



**OKLAHOMA GAS and ELECTRIC
COMPANY**

**2021 Arkansas Energy Efficiency Program Portfolio
Annual Report**

**Section 9: Annual Reporting Requirements, and Order No. 29 in Docket No. 06-004-R.
Version 3.0 May 20, 2014**

May 1, 2022

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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”) 2021 to the Arkansas Public Service Commission (“APSC” or “Commission”) pursuant to Order No. 29 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 May 20, 2014.

HISTORY:

OG&E began implementation of EE programs in Arkansas in December 2007 with its Quick Start program portfolio. The Quick Start Portfolio 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[®] 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 was approved on February 3, 2010 for an 18-month implementation period ending on June 30, 2011. The initial Portfolio included the continuation of the two statewide programs, AWP, and EEA, and three OG&E programs: LivingWise[®] 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 who would not otherwise qualify for the AWP.

The Comprehensive Portfolio was approved on June 30, 2011 for the remainder of PY 2011. PYs 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[®] Student Energy Education program. 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 A/C 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 and 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 allowed 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 0.90 percent 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 percent 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 discontinuation of the AWP program, additions to the measure mix, and resulting budget increase for the OG&E/AOG (Unified) Weatherization program.

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 in a more cost-effective manner than another. The Commercial Lighting and Standard Offer Programs were 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®) were both combined into a Home Energy Efficiency Program (“HEEP”) with additional channels such as Consumer Products, Residential Solutions, and HVAC Replacement and Tune-ups. The Consistent Weatherization Approach (“CWA”),

referred to as the OG&E/AOG (Unified) Weatherization Program (“UWP”) in Annual Reports previous to Order No. 22 of Docket No. 13-002-U, and the EEA Program remained unchanged as stand-alone programs.

On March 8, 2018, OG&E filed for the inclusion of the Continuous Energy Improvement (“CEI”) Pilot Program for 2018 and 2019 into the existing CEEP Program in the 2017-2019 Portfolio Plan and was approved on March 23, 2018 through Order No. 80, in Docket 07-075-TF.

On March 15, 2019, OG&E filed the next triennial 2020-2022 Portfolio Plan and was approved by the Commission on June 17, 2019 through Order No. 88 in docket 07-075-TF. To assist in addressing Act 1102 Low-Income and over age 65 customers, OG&E carved out five percent of the CWA Program funds and incorporated additional health and safety measures. A soft cap of \$3,800 per home was implemented. The HEEP Program placed more emphasis on in-home assessments with direct install measures to drive participation in HVAC tune-ups and replacements to offset the reduction in lighting kWh savings. It also targeted remaining cost-effective envelope measure opportunities as it begins to move away from lighting due to the anticipated EISA baseline changes. CEI and Retro-Commissioning (“RCx”) channels were added to the CEEP 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

Program Year	Energy (kWh)	% Increase from Prior Year	Demand (kW)	% Increase from Prior Year
2008	2,434,738		666	
2009	5,607,951	130%	921	38%
2010	4,143,096	-26%	1,317	43%
2011	4,985,328	20%	1,520	15%
2012	7,595,741	52%	1,840	21%
2013	13,410,729	77%	2,797	52%
2014	13,794,070	3%	2,883	3%
2015	20,543,040	49%	3,115	8%
2016	23,257,181	13%	3,434	10%
2017	21,130,663	-9%	3,396	-1%
2018	22,556,832	7%	3,974	17%
2019	26,071,158	16%	4,591	16%
2020	28,050,242	8%	4,878	6%
2021	28,540,540	2%	5,479	12%

GOALS AND OBJECTIVES:

Order No. 15 in Docket 08-137-U established default energy savings target as percentage of 2010 energy sales. In 2020, the energy savings target increased to 1.20 percent of 2018 energy sales, adjusted for self-direct customers per Order No. 43 in Docket 13-002-U.

The annual energy savings targets as a percentage 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

Program Year	Baseline Sales Year	Percent of Sales	Energy Savings Targets (MWh)	Filed Energy Savings Goals (MWh)
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
2017	2015	0.90%	18,058	18,063
2018	2015	0.90%	18,058	18,063
2019	2015	1.00%	20,531	20,136
2020	2018	1.20%	25,909	24,675
2021	2018	1.20%	24,555	25,200

OG&E's filed energy savings goal for 2021 was 25,200,145 kWh. After adjusting for self-direct customers from the baseline year, the baseline target was 24,555,136 kWh. The 2021 EE portfolio actual achieved energy savings were 28,540,540 kWh.

MAJOR ACCOMPLISHMENTS:

OG&E continued its success in 2021 by exceeding both the targeted and filed energy savings goals, reaching 113% of the filed goal while spending 68% of the planned budget.

PROGRESS ACHIEVED:

The program portfolio has demonstrated continued success by consistently outperforming savings goals over the past six years. The historical annual energy savings to goal achievements is illustrated in Table 1-3 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	23,257,180	120%
2017	18,062,811	21,130,663	117%
2018	18,062,811	22,556,832	125%
2019	20,136,187	26,071,158	129%
2020	24,675,000	28,050,242	114%
2021	25,200,145	28,540,540	113%

Table 1-4 Historic kWh savings and costs per kWh achievement

Program Year	Energy (kWh)	Demand (kW)	Total Portfolio Costs	\$/kWh	\$/kW
2011	4,985,328	1,520	\$2,071,159	\$0.42	\$1,363
2012	7,595,741	1,840	\$3,149,264	\$0.41	\$1,712
2013	13,410,729	2,797	\$3,714,378	\$0.28	\$1,328
2014	13,794,070	2,883	\$4,547,079	\$0.33	\$1,577
2015	20,543,040	3,115	\$6,075,144	\$0.30	\$1,950
2016	23,257,180	3,434	\$6,362,822	\$0.27	\$1,853
2017	21,130,663	3,396	\$6,404,252	\$0.30	\$1,886
2018	22,556,832	3,974	\$6,940,945	\$0.31	\$1,747
2019	26,071,158	4,591	\$7,184,464	\$0.28	\$1,565
2020	28,050,242	4,878	\$6,866,723	\$0.24	\$1,408
2021	28,540,540	5,479	\$6,480,491	\$0.23	\$1,183

HIGH-LEVEL RECAP:

The 2021 portfolio produced 28,540,540 kWh exceeding OG&E's savings goal. These ongoing energy savings will accumulate over the life of the EE measures. The EE portfolio recoverable expenses of \$6,480,491 for 2021 were 68% of the approved annual budget of \$9,520,717. Customer incentives and rebates account for 55% of the total portfolio expenses.

HIGHLIGHTS OF WELL-PERFORMING PROGRAMS:

The Commercial & Industrial program offerings demonstrated continued success in 2021 under the CEEP umbrella, achieving 128% of the planned savings goal while spending 88% of the budget. This accounted for 76% of the total Portfolio energy savings.

There are four residential channel offerings under the HEEP umbrella. The combined channels achieved 121% of the HEEP savings goal while spending only 88% of the planned budget. HEEP accounted for 60% of OG&E's residential portfolio energy savings and penetrates a hard to reach customer segment allowing for more customers to participate and be further educated in the energy management of their home.

WHAT'S WORKING AND WHAT'S NOT:

The residential portfolio of EE programs is working well. The HEEP Program portion of the residential portfolio achieved 121% of energy savings goals while spending 88% of the total HEEP residential filed budget. The current EM&V reports validate the impact and process success of OG&E's residential programs. The CWA achieved 57% of energy its energy savings goal while spending 36% of its budget. For the 2021 program year CLEAResult was brought on to implement the CWA channel. As with any change, there are always barriers to overcome. One of the largest barriers to the CWA channel in 2021 was that none of the previous program contractors returned to support the offering. All new contractors had to be recruited and trained. Four new contractors were recruited and proceeded with implementing the weatherization measures for qualified customers. Although the program was not placed on pause as in the previous year, the channel still felt the impacts. All the participating contractors were impacted during the year by COVID-19. Each of the crews had family ill from it, and some of them lost immediate and/or extended family. The continued impacts from the COVID-19 pandemic led to lower than anticipated savings and budget spend in the CWA.

TRAINING ACHIEVEMENTS:

OG&E provided in person and virtual 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 the entire EE program portfolio for PY 2021. EM&V activities were performed in accordance with the Arkansas Technical Reference Manual ("TRM") Version 8.2. 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 PY2021:

Table 1-6 Portfolio Summary

2021 Portfolio Summary										
Net Energy Savings		Costs			Cost-Effectiveness			Goal Achievement		
Demand MW	Energy MWh	Actual Expenditures	LCFC	Performance Incentives	TRC Net Benefits (NPV)	TRC Ratio	PAC Ratio	Commission Established Target % of Baseline	Actual Savings Achieved % of Baseline	% of Target Achieved (%)
5	28,541	\$ 6,480,491	\$ (0)	\$ 723,574	\$ 15,105,567	3.22	2.96	1.20%	1.39%	116%

Table 1-7 Portfolio Costs by Program Summary

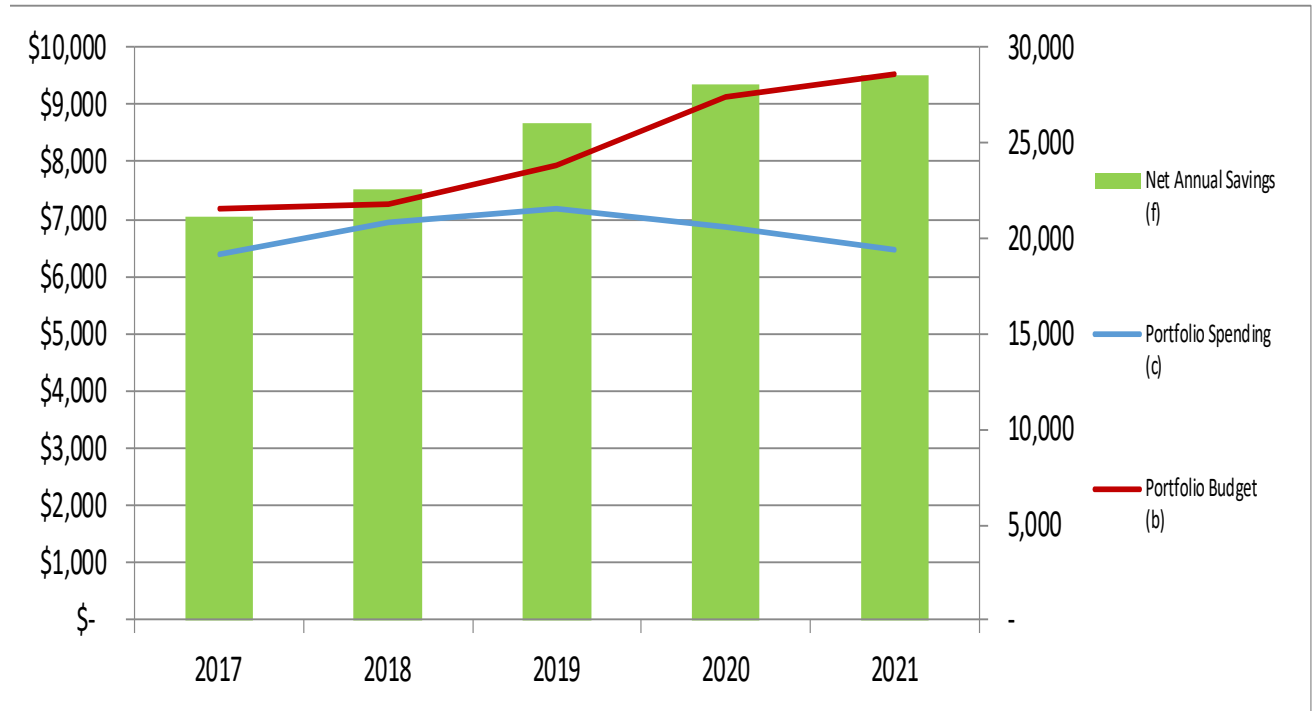
EE Portfolio Expenditures by Program					
Program Name	Target Sector	Program Type	2021		% of Budget
			Budget (\$)	Actual (\$)	
Consistent Weatherization Approach_CWA	Residential	Whole Home	\$ 3,459,787	\$ 1,237,306	36%
Home Energy Efficiency Program	Residential	Other	\$ 1,075,755	\$ 946,912	88%
Commercial Energy Efficiency Program	Small Business/C&I	Custom	\$ 4,869,415	\$ 4,291,068	88%
Energy Efficiency Arkansas	All Classes	Behavior/Education	\$ 20,760	\$ 5,204	25%
Planning	All Classes	Other	\$ 70,000	\$ -	0%
Regulatory	-	-	\$ 25,000	\$ -	0%
Total			\$ 9,520,717	\$ 6,480,491	68%

Table 1-8 Portfolio Costs by Type Summary

EE Portfolio Expenditure Summary by Cost Type				
Cost Type	2021 Total Expenditures			
	% of Total	Budget (\$)	Actual (\$)	% of Total
Planning / Design	0%	\$ -	\$ -	0%
Marketing & Delivery	34%	\$ 3,208,294	\$ 2,469,194	38%
Incentives / Direct Install Costs	54%	\$ 5,159,663	\$ 3,561,597	55%
EM&V	3%	\$ 295,000	\$ 272,390	4%
Administration	9%	\$ 832,760	\$ 177,310	3%
Regulatory	0%	\$ 25,000	\$ -	0%
	100%	\$ 9,520,717	\$ 6,480,491	100%

Table 1-9 Company Statistics¹

Company Statistics										
Program Year	Revenue and Expenditures					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 (%=c/a)		Net Annual Savings (e) (MWh)	% of Energy Sales (%=e/d)	Net Annual Savings (f) (MWh)	% of Energy Sales (%=f/d)
2017	\$ 180,679	\$ 7,182	4.0%	\$ 6,404	3.5%	2,547,850	18,063	0.71%	21,131	0.83%
2018	\$ 176,781	\$ 7,266	4.1%	\$ 6,941	3.9%	2,670,588	18,063	0.68%	22,557	0.84%
2019	\$ 166,642	\$ 7,949	4.8%	\$ 7,184	4.3%	2,566,880	20,136	0.78%	26,071	1.02%
2020	\$ 162,230	\$ 9,132	5.6%	\$ 6,867	4.2%	2,440,096	24,675	1.01%	28,050	1.15%
2021	\$ 190,420	\$ 9,521	5.0%	\$ 6,480	3.4%	2,561,095	25,200	0.98%	28,541	1.11%



¹ Total annual energy sales include self-direct customer sales.

2.0 Portfolio Programs

2.1 Consistent Weatherization Approach

2.1.1 Program Description

This program in previous portfolios was referred to as the Unified Weatherization Program (UWP). It is designed to target residential customers and allow them to participate in the program with no out-of-pocket expense, and it also provides customers the opportunity to actively manage their energy costs. The program targets residential single-family homes which were built 10 or more years ago that are severely energy inefficient, or with an electricity cost per square foot of 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 56,000 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 transitioned the management of the CWA program to CLEAResult for implementation for the 2021 program year. With this transition, none of the incumbent independent contractors: DK Construction, Total Home Efficiency and Williams Energy chose to continue their participation in the offering. CLEAResult recruited four qualified companies to participate. These companies include Custom Insulation, based in Hot Springs, AR, D&A Conservation established in Midlothian, TX, e3 Solutions based out of Conway, AR as well as Home Energy Xperts in Springdale, AR. Each contractor is Building Performance Institute (BPI) certified. CLEAResult personnel arrange training sessions to maintain consistent implementation practices across the CWA. Contractors are encouraged to attend the sessions and receive additional education on weatherization of homes, both online and in classrooms, for improvement in proper home weatherization techniques. OG&E views the weatherization program as a key component in its EE portfolio and continues to support its success.

Energy-saving equipment or other in-home improvements include: replacement of glass and/or doors, LEDs, return air cavity sealing, CO detectors, smoke detectors, attic insulation, air infiltration, duct sealing, 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 can locate and seal larger areas of air infiltration in the homes.

OG&E and 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 overlapping service territories.

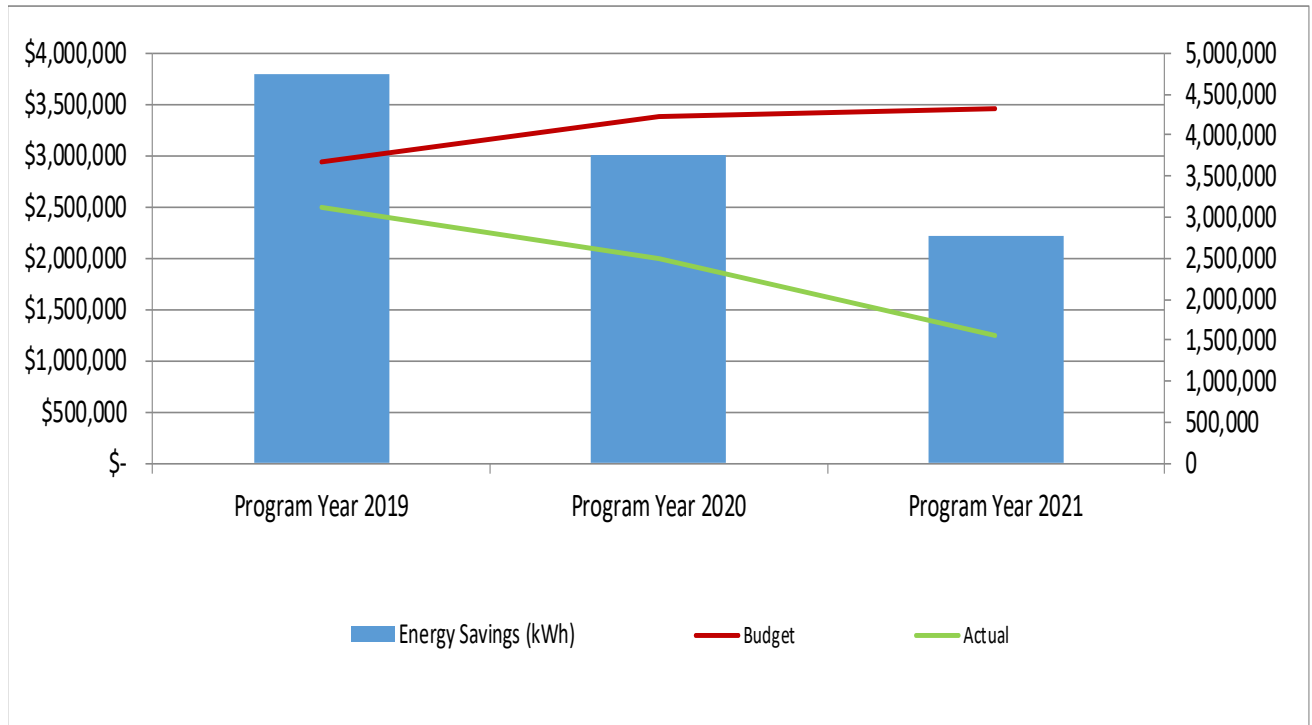
2.1.2 Program Highlights

- OG&E weatherized 867 homes in 2021.
- The CWA meets the requirements for the Arkansas Consistent Weatherization Approach.

2.1.3 Program Budget, Savings, and Number of Measures

Table 2-1 Consistent Weatherization Approach

Consistent Weatherization Approach												
Program	Expenditures			Energy Savings (kWh)			Demand Savings (kW)			Participants		
	Budget	Actual	%	Plan	Evaluated	%	Plan	Evaluated	%	Plan	Actual	%
Program Year 2019	\$ 2,947,890	\$ 2,492,862	85%	4,671,768	4,732,484	101%	1,050	1,163	111%	1,600	1,339	84%
Program Year 2020	\$ 3,381,858	\$ 2,003,327	59%	4,634,094	3,758,670	81%	1,052	919	87%	1,945	1,134	58%
Program Year 2021	\$ 3,459,787	\$ 1,237,306	36%	4,858,432	2,770,015	57%	1,095	743	68%	1,923	867	45%



2.1.4 Description of Participants

Participants of this program must meet the following criteria:

- The home is 10 or more years old.
- Electricity cost exceeds 10 cents per square foot.

2.1.5 Challenges and Opportunities

- OG&E has maintained a steady pace in obtaining and qualifying customers' homes in a timely manner for weatherization.
- With the change in contractors in PY2021, Health and Safety measures were not implemented thoroughly. This has been addressed for PY2022.
- As this program has matured through the 2021 program year, long-term lead generation has been necessary for sustained success and is a concern moving forward, based on the state's requirements: if OG&E can continue to generate leads that fit the criteria as required by the state.

