%	100%
	N=16	N=11	N=27

Source: Question A8\_O

Note: Totals may not sum to 100 percent due to rounding

Regardless of how the program paperwork got done, AR C&I program participants were highly satisfied with the process. We asked these respondents to rate their satisfaction with the paperwork process using a scale of 0 to 10, where 0 is "very dissatisfied" and 10 is "very satisfied". All participants rated the paperwork process with an 8, a 9, or a 10. The mean overall paperwork satisfaction score (both tracks) was 9.6.

*Measure Installation*

We asked Arkansas C&I program participants to identify any barriers they may have encountered while purchasing or installing program measures. Most respondents did not encounter any barriers. However, respondents who participated in the Standard Offer program were slightly more likely to encounter a barrier (13 percent) than those in the Lighting program (9 percent). When asked to provide more information about any barriers they may have faced, respondents contributed their challenges with their own building's age or limitations, not program or equipment specific barriers.

Table 5-31 Were there barriers when purchasing or installing program measures?

Category	Lighting	Standard Offer	Total
Yes	9%	13%	11%
No	91%	87%	89%
Total	100%	100%	100%
	N=23	N=24	N=46

Source: Question M1R1

Note: Totals may not sum to 100 percent due to rounding

Respondents replied for multiple measures

All respondents who participated in the Lighting program confirmed their measures were still installed today. One respondent from the Standard Offer indicated their measure was no longer installed. Between both programs, our respondents confirmed that 96 percent of the program measures were still installed. All respondents who confirmed program measures were still installed also confirmed the measures were in working order.

*Measure Satisfaction*

The evaluation team asked AR C&I program participants to rate their satisfaction with the measures they had installed through the program, using a scale of 0 to 10, where 0 is "very dissatisfied" and 10 is "very satisfied". Participants' mean overall measure satisfaction score (both tracks) was 9.8. Lighting participants in particular were very

satisfied with their measures. Twenty-one out of twenty-two respondents rated their lighting measure satisfaction a 10 of 10. The mean score of Standard Offer participants regarding the measures they had installed through the program was 9.6. While respondents did not offer many comments about program measures in specific feedback within this survey, one participant did indicate that he or she wanted “*brighter security lights*”.

### **5.3.1.3 Program Satisfaction**

The evaluation team asked AR C&I program participants to rate their overall program satisfaction using a scale of 0 to 10, where 0 is "very dissatisfied" and 10 is "very satisfied". Participants' mean overall program satisfaction score was 9.6. Lighting customers rated their satisfaction a 9.7 overall while Standard Offer participants scored their satisfaction slightly lower, with a mean score of 9.4. Table 5-32 highlights what respondents said when asked what they would change about the C&I program if given the opportunity. Sixty percent indicated they wouldn't change anything. The second most popular answer to this question was “other”; the most frequently mentioned ways participants defined “other” included that they wanted more information about: a) how savings are calculated, and b) what other measures or program offerings are available from OG&E. Participants mentioned with similar frequency that they also wanted more communication and support from OG&E and/or CLEAResult though the process. For example, one respondent offered this specific feedback: “*Maybe some sort of online platform where you can check on the status of the project, you know? It kind of went into a black hole once we submitted the paperwork, not knowing when it was going to be approved.*”

Table 5-32 What Would You Change About the Program?

	Lighting	Standard Offer	Total
Would not change anything	48%	74%	60%
Other (specify)	44%	26%	36%
Increase incentive amount	9%	0%	5%
Improve incentive payment speed	0%	5%	2%
Total	100%	100%	100%
	N=23	N=19	N=42

Source: Questions SAT1C01 SAT1C02 SAT1C03 SAT1C04 SAT1C05 SAT1C06  
 Note: 1) Totals may not sum to 100 percent as respondents could select more than one answer, and 2) Respondents were asked if they wanted to change the program application or paperwork process, or if they would want to improve initial processing time. No respondents chose these answers, so they were omitted from the table.

To further assess the value of the AR C&I program to its participants, we asked respondents to rate the value of the Lighting and Standard Offer program components to their organization. We presented a 0 to 10 value scale to respondents to use when scoring the program components, where 0 was “not at all valuable” and 10 was “very valuable”. Table 5-33 displays the mean total value score of each program component among C&I respondents overall. The scores presented in this table show that all program offerings have value to respondents, as no single component had a mean score of less than an 8 among our surveyed respondents.

Respondents scored “communication from program representatives” the highest, with an overall mean score of 9.3. Examining the responses of Lighting and Standard Offer respondents separately, this program component still scored the highest among each group. Conversely, program materials – while still having a relatively high mean score – were at the bottom of the respondents’ value list with a mean score of 8.3.

Table 5-33 Value of Commercial Program Components to Your Organization?

AR C&I Program Component	Mean Value Score
Communication from program representatives	9.3
The energy efficient measures that OG&E provides through the program	9.2
Technical assistance from OG&E or CLEAResult program representatives	9.0
Technical assistance from your contractor or vendor	9.0
The incentive amount compared to your total project cost	8.9
Materials describing the program requirements and benefits	8.3

Another way to measure program satisfaction is to understand whether a program participant has recommended the program to other OG&E customers. When we asked our Lighting or Standard Offer respondents if they had recommended the AR C&I programs to others, 83 percent of Lighting participants and 74 percent of Standard Offer participants had helped spread the word about the AR C&I program offerings. Among those who had not yet recommended the program, we asked them if they would if provided the opportunity. These respondents confirmed they would recommend the program if the opportunity presented itself.

It is also worth noting that – upon conclusion of our participant survey – 15 of the survey respondents (35 percent) indicated they wanted to comment further about the program. Thirteen of these 15 respondents provided additional positive comments about the value of the AR C&I programs. Below are examples of verbatim comments we captured through our participant survey:

*“This is just a heck of a program and you all can see the difference if you see my bills.”*

*“I think CLEAResult, Process & Power and Robin Arnold all did a great job.”*

*“I appreciate them. It’s that simple. I appreciate what they’ve done.”*

**5.3.1.4 General Respondent Characterization**

Table 5-34 summarizes basic information collected about the AR C&I respondents and their facilities. The AR C&I program served OG&E business customers within a variety of sectors, such as Industrial & Manufacturing, Retail, Restaurant and Office. Lighting program participants we surveyed had smaller businesses, represented by a mean employee count of 13. Meanwhile, Standard Offer respondents had 196 mean



employees. Roughly three-quarters (71 percent) of overall respondents indicated they owned and occupied the building they were doing business in. We asked those who did not both own **and** occupy their building if they at least paid the electric bill at their facility. Lighting respondents were split almost in half over the issue of who pays the electric bill, with 57 percent of respondents confirming they paid the bill, while 43 percent reported that someone else did. All Standard Offer customers answering this question indicated they paid the utility bill at their facility.

Table 5-34 AR C&I Participant Characteristics

Category			Program Track		
			Lighting	Standard Offer	Total
Business activity that accounts for most of the floor space covered by your OG&E utility bill	Office	Column N %	17%	5%	12%
	Retail	Column N %	26%	5%	17%
	Industrial / Manufacturing	Column N %	9%	32%	19%
	Warehouse or distribution center	Column N %	9%	5%	7%
	Other healthcare	Column N %	4%	0%	2%
	College / university	Column N %	4%	0%	2%
	Restaurant	Column N %	4%	26%	14%
	School K-12	Column N %	4%	5%	5%
	Religious worship	Column N %	0%	5%	2%
	Other	Column N %	22%	16%	19%
	Total	Column N %	100%	100%	100%
	Unweighted Count	N=23	N=19	N=42	
Best description of company's ownership of this facility	You company owns and occupies this facility	Column N %	70%	72%	71%
	Your company owns this facility but it is rented to someone else	Column N %	13%	6%	10%
	Your company rents this facility from someone else	Column N %	17%	22%	20%
	Total	Column N %	100%	100%	100%
	Unweighted Count	N=23	N=18	N=41	
Does the company pay the electric bill at this facility	Yes	Column N %	57%	100%	77%
	No	Column N %	43%	0%	23%
	Total	Column N %	100%	100%	100%
		Unweighted Count	N=7	N=6	N=13
Respondents (n)			23	19	42

Source: Questions FIRM1 FIRM2 FIRM3 FIRM4  
 Note: Totals may not sum to 100 percent due to rounding

Table 5-35 provides information on how budget and energy efficiency decisions are made within the organizations of these AR C&I respondents. Most (83 percent overall) report that their company's budget decisions are made locally. Two-thirds of respondents (65 percent) indicated their company requires that an energy efficiency investment meet certain return on investment or simple payback thresholds to be purchased and installed, while 34 percent indicated they had no such requirement.

Table 5-35 How AR C&I Participant Make Energy Efficiency Project Decisions

Category			Program Track		
			Lighting	Standard Offer	Total
Are your company's budget decisions made locally, regionally, nationally, worldwide, or something else	Locally	Column N %	78%	89%	83%
	Regionally	Column N %	13%	0%	7%
	Nationally	Column N %	4%	6%	5%
	Other	Column N %	4%	6%	5%
	Total	Column N %	100%	100%	100%
		Unweighted Count	N=23	N=18	N=41
Does your company require that an energy efficiency investment meet certain return on investment or simple payback thresholds to be purchased and installed	Yes, specific ROI	Column N %	22%	28%	24%
	Yes, simple payback	Column N %	43%	39%	41%
	No	Column N %	35%	33%	34%
	Total	Column N %	100%	100%	100%
		Unweighted Count	N=23	N=18	N=41

Source: Questions FIRM5 FIRM6

Note: Totals may not sum to 100 percent due to rounding

### 5.3.2 Process Evaluation Methods

Below, we present the methodology used for the process-related data collection activities the evaluation team performed in association with the AR C& I program evaluation. These activities included program staff interviews and a survey of participating customers.