2.1.6 Planned or Proposed Changes to Program and Budget

- The CWA remains a standalone program in the new triennial 2020-2022 portfolio. To comply with Act 1102, OG&E provides a low-income pilot program that is very similar to the Gas Utility proposal. To fund this pilot, 5% of the current CWA budget is carved out to address Act 1102. The participation goal was 80 homes. 468 homes qualified under Act 1102 in 2021. A soft cap will be used for installing measures with a maximum of \$3,800 per home.
- OG&E's budget for PY2022 is \$3,472,695.

2.2 Home Energy Efficiency Program

2.2.1 Program Description

HEEP identifies and serves single and multi-family property owners or managers who seek assistance in improving the efficiency of energy-consuming systems and components. The program provides energy-saving measures at reduced or no out-of-pocket cost for residential customers through several participation channels including Residential Solutions, Schools Outreach, HVAC Replacement and Tune-up, and Consumer Product Solutions. Upgrade measures include, but are not limited to: LED light bulbs, Advanced Power Strips (APS), low-flow showerheads, low-flow faucet aerators, duct sealing, air sealing, attic insulation, wall insulation, and ENERGY STAR[®] rated windows and pool pumps through residential channels. The Consumer Product Solutions offering includes reduced cost merchandise at the retail point of purchase on LED light bulbs, APS, energy efficient water dispensers, bathroom ventilation fans, room air purifiers, and window unit room air conditioners.

The LivingWise[®] Schools Outreach channel targeted sixth grade students and is designed to provide an educational opportunity to learn about energy-efficient prospects in their homes. This approach includes an established curriculum that teachers use to review and educate their students regarding activities that can help them save energy. The students are given an energy efficiency kit with easy-to-install measures (e.g., LEDs, aerators, and showerheads) that they take home to have their parents or guardians help them install.

2.2.2 Program Highlights

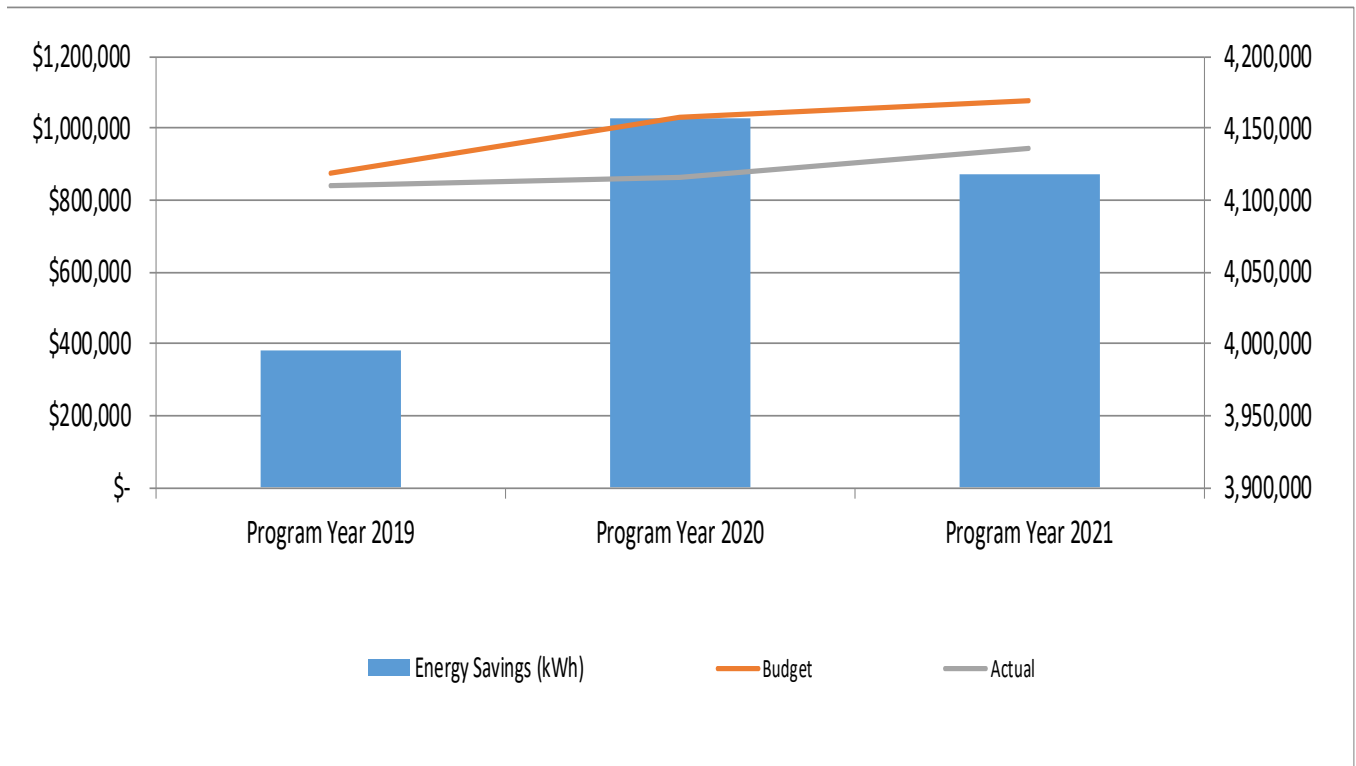
- The PY2021 program achieved 121% of the energy savings goal.
- The Consumer Products Solutions team activated 4-pack LED's at both Sam's Club and Walmart in the Fort Smith markets combined with channeling more funding to this particular program to account for the additional savings and to help aid in the deficiency in the CWA.
- The program reached 255 new participants in the HVAC Replacement and Tune-up channel which accounted for 488,605 ex ante gross kWh savings.
- In-home Energy Assessments enable the program to identify additional measures that participants with nontraditional dwellings qualify for that complement the CWA program. The coordinated effort between HEEP and CWA continues to allow for implementation of those identified measures.

2.2.3 Program Budget, Savings and Number of Measures

Table 2-2 Home Energy Efficiency Program Summary

Home Energy Efficiency Program

Program	Expenditures			Energy Savings (kWh)			Demand Savings (kW)			Participants		
	Budget	Actual	%	Plan	Evaluated	%	Plan	Evaluated	%	Plan	Actual	%
Program Year 2019	\$ 873,627	\$ 842,849	96%	1,879,206	3,995,618	213%	524	767	146%	34,891	98,690	283%
Program Year 2020	\$ 1,034,342	\$ 864,631	84%	3,322,845	4,156,673	125%	590	714	121%	3,509	6,927	197%
Program Year 2021	\$ 1,075,755	\$ 946,912	88%	3,401,317	4,118,059	121%	604	744	123%	3,592	4,379	122%



2.2.4 Description of Participants

- Participants within the HEEP Program include:
 - Multi-family residence – two or more storied structures where multiple families reside in multiple units under a single, contiguous roof most often described as

apartments, duplexes, triplexes, condominiums, or townhomes.

- Participants residing in apartment complexes or other multi-family units 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 may be considered hard-to-reach when providing education and opportunities for managing energy use.
- Single-family residence – one story structures where a single-family group resides in a standalone structure under a single contiguous roof.
 - This channel includes structures traditionally “stick-built” or with wooden framing.
- LivingWise[®] Student Energy Education - this channel focuses on sixth grade students in the public-school system. The kit provides several easily installed EE products for the home, allowing students and parents or guardians to have conversations about using energy efficiently. This program promotes EE education to the future homeowners, so they will understand the impacts of energy conservation and adopt a culture of energy efficiency.

2.2.5 Challenges and Opportunities

- The HVAC Replacement and Tune-up channel included a bill insert promoting a no-cost A/C system tune-up for eligible customers. This channel saw great success this year as the program team worked with a participating contractor to provide A/C Tune-Ups in a large apartment complex located in Fort Smith.
- The program team continues to recruit additional contractors to participate in the A/C Tune-up measures. By expanding this base, additional residential customers could be reached.
- The Consumer Products offering was expanded to include instant rebates for customers in select retail establishments that purchased qualified bathroom vent fans, room air purifiers, and water dispensers. While the instant rebates were still offered on LEDs; the window A/C units offering resulted in 640 additional customers reached resulting in 44,705 ex ante gross kWh savings. This channel also offered instant rebates on advanced power strips (APS) in select retail locations which were well received by consumers. The rebate resulted in 1,316 APS installations in homes and saved a combined 220,298 kWh. Customers took advantage of the instant rebates on 40 room air purifiers (18,740 kWh), 25 water dispensers (12,045 kWh) and 48 bathroom ventilation fans (1,315 kWh).

2.2.6 Planned or Proposed Changes to Program and Budget

- In 2022, the Consumer Products channel will expand its reach by adding additional select retail locations to promote all instant rebate opportunities available to OG&E's residential customers and specifically targeting the hard to reach customer base.
- OG&E's proposed budget for PY2022 is \$1,083,715.

2.3 Commercial Energy Efficiency Program

2.3.1 CEEP Program Description

CEEP provides incentives to OG&E commercial customers in the Arkansas service territory, encouraging the installation or upgrade of more efficient equipment in energy consuming systems. The program is aligned toward commercial, industrial, public authority, schools, and small business facilities of all sizes. CEEP measures include but are not limited to; LED lighting and fixtures, compressors, variable speed fans, HVAC upgrades, weather stripping, occupancy-based technology, gaskets, strip curtains, refrigeration upgrades, and pre-rinse spray valves.

CEEP recruits and educates customers on the advantages of upgrading their energy systems through direct outreach, educational contacts, and booth displays at local vendor open houses. Many different avenues and strategies are used to encourage customers to upgrade energy consuming systems in each facility. CEEP works with lighting manufacturer representatives, conducting walkthrough audits and performing detailed, custom audits unique to the facilities. Commercial customers benefit from financial incentives, bill savings, and the energy management education the program provides.

2.3.2 Program Highlights

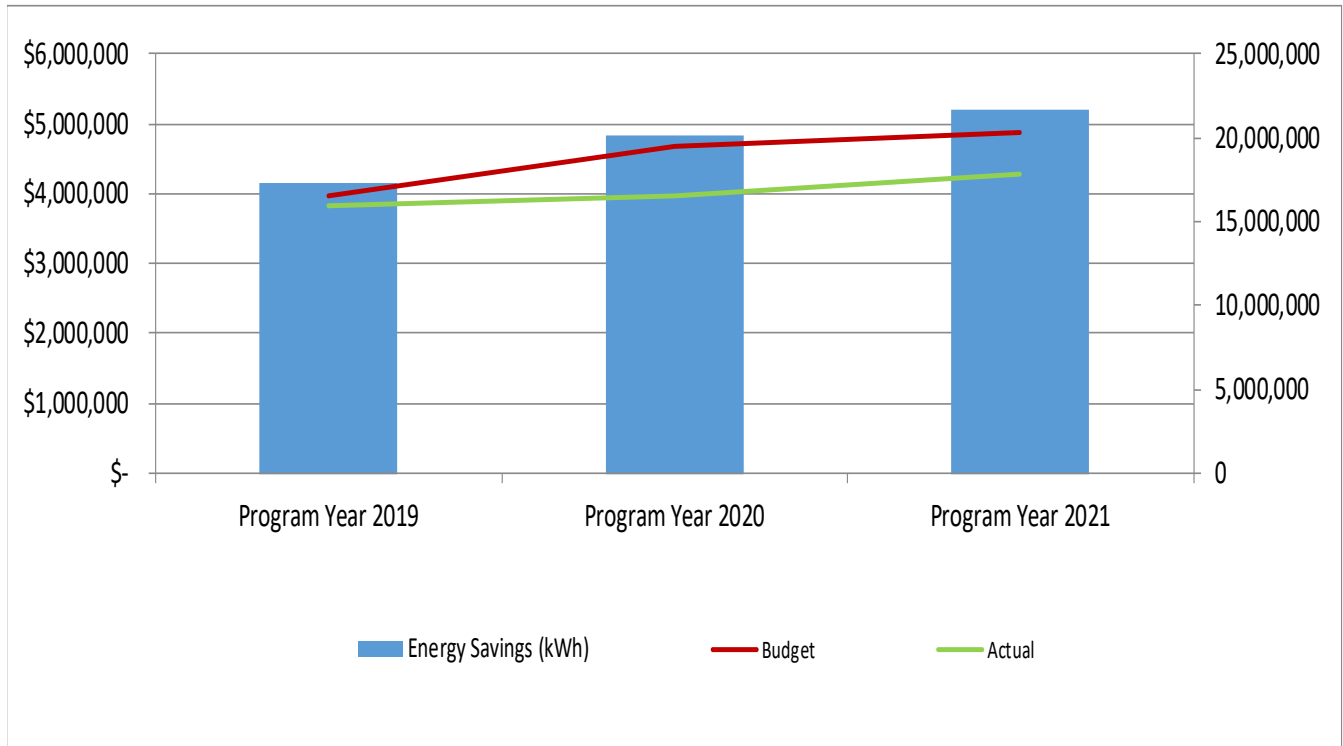
- The CEEP program successfully reached business customers across the service territory. 238 projects were completed in 2021.
- In PY2021 the Large Commercial and Industrial channel alone completed 54 projects for a combined 14,879,271 kWh and achieved 109% of the gross kWh goal. Some of the participants in this channel were Graphic Packaging and AFCO Steel with LED retrofits, and new construction projects for Holiday Inn Express and Farmer's Co-op.
- CEI finished 2021 achieving 1,359,001 annual kWh savings combined through the cohort participation. Pernod Ricard was the largest contribution in PY2021 with 558,896 kWh savings and Hiland Dairy with 453,845 kWh savings as well.

2.3.3 Program Budget, Savings and Number of Measures

Table 2-3 – CEEP Program Summary

Commercial Energy Efficiency Program

Program	Expenditures			Energy Savings (kWh)			Demand Savings (kW)			Participants		
	Budget	Actual	%	Plan	Evaluated	%	Plan	Evaluated	%	Plan	Actual	%
Program Year 2019	\$ 3,982,185	\$ 3,816,677	96%	13,585,213	17,343,056	128%	2,343	2,661	114%	37,114	32,368	87%
Program Year 2020	\$ 4,668,575	\$ 3,976,594	85%	16,718,061	20,134,899	120%	3,278	3,245	99%	503	245	49%
Program Year 2021	\$ 4,869,415	\$ 4,291,068	88%	16,940,396	21,652,466	128%	3,311	3,993	121%	492	237	48%



2.3.4 Description of Participants

Participants in the program included large commercial, industrial, small business, schools, government, and lighting distributor customers.

2.3.5 Challenges and Opportunities

- The Small Business contractors made a significant rebound in PY2021. Collectively they completed 128 projects for small businesses and achieved 2,716,455 annual kWh savings.

This savings brought the channel to 85% of the annual gross kWh goal. In PY2022 the challenge will be to keep the participating contractors engaged and to maintain the momentum gained in PY2021.

- Significant customer demand for the Large Commercial and Industrial and Schools and Government channels has given the CEEP a significant pipeline of potential projects next year. These projects were reviewed and placed in queue for PY2022 incentive funding.
- Commercial A/C Tune-Up demand increased in PY2021. The participating HVAC contractors have continued to assist these customers to take advantage of this opportunity. In PY2021 there were 136 commercial A/C Tune-Ups completed resulting in 404,332 annual kWh savings.

2.3.6 Planned or Proposed Changes to Program and Budget

- In PY2022 the program team will work closely with the Small Business Solutions (SBS) participating contractors in hopes of carrying their momentum from PY2021 into PY2022. They experienced an extremely successful year, and the program teams will work to maintain that.
- OG&E's proposed budget for PY2022 is \$5,134,343.

2.4 Energy Efficiency Arkansas Program

2.4.1 Program Description

The EEA Program provides information to all customers, of all classes, allowing them to make informed decisions about how they use energy and to consider alternatives to reduce their consumption rates, 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, and (3) commercial and industrial education and outreach.

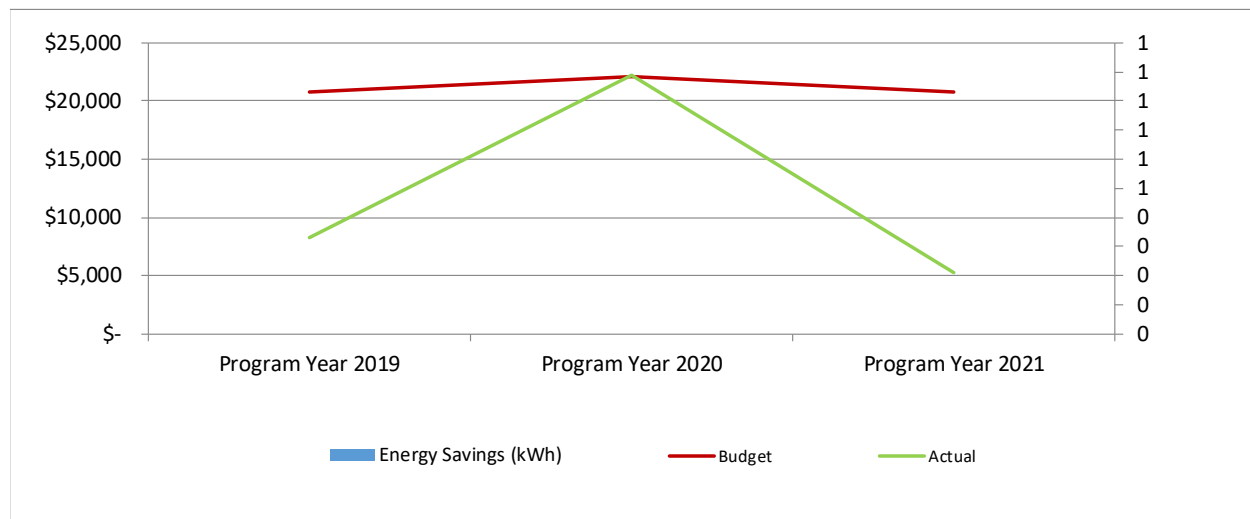
2.4.2 Program Highlights

EEA outreach events and training in the OG&E service territory included: The AEHC Spring Education Workshop, 2022 Arkansas Municipal League Hybrid Winter Conference, HBA of Greater Little Rock 70th Annual Home Show, and the Building Science Principles course held online.

2.4.3 Program Budget, Savings and Participants

Table 2-4 –Energy Efficiency Arkansas Program Summary

Energy Efficiency Arkansas												
Program	Expenditures			Energy Savings (kWh)			Demand Savings (kW)			Participants		
	Budget	Actual	%	Plan	Evaluated	%	Plan	Evaluated	%	Plan	Actual	%
Program Year 2019	\$ 20,731	\$ 8,292	40%	0	0	-	0	0	-	0	0	-
Program Year 2020	\$ 22,082	\$ 22,170	100%	0	0	-	0	0	-	0	0	-
Program Year 2021	\$ 20,760	\$ 5,204	25%	0	0	-	0	0	-	0	0	-



2.4.4 Description of Participants

- Residential and C&I customers in Arkansas.

2.4.5 Challenges and Opportunities

- OG&E, along with the EEA, 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. Educating the customer is essential in stressing the importance of EE in all applications.

2.4.6 Planned or Proposed Changes to Program and Budget

- OG&E will continue its support of the EEA Program throughout the next triennial 2020-2022 Portfolio Plan.
- OG&E's proposed budget for PY2022 is \$22,104.

3.0 Supplemental Requirements

3.1 Staffing

In 2021, OG&E had a total of 2 Full-Time Equivalents (“FTEs”); 1 FTE managing its EE programs, and EM&V and Administrative support make up the remaining FTE.

3.2 Stakeholders Activities

During 2021, the PWC members continued to be active and engaged participants in matters pertaining to energy efficiency program evaluation and related issues, as directed by Staff. In 2021, the PWC mainly discussed updates to the Technical Reference Manual (“TRM”). Topics included Injection Molding Machines, Electric Vehicle Charging Stations, and the proposed expansion of NEBs for Low-Income Programs.

The PWC conducted 13 virtual meetings during 2021.

Table 1: Summary of PWC Activities in 2021

Date	Title	Topics
2/8/2021	Carbon Calculator	<ol style="list-style-type: none"> 1. Carbon Calculator Update 2. TRM Updates for V 9.0 3. Utility EE Program Planning 4. Updates on EM&V Activities
4/22/2021	TRM Updates	<ol style="list-style-type: none"> 1. TRM Version 9.0 Update Plan <ol style="list-style-type: none"> a. Process/schedule for TRM Update Meetings b. Guidance for TRM Updates c. Specific Areas for Update (Codes and Standards) d. Recent New Measure Requests
5/4/2021	PWC Meeting May 4	<ol style="list-style-type: none"> 1. Discussion of Next Tree-Year Planning Cycle <ol style="list-style-type: none"> a. Joint Motion b. Potential Study c. Covid-19 Impacts 2. TRM Update Discussion 3. Updates on EM&V Activities 4. Next Steps
5/6/2021	TRM Updates	<ol style="list-style-type: none"> 1. Codes and Standards Updates 2. Energy Star Existing Measure Update 3. Energy Star New Measures Discussion
5/20/2021	TRM Updates	<ol style="list-style-type: none"> 1. Injection Molding Machines 2. Steam Leak Repair 3. Compressed Air Projects 4. Industrial EE Gear Lubricants
6/3/2021	TRM Updates	<ol style="list-style-type: none"> 1. Energy Star Storm Windows 2. Electric Vehicle Charging Stations 3. Commercial Wi-fi Thermostats
6/4/2021	TRM Updates	<ol style="list-style-type: none"> 1. ENERGY STAR Storm Windows 2. Electric Vehicle Charging Stations 3. Commercial Wi-fi Thermostats

6/17/2021	TRM Updates	<ol style="list-style-type: none"> 1. Clarifications to Protocol C: Process Evaluations 2. Proposed Expansion of NEBS for Low-Income Programs 3. Average H&S Cost per Participant by Utility 4. Proposed Next Steps 5. Identification of New Program Designs 6. Opportunities Post Covid-19
7/1/2021	TRM Updates	<ol style="list-style-type: none"> 1. HIMs (High Impact Measure) <ol style="list-style-type: none"> a. Background b. Methods c. HIMs by Utilities Discussion d. Future HIMs Analyses
7/29/2021	TRM Updates	Lighting Study and Proposed EULs
8/11/2021	TRM Technical Forum	<ol style="list-style-type: none"> 1. TRM Volume 1 Updates 2. TRM Volume 2 Updates- Residential 3. TRM Volume 2 Updates- C&I measures 4. Presentation and Discussion from the ADEQ and the Regulatory Assistance Project (RAP)
11/17/2021	PWC Low Income Working Group	<ol style="list-style-type: none"> 1. Recap of IEM PY2020 Findings 2. Identification of Key issues to Consider Going Forward
12/2/2021	PWC Order #62 Discussion	<ol style="list-style-type: none"> 1. Discussion of Order #62 2. Discussion of the Potential Study <ol style="list-style-type: none"> a. Scope b. Timing for the RFP 3. Schedule 4. Next Steps

3.3 Information provided to Customer to Promote EE

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

Appendices to be added in pdf format.

4.0 EM&V Contractor Reports

ADM & Associates, Inc. provided outcomes for the EM&V results and Cost Benefit Analysis for OG&E's PY 2021 Portfolio. OG&E is providing the report in the attached exhibits.

Attachments:

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

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

EVALUATION, MEASUREMENT AND VERIFICATION REPORT FOR THE 2021 ARKANSAS ENERGY EFFICIENCY PORTFOLIO

SUBMITTED TO: OKLAHOMA GAS & ELECTRIC

SUBMITTED ON: MARCH 23, 2022

SUBMITTED BY: ADM ASSOCIATES, INC.

ADM Associates, Inc
3239 Ramos Circle
Sacramento, CA 95827
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Oklahoma Gas & Electric



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1 Introduction

1.1 Acknowledgements

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Oklahoma Gas and Electric (OG&E) staff participated in ongoing evaluation deliverable reviews and discussions, attended regular meetings, and responded to follow-up questions, data requests and document requests. They are an ongoing partner in our evaluation efforts.

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1.2 Acronyms and Abbreviations

Table 1-1 Commonly Used Acronyms and Abbreviations

Acronym	Term
AC	Air conditioner
AOH	Annual Operating Hours
APS	Advanced Power Strip
APSC	Arkansas Public Service Commission
SBS	Small Business Solutions
CEEP	Commercial Energy Efficiency Program
CWA	Consistent Weatherization Approach
C&EE	Conservation and Energy Efficiency
C&I	Commercial and Industrial
CEE	Consortium for Energy Efficiency
CF	Coincidence Factor
CFL	Compact Fluorescent Lamp (bulb)
CFM	Cubic feet per minute
DI	Direct Install
DLC	Design Lights Consortium
EEA	Energy Efficiency Arkansas
EER	Energy efficiency ratio
EFLH	Equivalent full-load hours
EISA	Energy Independence and Security Act
EL	Efficiency loss
EM&V	Evaluation, Measurement, and Verification
EPP	Efficient Products Pathway
EUL	Estimated Useful Life
ES	ENERGY STAR®
FR	Free-rider
FVR	Field Verification Rate
GPM	Gallons per minute
HDD	Heating Degree Days
HEEP	Home Energy Efficiency Program
HID	High intensity discharge
HOU	Hours of Use
HP	Heat pump
HSP	Home Solutions Program
HSPF	Heating seasonal performance factor
HVAC	Heating, Ventilation, and Air Conditioning
IEF	Interactive effects factor
IEM	Independent Evaluation Monitor
IEER	Integrated Energy Efficiency Ratio
IPLV	Integrated Part Load Value

Acronym	Term
IQ	Income Qualified
ISR	In-service rate
kW	Kilowatt
kWh	Kilowatt-hour
LED	Light Emitting Diode
M&V	Measurement and verification
NC	New construction
NEB	Non-energy Benefit
MW	Megawatt
MWh	Megawatt-hour
NTG	Net-to-Gross
PCT	Participant Cost Test
PY	Program year
QA	Quality assurance
QC	Quality control
RCA	Refrigerant charge adjustment
RIM	Ratepayer impact measure
ROB	Replace on Burnout
SEER	Seasonal Energy Efficiency Ratio
SO	Spillover
TRM	Technical Reference Manual
TU	Tune-up
UCT	Utility Cost Test
UWP	OG&E and AOG Unified Weatherization Program (Prior to 2020)
VFD	Variable Frequency Drive

1.3 Savings Types

Table 1-2 Commonly Used Savings Types

Term	Definition
Energy Savings (kWh) ¹	The change in energy (kWh) consumption that results directly from program-related actions taken by participants in a program.
Demand Reductions (kW)	The time rate of energy flow. Demand usually refers to electric power measured in kW (equals kWh/h) but can also refer to natural gas, usually as Btu/hr., kBtu/hr., therms/day, etc.
Other Fuels (Natural Gas & Propane)	Other fuel savings, such as propane and natural gas, which are estimated based on dual-fuel savings that are not incentivized by both of the utilities that participated in the project.
Water (Gallons)	Water savings that are reported in association with the installation of water saving devices.
<i>Ex ante</i> Gross	The change in energy consumption and/or peak demand that results directly from program-related actions taken by participants in a program, regardless of why they participated.
<i>Ex post</i> Gross	Latin for “from something done afterward” gross savings. The energy and peak demand savings estimates reported by the evaluators after the gross impact evaluation and associated M&V efforts have been completed.
<i>Ex post</i> Net	The energy and peak demand savings estimates reported by the evaluators after application of the results of the net impact evaluation. Typically calculated by multiplying the <i>ex post</i> gross savings by a NTG ratio.
Annual Savings	Energy and demand savings expressed on an annual basis, or the amount of energy and/or peak demand a measure or program can be expected to save over the course of a typical year. The AR TRM V8.2 provides algorithms and assumptions to calculate annual savings and are based on the sum of the annual savings estimates of installed measures or behavior change.
Lifetime Savings	Energy savings expressed in terms of the total expected savings over the useful life of the measure. Typically calculated by multiplying the annual savings of a measure by its EUL. The TRC test uses savings from the full lifetime of a measure to calculate the cost-effectiveness of programs.

¹ Definitions are from the Glossary in AR TRM V8.2, page 98.

2 Executive Summary

2.1 Introduction

On March 15, 2019 OG&E filed its triennial plan for Program Years 2020 to 2022 (PY2020 to PY2022) in compliance with Order No. 41 Docket No. 13-002-U, which set the time for the next three-year Portfolio to be filed, and Order No. 43 of Docket No. 13-002-U, which set the targets requiring electric investor-owned utilities (IOU) to capture energy savings in the amount of 1.2% of their 2018 sales. OG&E's Portfolio was approved by the Arkansas Public Service Commission (APSC) on June 17, 2019, with Order No. 88.

OG&E's 2021 budgets, energy savings and demand reduction goals serve as the basis against which its portfolio of programs were evaluated in 2021.

OG&E's 2020 to 2022 Plan includes a portfolio of programs designed to facilitate reductions in electric energy (kWh) and peak demand (KW) in every customer class. OG&E offers retail electric service in Oklahoma and Arkansas, servicing approximately 68,000 customers in Arkansas. OG&E's Arkansas service territory encompasses the City of Fort Smith and several nearby municipalities.

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

2.2 Summary of OG&E's Energy Efficiency Portfolio

In 2021, OG&E offered a portfolio of three energy efficiency programs, which provided a comprehensive range of customer options focused on energy efficiency and educational options. At a high-level, OG&E designed its programs to achieve the following objectives:

- PY2021 net energy-savings goal² of 25,200,145 kWh and demand reduction target of 5,010 kW;³
- Significant energy-savings opportunities for all customers and market segments;
- Broad ratepayer benefits; and

² This value was based on the Commission approved target of 1.20% of 2018 sales as set forth by the APSC and includes a reduction from target 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.

- Comprehensiveness in seven areas (i.e., comprehensiveness factors) defined by the APSC.⁴

In PY2021, two residential programs and one commercial and industrial (C&I) program were evaluated. The Home Energy Efficiency Program (HEEP), the Consistent Weatherization Approach (CWA) program, and the Commercial Energy Efficiency Program (CEEP) were all existing programs at the onset of PY2021.

Table 2-1 PY2021 OG&E Energy Efficiency Portfolio Overview

Program	Channel	Sector	PY2021 Net kWh Target ⁵	PY2021 Net kW Target
Home Energy Efficiency Program (“HEEP”)	Residential Solutions (RSOL)	Residential	3,401,317	604
	LivingWise® Schools Outreach			
	HVAC Replacement & Tune-up (HVAC)			
	Consumer Product Solutions (CPS)			
Consistent Weatherization Approach (CWA)	Consistent Weatherization Approach	Residential	4,858,432	1,095
	Low Income Pilot			
Commercial Energy Efficiency Program (“CEEP”)	Commercial and Industrial (C&I) Solutions	C&I	16,940,396	3,311
	Small Business Solutions (SBS)			
	Schools and Government Entities (SAGE)			
	Midstream Lighting			
	Continuous Energy Improvement (CEI)			
	Retro-commissioning Solutions (RCx)			
Total			25,200,145	5,010

2.3 Overview of Program Offerings

2.3.1 Residential Programs

- **Home Energy Efficiency Program (HEEP):** This program is a multipronged residential offering designed to incentivize OG&E’s Arkansas customers to reduce their energy consumption by performing energy efficient upgrades to their homes. Designed to provide homeowners with multiple options, the proposed program combines Residential Solutions, Heating, Ventilation, and Air Conditioning (HVAC), and Consumer Products components. Providing homeowners with increased choices to

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

⁵ Goal information is from the Docket 01-075-TF Doc 393, *Oklahoma Gas & Electric Company: 2020-2022 Energy Efficiency Portfolio Plan for Arkansas*, in Alek Antczak’s Direct Exhibit ABA-3, in table 2 on page 22 of the PDF.

participate is expected to result in increased customer engagement, greater measure adoption, and increased program savings.

- Residential Solutions (RSOL): The Residential Solutions component of the HEEP program is a market-driven approach that promotes energy efficiency by providing homeowners with low-cost in-home assessments, direct install measures, community educational outreach, and incentives on home retrofits. Incentives are provided to encourage participation and decrease the upfront costs of energy efficient upgrades.
- LivingWise® Schools Outreach provides 6th grade students an educational opportunity to learn about how they can affect the energy efficiency of their home. Teachers will work directly with the program team to obtain materials.
- HVAC Replacement & Tune-up (HVAC): The air conditioner (A/C) tune-up and HVAC replacement component of HEEP focuses on improving the EE of the HVAC systems of residences. It provides incentives to improve operating efficiency of the existing HVAC unit or to replace it with a higher efficiency unit, through a program-approved Trade Ally network.
- Consumer Product Solutions (CPS): The lighting and appliances component promotes the purchase of energy efficient lighting and products including, but not limited to, LED lighting. There is also a food bank component to this channel, which gives LED lighting to food banks for inclusion in their food boxes to income qualified (IQ) customers. To help customers offset a portion of the incremental cost associated with higher efficiency appliances and products, the program uses upstream, midstream, and downstream incentives.
- **Consistent Weatherization Approach (CWA)**: This program aligns with the statewide Consistent Weatherization Approach (CWA) and will be delivered through approved OG&E contractors. Participation is available to all OG&E residential customers who live in single family (SF) or individually metered multi-family (MF) homes that are 10 years or older or meet the \$0.10 per square foot criteria. The program focuses on educating the customer on the efficiency of their home and developing an implementation plan to provide energy upgrades that align with the customer's needs and available program offerings. Where possible, the program will align measure offerings and incentive packages with Arkansas Oklahoma Gas (AOG) Weatherization Program, for dual fuel customers.
- Low Income Pilot: In PY2020, the low-income pilot was added to the program.

2.3.2 Commercial and Industrial (C&I) Programs

- **The Commercial Energy Efficiency Program (CEEP):** This is a portfolio-style program approach designed to address the needs of OG&E's commercial and industrial (C&I) customer base. Specifically, the program provides an umbrella for all C&I customers to participate through either prescriptive or custom channels, each specialized for a particular market segment or delivery channel.
 - Commercial and Industrial Solutions (C&I Solutions): C&I Solutions will offer direct installation of low-cost measures and performance and custom participation paths for customers to perform energy upgrades. Technical support will also be provided to assist in project identification and development.
 - *Prescriptive:* This path provides per-unit incentives for deemed savings measures installed by qualified contractors as defined by the current TRM.
 - *Custom:* This path gives participants an opportunity to achieve their specific EE goals by proposing measures that may be outside of the scope of the current TRM. Proposed measures are evaluated for savings and costs, and an appropriate incentive amount is approved if the project is deemed cost-effective.
 - Schools & Governmental Entities (SAGE): This channel assists institutional customer segments in overcoming barriers to energy efficiency that are unique to their market segment, such as conflicting organizational goals, outdated specifications, limited technical knowledge, and counterproductive energy budgeting. The program also provides benchmarking services to qualifying customers.
 - Small Business Solutions (SBS): Small Business Solutions offers direct installation of low-cost EE measures, facility walk-throughs and incentives for a suite of EE measures. This offer is targeted at business customers with peak demand less than 150kW. 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. This targeted channel is also eligible to participate in the larger C&I Solutions custom offering if the customer's needs are beyond the scope of services outlined within this outreach approach.
 - Midstream: This channel encourages customers to participate by providing point of sale (POS) discounts on selected products through local lighting distributors. The financial incentives are paid to the lighting distributors to allow reduced costs for the end customer.

- **Continuous Energy Improvement (CEI):** The CEI channel provides energy conservation training to all levels of employees within a customer’s organization with a focus on low or no cost savings opportunities. This channel also offers a facility-wide assessment of energy usage and provides customers with continuous energy usage monitoring and feedback.
- **Retro-commissioning (RCx):** The RCx channel provides a non-capital-intensive approach to energy efficiency engagement. Additionally, capital projects that are identified through the retro-commissioning process, can be rebated through other programs channels.

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 2-2 for a list of the OG&E programs and targeted customer segments.

Table 2-2 OG&E PY2021 Energy Efficiency Portfolio Sectors Served by Program

Program	Residential	Multi-family ⁶	Small Business	C&I	Institutional & Municipal	Agricultural
HEEP	X	X				
CWA	X					
CEEP			X	X	X	X

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

2.4 Evaluation Objectives

The following activities were performed through the PY2021 EM&V effort:

- Verify program tracking data and correctly apply the Arkansas Technical Reference Manual Version 8.2 (AR TRM V8.2)⁷ to calculate savings and estimate PY2021 gross and net energy (kWh) and demand (kW) impacts at the high impact measure, program, and portfolio levels;
- Adjust *ex ante* gross savings using the results of evaluation research, relying primarily on tracking system and engineering desk reviews/metered data analysis and achieve a minimum precision of ±10% of the gross realized savings estimate at 90% confidence;
- In consultation with the IEM, ADM estimated net-to-gross (NTG) values, which were calculated following AR TRM V8.2 Volume 1 Protocol H⁸ and provides complete documentation and transparency of all evaluated savings estimates, and where

⁶ All multifamily are duplexes that are single-metered, with more than four (4) units.

⁷ AR TRM V8.2 can be found here: <http://www.apscservices.info/EEInfo/TRMV8.2.pdf>

⁸ See additional details in each program chapter, as well as Appendix C. Net-to-Gross Approaches and Outcomes.

relevant, compare with AR TRM V8.2 calculation, as recommended in the IEM's PY2020 EM&V Annual Summary Report;

- Provide ongoing technical reviews and guidance to implementers and OG&E throughout the evaluation cycle and review tracking system data to assess data captured for new measure offerings following AR TRM V8.2 Volume 1 Protocol A;
- Support the calculation of portfolio Non-energy Benefits (NEBs) in accordance with AR TRM V8.2 Volume 1 Protocol L;
- Conduct EM&V research to support possible updates for the next version of the TRM, which may include information on commercial and residential envelope measures, business type lighting hours of use, etc.
- Gain an understanding of program operations, challenges and evaluation needs through OG&E and implementation contractor key staff interviews, complemented with program documentation review and monthly status meetings.
- Conduct a full process evaluation for every program once over the three-year 2020–2022 program cycle and assess other process evaluation needs annually, document progress in incorporating recommendations identified during the prior year evaluation; and
- Update the assessment of OG&E's success in achieving the goals and objectives established in the Commissions Comprehensiveness Checklist.⁹

2.5 Evaluation Findings

2.5.1 Specify Method of Gross Impact Evaluation

OG&E's portfolio achieved 113% of planned net energy savings (kWh) and 109% of planned net demand reduction (kW) in PY2021. 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 (PY2021) as "first year" impacts.

Table 2-3 shows the OG&E goals, reported gross impacts, evaluated first year *ex post* gross energy savings (30,242,490 kWh) and demand reductions (5,808 kW), gross realization rates (99% for kWh, 104% for kW), net impacts (28,540,540 kWh and 5,479 kW), NTG (94% for kWh, 94% for kW), and *ex post* net lifetime impacts (409,074,934 kWh).¹⁰ The levelized cost of energy savings (kWh) for the PY2021 portfolio is \$ \$0.025 (\$/kWh).

⁹ As defined by the APSC in the C&EE Rules of Order No. 17 in Docket 08-144-U.

¹⁰ Lifetime impacts are the sum of energy savings over the course of the measure's estimated useful life (EUL) and the weighted average demand reduction across the lifetime of the measure divided by the EUL (in years).

Table 2-3 PY2021 OG&E Portfolio Evaluation Impacts

Impact	Metric	HEEP	CWA	CEEP	Total
Energy Savings (kWh)	Goals (Net)	3,401,317	4,858,432	16,940,396	25,200,145
	<i>Ex ante</i> (Gross)	4,936,629	3,142,080	22,957,157	31,035,866
	<i>Ex post</i> (Gross)	5,652,639	2,862,274	21,727,576	30,242,490
	Realization Rate	115%	91%	95%	99%
	<i>Ex post</i> (Net)	4,118,059	2,770,015	21,652,466	28,540,540
	NTG Ratio	73%	97%	100%	94%
	% of Goal (Net)	121%	57%	128%	113%
	Lifetime (Net)	68,425,249	48,548,731	292,100,955	409,074,934
Annual Demand Reduction (kW)	Goals (Net)	604	1,095	3,331	5,010
	<i>Ex ante</i> (Gross)	889	851	3,831	5,571
	<i>Ex post</i> (Gross)	1,030	764	4,015	5,808
	Realization Rate	116%	90%	105%	104%
	<i>Ex post</i> (Net)	744	743	3,993	5,479
	NTG Ratio	72%	97%	99%	94%
	% of Goal (Net)	123%	68%	121%	109%

The contribution to portfolio energy (kWh) savings by program is summarized in Figure 2-1.