#### 5.3.2.1 Program Staff Interviews

The evaluation team completed an in-depth interview with the AR C&I program manager at OG&E and an additional interview with staff at CLEAResult -- the program implementer -- as part of the process evaluation. The evaluation team used these program staff interviews to identify program updates or changes experienced in PY16. Further, these interviews explored energy efficiency staff roles and responsibilities, program communications and marketing, and the overall program delivery processes in place during PY16.

### 5.3.2.2 Participating Customer Surveys

OG&E AR C&I program participants were surveyed by telephone by Tetra Tech’s in-house survey lab in early February 2017 as part of this evaluation. The surveys collected respondent feedback on program communication and offerings, program measures (including installation verification), and participant satisfaction. The survey also collected key business characteristic information from program participants. The evaluation team received and reviewed Arkansas C&I program tracking data from CLEAResult after PY16 concluded.<sup>63</sup> The program tracking data provided contact information for participating customers and measure descriptions of equipment installed through the program.

Tetra Tech began fielding the participant survey on February 9, 2017. Participant data collection ended on February 17, 2017. We ultimately completed surveys with 42 Arkansas C&I program participants by using a census of the 138 unique participant records in the program tracking data. Information about the starting record counts and the final response rate for this survey can be found in Appendix E.

### 5.3.3 Recommendations for Program Design and Implementation

Based on the findings from the process evaluation, we pose the following recommendations for program design and implementation.

- **Continue to work with customers to share program information with them – including examples of available program measures, incentives, and savings potential.** While participants were very satisfied with communications they had with their program representative, they also told us they wanted even more. Specific information that participants named as desirable included more information about when to expect their rebate, or how much savings they should expect to realize, would be appreciated.
- **Actively promote the changes to the PY17 program and structure early in the program year to bring past customers back into the program.** AR C&I program participants have elevated levels of satisfaction with the program and the projects installed through it. As new offerings are extended in PY17, there may be an opportunity to return customers to the program for more projects and measures.
- **Ask satisfied customers to spread the word about the program.** While roughly three out of every four of the AR C&I customers we surveyed indicated they had recommended the program to others, about one-fourth had not.

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<sup>63</sup> Program tracking data file name: OGE AR CI ADM Flat File ADM revised request 01042017 FINAL.xlsx

However, all of those who had not yet told another customer about the program confirmed they **would** recommend the program if the opportunity presented itself.

- **Entertain alternative marketing approaches to continue to reach new customers through the program.** Most participants indicated they heard about the program from their OG&E or CLEAResult contact, or a contractor or vendor. To continue to bring more, new C&I customers into the program, CLEAResult (who will be performing marketing activities in PY17) should consider how to better utilize the OG&E website and new-to-the program outreach methods to promote program offerings.

## Appendix A. Portfolio Cost-Effectiveness

### Overview

ADM estimated the cost-effectiveness for the overall energy efficiency portfolio and programs, based on 2016 costs and savings estimates provided by OG&E and their third-party implementers. This appendix provides the cost-effectiveness results, as well as a brief overview of the approach taken by the Evaluators.

The portfolio, and programs, pass all the cost-effectiveness tests except the RIM test. Table 5-36 presents the cost effectiveness results for the PY2016 portfolio.

Table 5-36 PY2016 Cost Effectiveness Results

Program	TRC	UCT	RIM	PCT	SCT	TRC Net Benefits
MFDI	3.61	4.50	0.71	6.83	3.61	\$2,582,329
SEE LivingWise	13.10	2.88	0.48	8.41	13.14	\$843,251
Unified Wx	2.72	1.98	0.64	3.69	2.73	\$3,559,920
C&I SOP	2.00	4.24	0.97	2.17	2.00	\$3,294,213
C&I Lighting	2.14	3.39	0.95	2.53	2.14	\$2,925,864
EEA	0.00	0.00	0.00	0.00	0.00	-\$18,411
Regulatory	0.00	0.00	0.00	0.00	0.00	-\$28,661
<b>Total</b>	<b>2.46</b>	<b>3.19</b>	<b>0.81</b>	<b>3.15</b>	<b>2.46</b>	<b>\$13,158,505</b>

### Approach

The California Standard Practice Model was used as a guideline for the calculations, along with guidance from the Arkansas TRM version 6.0. The cost effectiveness analysis methods which were used in this analysis are among the set of standard methods used in this industry and include the Utility Cost Test (UCT), Total Resource Cost Test (TRC), Ratepayer Impact Measure Test (RIM), and Participant Cost Test (PCT). All tests weigh monetized benefits against costs. These monetized amounts are presented as Net Present Value (NPV) evaluated over the lifespan of the measure. The benefits and costs differ for each test based on the perspective of the test. The definitions below are taken from the California Standard Practice Manual.

- **The Total Resource Cost Test (TRC)** measures the net costs of a demand-side management program as a resource option based on the total costs of the program, including both the participants' and the utility's costs.
- **The Utility Cost Test (UCT)** measures the net costs of a demand-side management program as a resource option based on the costs incurred by the program administrator (including incentive costs) and excluding any net costs

incurred by the participant. The benefits are similar to the TRC benefits. Costs are defined more narrowly.

- **The Participants Cost Test (PCT)** is the measure of the quantifiable benefits and costs to the customer due to participation in a program. Since many customers do not base their decision to participate in a program entirely on quantifiable variables, this test cannot be a complete measure of the benefits and costs of a program to a customer.
- **The Ratepayer Impact Measure Test (RIM)** test measures what happens to customer bills or rates due to changes in utility revenues and operating costs caused by the program. Rates will go down if the change in revenues from the program is greater than the change in utility costs. Conversely, rates or bills will go up if revenues collected after program implementation is less than the total costs incurred by the utility in implementing the program. This test indicates the direction and magnitude of the expected change in customer bills or rate levels.

A common misperception is that there is a single best perspective for evaluation of cost-effectiveness. Each test is useful and accurate, but the results of each test are intended to answer a different set of questions. The questions to be addressed by each cost test are shown in Table 5-37.<sup>64</sup>

Table 5-37 Questions Addressed by the Various Cost Tests

Cost Test	Questions Addressed
Participant Cost Test (PCT)	<ul style="list-style-type: none"> <li>■ Is it worth it to the customer to install energy efficiency?</li> <li>■ Is it likely that the customer wants to participate in a utility program that promotes energy efficiency?</li> </ul>
Ratepayer Impact Measure (RIM)	<ul style="list-style-type: none"> <li>■ What is the impact of the energy efficiency project on the utility’s operating margin?</li> <li>■ Would the project require an increase in rates to reach the same operating margin?</li> </ul>
Utility Cost Test (UCT)	<ul style="list-style-type: none"> <li>■ Do total utility costs increase or decrease?</li> <li>■ What is the change in total customer bills required to keep the utility whole?</li> </ul>

<sup>64</sup> <http://www.epa.gov/cleanenergy/documents/suca/cost-effectiveness.pdf>

<p>Total Resource Cost Test (TRC)</p>	<ul style="list-style-type: none"> <li>■ What is the regional benefit of the energy efficiency project (including the net costs and benefits to the utility and its customers)?</li> <li>■ Are all of the benefits greater than all of the costs (regardless of who pays the costs and who receives the benefits)?</li> <li>■ Is more or less money required by the region to pay for energy needs?</li> </ul>
<p>Societal Cost Test (SCT)</p>	<ul style="list-style-type: none"> <li>■ What is the overall benefit to the community of including indirect benefits?</li> <li>■ Are all of the benefits, including indirect benefits, greater than all of the costs (regardless of who pays the cost and who receives the benefits)?</li> </ul>

Overall, the results of all five-cost-effectiveness tests provide a more comprehensive picture than the use of any one test alone. The TRC and SCT cost address whether energy efficiency is cost-effective overall. The PCT, UCT, and RIM address whether the selection of measures and design of the program are balanced from the perspective of the participants, utilities, and non-participants. The scope of the benefit and cost components included in each test are summarized in Table 5-38.<sup>65</sup>

Table 5-38 Benefits and Costs Included in each Cost-Effectiveness Test

Test	Benefits	Costs
<p>PCT (Benefits and costs from the perspective of the customer installing the measure)</p>	<ul style="list-style-type: none"> <li>■ Incentive payments</li> <li>■ Bill Savings</li> <li>■ Applicable tax credits or incentives</li> </ul>	<ul style="list-style-type: none"> <li>■ Incremental equipment costs</li> <li>■ Incremental installation costs</li> </ul>
<p>UCT (Perspective of utility, government agency, or third party implementing the program)</p>	<ul style="list-style-type: none"> <li>■ Energy-related costs avoided by the utility</li> <li>■ Capacity-related costs avoided by the utility, including generation, transmission, and distribution</li> </ul>	<ul style="list-style-type: none"> <li>■ Program overhead costs</li> <li>■ Utility/program administrator incentive costs</li> </ul>
<p>TRC (Benefits and costs from the perspective of all utility customers in the utility service territory)</p>	<ul style="list-style-type: none"> <li>■ Energy-related costs avoided by the utility</li> <li>■ Capacity-related costs avoided by the utility, including generation, transmission, and distribution</li> <li>■ Additional resource savings</li> <li>■ Monetized non-energy benefits as outlined by the TRM version 6.0</li> </ul>	<ul style="list-style-type: none"> <li>■ Program overhead costs</li> <li>■ Program installation costs</li> <li>■ Incremental measure costs</li> </ul>

<sup>65</sup> Ibid.