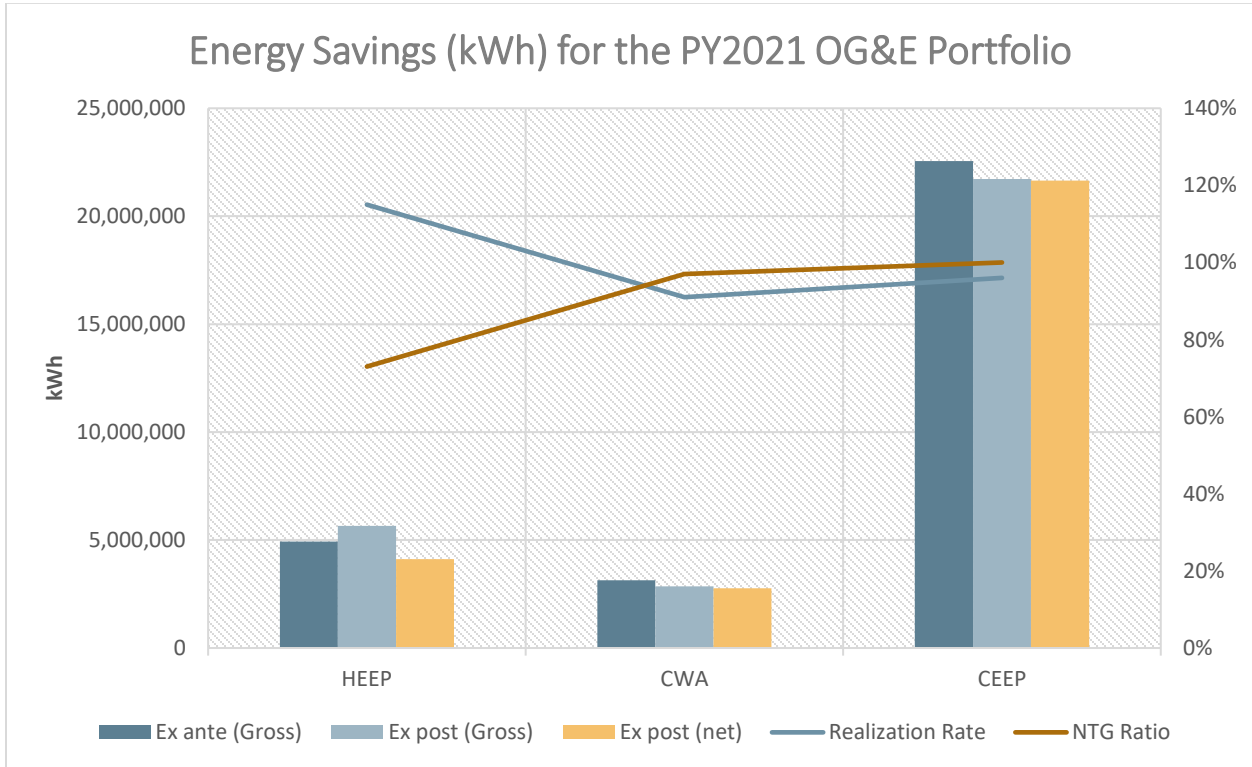


Figure 2-1 PY2021 Contribution to Portfolio Net Energy (kWh) Savings

Figure 2-2 below represents *ex post* net energy savings (kWh), by end use and sector, in the PY2021 OG&E portfolio.

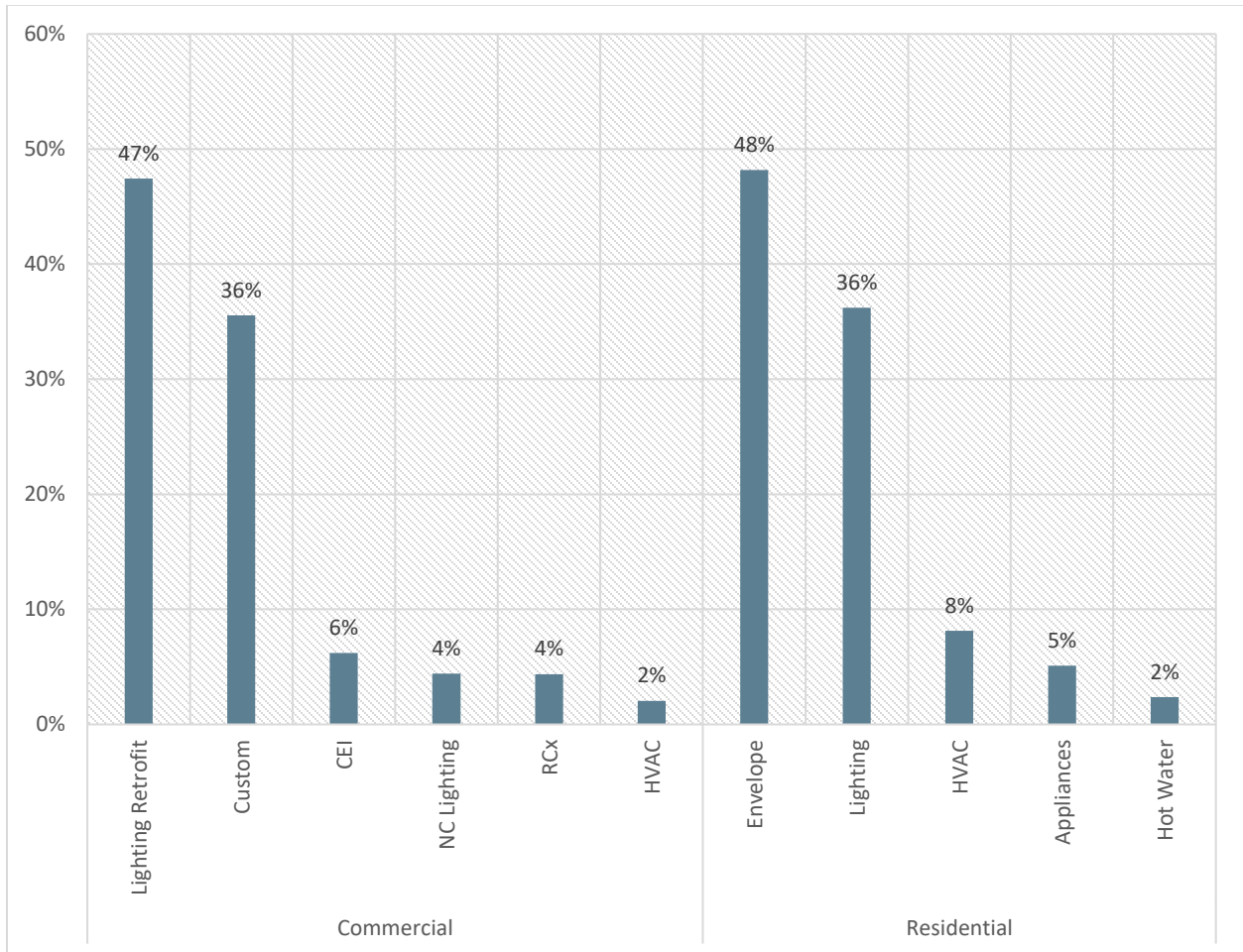


Figure 2-2 Percentage of *Ex ante* Energy Savings (kWh) for the PY2021 Portfolio

Each bar in Figure 2-3 shows the percentage of savings for each measure type, for each program in the residential sector. Aggregated across both HEEP and CWA, Duct sealing (37%), LEDs (36%), HVAC tune-up (6%), and ceiling insulation (5%) are HIMs¹¹, accounting for 85% of residential portfolio *ex post* verified net kWh savings.

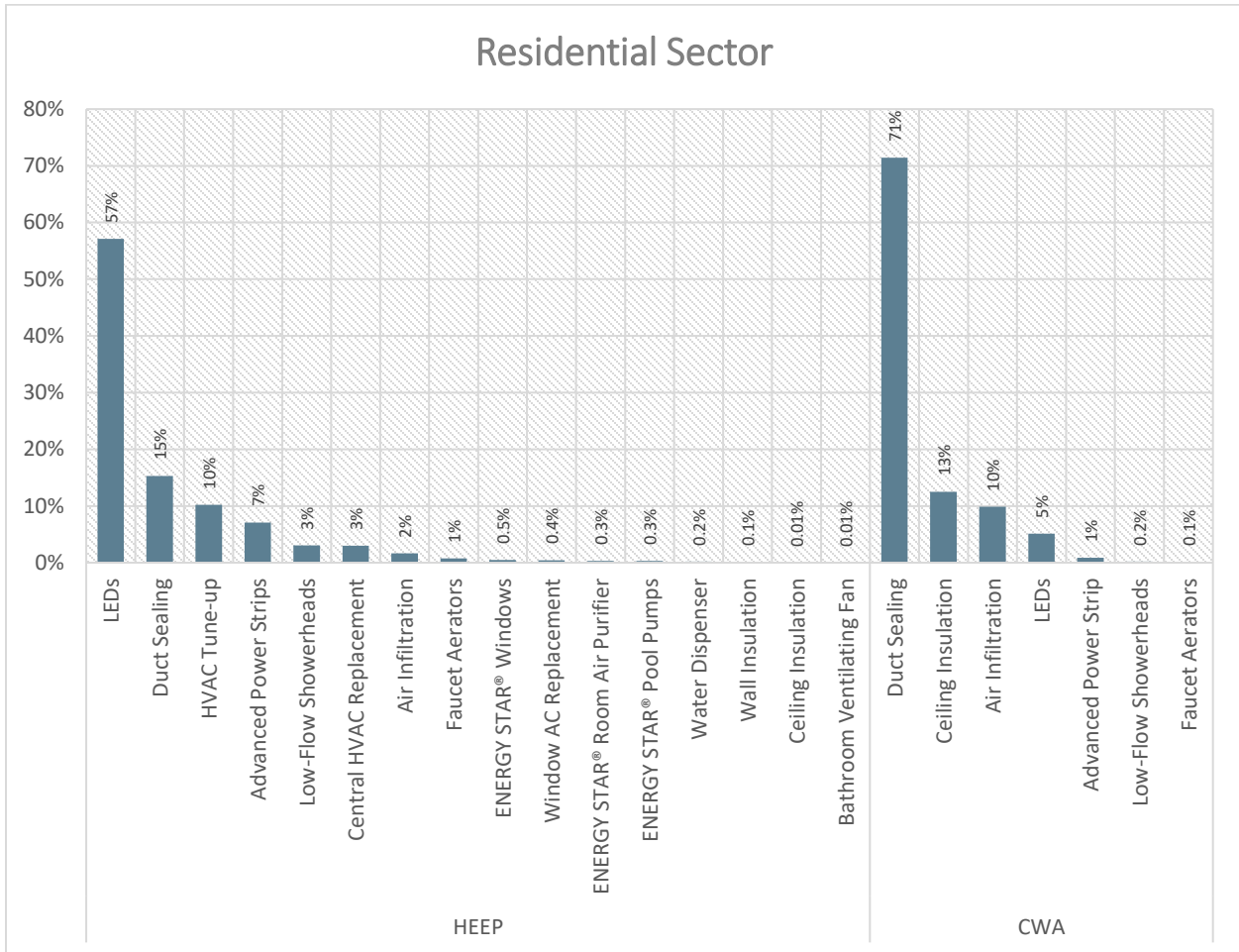


Figure 2-3 *Ex Post* Energy Savings (kWh), by Measure - Residential Sector

Each bar in Figure 2-4 below shows the contributions to *ex ante* gross energy savings (kWh) for each measure in the commercial sector. Linear LED lamps, LED high bay, custom VFD, custom lighting, linear LEDs, LED troffers, and continuous energy improvement were the HIMs for the

¹¹ A High Impact Measure (HIM) is an energy efficiency measure that accounts for at least 5% of total portfolio gross kilowatt hour, kilowatt, and/or therm savings in one or more of the utility's energy efficiency programs. This is per Protocol E1 of the AR TRM V8.2, page 46.

commercial sector, and equal to 84% of portfolio *ex ante* energy savings (kWh). Custom projects included lighting, refrigeration, refrigeration gasket, and HVAC.

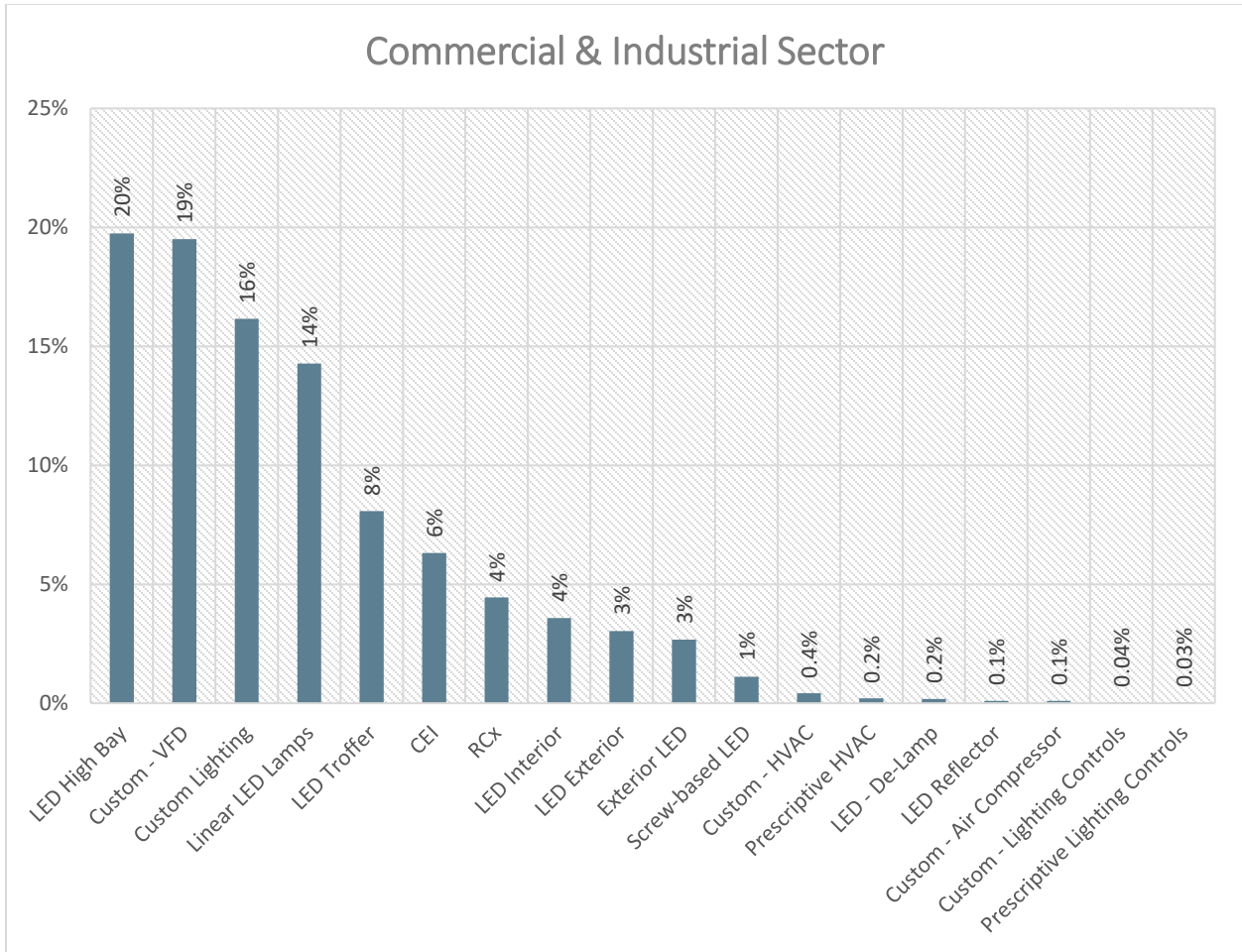


Figure 2-4 *Ex Post* Energy Savings (kWh), by Measure - C&I Sector

Further, the Evaluators put the net savings into the context of OG&E’s PY2021 goal¹². Table 2-4 summarizes the performance against goals of programs evaluated in this report.

¹² 2020-2022 Plan found here: http://www.apscservices.info/pdf/07/07-075-tf_393_1.pdf

Table 2-4 OG&E PY2021 Performance Against Energy Savings (kWh) Goals

Program	2021 Net Energy (kWh) Savings Goal	2021 <i>Ex post</i> Net Energy (kWh) Savings	% of Goal Attained
HEEP	3,401,317	4,118,059	121%
CWA	4,858,432	2,770,015	57%
CEEP	16,940,396	21,652,466	128%
Total	25,200,145	28,540,540	113%
Sums may differ due to rounding.			

The PY2021 budgets and actual spend are summarized in Table 2-5 below.

Table 2-5 Summary of Budgets and Actual Spend in PY2021

Program	PY2021 Budgeted Expenditures ¹³	PY2021 Actual Expenditures	Percent of Budget Expended
HEEP	\$ 1,075,755	\$ 946,912	88%
CWA	\$ 3,459,787	\$ 1,237,306	36%
CEEP	\$ 4,869,415	\$ 4,291,068	88%
EEA	\$ 20,760	\$ 5,204	25%
Regulatory	\$ 25,000	\$ -	0%
Planning	\$ 70,000	\$ -	0%
Total	\$ 9,520,717	\$ 6,480,491	68%
Sums may differ due to rounding.			

2.6 Summary of Evaluation Findings

Following a review of present program offerings and interviews with utility and third-party implementation (TPI) staff, the Evaluators found the following.

¹³ Ibid.

2.6.1 HEEP

Overall HEEP Performance in PY2021	<p>The program performed well in PY2021, achieving a 7% increase in overall claimed kWh savings compared to PY2020.</p>
	<p>The percent of overall claimed savings increased for both the RSOL and the HVAC channels in PY2021. These two channels accounted for 15% and 10% of overall savings, compared to 8% and 3% in PY2020, respectively.</p>
	<p>HEEP added three new measures to the program, including bathroom ventilation fans, ENERGY STAR room air purifiers, and water dispensers (or water coolers).</p>
	<p>Multi-family projects represent a significant volume of participation in PY2021, accounting for 89% of HEEP savings where housing type is known. There is no housing type information for LivingWise® Schools Outreach or the upstream component of CPS.</p>
	<p>Overall program NTG ratio decreased from 83% to 73%.</p> <p>Although measure NTG ratios for RSOL, HVAC, and LivingWise® were largely similar to PY2020, the 20% increase in free ridership for LEDs in the CPS channel drove the NTG ratio down from 74% in PY2020 to 55% in PY2021.</p>

2.6.2 CWA

Changes in program administration resulting from the hand-off from OG&E internal implementation to third-party implementation by CLEAResult	The three Trade Allies that had been in the program since inception were replaced with four new Trade Allies.
	The program migrated from per-measure payments to per-kWh payments.
	The program met 49% of its net savings goal while spending 36% of its program budget.
	The program installed 2.47 measures at \$1,027 per home, compared to 6.40 measures at \$1,968 per home in PY2020.
Changes in tracking data from Frontier EnerTrek to CLEAResult DSMT System	Program tracking data now presents an individual measure in each line item, with multiple rows of data per home. This simplifies the process for energy savings calculations in the evaluation.
Changes in measures & services after hand-off to CLEAResult	Savings per-home increased from 1,129 to 3,430 kWh.
	Program NTG ratio increased from 84% to 97%.
	Increased funding by AOG has resulted in a decline in natural gas NEBs. In prior program years, AOG would run out of budget in the fourth quarter, and as a result OG&E would derive significant NEBs from homes that have gas service but received no funding from AOG. AOG claimed all available Therms in PY2021 – this resulted in lower NEBs for OG&E but overall improved cost-effectiveness (particularly with the Utility Cost Test) as OG&E and CLEAResult were able to better-focus program funds on obtaining electric benefits.
	The percent of survey respondents indicating that they are “Satisfied” or “Very Satisfied” with the program overall has declined from 97% to 81%.
Health & safety measure delivery	Prevalence of H&S measures has declined significantly, as spending per-participant has declined from \$84 to \$4, and the percent of participants receiving any H&S measures declined from 79% to .72%.

2.6.3 CEEP

<p>Staff are actively engaged with participating Trade Allies</p>	<p>OG&E staff have regular daily interactions with Trade Allies to answer questions and provide training. CLEAResult staff has regular one-on-one communications with Trade Allies about submitted projects. Information about program changes is generally provided to Trade Allies through the project review process.</p>
<p>Continuous Energy Improvement and Retrocommissioning have significantly increased their contribution to program-level savings</p>	<p>In PY2020, CEI and RCx totaled 245,803 gross kWh savings (less than 1% of total CEEP gross kWh). In PY2021, this has increased to 1,151,862 gross kWh (11% of total CEEP gross kWh). This is a significant and meaningful increase in CEEP savings, and this will be of increasing importance should commercial lighting savings potential decline due to saturation or advancing codes and standards.</p>
<p>Small Business Solutions significantly surpassed performance expectations</p>	<p>Prior to PY2021, OG&E and CLEAResult staff indicated concern for the performance of SBS as the small business sector had been significantly impacted by COVID-19 and the associated economic downturn. However, SBS outperformed expectations, with gross kWh increasing by 42% compared to PY2020 (constituting 12% of CEEP savings, compared to 9% in PY2020).</p>
<p>Midstream distributors are satisfied with the program, but stated that they believe the program would benefit from broader promotion</p>	<p>Although Midstream participating lighting distributors were satisfied with the program and its benefits, they reported a general lack of awareness of the program across their customer base. Distributors stated that their sales in the program would increase if the program was more broadly promoted so that customers were aware of this option prior to engaging with the distributor.</p>
<p>The COVID-19 pandemic has impacted small businesses across the country and in Arkansas significantly</p>	<p>As reported in the Census data analysis, many small business owners are working more hours and struggling with major challenges like supply chain issues, employee illness, and hiring challenges. For small businesses that lack a dedicated facility manager or sustainability team, capital projects and/or energy efficiency improvements may have been deprioritized as the pandemic has continued as new and more pressing challenges continue to arise.</p>

2.7 Progress on Previous Recommendations

In PY2020, nine 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 PY2020 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. Five out of nine recommendations have been adopted. These recommendations included improvements to program tracking data to further facilitate calculation of NEBS.
- 2) **Under consideration.** This applies most typically to larger recommendations that would require APSC approval and reflects recommendations that have neither been adopted nor explicitly rejected.
 - a. None of the recommendations were under consideration.
- 3) **Rejected.** This applies to recommendations which are reviewed by OG&E and rejected.
 - a. None of the recommendations were rejected.
- 4) **Not applicable.** This would apply to recommendations which are no longer applicable to the OG&E's portfolio.
 - a. One recommendation is not applicable. The Evaluators had included a recommendation pertaining to QA/QC for cross-program participation by CEI customers in other CEEP channels when this had already been a procedure in place by CLEAResult.
- 5) **In Progress.** This applies to recommendations which were included in the PY2020 EM&V and have been selected for adoption by OG&E or their implementation contractors, but for which the incorporation is not yet complete
 - a. Four of the nine recommendation is in progress. This includes recommendations that require broader changes in program practices, such as ensuring consistent naming conventions for projects in the pre-review phase to closed phase, ensuring greater detail for projects marked as "Custom" in tracking data, and improving incremental cost estimation for new construction projects.

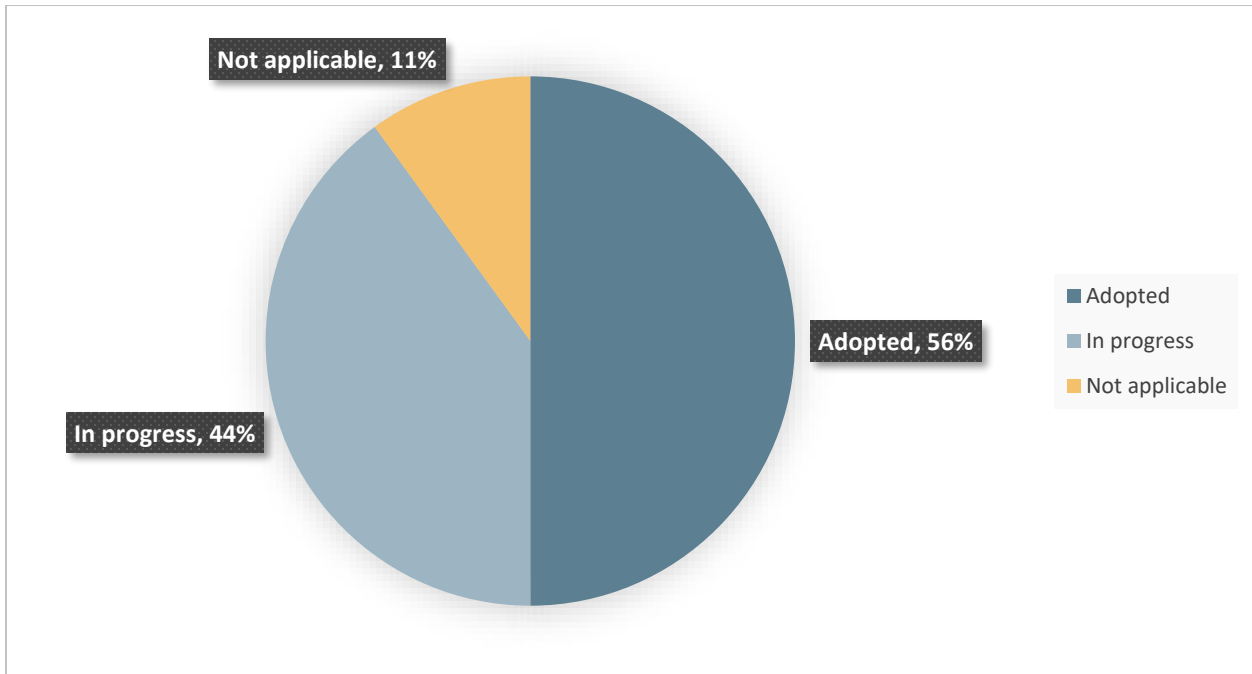


Figure 2-5 Status of PY2020 Recommendations (N=9)

2.8 Structure of the Report

This report is structured as shown below:

- Section 1 Introduction;
- Section 2 Executive Summary;
- Section 3 General Methodology;
- Section 4 Evaluation Findings;
- Section 5 HEEP Findings;
- Section 6 CWA Findings;
- Section 7 CEEP Findings;
- Appendix A – Portfolio Cost-Effectiveness;
- Appendix B – CEEP Custom Project Site-level Reports; and
- Appendix C – Net-to-Gross Approach and Outcomes.

3 General Methodology

3.1 Introduction

This section details general impact evaluation methods by program-type as well as data collection methods.

This section will present full descriptions of the following:

- Gross Savings Estimation;
- Sampling Methodologies;
- Free-Ridership and Spillover Determination;
- Process Evaluation Methodologies; and
- Data Collection Procedures.

The Evaluators would like to note that in several cases in this report, the summation of total savings, expenditures and other tracked metrics may be off by one due to rounding.

3.2 Glossary of Terminology

As a first step to detailing the evaluation methodologies, the Evaluators have provided a glossary of terms¹⁴ 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.
- **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. However, per the Arkansas TRM V8.2 Protocol F, “participants who would have installed the equipment within one year will be considered full free riders; 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).”
- **Gross Realization Rate** – The ratio of *Ex post* Gross Savings and *Ex ante* Gross Savings.
- **Participant** – A consumer who received a service offered through the subject efficiency program in each program year.

¹⁴ This is in addition to sections 1.2 Acronyms and Abbreviations and 1.3 Savings Types.

- **Net-to-Gross (NTG)** – A factor representing net program savings divided by gross program savings that is applied to gross program impacts, converting them into net program load impacts after adjustments for free ridership and spillover. $(1 - \text{Free-ridership \%} + \text{Spillover \%})$.
- **Spillover** – Reductions in energy consumption and/or demand caused by the presence of the energy efficiency program that exceeded 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 was drawn from several evaluation reference documents, such as the 2007 International Performance Measurement & Verification Protocol (IPMVP),¹⁵ 2004 California Evaluation Framework,¹⁶ 2006 Department of Energy (DOE) Energy Efficiency and Renewable Energy (EERE) Guide for Managing General Program Evaluation Studies¹⁷ and the AR TRM V8.2.

3.3 Overview of Methods

The evaluation of the PY2021 OG&E portfolio is intended to provide:

- Net impact results;
- Gross impact results; and
- Program feedback and recommendations via a process evaluation.

In doing so, this evaluation provides verified gross savings results, recommendations for program improvement, and ensures cost-effective use of ratepayer funds. Leveraging experience and lessons learned from this impact evaluation can provide guidance to improve both the programs and portfolio in the future.

3.4 Sampling

Sampling is necessary to evaluate savings for the portfolio inasmuch 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 were drawn to ensure +/- 10% precision at 90% confidence.

¹⁵ <https://www.nrel.gov/docs/fy02osti/31505.pdf>

¹⁶ http://www.calmac.org/publications/California_Evaluation_Framework_June_2004.pdf

¹⁷ http://energy.gov/sites/prod/files/2013/11/f4/pmguide_chapter_7.pdf

Programs were evaluated on one of three bases:

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

3.4.1 Census

A census of participant data was used for the HEEP CPS channel where such review was feasible. All program measures were evaluated.

3.4.2 Field Verification Rate

The Evaluators conducted field data collection to assess the verification rate for duct sealing, air infiltration, and ceiling insulation for the CWA.

3.4.3 Simple Random Sampling

For programs with relatively homogenous measures, the Evaluators conducted a simple random sample when surveying program participants. In PY2021 this applied to the CWA. The sample size for verification surveys was calculated to meet $\pm 10\%$ precision at 90% confidence (90/10). The sample size to meet 90/10 requirement was calculated based on the coefficient of variation of savings for program participants, defined as:

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

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 0.5 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

3.4.4 Stratified Sampling

For the CEEP, Simple Random Sampling was not an effective sampling strategy. 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.

Instead, we used a sample approach designed to select projects for the M&V sample that considers skewed data. With this approach, we selected several sites with large savings for the sample with certainty and then took a systematic random sample of the remaining sites. Once the certainty sites had been selected, the remaining sites were ordered according to the magnitude of their savings and then systematically random sampled. This ensured that any sample selected had some units with high savings, some with moderate savings, and some with low savings.

3.5 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. The Evaluators followed all applicable measure- and program-level guidelines and protocols from the AR TRM V8.2.

To evaluate gross program impacts, the Evaluators adjusted program-reported gross savings using the results of our research, relying primarily on engineering desk reviews, AR TRM V8.2 deemed savings calculation and on-site 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 AR TRM V8.2. Where sampling was used (for surveys and site visits), we designed a sampling plan to achieve a minimum precision of $\pm 10\%$ at 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 3-1 lists the impact analysis activities the Evaluators performed for the PY2021 EM&V.

Table 3-1 PY2021 Impact Evaluation Activities by Program

Program	CEEP	CWA	HEEP
Database and Document Review	X	X	X
Engineering Desk Review	X	X	X
Deemed Savings Review per the AR TRM	X	X	X
Leakage Analysis			X
Modeling	X		X
Load Data Analysis & Baseline Estimation	X		

Where applicable, more detailed engineering and econometric approaches are provided in the program chapter.

3.6 Estimation of Net Savings

Table 3-2 below summarizes the *ex post* net savings approach used in the PY2021 evaluations. Additional details and the reasons for taking the stated approach, survey administration procedures, and weighting approaches used for developing program-level net savings impacts are discussed in the program chapters.

Table 3-2 PY2021 *Ex post* Net Savings Approach

Program	Literature Reviews	Self-Report Surveys	Citation of Prior Program Year Surveys	Econometric Model	Not Applicable
HEEP	X		X	X	
CWA	X	X			
CEEP		X	X		

3.6.1 Residential Programs Net Savings Estimation Methodology

The Evaluators developed new NTG ratios for the following program offering:

- CWA:
 - The core weatherization program offering had NTG updated via participant surveying.
 - The Low-Income channel had assignment of 100% NTG validated by desk review.
- HEEP:
 - The retail lighting portion of the Consumer Products channel had NTG updated via econometric modeling.
 - Other channels and measures had NTGs that were based on either (1) NTG ratios develop for HEEP in PY2019-PY2020 evaluations or (2) developed based on literature reviews completed in PY2020 or PY2021.
- CEEP:
 - Large C&I Solutions and Small Business Solutions had NTG ratios updated via participant surveying.
 - Other channels used prior-year NTG ratios.

3.6.2 Econometric Modeling Approach for HEEP CPS Channel

This method of free ridership was developed through the estimation of a price response model which will be used to predict sales levels in the absence of the program.

The premise of the price response model is that the quantity of the subsidized product will vary based on the price of the product and how well they are promoted. The program tracking data includes sales for each retailer, by model number and week. For each retailer and model number combination, original retail price and program price data will be available. As program price discounts and/or retailer original pricing change throughout the year, the tracking data is updated, allowing for the comparison of same-model sales under slightly different pricing conditions. Price effects are the main program tool for encouraging the purchase of high efficiency lighting choices. Due to the inability to observe price effects for other program offerings, this approach will be used only for the lighting portion of the program.

The final price response model is used to estimate a free ridership as described in the equation below:

$$\text{Free ridership ratio} = \frac{\sum_i^n (E[\text{Product}_{NoProgram_i}] * kWh_i)}{\sum_i^n (E[\text{Product}_{Program_i}] * kWh_i)}$$

Where:

$E[\text{Product}_{NoProgram_i}]$ = the expected number of products, i, purchased given original retail pricing (as predicted by the model).

$E[\text{Product}_{Program_i}]$ = the expected number of products, i, given program discounted pricing (as predicted by the model).

kWh_i = the average kWh savings for product, i.

The price response modeling approach is advantageous in that it is built upon actual sales data from participating retailers (as opposed to relying solely on consumer self-report surveys). There are, however, many limitations for the approach. Most importantly, non-program sales data is not available for inclusion in the model. As a result, the modeling of price impacts fits program sales data well, but it is uncertain whether those price effects apply well to prices outside of program ranges. Additionally, the lack of non-program sales data means that for many product types and time ranges, the available sales data lists zero sales. These “zeroes” in most cases do not actually represent zero sales, but rather a lack of information because program pricing is not in effect for a given product during a given week, presenting a challenge in modeling the sales data using typical time-series or panel data methods. Finally, there are likely variables that affect sales levels for products that are not captured by the program

tracking data; thus, there is a risk of omitted variable bias in addition to the inherent amount of error from statistical modeling.

3.6.3 Commercial & Industrial (C&I) Programs

The Evaluators conducted primary research in the form of participant self-report to estimate the *ex post* net impacts of the CEEP downstream channels and applied the applied downstream NTG ratio to the midstream channel.

3.6.4 Free-ridership Approach

The net savings approach used in PY2021 applied several criteria to determine which portion of a participant's savings should be attributed to free ridership. The first criterion comes from the response to the following questions:

- "Would you have been financially able to install the equipment or measures without the financial incentive from the Program?"
- "To confirm, your organization would NOT have allocated the funds to complete a similar energy saving project if the program incentive was not available. Is that correct?"

If a customer answered "No" to the first question and confirms the response by saying yes to the second question, a free ridership score of 0 was assigned to the project. That is, if a customer required financial assistance from the program to undertake a project, that customer was not deemed a free rider.

For decision-makers who indicated they could undertake energy efficiency projects without financial assistance from the program, three additional factors determine what percentage of savings is attributable to free ridership. The three factors were:

- Plans and intentions of the 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 the decision-maker survey responses to develop binary variables indicating whether a participant showed free ridership behavior. The first required step is to determine if a participant stated that his or her intention was to install an energy efficiency measure without program assistance by applying a set of rules to the decision-makers survey response. 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 (Definition 1) indicating customer plans and intentions that likely signify free ridership were as follows:

- The respondent answered “yes” to the following two questions: “Did you have plans to install the measure before participating in the program?” and “Would you have gone ahead with this planned installation of the measure even if you had not participated in the program?”
- The respondent answered, “definitely would have installed” to the following question: “If the financial incentive from the program had not been available, how likely is it that you would have installed [Equipment/Measure] anyway?”
- The respondent answered “no, the program did not affect level of efficiency that we chose for equipment” in response to the following question: “How did the availability of information and financial incentives through the program affect the level of energy efficiency you chose for [Equipment/Measure]?”

The second, less restrictive criteria (Definition 2) indicating customer plans and intentions that likely signify free ridership were as follows:

- The respondent answered “yes” to the following two questions: “Did you have plans to install the measure before participating in the program?” and “Would you have gone ahead with this planned installation of the measure even if you had not participated in the program?”
- Either the respondent answered, “definitely would have installed” or “probably would have installed” to the following question: “Would you have completed the [Equipment/Measure] project even if you had not participated in the program?”
- The respondent answered “no, the program did not affect level of efficiency that we chose for equipment” in response to the following question: “How did the availability of information and financial incentives through the program affect the level of energy efficiency you chose for [Equipment/Measure]?”

The second required factor is determining if a customer reported that a recommendation from a program representative or experience with the program was influential in the decision to install a piece of equipment or measure. This criterion indicates that the program’s influence may lower the likelihood of free ridership when either of the following conditions were true:

- The respondent answered, “very important” to the following question: “How important was previous experience with the program in making your decision to install [Equipment/Measure]?”
- The respondent answered, “definitely not would have” or “probably not would have” to the following question: “If the program representative had not recommended

implementing the [Equipment/Measure], how likely is it that you would have implemented it anyway?”

- The third required factor is determining if a participant in the program indicated 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 higher likelihood of free ridership. The criteria indicating that previous experience may signify a higher likelihood of free ridership were as follows:
 - The respondent answered “yes” to the following question: “Not including the project that your organization received an incentive for in [PROGRAM YEAR], has your organization completed any significant energy efficiency projects in the last three years?” and the respondent states that they completed some of those projects without a program incentive.
 - The respondent answered “yes” to the following question: “Thinking about all of the projects you completed in the last three years, did you implement any energy efficient equipment or projects similar to the [Equipment/Measure] that you implemented at your facility located at [LOCATION] as part of any of those projects?”

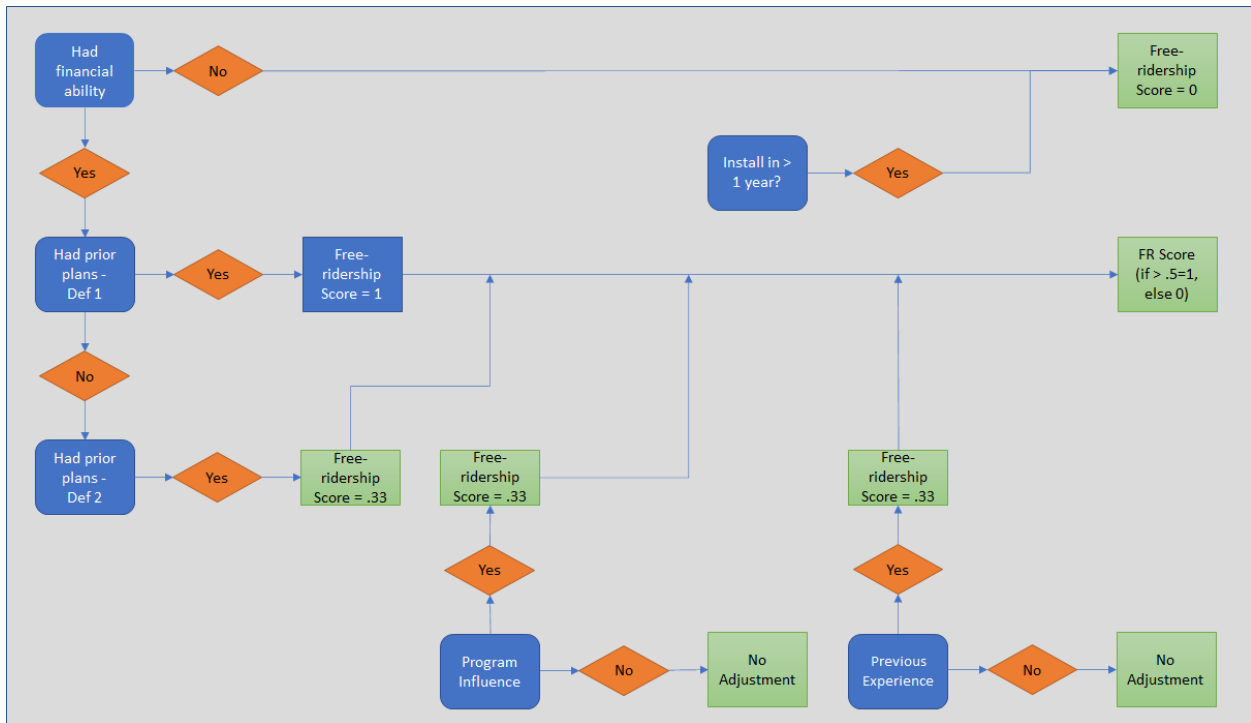


Figure 3-1 Non-residential Free-ridership Scoring Flow Chart

3.6.4.1 Participant Spillover Approach

To assess participant spillover savings, survey respondents were asked whether they implemented any additional energy saving measures for which they did not receive a program incentive. Respondents were also asked to provide information on the measures implemented for use in estimating the associated energy savings.