<p>SCT (Benefits and cost to all in the utility service territory, state, or nation as a whole).</p>	<ul style="list-style-type: none"> <li>■ Energy-related costs avoided by the utility</li> <li>■ Capacity-related costs avoided by the utility, including generation, transmission, and distribution</li> <li>■ Non-energy benefits as outlined by the TRM version 6.0</li> </ul>	<ul style="list-style-type: none"> <li>■ Program overhead costs</li> <li>■ Program installation costs</li> <li>■ Incremental measure costs</li> </ul>
<p>RIM (Impact of efficiency measure on non-participating ratepayers overall)</p>	<ul style="list-style-type: none"> <li>■ Energy-related costs avoided by the utility</li> <li>■ Capacity-related costs avoided by the utility, including generation, transmission, and distribution</li> </ul>	<ul style="list-style-type: none"> <li>■ Program overhead costs</li> <li>■ Lost revenue due to reduced energy bills</li> <li>■ Utility/program administrator installation costs</li> </ul>

### Non-Energy Benefits

In Arkansas, the IEM, in collaboration with OG&E and the other investor owned utilities (IOUs) and other stakeholders through the Parties Working Collaboratively (PWC), have developed a uniform set of benefits to be associated with measures implemented in the portfolio. These Non-Energy Benefits (NEBs) are an addition to programs under the authorization of Arkansas TRM 6.0. Volume 1 - Protocol L. After reviewing the guidance from the PWC, the Arkansas Public Service Commission (Commission) issued Order No. 30 on December 10, 2015, which provided direction and guidance regarding the inclusion of NEBs in the Technical Reference Forum, as follows:<sup>66</sup>

*The Commission therefore orders and directs that the following three categories of NEBs be consistently and transparently accounted for in all applications of the TRC test, as it is applied to measures, programs, and portfolios:*

- a. *benefits of electricity, natural gas, and liquid propane energy savings (i.e., other fuels);*
- b. *benefits of public water and wastewater savings; and*
- c. *benefits of avoided and deferred equipment replacement costs as conditioned herein.”*

In response to the Commission Order for NEBs outlined above, Protocol L was added to the Arkansas TRM version 6.0, which encompasses NEBs:

- Protocol L1: Non-Energy Benefits for Electricity, Natural gas, and Liquid Propane (“other fuels”)
- Protocol L2: Non-Energy Benefits for Water Savings

<sup>66</sup> Arkansas TRM version 6.0, Protocol L.

- Protocol L3: Non-Energy Benefits of Avoided and Deferred Equipment Replacement Costs.

This recommended approach has been developed jointly by the IEM and the PWC for each category as directed by the Commission.

Below is a summary of the NEBs that were calculated in each program in PY2016. The values associated with each NEB in the cost benefit analysis are outlined in each program chapter.

- **Multifamily Direct Install:** water savings resulting from efficient faucet aerators and showerheads and deferred replacement costs were calculated for LED bulbs. There were no gas or propane units identified in the project data.
- **SEE LivingWise:** water savings resulting from efficient faucet aerators and showerheads, natural gas, and liquid propane savings. Deferred replacement costs were calculated for LED bulbs.
- **OG&E/AOG Weatherization (Unified Wx):** water savings resulting from efficient faucet aerators and showerheads, as well as electricity or natural gas (where either OG&E or AOG was not sponsoring the program or serving the electricity or natural gas), and liquid propane savings.
- **C&I Lighting:** natural gas savings associated with heating/cooling interactive effects for lighting projects, as well as deferred replacement costs.
- **C&I Standard Offer:** water savings resulting from faucet aerators, as well as deferred replacement costs.

### Economic Inputs for Cost Effectiveness Analysis

The Evaluators used the economic inputs provided by OG&E for the cost benefit analysis, this included avoided costs that were estimated using the Real Economic Carrying Charge (RECC) approach. The rates utilized for avoided water and avoided propane use were from Protocol L in the Arkansas TRM version 6.0.

The Evaluators used the discount rates provided by OG&E to perform the cost benefit analysis, and these values align with the rates used in the PY2016 Plan. The evaluated net energy savings (kWh) and demand reductions (kW) values utilized in the cost benefit analysis include a line loss factor of 1.0859.

### Results

Table 5-39, Table 5-40, Table 5-41, and Table 5-42 outline the results for each test, for both the programs and the portfolio as a whole.

Table 5-39 PY2016 Cost-Effectiveness Results by Program

Program	TRC	UCT	RIM	PCT	SCT
MFDI	3.61	4.50	0.71	6.83	3.61
SEE LivingWise	13.10	2.88	0.48	8.41	13.14
Unified Wx	2.72	1.98	0.64	3.69	2.73
C&I SOP	2.00	4.24	0.97	2.17	2.00
C&I Lighting	2.14	3.39	0.95	2.53	2.14
EEA	0.00	0.00	0.00	0.00	0.00
Regulatory	0.00	0.00	0.00	0.00	0.00
<b>Total</b>	<b>2.46</b>	<b>3.19</b>	<b>0.81</b>	<b>3.15</b>	<b>2.46</b>

Table 5-40 PY2016 Cost-Effectiveness Benefits by Program

Program	TRC Benefits	UCT Benefits	RIM Benefits	PCT Benefits	SCT Benefits
MFDI	\$3,571,892	\$3,131,029	\$3,482,300	\$4,564,462	\$3,571,892
SEE LivingWise	\$912,913	\$258,112	\$248,929	\$508,790	\$915,145
Unified Wx	\$5,634,621	\$4,136,748	\$4,169,191	\$6,143,320	\$5,663,281
C&I SOP	\$6,577,200	\$6,059,568	\$6,135,087	\$5,668,342	\$6,577,200
C&I Lighting	\$5,483,725	\$4,996,706	\$5,047,177	\$4,584,183	\$5,483,725
EEA	\$0	\$0	\$0	\$0	\$0
Regulatory	\$0	\$0	\$0	\$0	\$0
<b>Total</b>	<b>\$22,180,351</b>	<b>\$18,582,163</b>	<b>\$19,082,685</b>	<b>\$21,469,097</b>	<b>\$22,211,244</b>

Table 5-41 PY2016 Cost-Effectiveness Costs by Program

Program	TRC Costs	UCT Costs	RIM Costs	PCT Costs	SCT Costs
MFDI	\$989,563	\$695,847	\$4,886,075	\$667,951	\$989,563
SEE LivingWise	\$69,662	\$89,777	\$517,975	\$60,477	\$69,662
Unified Wx	\$2,074,701	\$2,087,750	\$6,554,097	\$1,663,924	\$2,074,701
C&I SOP	\$3,282,986	\$1,428,025	\$6,343,956	\$2,607,373	\$3,282,986
C&I Lighting	\$2,557,861	\$1,475,966	\$5,330,466	\$1,811,578	\$2,557,861
EEA	\$18,411	\$18,411	\$18,411	\$0	\$18,411
Regulatory	\$28,661	\$28,661	\$28,661	\$0	\$28,661
<b>Total</b>	<b>\$9,021,846</b>	<b>\$5,824,437</b>	<b>\$23,679,641</b>	<b>\$6,811,303</b>	<b>\$9,021,846</b>

Table 5-42 PY2016 Cost-Effectiveness Net Benefits by Program

Program	TRC Net Benefits	UCT Net Benefits	RIM Net Benefits	PCT Net Benefits	SCT Net Benefits
MFDI	\$2,582,329	\$2,463,078	-\$1,403,774	\$3,896,511	\$2,903,941
SEE LivingWise	\$843,251	\$197,635	-\$269,046	\$448,313	\$854,668
Unified Wx	\$3,559,920	\$2,472,824	-\$2,384,906	\$4,479,396	\$3,999,357
C&I SOP	\$3,294,213	\$3,452,195	-\$208,869	\$3,060,969	\$3,969,827
C&I Lighting	\$2,925,864	\$3,185,128	-\$283,289	\$2,772,605	\$3,672,148
EEA	-\$18,411	\$0	-\$18,411	\$0	\$0
Regulatory	-\$28,661	\$0	-\$28,661	\$0	\$0
<b>Total</b>	<b>\$13,158,505</b>	<b>\$11,770,861</b>	<b>-\$4,596,957</b>	<b>\$14,657,795</b>	<b>\$15,399,941</b>

## Appendix B. Marketing Materials

### OG&E MULTI-FAMILY EFFICIENCY PROGRAM

*Your home is now more energy efficient.*



OG&E and your property management company have teamed up to save you money on your utility bills. Below are the upgrades that have been installed in your home from the Multi-Family Efficiency Program.



Low-flow faucet aerators

#### KITCHEN & BATHROOM FAUCET AERATORS

- Technicians installed low-flow faucet aerators in the kitchen and bathroom, using 31% less water than standard faucets, requiring less energy for water heating
- Flow compensator gives consistent flow regardless of water pressure



Low-flow shower head

#### ENERGY-EFFICIENT SHOWER HEADS

- Technicians replaced the bathroom shower heads with models that use 40% less water than traditional "low-flow" shower heads, requiring less energy for water heating
- Pressure compensating technology guarantees a consistent flow rate regardless of available water pressure



Compact Fluorescent Light Bulb (CFL)

#### COMPACT FLUORESCENT LIGHT BULBS (CFLS)

- ENERGY STAR® CFLs were installed in the property lighting fixtures
- CFLs use up to 75% less energy and last up to 10 times longer than traditional incandescent bulbs

#### ADVANCED POWER STRIPS

- Technicians have installed advanced power strips to help in reducing energy usage for unused entertainment equipment
- Entertainment equipment (e.g., gaming systems, audio equipment, computers, etc.) can pull electricity from a power outlet even if turned off. Advanced power strips reduce the energy usage when not in use.

#### LEARN MORE

Contact us for more information.

To speak with an Energy Advisor call

479-649-2849 or visit us at [oge.com/multifamily](http://oge.com/multifamily)

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**OG&E®**  
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# PROGRAMA DE EFICIENCIA MULTI-FAMILIAR DE OG&E

*Su hogar ahora es más energéticamente eficiente.*



OG&E y su compañía administradora de propiedad se han unido para que usted ahorre dinero en sus recibos de utilidades. A continuación están las mejoras que se han instalado en su hogar desde el Programa de Eficiencia Multi-Familiar.