To determine if the savings from the reported measures were attributable to the program, survey respondents are asked questions about the degree to which their experience with the program influenced them to implement the measures and the likelihood of implementing the measures in the absence of the program.

Specifically, respondents were asked the following questions:

- SO1: How important was your experience with the [PROGRAM] in your decision to install this equipment?
- SO2: If you had NOT participated in the [PROGRAM], how likely is it that your organization would still have installed this equipment?

The responses to these questions were used to develop a spillover score as follows: Spillover = Average (SO1, 10 – SO2)

Savings from measures associated with a spillover score of 7 or greater were considered attributable to the program.

The final NTG estimate for the program is calculated as: NTG = 1 – free ridership + participant spillover

3.7 Deviation from the PY2021 EM&V Plans

The Evaluators attempted to interview Trade Allies for CEEP Large C&I Solutions and received hard refusals. This will be attempted again in PY2022.

3.8 Deviations from the AR TRM V8.2

The sections below outline where the Evaluators deviated from the AR TRM V8.2 in PY2021:

- CEEP: CoolSaver, the CLEAResult Work Paper¹⁸ was used for these projects.
- HEEP: CoolSaver, the CLEAResult Work Paper was used for these projects.
- HEEP: Water Dispensers/Coolers, this measure is not in the TRM V8.2, the Evaluators cited the New Orleans TRM V4.0¹⁹.

¹⁸ The CLEAResult CoolSaver work paper is updated annually and provided to the Evaluator by the Implementer.

¹⁹ https://cdn.energy-neworleans.com/userfiles/content/energy_smart/New_Orleans_TRM/New_Orleans_TRM_Version_4.pdf

3.9 Cost-Effectiveness Approach

The cost-effectiveness of OG&E's programs was calculated based on reported total spending, energy savings (kWh), and demand reduction (kW) for each of the energy efficiency programs. All spending estimates were provided by OG&E. The methods used to calculate cost-effectiveness are informed by the California Standard Practice Manual.²⁰

Additional information can be found in Appendix A: Portfolio Cost-Effectiveness.

3.10 Non-Energy Benefit (NEB) Approach

Electric energy efficiency programs claimed primary fuel savings after the installation of measures that achieve energy (kWh) savings and demand (kW) reductions. Savings are monetized with the avoided costs. In Arkansas, the IEM, in coordination with investor-owned utilities (IOUs) and other stakeholders through the Parties Working Collaboratively (PWC), has also acknowledged that other NEBs are associated with the implementation of these measures. These other benefits can include reductions in water usage, fossil fuel consumption, and avoided and deferred replacement costs.

These NEBs are an addition to Arkansas programs under the authorization of Arkansas TRM V8.2. 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 Non-Energy Benefits ("NEBs") in the Technical Reference Forum (p. 21 of 21):²¹

"The Commission therefore directs that the IEM be requested to recommend an approach for quantification of deferred equipment replacement NEBs in individual instances when they are material and quantifiable. Approval of deferred customer equipment NEBs, however, is conditioned as follows: The Commission directs that each recommended approach for customer deferred equipment replacement NEB quantification shall be included within the annual TRM update filing, and that its reasonableness shall be addressed in testimony by the IEM and/or Staff, and may be addressed by other parties, so that the Commission may approve or disapprove such proposed NEB quantifications.

²⁰ California Standard Practice Manual: Economic Analysis of Demand Side Management Programs, October 2001. Available at: http://www.cpuc.ca.gov/NR/rdonlyres/004ABF9D-027C-4BE1-9AE1-CE56ADF8DADC/0/CPUC_STANDARD_PRACTICE_MANUAL.pdf

²¹ Arkansas TRM V8.2, Protocol L.

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:

- o benefits of electricity, natural gas, and liquid propane energy savings (i.e., other fuels);*
- o benefits of public water and wastewater savings;*
- o benefits of avoided and deferred equipment replacement costs as conditioned herein.”*

Per this Protocol²² the recommended approach to quantify the NEBs will fall within these three categories.

3.10.1 Non-Energy Benefit (NEB) Protocols

Per Commission orders, NEBs are concentrated on other fuels, water, and deferred equipment costs. In response to the Commission Order for NEBs, a recent protocol addition is Protocol L, 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; and
- Protocol L3: Non-Energy Benefits of Avoided and Deferred Equipment Replacement Costs.

OG&E’s tracking system captures inputs needed for NEB calculations based on the AR TRM V8.2 algorithm. The Evaluators review included assessing the consistency of inputs for all assumptions for each measure.

3.11 Overview of Process Evaluation

The Evaluators took the following steps to determine the scope of the process evaluation for the PY2021 programs in OG&E’s portfolio.

3.12 General Approach

The Evaluators completed a limited process evaluation for all programs.

3.13 Justification for PY2021 Process Evaluation Approach

Process evaluations in general assess organizational and procedural aspects of programs to provide feedback on aspects of programs that are functioning well and contribute

²² Protocol L of the Arkansas TRM V8.2.

recommendations when areas of improvement are identified. The Evaluators have consulted and followed TRM V8.2 Volume 1 Protocol C, to determine whether conducting a process evaluation is appropriate for a specific program in the portfolio, as well as the appropriate timing for the process evaluation.

Protocol C defines the criteria that require a process evaluation be undertaken as well as criteria justifying conducting a process evaluation. Table 3-3 provides details on specific criteria that must be met prior to proceeding with a process evaluation.

Table 3-3 TRM V8.2 Volume 1 Protocol C: Process Evaluation Guidance

Criteria for Process Evaluations
Process evaluation required if... <ul style="list-style-type: none"> ■ Program is new/modified ■ No process evaluation has been undertaken during current funding cycle ■ A change in program implementation occurred.
Process evaluation potentially needed if... <ul style="list-style-type: none"> ■ Program impacts are lower than expected ■ Goals (both informational and educational) are not being achieved ■ Rates of participation are lower/slower than expected ■ Program’s operational system is slow to get up and running ■ Cost effectiveness of the program is less than expected ■ Participants (customers & market actors) report problems/low rates of satisfaction with program

After reviewing implementation of programs and process evaluation activities already completed in PY2021, including information provided by implementation contractors at the project kick-off meeting, the Evaluators identified the content in Table 3-4 below.

The table shows the criteria that would indicate that the conditions were appropriate to complete a process evaluation in PY2021.

Table 3-4 Determination of PY2021 Process Evaluation Structure and Timing

Criterion	HEEP	CWA	CEEP
New and innovative components	Yes	Yes	Yes
Process evaluation completed during funding cycle	Yes	Yes	No
New vendor or implementation Trade Ally	No	Yes	No
Impact problems	No	No	No
Information/educational objectives not met	No	No	No
Participation problems	No	No	No
Operational challenges	No	No	No
Program is cost effective	Yes	Yes	Yes
Negative feedback	No	No	No
Problems with program or low satisfaction	No	No	No
Level of Effort in PY2021	Limited	Limited	Limited

4 Evaluation Findings

This chapter provides a summary of the findings and any cross-cutting evaluation activities that occurred over the course of the PY2021 EM&V effort. Specifically, this chapter includes: a summary of program and portfolio performance in PY2021; a summary of EM&V activities and expenditures in PY2021; and high-level findings that cut across programs.

4.1 Summary of Evaluation Effort

Table 4-1 summarizes the EM&V expenditures by the Evaluators, total EM&V expenditures by all parties, and total program budgets.

Table 4-1 OG&E Portfolio PY2021 EM&V Expenditures

PY2021 EM&V Expenditures	PY2021 Portfolio Expenditures	EM&V as % of Expenditures
\$ 272,390	\$ 6,840,490	3.9%
Sums may differ due to rounding.		

To facilitate a thorough evaluation, the Evaluators conducted several primary research and data collection activities, including interviews with program and implementer staff, customer surveys, property manager interviews, and Trade Ally interviews. Specific PY2021 activities by program are listed in Table 4-2.

Table 4-2 Summary of PY2021 Data Collection Efforts

Program	Channel	# Site Visits	# Surveys	# Interviews ²³	# Staff Interviews	# Lit. Reviews
HEEP	CPS	0	0	0	7 ²⁴	1
	HVAC	0	0	0		0
	RSOL	0	48	0		6
	LivingWise®	0	324	0		1
CWA	N/A	56	57	0		1
CEEP	C&I Solutions	5	10	0		0
	SBS	5	26	0		0
	Midstream	0	0	3		0
	SAGE	0	0	0		0
	RCx	0	0	0		0
	CEI	0	0	0	0	
Total		66	465	3	7	9

²³ These interviews were performed with property managers, Trade Allies and other market actors, such as builders.

²⁴ Interviews were conducted with 4 OG&E and 3 CLEAResult staff. Several staff members participate in more than one program/channel.

4.2 Summary of Cost-effectiveness Results

Table 4-3 below outlines the results from the cost-effectiveness analysis performed on the PY2021 portfolio, by program, along with the net benefits for the total resource cost (TRC) test.

Table 4-3 Cost-Effectiveness by Program, PY2021

Program	TRC	UCT	RIM	PCT	TRC Net Benefits
HEEP	4.34	3.27	0.55	12.51	\$ 3,048,555
CWA	3.19	2.03	0.56	9.53	\$ 2,674,135
CEEP	3.02	3.16	0.54	7.90	\$ 9,388,080
EEA	0.00	0.00	0.00	0.00	\$ (5,204)
Total	3.22	2.96	0.54	8.69	\$ 15,105,567
Sums may differ due to rounding.					

The incorporation of NEBs into cost-effectiveness testing in Arkansas at times leads to what could historically be thought of as atypical results. For example, the HEEP and the CWA have a higher TRC than UCT. Under a narrower approach to TRC (without NEBs), the TRC would always be lower than the UCT under the assumption that incentives are less than or equal to incremental cost. However, with NEBs included the TRC score for these programs is greater than the UCT score because the aggregate impact of the NEBs and the penalty to benefits from the negative gas interaction is still a benefit of greater magnitude than the difference between measure incremental costs and incentive levels.

The TRC in PY2021 is higher than it was in PY2020 (2.48) and TRC net benefits are higher than PY2020 (\$12,567,109). In PY2020, the Evaluators updated the avoided costs, discount rates, lines losses and customer rates to align with the new triennial planning period of PY2020 to PY2022. In PY2021, the Evaluators adopted the same economic inputs as in PY2020 and will hold them constant throughout the planning period. The table below outlines the differences year-over-year.

Table 4-4 Cost Effectiveness Analysis: Economic Input Comparison

Discount Rates	PY2020	PY2021
Utility (TRC)	5.42%	5.42%
Utility (UCT)	5.42%	5.42%
Utility (RIM)	5.42%	5.42%
Societal (SCT)	1.29%	1.29%
Participant (PCT)	6.04%	6.04%
Line Losses		
Line Losses (demand)	7.83%	7.83%
Line Losses (energy)	7.25%	7.25%
Line Losses (therm)	2.67%	2.67%
Escalation rate	2.20%	2.20%
Avoided Costs		
Avoided Energy (\$/kWh)	\$ 0.03	\$ 0.03
Avoided Demand (\$/kW)	\$ 95	\$ 95
Avoided Natural Gas (\$/therm)	\$ 0.517	\$ 0.517
Avoided Water (\$/gallon)	\$ 0.008	\$ 0.008
Avoided Propane (\$/gallon)	\$ 2.33	\$ 2.38

4.2.1 Cost-effectiveness Methodology

See Appendix A: Portfolio Cost-Effectiveness of this report for additional details on the Evaluators approach.

4.2.1.1 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.

4.2.1.2 Marginal Line Losses

The Evaluators used marginal line loss inputs provided by OG&E for the cost benefit analysis.

4.2.2 Non-Energy Benefits (NEBs)

Below is a summary of the Non-Energy Benefits (NEBs) that were calculated in each program in PY2021.

- **HEEP:** this program captured propane (LivingWise® Schools Outreach), natural gas (Residential Solutions, Consumer Products and LivingWise® Schools Outreach), water

(Residential Solutions and LivingWise® Schools Outreach) and ARCs (Residential Solutions, Consumer Products and LivingWise® Schools Outreach).

- **CWA and LI pilot:** this program captured natural gas savings, propane savings, water savings and ARCs.
- **CEEP:** this program captured natural gas (C&I Solutions, SAGE, Midstream and Small Business Solutions) and ARCs (C&I Solutions, SAGE, Midstream and Small Business Solutions).

The tables below outline the potential NEBs for the PY2021 OG&E energy efficiency portfolio.

Table 4-5 PY2021 Residential NEBs by Measure²⁵

Measure	Water	Other Fuel	ARCs/ DRCs	AR TRM V8.2 Section
Advanced power strips				2.4.4
AC tune-up				2.1.5
Air infiltration		X		2.2.9
Ceiling insulation		X		2.2.2
Duct sealing - AC with resistance heat				2.1.11
Duct sealing - electric cooling with gas heat		X		2.1.11
Duct sealing - heat pump				2.1.11
Duct sealing electric resistance no cooling				2.1.11
ENERGY STAR® LEDs		X	X	2.5.1
ENERGY STAR® pool pumps				2.4.5
Faucet aerators	X	X		2.3.4
LED fixtures		X	X	2.5.1
Heat pump or AC Replacements				2.1.5
Low-flow showerheads	X	X		2.3.5
Smart thermostats		X		2.1.12
Water heater jackets				2.3.2
Water heater pipe insulation				2.3.3

²⁵ This tables represents potential NEBs for each measure. In some cases, there is either not enough data available to calculate those NEBs, or that NEB was not applicable in that application.

Table 4-6 PY2021 C&I NEBs by Measure

Measure	Water	Other Fuel	ARCs/ DRCs	AR TRM V8.2 Section
Anti-sweat heater controls				3.7.5
Commercial AC/HP tune-up				3.1.7
Commercial door air infiltration		X		3.2.11
Commercial showerheads	X			3.3.5
Computer power management				3.7.3
Custom - heating and cooling				N/A
Custom - non-heating and cooling	X			N/A
Custom - non-heating and cooling (lighting controls)				N/A
Custom controls (dual enthalpy economizer)				N/A
Refrigeration measures				3.4.1
Faucet aerators	X			3.3.2
High efficiency battery chargers		X	X	3.7.14
High intensity discharge (HID) lamps		X	X	3.6.3
Integrated ballast CFL lamps		X	X	3.6.3
Integrated ballast LED lamps		X	X	3.6.3
LEDs		X	X	3.6.3
Lighting controls		X	X	3.6.2
Low-flow pre-rinse spray valves	X		X	3.8.11
Magnetic ballast T5 or premium T8 retrofit of T12		X	X	3.6.3
Midstream: exterior fixtures		X	X	3.6.3
Midstream: interior fixtures		X	X	3.6.3
Midstream: interior lamps		X	X	3.6.3
Modular CFLs and CCFLs		X	X	3.6.3
Occupancy based controls (vending misers)				3.7.4
Occupancy-based PTHP/PTAC controls				3.1.14
Other linear fluorescents		X	X	3.6.3
Refrigeration door gaskets				3.7.8
Refrigeration strip curtains				3.7.7
Smart thermostats		X		N/A
Unitary and split system AC/HP equipment				3.1.18
Variable frequency drives				N/A

NEB estimates are found in each of the program chapters within this report. There are no deferred replacement costs (DRC) estimated for the PY2021 portfolio.

4.2.3 NEBs Impact

The figure below summarizes total TRC benefits by program and by category.

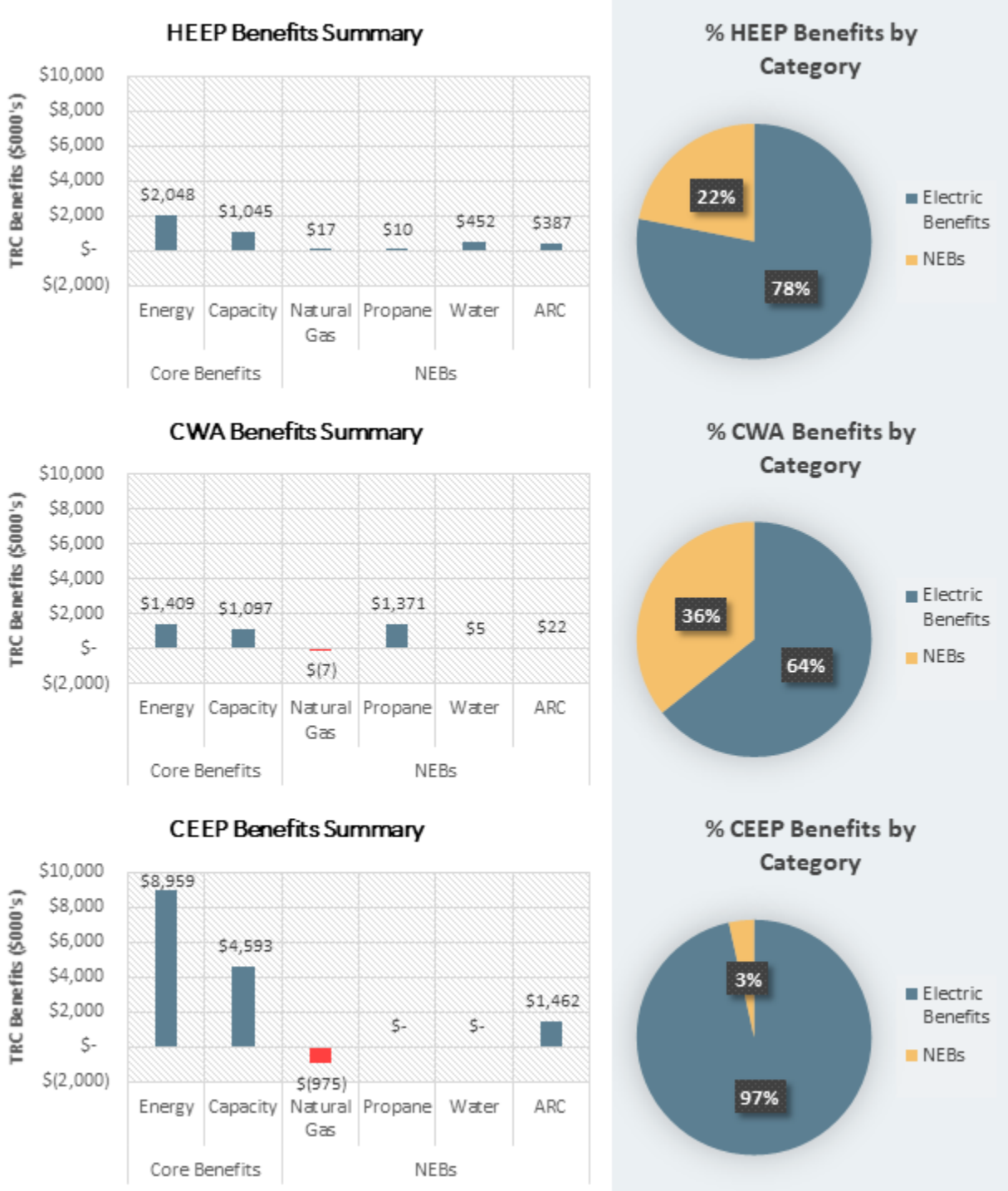


Figure 4-1 NEBs TRC Impact by Program

4.3 Tests of Portfolio Comprehensiveness

This section outlines how the OG&E portfolio performed against the seven factors developed by the IEM and the Parties Working Collaboratively (PWC).²⁶

The Evaluators reviewed the OG&E programs and portfolio to assess whether it complied 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.

This section will reflect the results for all programs in PY2021.

4.3.1 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.

The Evaluators determined that OG&E met the objectives of Factor 1.

4.3.1.1 *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.

²⁶ Docket No. 08-144-U, "Order defining "comprehensive" in the planning, approval and implementation of essential energy efficiency services," found here: http://www.apscservices.info/pdf/07/07-085-tf_183_1.pdf

- Thirty-seven percent of CWA respondents stated they learned about the program from bill inserts or marketing mailers sent by the program. Twenty-one percent learned about the program by word-of-mouth from friends and relatives.

The scoring for customer education is in Table 4-7.

Table 4-7 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
HEEP	●	●	●	●
CWA	●	●	●	N/A
CEEP	●	●	●	●

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

The scoring for Trade Ally training is in the table below. The Evaluators reviewed each OG&E program to assess 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.

All OG&E programs have components that are trade-ally driven. All interviewed Trade Allies indicated satisfaction with the residential programs.

The Evaluators note, however, that new Trade Allies in the CWA have not been installing the same breadth of comprehensive measures as observed in prior iterations of the program. The average measures per home declined from 6.40 to 2.47. In the Low-Income Pilot, fewer than 5% of participants received any health and safety spending.