Aireadores de Grifo de bajo-flujo

## AIREADORES DE GRIFO PARA COCINA & BAÑO

- Los técnicos instalaron aireadores de grifo de bajo flujo en la cocina y el baño, utilizando 31% menos de agua que los grifos estándar, requiriendo menos energía para calentar agua
- El compensador de flujo provee flujo constante sin importar la presión del agua



Cabezal de regadera de bajo-flujo

## CABEZALES DE REGADERA ENERGÉTICAMENTE EFICIENTES

- Los técnicos reemplazaron los cabezales de la regadera con modelos que utilizan 40% menos agua que los tradicionales cabezales de "bajo-flujo", requiriendo menos energía para calentar el agua
- La Tecnología de compensación de presión garantiza un flujo constante sin importar la presión del agua disponible



Focos de Luz Compacta Fluorescente (CFL)

## FOCOS DE LUZ COMPACTA FLUORESCENTE (CFLS)

- Los Focos de Luz Compacta Fluorescente (CFLs) ENERGY STAR® fueron instalados en los accesorios de iluminación de la propiedad
- Los Focos de Luz Compacta Fluorescente (CFLs) consumen hasta un 75% menos de energía y duran hasta 10 veces más que los focos incandescentes tradicionales

## REGLETAS AVANZADA

- Los técnicos han instalado regletas avanzada para ayudar a reducir el uso de energía para equipos de entretenimiento sin usar
- Equipo de animación (es decir, los sistemas de juego, equipos de sonido, computadoras, etc.) puede tirar de electricidad a partir de una toma de corriente, incluso si se desconecta. Regletas avanzada reduce el consumo de energía cuando no esté en uso.

### CONOZCA MÁS

Contáctenos para obtener más información.  
Para hablar con un Asesor de Energía llame al  
**479-649-2849** o visítenos en [oge.com/multifamily](http://oge.com/multifamily)

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**OG&E®**  
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## OG&E MULTI-FAMILY EFFICIENCY PROGRAM

Add value to your property with rebates from OG&E.



### The OG&E Multi-Family Efficiency Program offers benefits to you and your tenants.

- Add value to your property while reducing electricity and water costs
- Tenants will appreciate lower utility bills
- Reducing energy use by 15% in a typical 250-unit individually metered community will increase net operating income and can enhance asset value by over \$200,000 annually\*

\*Multi-Family Fact Sheet, [www.energystar.gov](http://www.energystar.gov)

### MULTI-FAMILY EFFICIENCY PROGRAM

Through the OG&E Multi-Family Efficiency Program, qualified contractors will install energy-saving products including compact fluorescent light bulbs (CFLs), energy-efficient shower heads, faucet aerators and advanced power strips at no cost. During the install contractors will also be performing duct and air-sealing work to increase efficiency of the unit.

#### *Air Infiltration*

During an air infiltration service, OG&E'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 tenant's home.

#### *Duct Sealing*

Qualified OG&E contractors will evaluate your tenant's duct system, seal leaks and repair or replace damaged ducts which can greatly improve home comfort and reduce heating and cooling costs by as much as 20 percent.

### PROGRAM PROCESS

- NO COST installation by a participating OG&E Contractor
- Installation scheduled by the Contractor at the property's convenience
- Labor and materials supplied by the Contractor
- Replaced fixtures removed by Contractor
- Contractor submits rebate paperwork to the Program
- Rebate checks mailed in 4 to 6 weeks

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## OG&E MULTI-FAMILY EFFICIENCY PROGRAM

### PROGRAM REBATES & MATERIALS

*One to four bath units qualify for \$10 per unit*

Installation includes the following upgrades:

- Low-flow faucet aerators (kitchen and bath)
- Low-flow shower heads
- Advanced power strips
- Compact Fluorescent Lamps (CFLs)
- Air and duct leakage improvements



Low-flow faucet aerators



Low-flow shower head



Advanced power strip

### SAVINGS BY THE NUMBERS

*A 100-unit apartment complex with all upgrades installed can see a savings of:*

- **650,000 kWh** annually
- **290,000 gallons** of water annually
- **\$1,000** incentive

### LEARN MORE

Contact us for more information.

To speak with an Energy Advisor call

**479-755-5794** or visit us at [oge.com/multifamily](http://oge.com/multifamily)

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## Appendix C. SEE LivingWise Staff Interview Guide

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### OG&E STAFF INTERVIEW GUIDE – STUDENT ENERGY EDUCATION LivingWise PROGRAM

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Interviewee(s)

---

Interviewer(s)

---

Program/Area of responsibility

---

Date(s):

---

### Overview of the Student Energy Education LivingWise Program Discussion

The purpose of the discussion is as follows:

- Discuss staff roles and program goals
- Identified key researchable issues, examples below:
  - Process-related program issues
  - Impact-related program issues
  - Marketing issues
  - Organizational issues
  - IT issues
  - Implementation contractor / program staff issues
- Summarize activities to address issues

*With your permission, the call will be recorded. This is for transcription purposes only to make sure we accurately represent your responses. No one but ADM or Tetra Tech evaluation team staff members will listen to the recording.*

### Implementation Roles Inside and Outside OG&E

- Your responsibilities or role regarding the AR and OK School Energy (LivingWise®) program:
- Can you describe your role with the program(s)?
- Are there any others at OG&E that help you regarding this program? If so, in what way do they assist you?
- Do you feel you have sufficient time and resources to manage this program?
- Interaction with Resource Action Programs (RAP)?
- Can you describe RAP's role in program implementation and what their responsibilities are?



- Has anything changed about RAP's role over the past year or so? If so, why?
- How do you communicate with RAP about this program (probe for channels used, frequency, ease, etc.)?
- Do you face any specific challenges or difficulties in working with RAP?
- Are there any other OG&E Energy staff, trade allies, or organizations that assist with the implementation of this program?
- If so, what are the roles and responsibilities of these other persons?

### **Program Design and Marketing**

- Who was involved in the program design?
- Have there been any modifications or program changes in the past year?
- What are the program goals?
- How are the program goals communicated internally and externally?
- How well has the program been performing in relation to goals? Why?
- What marketing activities are being used to increase participation?
- Do the marketing efforts vary across OG&E's service territory (i.e., by county? Something else?)
- Who is responsible for marketing efforts?
- How effective have these methods been in identifying and engaging potential participants? Why?
- Do you allow repeat participants (i.e., schools and teachers) in this program?
- Please verify what student grade level the program is currently targeting.

### **Program Operations**

- What are the participation steps for teachers who want to participate in the LivingWise program?
- Have these changed over the last year or two? IF YES, why and how?
- Are there any barriers to participation in this program, from your perspective?
- (IF NOT PREVIOUSLY MENTIONED IN CONVERSATION) What measures are offered within the LivingWise kits?
- Have any of these measures been added recently? Are any set to be discontinued in the near future?
- How are participants' and savings data tracked?
- Who manages or has access to the tracking database?
- Is there anything that would be helpful to track that is not currently available? Or data needed to help support evaluation efforts?
- How easy is it to use the tracking system?

- How would you characterize the quality of data provided over the course of the program year (i.e. have many cases of error-correction or missing data occurred)?
- How often do you receive reports on program progress from RAP (if at all)?
- Is there any verification process for measure installation?
- Is there any Quality Control performed within this program? Examples within a School Education program could include things like checking returned information from the families/schools.
- Are there any incentives for teachers or students to participate in the program tracking processes?
- What aspects of the program implementation are working well? Which could be improved?
- What future challenges to you see for the program?
- What do you think could be done to minimize those challenges?
- Are there any currently planned program changes for the upcoming year? What is the basis for these changes?

### **Evaluation**

- What are your needs from this evaluation or what do you hope to learn?
- From your perspective, are there any program areas/ items/ perspectives that we should be sure to touch on in our upcoming interview with RAP?

## Appendix D. Unified Wx Participant Survey Instrument

### ARKANSAS UNIFIED WEATHERIZATION PROGRAM PARTICIPANT SURVEY

#### NOTE:

- Variable names in the data set are in bold type.
- Variables that are not in bold type indicate questions that were dropped from the dataset, but included in the survey.
- A code of (-6) means programmed skip (i.e., a skip that was purposely programmed based
- A code of (-8) means don't know.
- A code of (-9) means refused.
- Questions were asked of all respondents unless indicated otherwise.
- Response codes with an asterisk (\*) are recoded responses to open-ended questions, or responses added during data cleaning.

### SURVEY FILES

1. Survey Data File: OG&E\_AR\_UWP\_Participant Survey Cleaned Data\_01Dec2016

### SAMPLE VARIABLES

**The following fills will be used throughout the survey. These fills may need to be revised once Tetra Tech finalizes the survey sample.**

**CASEID**      Customer's unique record identifier

**CONTACT**     Customer name

**PHONE**      **Participant's phone number**

**ADDRESS** Street address where weatherization services were received  
**DATE** Date received weatherization services  
**PROGRAM** Unified Weatherization Program

**MEASURES List of measures received**

**UTILITY** Name of utility providing the AR customer's service

- 1 OG&E and AOG
- 2 OG&E
- 3 AOG

**CFL** Flag to indicate that customer received CFL bulbs  
**CFL\_QTY** Quantity of CFL bulbs received

**INTRODUCTION**

**INTRO** Hello, my name is \_\_\_\_\_ and I'm calling on behalf of the Arkansas gas and electric utilities regarding your household's participation in their *[PROGRAM]* in 2016. Through this program your home received an energy assessment and several energy efficient items installed in your home. May I speak with *[CONTACT]* or someone else who's familiar with your household's participation in this program?

- 1 Yes
- 2 No *[ATTEMPT TO CONVERT]*

PREAMBLE I'm with Tetra Tech, an independent research firm hired by OG&E. I am calling to learn about your experiences participating in the Weatherization Program.

I'm not selling anything; I'd just like to ask your opinion about this program. Let me assure you that your responses will be kept confidential and your individual responses will not be revealed to anyone unless you grant permission.

Before we start, I would like to inform you that for quality control purposes, this call will be recorded and monitored.

FAQ OG&E has hired our firm to evaluate the program. As part of the evaluation, we're talking with customers that participated in the OG&E program to understand their experiences with the program.)

(Why are you conducting this study: Studies like this help OG&E better understand customers' need for energy efficiency programs and services.)