Table 4-8 Assessment of Trade Ally Training

Program	Trade Ally Training Offered	Training Requirements Adhere to Best Practices	Trade Allies Participate in Training
HEEP	●	●	●
CWA	●	○	●
CEEP	●	●	●

4.3.1.3 *OG&E 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.

The scoring for marketing and outreach is in Table 4-9.

Table 4-9 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
HEEP	●	●	●	●
CWA	●	◐	◐	●
CEEP	●	●	●	●

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.
- Trade Allies market the programs through neighborhood canvassing, road signs, and flyers.
- Trade Allies in the CWA have not promoted the full breadth of the program, having provided a lower amount of measures per-home than compared to past program years (and compared to the prior Trade Ally network).

4.3.2 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.

The Evaluators determined that OG&E achieved the Factor 2 objectives for HEEP and CEEP but did not meet this objective for CWA.

4.3.2.1 In most cases, program budgets were sufficient to implement the programs.

In PY2021, at a portfolio level, OG&E achieved its energy savings (kWh) and demand reduction (kW) targets while spending 69% of its allocated budget²⁷, and at an overall levelized cost of \$0.025/kWh. HEEP met 121% of its net energy savings goal while spending 88% of its budget. CEEP achieved 128% of the energy savings goal while spending 88% of its allocated budget. However, the CWA only met 57% of its net savings goal while spending 36% of its 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.²⁸ The CWA program had a higher levelized acquisition cost than any other program, at \$0.036/kWh (a 32% decrease from the levelized cost of \$0.053 found in PY2020). HEEP had a levelized acquisition cost of \$0.021 and CEEP was \$0.025.

Program and implementation staff reported that, overall, they had sufficient budget to cover program implementation in PY2021. Table 4-10 shows the spending and energy savings percentages for each program, along with the cost per kWh of savings.

In PY2021, CWA did not reach goal. While participation is lower than in past program years (837 homes, compared to 1,184 in PY2020), the Evaluators note that the number of measures per home declined in PY2021. In the transition to CLEAResult, the program turned over to a new network of four Trade Allies (with all three preexisting Trade Allies exiting the program). The new Trade Allies did not provide as many multi-measure projects and significantly underspent compared to expectations in installation of health & safety measures.

Table 4-10 PY2021 Budget Allocation and Program Goal Attainment

Program	Spending (Percentage of Budget)	Energy Savings (Percentage of Goal)	Levelized (\$ per kWh)
HEEP	88%	121%	\$ 0.021
CWA	36%	57%	\$ 0.036
CEEP	88%	128%	\$ 0.025
Total²⁹	69%	113%	\$ 0.025

²⁷ This factors out EEA budgets (total budget of \$20,760, total spend of \$5,204). If those budgets are included in this analysis, OG&E expenditures are 74% of planned budget.

²⁸ 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>

²⁹ Total is the percent of program-specific spend compared to program-specific budgets. This excludes EEA.

The scoring for Factor Two is in Table 4-11.

Table 4-11 Assessment of Budgetary, Management, and Delivery Resources

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
HEEP	●	●	●	●
CWA	●	●	●	○
CEEP	●	●	●	●

4.3.3 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. The Evaluators determined that OG&E continued to meet the objectives of Factor 3 in PY2021.

4.3.3.1 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 V8.2 were utilized by the residential programs.
- 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, including HVAC, building envelope, and process equipment improvement.

The scoring for this factor is in Table 4-12.

Table 4-12 Assessment of End-uses Addressed by Program

Program	HVAC	Lighting	Weatherization	Industrial Process	Behavioral
HEEP	●	●	●	N/A	N/A
CWA	●	●	●	N/A	N/A
CEEP	●	●	N/A	●	●

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 residential portion of 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 (44% of the residential customer count³⁰). With the need of a control group, a behavioral program would likely encompass most of OG&E's service territory. Behavioral marketing is likely best-driven through Energy Efficiency Arkansas (EEA) which receives funding from all Arkansas IOUs.
- **Smart thermostats.** OG&E opted to remove smart thermostats from HEEP. This measure has been cost-effective in other AR utility portfolios and should be reconsidered for inclusion.

4.3.4 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.

The Evaluators found that OG&E met the Factor 4 objectives in most respects in PY2021. The Evaluators note that the PY2021 CWA had a notable decline in project comprehensiveness.

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

The OG&E portfolio has programs that bundle on-site 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.

³⁰ Per the EIA Form 861, OG&E has 57,189 residential customers in Arkansas as of December 2021.

4.3.4.2 *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 or bundled incentives for premium efficiency measures at this time.

The CWA moved to a per-kWh payment structure for Trade Allies, and in PY2021 the Evaluators note a decline in project comprehensiveness compared to prior program years. This has corresponded with increased cost-effectiveness, however.

Table 4-13 provides an overview of the scoring for this Factor.

Table 4-13 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
HEEP	●	●	●	●	●
CWA	●	●	○	○	○
CEEP	●	●	●	●	●

4.3.5 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, the Evaluators 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.

The Evaluators found that OG&E mostly met the Factor 5 objectives in PY2021. While OG&E has successfully targeted, and leveraged, industry partners for many market segments in CEEP, the Evaluators recommend expanding mobile home industry organizations.

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 CWA 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 including professional organizations, trade groups, universities, and homeowner’s associations.

The program targeted residence that are 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. Table 4-14 summarizes the comprehensiveness of offerings for each program.

Table 4-14 Assessment of Targeted Customer Sectors by Program

Program	Residential	Multifamily	Mobile Home	Small Commercial	Large Commercial	Industrial	Agricultural	Public Sector
HEEP	●	●	◐	N/A	N/A	N/A	N/A	N/A
CWA	●	N/A	●	N/A	N/A	N/A	N/A	N/A
CEEP	N/A	N/A	N/A	●	●	●	●	●

4.3.6 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 PY2021, the Evaluators assessed three key performance indicators: 1) whether programs achieved their Plan goals, 2) NTG values, and 3) program cost-effectiveness.

4.3.6.1 Goal Achievement

In PY2021 CEEP and HEEP achieved their energy savings targets, but CWA did not. In PY2021, the portfolio exceeded its net energy savings (kWh) goal by 13% the same margin as observed in PY2020.

4.3.6.2 Cost-Effectiveness Results and NTG

OG&E’s portfolio is cost effective, as demonstrated with Total Resource Cost (TRC), Utility Cost Test³¹ (UCT), and Participant Cost (PCT) test ratios greater than 1.0. The portfolio-level TRC test ratio is 3.22 and all programs achieved TRC ratios above 1.0. The portfolio achieved UCT ratio of 2.96, which looks at cost effectiveness from the utility perspective. The portfolio-level PCT is 8.69. The programs and portfolio failed the RIM (0.54).

Table 4-15 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 4-15 Portfolio NTG and Cost Effectiveness Results

Program	Verified Net Savings (kWh)	NTG	TRC	UCT	RIM	PCT
HEEP	4,118,059	73%	4.34	3.27	0.55	12.51
CWA	2,770,015	97%	3.19	2.03	0.56	9.53
CEEP	21,652,466	100%	3.02	3.16	0.54	7.90
Portfolio	28,540,540	94%	3.22	2.96	0.54	8.69

Table 4-16 outlines the scoring for Factor Six.

Table 4-16 Assessment of Cost Effectiveness

Program	NTG Ratio	NTG Ratio Within Industry Norms	Met Net Savings Goal	Program TRC
HEEP	73%	●	●	4.34
CWA	97%	●	●	3.19
CEEP	100%	●	●	3.02

4.3.7 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.

³¹ The UCT is, in some cases, referred to as the Program Administrator Cost Test (PACT).

To assess Factor 7, the Evaluators reviewed performance indicators, including: 1) whether the EM&V Plan conforms to the TRM V8.2³², 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.

Below we summarize the PY2021 EM&V procedures' compliance with each of these evaluation metrics.

The EM&V Plan conformed to the TRM V8.2.

The Evaluators drew extensively on the AR TRM V8.2 to calculate deemed savings. Any deviation from the TRM has been explained in corresponding sections of the program.

The EM&V Plan was approved by the IEM.

The Evaluators prepared a comprehensive EM&V Plan for PY2021 and submitted it to OG&E and the IEM for review. The Evaluators received several comments from the IEM regarding areas for refinement or additional detail. In most cases, the IEM requested greater detail in the description of EM&V activities, and wherever possible, the Evaluators addressed these.

During the course of the Evaluation, if there were instances where the Evaluators needed to deviate from the original EM&V Plans, the Evaluators communicated the change to the IEM for their feedback and approval.

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

OG&E and its implementers were very responsive to the Evaluators' data requests and accessing data through CLEAResult's DSMT database was straightforward and productive.

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

- **Custom M&V Plans:** For custom projects implemented through the C&I programs, the implementer provided M&V plans that were reviewed by the Evaluator prior to project implementation. The early collaboration on M&V plans and data collection activities allow both implementer and Evaluators 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.

³² At the time of developing the EM&V Plans, Arkansas TRM V8.2 had not been filed. The plan was checked against V8.1 after this version was released to ensure there were no conflicts as a result of the TRM update, and the plan was found to be compliant with V8.1 Protocols as well.

- Data Transfer and Data Quality:** While there were some data integrity issues experienced, the Evaluators found that OG&E and their implementation partners, CLEAResult and AM Conservation Group (AM Conservation), were all 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 AR TRM V8.2 algorithms versus the use of simplifying assumptions.

The scoring for Factor Seven is found in Table 4-17.

Table 4-17 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
HEEP	●	●	●	●
CWA	●	●	●	●
CEEP	●	●	●	●

CWA tracking previously did not track building type or propane use. This was corrected as part of the migration to a new tracking platform beginning with PY2021.

In PY2021, CWA staff perform QA/QC inspections on 10% of all sites in the program.

The table below is a summary of the net present value (NPV) of all NEBs in the PY2021 OG&E portfolio.

Table 4-18 PY2021 OG&E NEB Findings Summary

Program	NPV NGS (\$)	NPV LPGS (\$)	NPV of Water/WW (\$)	NPV ARC (\$)	Total NPV of NEBs (\$)
HEEP	\$ 17,486	\$ 10,481	\$ 451,906	\$ 387,422	\$ 867,296
CWA	\$ (7,410)	\$ 1,371,348	\$ 4,718	\$ 22,351	\$ 1,391,007
CEEP	\$ (975,278)	\$ -	\$ -	\$ 1,462,243	\$ 486,965
Total	\$ (965,202)	\$ 1,381,830	\$ 456,624	\$ 1,872,016	\$ 2,745,268

Sums may differ due to rounding.

4.4 Portfolio-Level Recommendations

Consider issuing a Request for Information (RFI) for Program Innovations	<p>The portfolio spent 68% of its available budget (excluding EEA). OG&E will need to position itself to make up a significant loss in savings when the EISA backstop takes effect (essentially negating 36% of their residential portfolio savings).</p> <p>An RFI may provide avenues to develop new program ideas and would come without the obligation to hire a specific vendor. RFI program groupings could be categorized in terms of AMI-reliant and non-AMI-reliant program offerings.</p> <p>Another avenue for this type of program development could be via an innovations pilot fund.</p>
Consider different avenues of measure consolidation / streamlining	<p>The residential portfolio now includes numerous avenues for building envelope improvements (RSOL, CWA, Act 1102 Low Income Pilot). This invites the possibility of customer or Trade Ally confusion in terms of where to apply for what measure, and may open the risk of “gaming”, should Trade Allies find that a home is more advantageous in one program or another.</p> <p>OG&E and their implementers should address the current matrix of overlapping residential offerings and identify cases where either applicant confusion or Trade Ally “gaming” may occur and develop a more streamlined participation roadmap.</p>

5 Home Energy Efficiency Program (HEEP)

5.1 Overview of Evaluation Findings

Table 5-1 PY2021 HEEP Energy Savings Summary

Channel / Measure	<i>Ex ante</i> Gross Energy Savings (kWh)	Realization Rate (kWh)	<i>Ex post</i> Gross Energy Savings (kWh)	NTG (kWh)	<i>Ex post</i> Net Energy Savings (kWh)
Consumer Products	3,300,311	118%	3,886,784	64%	2,490,994
Advanced Power Strips	220,298	100%	220,298	52%	114,555
Bathroom Ventilation Fan	1,315	53%	698	73%	512
ES Room Air Purifier	18,740	100%	18,689	73%	13,705
LEDs (Food Bank)	783,045	100%	783,045	100%	783,045
LEDs (Specialty)	481,363	126%	607,760	55%	335,605
LEDs (Standard)	1,738,801	127%	2,203,829	55%	1,216,955
Water Dispenser	12,045	100%	12,045	73%	8,833
Window AC Replacement	44,704	90%	40,418	44%	17,784
HVAC Replacement & Tune-up	488,605	121%	591,749	92%	543,523
Central AC Replacement	26,939	100%	26,939	81%	21,820
Central AC Tune-up: M&V	10,121	100%	10,140	75%	7,605
Central AC Tune-up: Modeled	20,213	100%	20,217	75%	15,163
Central HP Tune-up: M&V	3,829	100%	3,836	100%	3,836
Central HP Tune-up: Modeled	393,936	100%	394,008	100%	394,008
Central HP Replacement	33,567	407%	136,608	74%	101,090
Residential Solutions	764,276	110%	844,131	95%	798,078
Advanced Power Strips	59,925	96%	57,439	78%	44,802
Air Infiltration	67,780	100%	67,822	100%	67,822
Ceiling Insulation	554	100%	554	100%	554
Duct Sealing	549,487	115%	629,990	100%	629,990
ES Pool Pumps	12,557	119%	14,982	90%	13,484
ES Windows	45,960	100%	45,950	44%	20,218
Faucet Aerators	208	100%	208	87%	181
LEDs (Standard)	23,967	98%	23,383	74%	17,303
Low-Flow Showerheads	618	92%	570	86%	490
Wall Insulation	3,219	100%	3,233	100%	3,233
LivingWise® Schools Outreach	383,437	86%	329,975	87%	285,464
Advanced Power Strips	184,324	93%	170,522	78%	133,007
Bathroom Aerators (1.0 GPM)	25,901	75%	19,518	98%	19,128
Kitchen Aerators (1.5 GPM)	16,821	77%	13,030	98%	12,769
Showerheads (1.5 GPM)	156,390	81%	126,905	95%	120,560
HEEP Total	4,936,629	115%	5,652,639	73%	4,118,059
Sums may differ due to rounding.					

Table 5-2 PY2021 HEEP Demand Reduction Summary

Channel / Measure	<i>Ex ante</i> Gross Demand Reductions (kW)	Realization Rate (kW)	<i>Ex post</i> Gross Demand Reductions (kW)	NTG (kW)	<i>Ex post</i> Net Demand Reductions (kW)
Consumer Products	545	126%	687	63%	434
Advanced Power Strips	25	100%	25	52%	13
Bathroom Ventilation Fan	0.16	98%	0.16	73%	0.12
ES Room Air Purifier	2	100%	2	73%	2
LEDs (Food Bank)	127	100%	127	100%	127
LEDs (Specialty)	78	140%	110	55%	60
LEDs (Standard)	283	140%	397	55%	219
Water Dispenser	1	100%	1	73%	1
Window AC Replacement	28	87%	25	44%	11
HVAC Replacement & Tune-up	123	98%	121	94%	114
Central AC Replacement	13	100%	13	81%	10
Central AC Tune-up: M&V	6	100%	6	75%	5
Central AC Tune-up: Modeled	12	100%	12	75%	9
Central HP Tune-up: M&V	1	100%	0.90	100%	1
Central HP Tune-up: Modeled	89	100%	89	100%	89
Central HP Replacement	2	8%	0.16	74%	0.12
Residential Solutions	165	112%	185	89%	165
Advanced Power Strips	8	96%	7	78%	6
Air Infiltration	20	100%	20	100%	20
Ceiling Insulation	0.33	100%	0.33	100%	0.33
Duct Sealing	98	120%	118	100%	118
ES Pool Pumps	3	119%	3	90%	3
ES Windows	31	100%	31	44%	13
Faucet Aerators	0.02	100%	0.02	87%	0.02
LEDs (Standard)	4	98%	4	74%	3
Low-Flow Showerheads	0.06	99%	0.06	86%	0.05
Wall Insulation	2	90%	1	100%	1
LivingWise® Schools Outreach	56	65%	36	87%	31
Advanced Power Strips	35	56%	20	78%	15
Bathroom Aerators (1.0 GPM)	3	75%	2	98%	2
Kitchen Aerators (1.5 GPM)	2	78%	1	98%	1
Showerheads (1.5 GPM)	16	81%	13	95%	13
HEEP Total	889	116%	1,030	72%	744
Sums may differ due to rounding.					

Table 5-3 outlines the PY2021 HEEP *ex post* gross, and net lifetime energy (kWh) savings.

Table 5-3 PY2021 HEEP Lifetime Savings Summary

Channel / Measure	EUL ³³	<i>Ex post</i> Gross Lifetime Energy Savings (kWh)	<i>Ex post</i> Net Lifetime Energy Savings (kWh)
Consumer Products	18	71,426,405	46,040,091
Advanced Power Strips	10	2,202,984	1,145,552
Bathroom Ventilation Fan	19	13,271	9,732
ES Room Air Purifier	9	168,201	123,342
LEDs (Food Bank)	19	14,877,859	14,877,859
LEDs (Specialty)	19	11,746,489	6,486,411
LEDs (Standard)	19	41,872,758	23,122,137
Water Dispenser	10	120,450	88,326
Window AC Replacement	11	424,393	186,733
HVAC Replacement & Tune-up	11	6,782,005	6,046,209
Central AC Replacement	19	511,837	414,588
Central AC Tune-up: M&V	9	87,573	65,680
Central AC Tune-up: Modeled	10	193,454	145,091
Central HP Tune-up: M&V	9	33,131	33,131
Central HP Tune-up: Modeled	10	3,770,279	3,770,279
Central HP Replacement	16	2,185,731	1,617,441
Residential Solutions	17	14,256,872	13,484,306
Advanced Power Strips	10	574,389	448,024
Air Infiltration	11	746,045	746,045
Ceiling Insulation	20	11,082	11,082
Duct Sealing	18	11,339,823	11,339,823
ES Pool Pumps	10	149,820	134,838
ES Windows	20	918,997	404,359
Faucet Aerators	10	2,077	1,807
LEDs (Standard)	19	444,279	328,766
Low-Flow Showerheads	10	5,700	4,902
Wall Insulation	20	64,659	64,659
LivingWise® Schools Outreach	10	3,299,753	2,854,643
Advanced Power Strips	10	1,705,217	1,330,069
Bathroom Aerators (1.0 GPM)	10	195,182	191,278
Kitchen Aerators (1.5 GPM)	10	130,300	127,694
Showerheads (1.5 GPM)	10	1,269,055	1,205,602
HEEP Total	17	95,765,035	68,425,249
Sums may differ due to rounding.			

Table 5-4 outlines the NEB estimates for the PY2021 HEEP.

³³ EULs for tune-up measures sourced from CLEAResult CoolSaver workpaper.

Table 5-4 *Ex post* Net Non-Energy Benefit (NEB) Estimates for HEEP

Channel / Measure	<i>Ex post</i> Net ARCs (\$)	<i>Ex post</i> Net Propane Savings (gallons)	<i>Ex post</i> Net Natural Gas Savings (therms)	<i>Ex post</i> Net Water Savings (gallons)
Consumer Products	\$ 384,220	0	(14,181)	0
Advanced Power Strips	N/A	0	0	0
Bathroom Ventilation Fan	N/A	0	0	0
ES Room Air Purifier	N/A	0	0	0
LEDs (Food Bank)	\$ 144,855	0	(5,086)	0
LEDs (Specialty)	\$ 61,173	0	(1,966)	0
LEDs (Standard)	\$ 178,192	0	(7,129)	0
Water Dispenser	N/A	0	0	0
Window AC Replacement	N/A	0	0	0
HVAC Replacement & Tune-up	\$ -	0	0	0
Central AC Replacement	N/A	0	0	0
Central AC Tune-up: M&V	N/A	0	0	0
Central AC Tune-up: Modeled	N/A	0	0	0
Central HP Tune-up: M&V	N/A	0	0	0
Central HP Tune-up: Modeled	N/A	0	0	0
Central HP Replacement	N/A	0	0	0
Residential Solutions	\$ 3,201	0	17,440	6,721
Advanced Power Strips	N/A	0	0	0
Air Infiltration	N/A	0	7,653	0
Ceiling Insulation	N/A	0	90	0
Duct Sealing	N/A	0	7,826	0
ES Pool Pumps	N/A	0	0	0
ES Windows	N/A	0	686	0
Faucet Aerators	N/A	0	0	1,874
LEDs (Standard)	\$ 3,201	0	(133)	0
Low-Flow Showerheads	N/A	0	0	4,847
Wall Insulation	N/A	0	1,319	0
LivingWise® Schools Outreach	\$ -	504	3,017	6,569,993
Advanced Power Strips	\$ -	0	0	0
Bathroom Aerators (1.0 GPM)	\$ -	63	379	994,412
Kitchen Aerators (1.5 GPM)	\$ -	42	253	662,388
Showerheads (1.5 GPM)	\$ -	399	2,386	4,913,193
HEEP Total	\$ 387,422	504	6,276	6,576,713
Sums may differ due to rounding.				