(Timing: This survey should take about 10 minutes of your time. Is this a good time for us to speak with you? IF NOT, SET UP CALL BACK APPOINTMENT OR OFFER TO LET THEM CALL US BACK AT 1-800-454-5070.)

(Sales concern: I am not selling anything; we would simply like to learn about your experience with the program. Your responses will be kept confidential and not revealed to anyone unless you grant permission. If you would like to talk with someone from [UTILITY] about this study, feel free to call [IF OG&E CUSTOMER: "OG&E customer service at 1-800-272-9741", IF AOG-ONLY CUSTOMER: "Scott Gentry at 479-784-2004"].)

**IDENTIFICATION OF KNOWLEDGEABLE HOUSEHOLD MEMBER**

**CELL1**                      **Have I reached you on your cell phone?**

- 1      Yes
- 2      No                      *[SKIP TO C1]*

**CELL2**                      **Then I would just like to confirm that you are in a location where it is safe to talk to you on your cell phone [NOTE: We want to be sure the respondent is not talking on their cell phone while driving a car.]**

- 1      Yes, it is okay to continue conversation
- 2      No                      *[SCHEDULE A TIME TO CALL BACK AND TERMINATE]*

**C1**                      **Program records indicate that you received an energy assessment and energy efficient items such as [MEASURES] through the [PROGRAM] around [DATE]. Do you recall receiving these items?**

For C1C01 to C1C04

- 1      Mentioned
- 0      Not mentioned

**C1C01**                      Yes                                      *[SKIP TO A1]*

**C1C02**                      Yes, but information is incorrect  
*[SPECIFY: Please tell me what is incorrect]*                                      *[SKIP TO A1]*

**C1C03**                      Yes, but date is incorrect  
*[SPECIFY: What is the correct date]*                                      *[SKIP TO A1]*

**C1C04**                      Does not recall receiving measures

**C1C020** *[IF C1=2]* Information that is incorrect

**C1C030** *[IF C1=3]* Date that is incorrect

**OTHER\_R** Is there someone else we should speak with that might know about the energy efficient items your household received through *[PROGRAM]*?

- 1 Yes
- 2 No *[THANK AND TERMINATE-INT81]*
- 3 Don't know *[THANK AND TERMINATE-INT81]*
- 4 Refused *[THANK AND TERMINATE-INT91]*

**AVAIL\_R** May I please speak with that person?

- 1 Yes *[BEGIN SURVEY WITH NEW RESPONDENT]*
- 2 No *[THANK AND TERMINATE-INT91]*
- 3 Don't know *[THANK AND TERMINATE-INT81]*
- 4 Refused *[THANK AND TERMINATE-INT91]*

**AWARENESS**

A1 How did you learn of the *[PROGRAM]*? *[SELECT ALL THAT APPLY]*

For A1C01 to A1C99

- 1 Mentioned
- 0 Not mentioned

- A1C01** Information that came in the mail
- A1C02** Newspaper or magazine article/ad
- A1C03** Contractor
- A1C04** Word of mouth from friends, relatives, or others
- A1C05** TV ad
- A1C06** Radio ad
- A1C07** Utility bill message
- A1C08** Utility website
- A1C09** Other website
- A1C10** Local community action agency
- A1C11** Email
- A1C12** Other *[SPECIFY]*
- A1C88** Don't know
- A1C99** Refused

**A1C120** *[IF A1C12=1]* Other channel, specified



A4 Why did you decide to participate in the program?  
*[DO NOT READ; SELECT ALL THAT APPLY]*

For A4C01 through A4C99

0 Not mentioned

1 Mentioned

- A4C01** To reduce my monthly gas bill
- A4C02** To reduce my monthly electric bill
- A4C03** The *[PROGRAM]* paid for some or all of the improvements
- A4C04** Contractor recommendation
- A4C05** Utility recommendation or information *[SPECIFY: which utility?]*
- A4C06** Recommendation from a friend, relative, neighbour
- A4C07** Community action agency recommendation
- A4C08** It is the right thing to do
- A4C09** Help save the environment
- A4C10** Save energy
- A4C11** Other *[SPECIFY]*
- A4C88** Don't know
- A4C99** Refused
  
- A4C050** *[IF A4C5=1]* Name of utility that recommended program, specified
- A4C110** *[IF A4C11=1]* Other reason, specified

**A5**            *[ASK IF >1 CHOICE SELECTED IN A4]* What would you say is the main reason that drove you to participate in the program?  
*[DISPLAY ONLY OPTIONS SELECTED IN A4]*

- 1            To reduce my monthly gas bill
- 2            To reduce my monthly electric bill
- 3            The [PROGRAM] paid for some or all of the improvements
- 4            Contractor recommendation
- 5            Utility recommendation or information
- 6            Recommendation from a friend, relative, neighbor
- 7            Community action agency recommendation
- 8            It is the right thing to do
- 9            Help save the environment
- 10           Save energy
- 11           Other
- 6           Programmed skip
- 8           Don't know
- 9           Refused

**PROGRAM PARTICIPATION AND MEASURE VERIFICATION**

Now I would like to ask you about the items you received through the program.

**M5A**            *[ASK IF CFL=1]* Is it correct that you received *[CFL\_QTY]* CFL bulbs?

1            Yes, quantity is correct

2            No, quantity is wrong            *[SPECIFY: How many did you receive?]*

-6            Programmed skip

-8            Don't know

-9            Refused

**M5AO**            *[IF M5A=2]* Quantity received, specified

M5C Did you receive any *other* home energy improvements through the [PROGRAM], including items that the energy specialist installed during the assessment?  
[DO NOT READ; SELECT ALL THAT APPLY]

For M5CC01 through M5CC99

- 0 Not mentioned
- 1 Mentioned

- M5CC01** CFL bulb(s) *[SPECIFY: How many?]*
- M5CC02** LED bulb(s) *[SPECIFY: How many?]*
- M5CC03** ENERGY STAR windows
- M5CC04** ENERGY STAR ceiling fan with light kit
- M5CC05** Heat pump water heater
- M5CC06** Water heater pipe wrap
- M5CC07** Water heater jacket
- M5CC08** Attic / Ceiling insulation
- M5CC09** Floor insulation
- M5CC10** Wall insulation
- M5CC11** Air sealing
- M5CC12** Duct sealing
- M5CC13** Other *[SPECIFY: What, and how much/many?]*
- M5CC14** No other items
- M5CC88** Don't know
- M5CC99** Refused
  
- M5CC010** *[IF M5CC01=1]* Quantity of CFLs, specified
- M5CC020** *[IF M5CC02=1]* Quantity of LEDs, specified
- M5CC130** *[IF M5CC13=1]* Other items received, specified

**M6** Please tell me which statement is most correct about the energy saving items you received through the program. *[READ STATEMENTS, SELECT ONE]*

- 1 The energy specialist installed all of the items you received.
- 2 The energy specialist installed some of the items but not all of them.
- 3 The energy specialist did not install any of the items.
- 8 *[DO NOT READ]* Don't know
- 9 *[DO NOT READ]* Refused

**M7** *[ASK ONLY IF M6=02 or 03]* You've indicated your energy specialist did not install at least one measure. Please tell me what they did not install.

***[RECORD VERBATIM]***

**M8** Since the work was performed, have you removed or replaced any of the energy efficiency equipment installed in your home through the program?

1 Yes [*SPECIFY WHICH ITEMS HAVE BEEN REMOVED OR REPLACED*]

2 No

-8 Don't know

-9 Refused

**M80** [*IF M8=1*] Items that have been removed or replaced, specified

M9 *[ASK IF M8=01]* Why did you remove or replace these items?  
*[SELECT ALL THAT APPLY]*

For M9C01 through M9C99

- 0 Not mentioned
- 1 Mentioned
- 6 Programmed skip

- M9C01** They were no longer working properly
- M9C02** I purchased new items that I liked better
- M9C03** I liked my old items better so I reinstalled them
- M9C04** I performed some remodeling or maintenance that required the removal of these items
- M9C05** Other *[SPECIFY]*
- M9C88** Don't know
- M9C99** Refused
  
- M9C05O** *[IF M9C05=1]* Other reason for removal, specified

**M10** Are there any additional services or items you would like to see offered through the program?

- 1 Yes *[RECORD VERBATIM]*
- 2 No
- 8 Don't know

**M100** *[IF M10=1]* Services or items would like to see offered, specified

**ENERGY SAVING ACTIVITIES**

**E1** Prior to the assessment, how familiar were you with the benefits of installing various energy efficiency improvements similar to those offered by the *[PROGRAM]*? *(READ STATEMENTS, SELECT ONE)*

- 1 Very unfamiliar
- 2 Somewhat unfamiliar
- 3 Neither familiar nor unfamiliar
- 4 Somewhat familiar
- 5 Very familiar
- 8 Don't know
- 9 Refused



**E2** Prior to the assessment, how familiar were you with doing various activities in your home to save energy such as washing clothes with cold water, turning off the lights when not in use, and adjusting heating system settings? Would you say you are... *[READ LIST]*

- 1 Very unfamiliar
- 2 Somewhat unfamiliar
- 3 Neither familiar nor unfamiliar
- 4 Somewhat familiar
- 5 Very familiar
- 8 *[DO NOT READ]* Don't know
- 9 *[DO NOT READ]* Refused

**E3** Prior to the assessment, did you perform any energy-saving activities in your home?

- 1 Yes
- 2 No
- 8 Don't know
- 9 Refused

E4            *[ASK IF E3=01]* What kind of energy-saving activities did you perform prior to the assessment? *[DO NOT READ; SELECT ALL THAT APPLY]*

For E4C01 through E4C99

- 0        Not mentioned
- 1        Mentioned
- 6      Programmed skip

- E4C01**      Wash clothes in cold water
- E4C02**      Hang clothes to dry
- E4C03**      Turn off lights when not in the room
- E4C04**      Adjust heating system settings
- E4C05**      Use energy-saving light bulbs such as LEDs
- E4C06**      Unplug electronics not in use
- E4C07**      Other                    *[RECORD RESPONSE]*
- E4C88**      Don't know
- E4C99**      Refused

**E4C070**    *[IF E4C07=1]* Other energy saving activity performed prior, specified

**E5** As a result of your experience with the *[PROGRAM]*, how much more knowledgeable would you say you are about energy efficiency and energy efficient options for your home? Would you say you are...

*[READ OPTIONS 1-4; SELECT ONE ANSWER]*

- 1 Not more knowledgeable than before participating
- 2 Slightly more knowledgeable than before participating
- 3 Somewhat more knowledgeable than before participating
- 4 Much more knowledgeable than before participating
- 8 *[DO NOT READ]* Don't know
- 9 *[DO NOT READ]* Refused

**E6** As a result of your experience with the program, do you now take additional action to save energy in your home?

*[IF NEEDED: Some examples include washing clothes with cold water, turning off the lights when not in use, and adjusting heating system settings]*

- 1 Yes
- 2 No
- 8 Don't know
- 9 Refused

**E7**            *[ASK IF E6=01]* What kind of energy-saving activities do you now perform that you didn't before the assessment? *[DO NOT READ; SELECT ALL THAT APPLY]*

For E7C01 through E7C99

- 0        Not mentioned
- 1        Mentioned
- 6       Programmed skip

- E7C01**        Wash clothes in cold water
- E7C02**        Hang clothes to dry
- E7C03**        Turn off lights when not in the room
- E7C04**        Adjust heating system settings
- E7C05**        Use energy-saving light bulbs such as LEDs
- E7C06**        Unplug electronics when not in use
- E7C07**        Other                    *[RECORD RESPONSE]*
- E7C88**                Don't know
- E7C99**                Refused

**E7C070**        *[IF E7C07=1]* Other energy saving activity now perform, specified

**E8** Since participation in the *[PROGRAM]*, have you participated in any other programs offered by your utility to help you reduce your energy bill or energy use?

- 1 Yes *[SPECIFY]*
- 2 No
- 8 Don't know
- 9 Refused

**E80** *[IF E8=1]* Other programs participated in, specified

**PARTICIPANT SPILLOVER**

**S1**            Since participating in the *[PROGRAM]*, have you bought and installed any additional energy efficient items on your own without a rebate or discount from a utility-sponsored program?

- 1        Yes
- 2        No
- 8      Don't know
- 9      Refused

S2 *[ASK IF S1 = 1]* We would like to know what you purchased and installed because of your experience with the program that you did not get a rebate or discount for.

For each of the following items, please tell me if you purchased and installed them since completing your *[PROGRAM]* project without getting a rebate or discount. *[READ LIST]*

For S2C01 through S2C99

- 0 Not mentioned
- 1 Mentioned
- 6 Programmed skip

- S2C01** CFLs (Compact Fluorescent Light bulbs)
- S2C02** LED Light Bulbs
- S2C03** An energy efficient appliance such as a refrigerator, dishwasher, clothes washer, or clothes dryer
- S2C04** Water Heater Pipe Insulation
- S2C05** Water Heater Jacket/Blanket/Insulation
- S2C06** Low Flow Faucet Aerators
- S2C07** Low Flow Showerhead
- S2C08** A room air conditioner
- S2C09** An energy efficient water heater
- S2C10** Something else *[SPECIFY]*
- S2C88** Don't know
- S2C99** Refused

**S2C100** *[IF S2C10=1]* Other energy efficient item purchased and installed, specified

**S3** [ASK IF S2C01= 1] How many CFLs did you purchase and install?

\_\_\_ [RECORD QUANTITY]

-6 Programmed skip

-8 Don't know

-9 Refused

**S4** [ASK IF S2C02= 1] How many LEDs did you purchase and install?

\_\_\_ [RECORD QUANTITY]

-6 Programmed skip

-8 Don't know

-9 Refused

**S5** [ASK IF S2C03= 1] What kind of appliance did you purchase?

[RECORD VERBATIM RESPONSE]

**S6** [ASK IF S2C03= 1] How do you know it is an energy efficient appliance?

[RECORD VERBATIM RESPONSE]

**S7** [ASK IF S2C04= 1] Do you know about how many feet of water heater pipe insulation you purchased and installed?

\_\_\_ [RECORD QUANTITY IN FEET]

-6 Programmed skip

-8 Don't know

-9 Refused



**S8** [ASK IF S2C06= 1] How many low flow faucet aerators did you install in bathroom sinks?

\_\_\_ [RECORD QUANTITY]

- 6 Programmed skip
- 8 Don't know
- 9 Refused

**S9** [ASK IF S2C06= 1] How many low flow faucet aerators did you install in kitchen sinks?

\_\_\_ [RECORD QUANTITY]

- 6 Programmed skip
- 8 Don't know
- 9 Refused

**S10** [ASK IF S2C07= 1] How many low flow shower heads did you install?

\_\_\_ [RECORD QUANTITY]

- 6 Programmed skip
- 8 Don't know
- 9 Refused

**S11** [ASK IF S2C08= 1] How many ENERGY STAR room air conditioners did you install?

\_\_\_ [RECORD QUANTITY]

- 6 Programmed skip
- 8 Don't know
- 9 Refused

**S12** *[ASK IF S2C08= 1]* How many square feet is the room that the ENERGY STAR air conditioner is installed in? *[IF MULTIPLE UNITS INSTALLED, ASK HOW MANY SQUARE FEET ON AVERAGE ARE THE ROOMS YOU INSTALLED THE AIR CONDITIONERS IN]*

\_\_\_ *[RECORD SQUARE FEET]*

-6 Programmed skip

-8 Don't know

-9 Refused

**S13** *[ASK IF S2C09= 1]* How did you know that the water heater you installed is an energy efficient water heater?

*[RECORD VERBATIM RESPONSE]*

**S14** *[ASK IF S2C09= 1]* What type of water heater did you install? Was it a...  
*[READ LIST; SELECT ONE]*

1 Natural gas storage tank water heater

2 Electric storage tank water heater

3 Heat pump water heater

4 A natural gas tank less water heater

5 Some other type of water heater *[SPECIFY]*

-6 Programmed skip

-8 Don't know

-9 Refused

**S140** *[IF S14=5]* Other type of water heater, specified

**S16**      *[ASK IF S2C01 THRU S2C09 SELECTED]* In approximately what month and year did you install the energy efficient items that you did not receive an incentive for?

*[RECORD VERBATIM RESPONSE]*

**S17**      *[ASK IF S2C01 THRU S2C09 SELECTED]* On a scale of 0 to 10, where 0 represents “not at all important” and 10 represents “extremely important”, how important was the experience with the program in your decision to purchase the items you just mentioned?

\_\_\_ *[RECORD 0-10]*

-6      Programmed skip

-8      Don't know

-9      Refused

**S18**      *[ASK IF S2C01 THRU S2C10 SELECTED]* On a scale of 0 to 10, where 0 represents “not at all likely” and 10 represents “extremely likely,” how likely would you have been to purchase those additional items if you had not participated in the program?

\_\_\_ *[RECORD 0-10]*

-6      Programmed skip

-8      Don't know

-9      Refused



**D3** When was your home built? (*READ CATEGORIES IF NECESSARY*)

- 1 Before 1970's
- 2 1970's
- 3 1980's
- 4 1990-1994
- 5 1995-1999
- 6 2000-2005
- 7 2006 or newer
- 8 Other *[RECORD RESPONSE]*
- 8 Don't know
- 9 Refused

**D30** *[IF D3=8]* Other time frame home was built, specified

**D4** Do you live in this home year-round?

- 1 Yes
- 2 No
- 8 Don't know
- 9 Refused

**D5A** *[IF D4 = 1]* Including yourself, how many people currently live in your home year-round?

\_\_\_ [RECORD QUANTITY]

- 6 Programmed skip
- 8 Don't know
- 9 Refused

**D5B** [IF D4 = 2 OR -8 OR -9] How many months per year do you live in this home?

\_\_\_ [RECORD QUANTITY]

- 6 Programmed skip
- 8 Don't know
- 9 Refused

**D5C** [IF D4 <> 1 and D5b > 0] Including yourself, how many people live in this home when you occupy it?

\_\_\_ [RECORD QUANTITY]

- 6 Programmed skip
- 8 Don't know
- 9 Refused

**D8** Which of the following categories includes your age?  
*[READ LIST; SELECT ONE]*

- 1 Under 25
- 2 25 to 34
- 3 35 to 44
- 4 45 to 54
- 5 55 to 64
- 6 65 or over
- 9 *[DO NOT READ]* Refused

**COM** We appreciate you sharing your time and your experiences with the program. Do you have any additional comments about the program that you would like to share?

- 1 Yes *[RECORD VERBATIM]*
- 2 No

**COMO** *[IF COM=1]* Other comments, specified

Thank you for your time.

## Appendix E. C&I Process Response Rate

Table 5-43 presents response rate information for the AR C&I participant telephone survey fielded by Tetra Tech during February 2017. The final overall response rate for this survey effort was 30 percent.

Table 5-43 AR C&I Participant Survey Response Rate

	Lighting	SOP	Overall
<b>Starting Sample</b>	<b>89</b>	<b>49</b>	<b>138</b>
<b>Attempted Sample</b>	<b>89</b>	<b>49</b>	<b>138</b>
<b>Completes</b>	<b>23</b>	<b>19</b>	<b>42</b>
Residential line	0	0	0
Did not participate in program	0	0	0
Not a utility customer	0	0	0
<b>Adjusted Sample</b>	<b>89</b>	<b>49</b>	<b>138</b>
Ineligible - Does not recall participating	2	3	5
Refusal	2	1	3
Incompletes (partial surveys)	7	4	11
Language Barrier	0	0	0
Bad Number	8	6	14
Affiliated with utility	0	0	0
Active	47	16	63
<b>Response Rate</b>			
<b>Response Rate (Complete/Adjusted Sample)</b>	<b>26%</b>	<b>39%</b>	<b>30%</b>

<b>Average Survey Length (min)</b>	<b>19.8</b>	<b>22.8</b>	<b>21.3</b>
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<b>Average Number of Attempts*</b>	<b>1.5</b>	<b>6.7</b>	<b>4.1</b>
------------------------------------	------------	------------	------------


\*Average number of attempts on active sample.

Calling dates: 2/9/17 through 2/17/17.



## **5.0 Appendix B: Promotional and Educational Materials**



# Bill Inserts



Increase your comfort while reducing your energy bills with **OG&E's FREE Weatherization Program**

The Weatherization Program provides free home energy efficiency upgrades to Arkansas residents whose home was built prior to 2006 and who are current OG&E or AOG customers. Weatherization services may include:


- Adding insulation to the attic
- Caulking, air sealing and weather stripping throughout your home
- Sealing around doors and windows
- Installing energy-saving compact fluorescent light bulbs (CFLs)



If you or someone you know could benefit from free home weatherization improvements, contact the Community Services Clearinghouse from 8:30 a.m. to 4 p.m. Monday through Friday at 479-782-5074.

This offer is for a limited time and will be completed at no charge to you. **CALL TODAY!**

**POSITIVE ENERGY TOGETHER®**



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**OG&E Free Weatherization Program**

For more information, call customer service at **800-272-9741**

**POSITIVE ENERGY TOGETHER®**



OG&E®  
OGE.COM

# Mailers

<Mr. John Q. Sample>  
<123 Main St.>  
<Oklahoma City, OK 54321-9876>

**Over \$3,000 in  
Energy Efficiency  
Improvements at  
NO COST to You!**

Dear <John Q. Sample>:

## Would You Like to Get Something For Free From OG&E?

Weatherizing your home is just as important in summer as winter. In the summer heat, air leakage can lead to a larger cooling bill. The OG&E Weatherization program increases the comfort of your home and helps reduce your cooling and heating bills ... at absolutely no cost to you!

It may sound too good to be true, but there's no catch – really. We'll send a trained crew to complete these services, which have been performed for thousands of our customers. Weatherization services may include:

- Adding insulation to the attic
- Sealing around doors and windows
- Caulking, air sealing and weather stripping throughout your home
- Installing energy-saving compact fluorescent bulbs (CFLs)

The services provided through this program have an estimated value over \$3,000, but are absolutely **FREE** to customers who meet the following criteria\*:

- Own or rent a single-family or duplex\*\* built prior to 2006
- Current OG&E or AOG residential customer

Please note this is a limited time offer and will no longer be available after we reach our target goal this year.

If you or someone you know could benefit from free home weatherization improvements, contact the Community Services Clearinghouse from 8:30 a.m. to 4 p.m. Monday through Friday at **479-782-5074**. The sooner you call, the quicker you can have your home weatherized. You'll be more comfortable and reduce your energy bills, both at no cost to you!

Sincerely,

Your friends at OG&E

\* Certain limitations and state-mandated guidelines may apply.

\*\* Weatherization services are available to rental properties if an eligible customer lives in the home and has approval from the property owner.

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# ...continually. bottom line, up... your company's Drive

<John Q. Sample>  
OR VALUED CUSTOMER  
<123 AnyStreet>  
<AnyTown, US 99999-9999>

Dear <First Name Last Name>,

You can get immediate efficiency rebates now, and lower bills for years to come. OG&E helps you make easy energy efficiency improvements to your infrastructure for significant savings, with offerings that pay off in the short term, too, including big rebates.

**Commercial Lighting:** OG&E's lighting upgrades have the quickest ROI, plus rebates covering up to 20% of the cost. These rebates help you recover some of the installation costs on LEDs, indoor and outdoor lighting, controls, sensors and LED exit lights in retrofit and new constructions, which subsequently reduce your monthly costs. And since lighting is responsible for the vast majority of the electrical usage in commercial buildings (almost 40%) it makes a significant impact on your expenses, so it's the best way to impact savings.

**Standard Offer Program:** Cooling and ventilation can account for about 25% of your electric bill, so recover some of the up-front costs to replace equipment, rather than making inefficient and expensive repairs. The program provides pre- and post- energy assessments showing customers how to reduce energy and peak demands with more efficient equipment. These rebates cover up to 20% of the costs on new motors, chillers, compressed air systems, HVAC systems, even commercial air conditioning and refrigeration upgrades.

Last year, customers received thousands of dollars in rebates, not to mention the reduction in energy bills. Be an OG&E efficiency partner. You'll delay the need for incremental power generation for years—helping all of us. Take advantage of long-term, bottom line success.

Sincerely,

Your friends at OG&E



Contact our Business Advantage Group at 888-988-9747,  
weekdays from 8 a.m. to 5 p.m., or email [businessadvantage@oge.com](mailto:businessadvantage@oge.com)  
For more information visit [OGE.com/rebate](http://OGE.com/rebate)

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# Flyers

## OG&E MULTI-FAMILY EFFICIENCY PROGRAM

Add value to your property with rebates from OG&E.



### The OG&E Multi-Family Efficiency Program offers benefits to you and your tenants.

- Add value to your property while reducing electricity and water costs
- Tenants will appreciate lower utility bills
- Reducing energy use by 15% in a typical 250-unit individually metered community will increase net operating income and can enhance asset value by over \$200,000 annually\*

\*Multi-Family Fact Sheet, [www.energystar.gov](http://www.energystar.gov)

### MULTI-FAMILY EFFICIENCY PROGRAM

Through the OG&E Multi-Family Efficiency Program, qualified contractors will install energy-saving products including compact fluorescent light bulbs (CFLs), energy-efficient shower heads, faucet aerators and advanced power strips at no cost. During the install contractors will also be performing duct and air-sealing work to increase efficiency of the unit.

#### *Air Infiltration*

During an air infiltration service, OG&E'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 tenant's home.

#### *Duct Sealing*

Qualified OG&E contractors will evaluate your tenant's duct system, seal leaks and repair or replace damaged ducts which can greatly improve home comfort and reduce heating and cooling costs by as much as 20 percent.

### PROGRAM PROCESS

- NO COST installation by a participating OG&E Contractor
- Installation scheduled by the Contractor at the property's convenience
- Labor and materials supplied by the Contractor
- Replaced fixtures removed by Contractor
- Contractor submits rebate paperwork to the Program
- Rebate checks mailed in 4 to 6 weeks

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## OG&E MULTI-FAMILY EFFICIENCY PROGRAM

### PROGRAM REBATES & MATERIALS

*One to four bath units qualify for \$10 per unit*

**Installation includes the following upgrades:**

- Low-flow faucet aerators (kitchen and bath)
- Low-flow shower heads
- Advanced power strips
- Compact Fluorescent Lamps (CFLs)
- Air and duct leakage improvements



*Low-flow faucet aerators*



*Low-flow shower head*



*Advanced power strip*

### SAVINGS BY THE NUMBERS

*A 100-unit apartment complex with all upgrades installed can see a savings of:*

- **650,000 kWh** annually
- **290,000 gallons** of water annually
- **\$1,000** incentive

### LEARN MORE

*Contact us for more information.*

*To speak with an Energy Advisor call*

*479-439-8627 or visit us at [oge.com/multifamily](http://oge.com/multifamily)*

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# OG&E MULTI-FAMILY EFFICIENCY PROGRAM

*Your home is now more energy efficient.*



OG&E and your property management company have teamed up to save you money on your utility bills. Below are the upgrades that have been installed in your home from the Multi-Family Efficiency Program.



*Low-flow faucet aerators*

## KITCHEN & BATHROOM FAUCET AERATORS

- Technicians installed low-flow faucet aerators in the kitchen and bathroom, using 31% less water than standard faucets, requiring less energy for water heating
- Flow compensator gives consistent flow regardless of water pressure



*Low-flow shower head*

## ENERGY-EFFICIENT SHOWER HEADS

- Technicians replaced the bathroom shower heads with models that use 40% less water than traditional "low-flow" shower heads, requiring less energy for water heating
- Pressure compensating technology guarantees a consistent flow rate regardless of available water pressure



*Compact Fluorescent Light Bulb (CFL)*

## COMPACT FLUORESCENT LIGHT BULBS (CFLS)

- ENERGY STAR® CFLs were installed in the property lighting fixtures
- CFLs use up to 75% less energy and last up to 10 times longer than traditional incandescent bulbs

## ADVANCED POWER STRIPS

- Technicians have installed advanced power strips to help in reducing energy usage for unused entertainment equipment
- Entertainment equipment (e.g., gaming systems, audio equipment, computers, etc.) can pull electricity from a power outlet even if turned off. Advanced power strips reduce the energy usage when not in use.

### LEARN MORE

Contact us for more information.

To speak with an Energy Advisor call

479-649-2849 or visit us at [oge.com/multifamily](http://oge.com/multifamily)

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# PROGRAMA DE EFICIENCIA MULTI-FAMILIAR DE OG&E

*Su hogar ahora es más energéticamente eficiente.*



OG&E y su compañía administradora de propiedad se han unido para que usted ahorre dinero en sus recibos de utilidades. A continuación están las mejoras que se han instalado en su hogar de el Programa de Eficiencia Multi-Familiar.



Aireadores de Grifo de bajo-flujo

## AIREADORES DE GRIFO PARA COCINA & BAÑO

- Los técnicos instalaron aireadores de grifo de bajo flujo en la cocina y el baño, utilizando 31% menos de agua que los grifos estándar, requiriendo menos energía para calentar agua
- El compensador de flujo provee flujo constante sin importar la presión del agua



Cabezal de regadera de bajo-flujo

## CABEZALES DE REGADERA ENERGÉTICAMENTE EFICIENTES

- Los técnicos reemplazaron los cabezales de la regadera con modelos que utilizan 40% menos agua que los cabezales tradicionales de "bajo-flujo", requiriendo menos energía para calentar el agua
- La Tecnología de compensación de presión garantiza un flujo constante sin importar la presión del agua disponible



Focos de Luz Compacta Fluorescente (CFL)

## FOCOS DE LUZ COMPACTA FLUORESCENTE (CFLS)

- Los Focos de Luz Compacta Fluorescente (CFLs) ENERGY STAR® fueron instalados en los accesorios de iluminación de la propiedad
- Los Focos de Luz Compacta Fluorescente (CFLs) consumen hasta un 75% menos de energía y duran hasta 10 veces más que los focos incandescentes tradicionales

## EXTENSIÓN AVANZADA DE MULTICONTACTO

- Los técnicos han instalado extensiones avanzadas de multicontacto para ayudar a reducir el uso de energía en equipo de entretenimiento que no se encuentre en uso.
- El equipo de entretenimiento (Ej: consolas de videojuegos, equipo de audio, computadoras, etc.) puede tomar electricidad de un enchufe eléctrico incluso cuando éste se encuentra desconectado. Las extensiones avanzadas de multicontacto reducen el consumo de energía cuando éste no se encuentra en uso.

### CONOZCA MÁS

Contáctenos para obtener más información.  
Para hablar con un Asesor de Energía llame al  
479-649-2849 o visítenos en [oge.com/multifamily](http://oge.com/multifamily)

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POSITIVA  
JUNTOS

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...continually.  
bottom line, **up...**  
your company's  
**Drive**

**Immediate efficiency rebates now,  
lower bills for years to come.**

OG&E helps you make easy business energy efficiency improvements for significant savings. These offerings pay off in the short term too, with huge rebates.

OG&E's **Commercial Lighting upgrades** have the quickest ROI, plus rebates covering up to 20% of the cost—including LED installations. And our **Standard Offer Program** provides a pre- and post-energy assessment showing customers how to reduce energy and peak demands with more efficient equipment—to help recover some of the costs rather than making inefficient and expensive repairs. What's more, rebates can also cover up to 20% of the costs on **motors, chillers, compressed air systems, HVAC systems**, even **commercial air conditioning and refrigeration improvements**.



Last year, customers received thousands of dollars in rebates, not to mention the reduction in energy bills. Be an OG&E efficiency partner. You'll delay the need for incremental power generation for years—helping all of us—and take advantage of long-term, bottom line success [OGE.com/rebate](http://OGE.com/rebate).

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ARKANSAS

# OG&E ENERGY EFFICIENCY PROGRAMS

## Serious Savings

OUR EXPERTISE CAN INCREASE THE ENERGY EFFICIENCY OF YOUR BUSINESS. THAT'S POSITIVE ENERGY TOGETHER®.

Improving the efficiency of your business is one of the most cost-effective ways to grow your company's bottom line. Not only do these investments reduce costs and protect the environment, they also help address volatile energy prices, strengthen energy security, create new jobs and spur economic growth. OG&E has several flexible programs to help our business and industrial customers make energy efficiency upgrades easier and more affordable.

### Commercial Lighting

The Commercial Lighting program provides incentives to Arkansas commercial and industrial (C&I) customers who purchase and install energy efficient indoor and outdoor lighting, lighting controls and light emitting diode (LED) exit lights in both retrofit and new construction applications. This program helps customers reduce monthly energy costs while reducing some of the initial cost barrier. Commercial buildings in the U.S. consume an estimated 18% of total U.S. energy use and contribute nearly 4% of global carbon dioxide emissions.

### Standard Offer

The Commercial/Industrial Standard Offer program provides incentives for the installation of a wide range of measures that reduce customer energy costs, reduce peak demand, and/or save energy in non-residential facilities such as public authority buildings, schools, hospitals and other industrial customers. In this program, large individual customers, energy service companies (ESCOs), and qualified contractors are eligible for incentive payments of \$250/kW for energy efficiency projects that significantly reduce customer peak demand. The Standard Offer program was designed to offer a flexible program to help customers achieve energy and demand savings. All commercial and industrial customers on the PL and LPL rates are eligible for this program.



Don't wait. Get started today on improving the energy efficiency of your business and help keep your energy costs down. Contact us to take advantage of these programs:

#### Business Advantage Group

Office (888) 988-9747 | Email businessadvantage@oge.com

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IMMEDIATE REBATES RIGHT NOW.  
**LOWER BILLS**  
FOR YEARS TO COME.

*“OG&E lowered our energy costs and our environmental impact tremendously. And with larger rebates than expected, they made our ROI much shorter.”*

Sam Sicard  
President & CEO,  
First National Bank of Fort Smith



Make easy energy efficiency business improvements for significant savings and get instant cash payback. OG&E's **Commercial Lighting upgrades** have fast ROI—including LED installations. And our **Standard Offer Program** provides a pre- and post-energy assessment showing how to reduce energy and peak demands with more **efficient equipment**—to help recover some of the costs rather than making inefficient and expensive repairs.

It's efficiency to bank on. Be an OG&E efficiency partner:

[OGE.com/rebate](http://OGE.com/rebate)

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# Radio Advertisement

## **:10 SPOT ONE**

VO: Would you like \$3,000 in home improvements—all completely free? Then see if you qualify for OG&E's limited-time Weatherization Program at OGE.com.

## **:10 SPOT TWO**

VO: Free attic insulation will make your home a lot cooler this summer. It's part of OG&E's limited-time Weatherization Program—find out more at OGE.com or call 479-782-5074.

## **:10 SPOT THREE**

VO: Was your home built before 2006? If so, it's probably leaking cool air right now. Keep it sealed with OG&E's free limited-time Weatherization Program—find out more at OGE.com.

## **:10 SPOT FOUR**

VO: Brighten your summer with CFL light bulbs—along with thousands of dollars in other free improvements. It's OG&E's limited-time Weatherization Program—find out more at OGE.com.

## **:10 SPOT FIVE**

VO: Sign up for over \$3,000 worth of free efficiency upgrades. But hurry, only a limited number of OG&E customers can qualify. Find out more at OGE.com or call 479-782-5074.

## **:10 SPOT SIX**

VO: Was your home built before 2006? Then you may qualify for \$3,000 worth of efficiency upgrades, all free. Find out more about OG&E's Weatherization Program at OGE.com.

## **:10 SPOT SEVEN**

VO: Get \$3,000 worth of improvements—from sealing leaks throughout your home to adding attic insulation and CFL bulbs. It's OG&E's limited-time Weatherization Program. Find out more at OGE.com.

**:10 SPOT EIGHT**

VO: Hurry, a limited number of home and rental property owners will qualify for OG&E's Weatherization Program—including \$3,000 worth of improvements, all free. Find out more at OGE.com.

**:10 SPOT NINE**

VO: Adding attic insulation. Sealing air leakage. Installing energy-saving CFLs. Get \$3,000 worth of improvements, all free, with OG&E's limited-time Weatherization Program. Visit OGE.com.

**:30 RADIO**

VO: Would you like over \$3,000 in home improvements—all free?

OG&E is offering home energy efficiency upgrades for a limited group of customers, all free. OG&E's Weatherization Program improves comfort and reduces your energy costs by offering everything from new attic insulation to sealing air leaks—even energy-saving CFL bulbs.

That's over \$3,000 worth of free upgrades. But hurry, only a limited number of OG&E and AOG customers can qualify. Visit OGE.com or call 479-782-5074. That's 479-782-5074.

**:30 RADIO**

VO: Was your home built before 2005?

Then you may qualify for over \$3,000 worth of energy efficiency upgrades, all for free. That's right, OG&E is offering \$3,000 worth of improvements, free. It includes caulking, weather stripping and sealing leaks, adding attic insulation—even installing CFL bulbs.

If you have a duplex or single-family home, hurry—a limited number will be accepted to OG&E's Weatherization Program. Visit OGE.com or call 479-782-5074. That's 479-782-5074.

**:15 SPOT**

VO: OG&E's Commercial and Industrial Energy Efficiency offerings help your company in the short term with huge rebates. And also in the long term, because being more energy efficient brings your business continued savings for years.

Take advantage of OG&E's Commercial Energy Efficiency rebates, visit OGE.com-slash-rebate.



**:60 SPOT**

VO: It's all about the bottom line when it comes to your business.

And OG&E is ready to help drive your company's bottom line ... up.

And up—continually.

Our Commercial and Industrial Energy Efficiency offerings pay off in the short term with huge rebates. And in the long term, too, because energy efficiency is key. So you'll not only find fast return on investment, but more importantly, your business will have continued savings for years to come.

First, OG&E's Commercial Lighting upgrades have the quickest ROI, plus immediate rebates covering up to 20% of the cost—including LED installations.

And rather than making expensive repairs, the OG&E Standard Offer program provides a pre- and post-energy assessment, showing customers how to reduce energy and peak demands with more efficient equipment—which helps recover some of the costs. And in many cases, rebates may also cover up to 20% of the costs on motors, chillers, compressed air systems—even HVAC systems.

So take advantage of OG&E's Commercial Energy Efficiency rebates, visit [OGE.com-slash-rebate](http://OGE.com-slash-rebate). That's [OGE.com-slash-rebate](http://OGE.com-slash-rebate).

**:60 SPOT**

VO: Have we got a business deal for you: Money now. More money every month after.

OG&E's Commercial and Industrial Energy Efficiency programs offer your business instant cash rebates for making energy efficiency improvements—without impacting operations. Which means lower bills for years to come.

Rather than making expensive repairs, the OG&E Standard Offer program provides a pre- and post-energy assessment, showing customers how to reduce energy and peak demands with more efficient equipment—which helps recover some of the costs. And OG&E's Commercial Lighting upgrades have the quickest ROI—including LED installations—plus rebates. Zero Mountain's CEO Joe Rumsey knows the value of efficient construction:

[00:13:56;29] Joe: When you're looking at whether you should be doing a lighting program the numbers work out very quickly that it is a smart business decision and the payback is huge and overall it provides a better working environment for your employees.

Efficiency is key to long-term business savings. Take advantage of OG&E's Commercial Efficiency rebates at [OGE.com-slash-rebate](http://OGE.com-slash-rebate). That's [OGE.com-slash-rebate](http://OGE.com-slash-rebate).