Figure 5-1 below represents measure installations that were performed in PY2021, by month. There were multiple months in which the participation spiked for each of the four HEEP channels. This suggests that the channels may not have been implemented simultaneously. The spike in March for CPS was a result of rebate processing backlog for January through March. The spike in August from CPS was due to the timing of Food Bank giveaways.

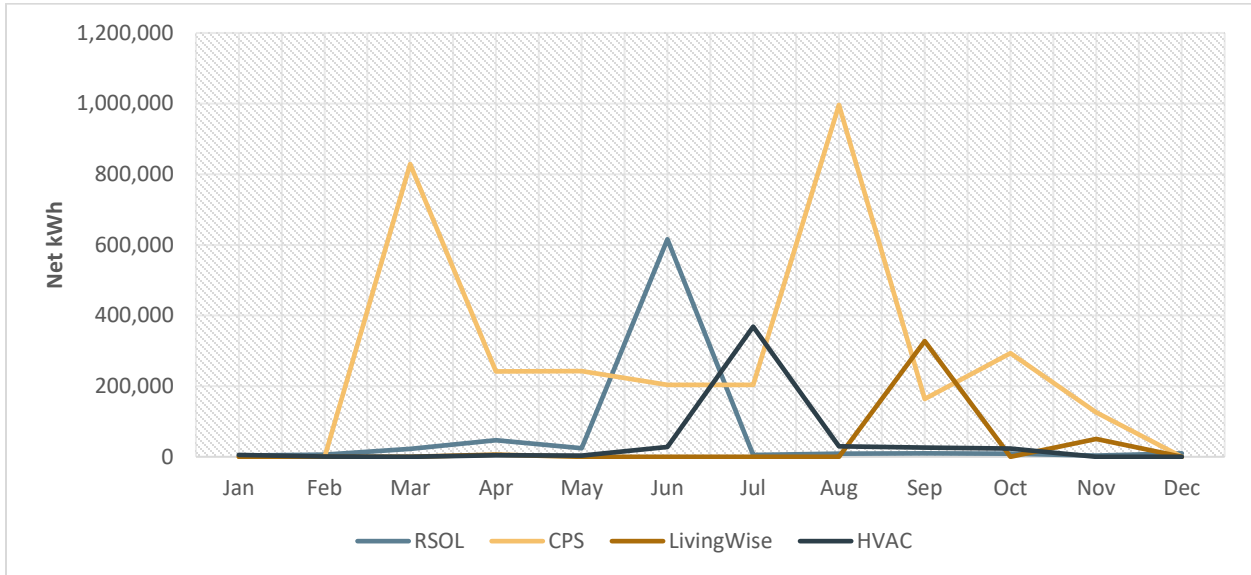


Figure 5-1 PY2021 *Ex ante* Energy Savings (kWh) by Month, installed in PY2021

Additional details (including evaluation approaches) are found in the following sections.

5.2 Program Overview

The HEEP program offering in PY2021 was a multipronged approach that is designed to incentivize residential customers to reduce the energy consumption of their homes. It provides the customer multiple avenues for participation, including Residential Solutions, LivingWise® Schools Outreach, HVAC Replacement and Tune-up, and Consumer Product Solutions channels.

5.2.1 Residential Solutions

The RSOL channel is designed to provide direct install measures to residential customers. The program promotes energy efficiency by offering home assessments to both detached single-family and individually metered multi-family residential customers.

The program helped residents achieve electric savings by consulting with a contractor or OG&E representative, who helped analyze their energy use, identify energy efficiency improvement projects, and install low-cost energy saving measures at participant homes.

Key elements of the Residential Solutions offering include:

- **Customer engagement:** A variety of customer intake channels are made available through this program including phone, email and web.
- **Contractors or OG&E representatives:** These individuals are available to participants and potential participants in the program to provide information on the benefits and costs of energy efficient projects. They have the knowledge to discuss the potential options customers have and assist in defining the best path for them to take based on their individual situation.
- **Incentive application:** Applications are developed for customers to submit to the program for installed eligible measures. The program will conduct a QA/QC review of all applications to ensure that all required information and documentation has been provided.
- **Incentive payment:** Trade Allies receive payment checks directly from the program for approved applications of installed eligible equipment and measures. Customers receive payment checks on a case-by-case basis if it is deemed necessary and fits within the established program guidelines.
- **Project Verification & Quality Assurance:** A detailed QA/QC protocol was established to ensure technical and programmatic compliance by participating Trade Allies.

5.2.2 LivingWise® Schools Outreach

This channel includes an outreach channel targeted at elementary school students and was designed to provide an educational opportunity to learn about energy efficient opportunities in their home. This approach included an established teaching curriculum that teachers use to review and teach their students what activities they can do to help save energy. The students were given an energy efficiency kit with easy to install measures (e.g., LEDs, aerators, showerheads, etc.) that they took home to have their guardians help them install.

This channel is targeted at sixth grade school students and included a survey for the students to fill out at home and return to their teacher. Teachers received the completed survey responses and submitted them to the program.

5.2.3 HVAC Replacement & Tune-up Channel (HVAC)

The objective of the HVAC Replacement and Tune-up channel (HVAC) was to generate energy and demand savings from residential HVAC systems through replacement of older inefficient equipment, or a tune-up of customer's existing HVAC system to optimize its operation and efficiency, effectively reducing energy intensity. This offering was designed as a market-driven approach that utilizes local HVAC contractors for completion of the work.

When customers contacted the program, the project team referred them to available contractors or scheduled an appointment for them. Contractors completed the tune-up or

HVAC unit replacement, as well as the data collection on system performance and the paperwork required to submit for the applicable program rebates. Once the application passed the program requirements review, it was processed, and the rebate was paid.

5.2.4 Consumer Products Solutions

The objective of the Consumer Products Solutions (CPS) channel was to achieve cost-effective energy savings by incenting and educating customers to purchase residential lighting and appliances through downstream, upstream, and midstream channels. Appliances offered in CPS include advanced power strips, smart thermostats, and window ACs. In PY2021, CPS added ENERGY STAR® room air purifiers, bathroom ventilation fans, and water dispensers.

The program developed relationships with participating partners and educating consumers to influence their purchasing behavior and by ensured that retailers make energy efficient products available at discounted prices to OG&E residential customers.

The PY2021 CPS channel also distributed LEDs through food banks. The participating food banks received the LEDs from CLEAResult and packed them into food boxes. At the food pantry, each food box is given to an Arkansas resident, who may or may not be an OG&E customer. The food box contains one four-pack of LEDs. This channel aims to target at all residential customers living within the OG&E Arkansas service territory.

To estimate total participation in HEEP, the Evaluators assumed that total packages of LEDs sold or distributed through CPS would equal the total number of participant households. Under this assumption, 37,566³⁴ homes participated in the HEEP in PY2021. Table 5-5 summarizes the total households, total measures and the *ex ante* gross kWh and peak kW savings, by measure.

Table 5-5 PY2021 HEEP Participation Summary by Channel

Channel	Number Participants/ Households	Total Quantity of Measures	<i>Ex ante</i> Gross Energy Savings (kWh)	<i>Ex ante</i> Gross Demand Reductions (kW)	Incentives
Residential Solutions	382 ³⁵	2,119	764,276	165	\$ 132,216
LivingWise® Schools Outreach	1,694	6,776	383,437	56	\$ 91,079
HVAC Replacement & Tune-up	255	261	488,605	123	\$ 63,065
Consumer Products Solutions	34,401 ³⁶	116,397 ³⁷	3,300,311	545	\$ 220,683
HEEP Total	36,732	125,553	4,936,629	889	\$ 507,043
Sums may differ due to rounding.					

³⁴ This includes participation estimates from the upstream portion of the CPS channel in PY2021.

³⁵ This value represents the number of unique account numbers in the project data.

³⁶ LEDs in Consumer Products is denominated in number of packages.

³⁷ LEDs in Consumer Products is denominated in number of bulbs sold. This value also includes 2,069 non-LED measures.

Table 5-6 below outlines participation by channel, by measure.

Table 5-6 PY2021 Participation for HEEP by Measure

Channel / Measure	Households / Measures	Identified SF Participants	Identified MF Participants
Consumer Products	116,397	Unknown	Unknown
Advanced Power Strips	1,316	Unknown	Unknown
Bathroom Ventilation Fan	48	Unknown	Unknown
ES Room Air Purifier	40	Unknown	Unknown
LEDs (Food Bank)	30,000	Unknown	Unknown
LEDs (Specialty)	17,497	Unknown	Unknown
LEDs (Standard)	66,831	Unknown	Unknown
Water Dispenser	25	Unknown	Unknown
Window AC Replacement	640	Unknown	Unknown
HVAC	261	96	165
Central AC Replacement	47	47	0
Central AC Tune-up: M&V	5	5	0
Central AC Tune-up: Modeled	13	13	0
Central HP Tune-up: M&V	1	1	0
Central HP Tune-up: Modeled	172	7	165
Central HP Replacement	23	23	0
RSOL	2,119	1,425	694
Advanced Power Strips	306	114	192
Air Infiltration	194	0	194
Ceiling Insulation	1	1	0
Contractor Payment	104	104	0
Duct Sealing	203	0	203
ES Pool Pumps	4	4	0
ES Windows	400	400	0
Kitchen Aerators (1.5 GPM)	6	0	6
LEDs (Standard)	896	799	97
Showerheads	2	0	2
Wall Insulation	3	3	0
LivingWise	6,776	Unknown	Unknown
Advanced Power Strips	1,694	Unknown	Unknown
Bathroom Aerators (1.0 GPM)	1,694	Unknown	Unknown
Kitchen Aerators (1.5 GPM)	1,694	Unknown	Unknown
Showerheads (1.5 GPM)	1,694	Unknown	Unknown
HEEP Total	119,312	1,521	859
*Total households do not equal the sum of measures due to households receiving multiple measures.			

5.3 Gross Impact Evaluation Approach

The Evaluators utilized the AR TRM V8.2 and New Orleans Louisiana (NOLA) TRM 4.0 values in assessing *ex post* gross energy savings (kWh), demand reductions (kW) and NEBs from residential measures. In addition to the AR TRM V8.2 and the NOLA TRM 4.0, the Evaluators also examined the Excel workbook used by the third-party implementation staff (CLEARResult and AM Conservation) to assess savings by measure. The workbook utilizes AR TRM V8.2 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.

5.3.1 Energy Savings Calculations

The following sections outline the impact evaluation approach for each channel in HEEP. For equipment and retrofits rebated through the PY2021 HEEP, calculation methodologies were performed as described in the AR TRM V8.2. Table 5-7 identifies the sections in the AR TRM V8.2 that were used for verification of measure-level savings.

Additionally, the NOLA TRM 4.0 was referenced for water dispenser measures, new for the PY2021 offerings in the CPS channel. The gross impact evaluation effort included the following:

- **Desk Review of Residential Calculations:** for all channels, the Evaluators utilized AR TRM V8.2 and NOLA TRM4.0 values in assessing savings from measures in HEEP. In HVAC, for the CoolSaver measure, a CLEARResult white paper³⁸ was utilized to verify savings.
- **Data Tracking Review:** for all channels, project data from the TPIs was reviewed to ensure that tracking systems followed Protocol A, B1 and B2 of the AR TRM V8.2.
- **Survey Analysis:** for AM Conservation, student/parent surveys were reviewed to determine in-service-rates (ISRs) and NEB estimates. For CPS, RSOL and HVAC, surveys were not used in impact analysis.
- **Leakage Analysis:** for CPS, leakage analysis was performed in compliance with Protocol K of the AR TRM V8.2.

³⁸ The white paper is titled, "2018 Measurement and Verification (M&V) Plan for CoolSaver – Option A – Retrofit Isolation: Key Parameter Measurement."

Table 5-7 AR TRM V8.2 Sections by Measure Type

Measure Category	Measure	TRM 8.2, Vol. 2 Subsection(s)
Appliances	Advanced Power Strips	2.4.4
	ENERGY STAR® Windows	2.2.7
	ENERGY STAR® Pool Pumps	2.4.5
	ENERGY STAR® Room Air Purifier	2.4.7
	Bathroom Ventilation Fan	2.1.12
	Water Dispenser (Water Cooler)	NOLA TRM 4.0 C.1.4
Domestic Hot Water	Faucet Aerator	2.3.4
	Showerhead	2.3.5
Envelope	Air Infiltration	2.2.9
	Ceiling Insulation	2.2.2
	Wall Insulation	2.2.3
HVAC	Duct Sealing	2.1.11
	Central AC Tune-up	2.1.5
	Central Air Conditioner (AC) Replacement	2.1.6
	Central Heat Pump (HP) Replacement	2.1.8
	Window AC Replacement	2.1.10
Lighting	LEDs (Specialty)	2.5.1.3
	LEDs (Standard)	2.5.1.4

5.4 Tracking System Review

The impact evaluation began with a review of program tracking data. The tracking data included a separate row for each measure installed. Every premise in the program had a unique incentive identifier, so each premise had multiple rows to reflect the different measures completed.

The tracking data provided measured values for duct pressurization testing and blower door tests, allowing for the re-creation of *ex ante* calculations based on leakage reduction. Ceiling insulation included an indicator for baseline R-value. Program specifications are to bring the home’s insulation level up to R-38 or R-49. The maximum allowable baseline insulation is R-22.

5.5 LivingWise® Schools Outreach

At the outset of each program year, AM Conservation calculates an average per-kit savings based on the then most current AR TRM and some assumptions about installation and NTG. AM Conservation sends electronic reports to OG&E throughout the year on the number of kits delivered to classrooms and the associated impacts. AM Conservation 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 AM Conservation and transferred into the Saratoga tracking system by OG&E. OG&E uses the participation information and impact estimates provided by AM Conservation as the reported amounts for the program year. For measures rebated through the PY2021 LivingWise® Schools Outreach channel, calculation methodologies were performed as described in the AR TRM V8.2.

In addition to the AR TRM V8.2, the Evaluators also examined the Excel workbook used by implementation staff (AM Conservation) to assess savings by school. The workbook utilizes AR TRM V8.2 savings algorithms to estimate per kit savings based on input parameters and was reported in adjusted gross 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 PY2021.

5.6 HVAC Replacement and Tune-up

The HVAC Replacement and Tune-up channel provided financial incentives to encourage residential customers to improve the efficiency of their HVAC systems. Incentives were provided for a tune-up of the system and for HVAC system replacements.

5.6.1 HVAC Replacement and Tune-up: HVAC Replacements

More detail can be found in AR TRM V8.2 Section 2.1.5, Section 2.1.6, and Section 2.1.8.

5.6.2 HVAC Replacement and Tune-up: AC Tune-ups

Tune-ups were provided by a qualified technician and involve testing the performance of the unit before and after measures are implemented. Typical measures implemented as part of the tune-up procedure include air flow correction; cleaning of the indoor blower, evaporator coils, condenser coils; and correction of refrigerant charge.

Evaluation of the program is based on the CoolSaver PY2021 M&V Plan provided by CLEAResult. The evaluators examined the Excel workbook containing a census of program participants to assess savings by measure. The workbook provided contains data exported from the program tracking tool. The Evaluators examined the data and recreated the overall savings calculations. Savings from AC and heat pump tune-ups were based on AR TRM V8.2 deemed equivalent full-load hours along with unit-specific capacity and deemed efficiency loss recovered due to work performed in accordance with the program.

5.7 Consumer Products Solutions (CPS)

5.7.1 Leakage

Leakage refers to cross-territory sales that occur when program discounted bulbs are installed outside of OG&E's service territory. When this occurs, the energy and demand impacts from the discounted bulbs are not being realized within the territory that paid for and claimed the savings. Estimates of leakage were assessed using an approach that combined random digit dial (RDD) survey responses with geo-mapping. The leakage analysis centered on the following approach:

- First, the Evaluators developed a mapping of concentric circles (drivetimes) surrounding each participating retailer. The initial modeling assumed the “reach” of a retailer is a 60-minute drive, which is then modified by the presence of an alternative sponsoring retailer (i.e., if a customer is within a 60-minute drive of two sponsoring retailers, it is assumed they purchased from the closest one). Non-participating retailers are also included as directly competing alternative retailers with the construction of the drive times.
- Second, the Evaluators used 2010 Census block data from Environmental Systems Research Institute (ESRI) to determine the proportion of the population that falls within each drivetime circle (from Step 1), as well as the proportion of the population that falls within the OG&E AR territory and within the state of Arkansas. Thus, for each drivetime circle for each retail location, the Evaluators determined the proportion of the population within the OG&E AR service territory, outside of OG&E AR service territory, and outside of the state of Arkansas. In addition, per the Department of Energy (DOE) National Renewable Energy Laboratory (NREL) Uniform Methods Project (UMP): Methods for Determining Energy Savings for Specific Measures Chapter 6: Residential Lighting Evaluation Protocol³⁹ (referred to herein as “the UMP Protocol”), the Evaluators also define that bulbs going to another utility which also runs upstream lighting programs will not be considered leakage. The Evaluators determined the following utilities run upstream lighting programs within OG&E's drivetime areas: SWEPCO Arkansas, Entergy Arkansas, and Public Service Company of Oklahoma (PSO).
- Third, a Random Digit Dial (RDD) survey was used to assess the shopping habits of customers within the radius of participating retailers. This was used to assess the total and maximum drivetime that Arkansas consumers accepted when shopping for

³⁹ Dimetrosky, Scott, Parkinson, Katie, and Lieb, Noah on behalf of the Department of Energy National Renewable Energy Laboratory. *The Uniform Methods Project: Methods for Determining Energy Efficiency Savings for Specific Measures Chapter 6: Residential Lighting evaluation Protocol*. October 2017.

products incentivized by the channel and was used in modifying the initial 60-minute drive assumption established in Step 1. An RDD survey was carried out for OG&E in 2015 and the results of this survey are shown in Table 5-8. This approach uses a log transformation of the drivetimes to smooth the data and estimates the cumulative percent via a second order polynomial regression. In 2021, the Wholesale channel was split out from the Mass Merchant channel; however, a dedicated RDD survey for the Wholesale channel did not occur in 2015. The RDD survey for the Wholesale retailer channel was taken from a similar survey conducted by ADM in 2019 in Oklahoma.

- Fourth, for each drive time, the propensity to drive is calculated based on the predicted cumulative percent. The propensity to drive is equal to 1 minus the predicted cumulative percent, such that customers with shorter drive times have a high propensity to drive (because cumulative percent from the RDD survey is lower for shorter drive times), while customers with longer drive times have lower propensity to drive (because predicted cumulative percent is higher for longer drive times). Customers with a propensity to drive represent the estimated population for a given drive time (i.e. estimated population willing to drive = propensity to drive(%)*total population).
- Lastly, the percentage of bulbs that leaked out of OG&E territory (but still within AR) and the percent that leaked out of state were calculated.

The analysis and creation of drivetimes was performed separately for four retailer types: Discount, Do-it-Yourself (DIY), Mass Merchant, and Wholesale. Discount retailers includes stores such as Dollar Store and Dollar General. DIY includes stores such as Lowe's, Ace, and Home Depot. Mass Merchant retailers include stores such as Walmart, Sears, and Target, while Wholesale includes Costco and Sam's Club.

The set of maps below provide an example of the analysis with snapshots of the geo-mapping process for the Discount retailer channel. The first map shows participating and non-participating retailer locations overlaid onto utility territories. The territory for OG&E is shown in light red. Participating stores are shown as green points while non-participating stores are shown as grey points. The second map shows the concentric drivetimes that were constructed for the Discount retailer channel to estimate leakage rates. The map is meant to illustrate how far a 60-minute drivetime extends beyond a store location and how the presence of another store affects the drivetime for other nearby stores.

Table 5-8 shows the drivetime survey results, shown below the two maps.

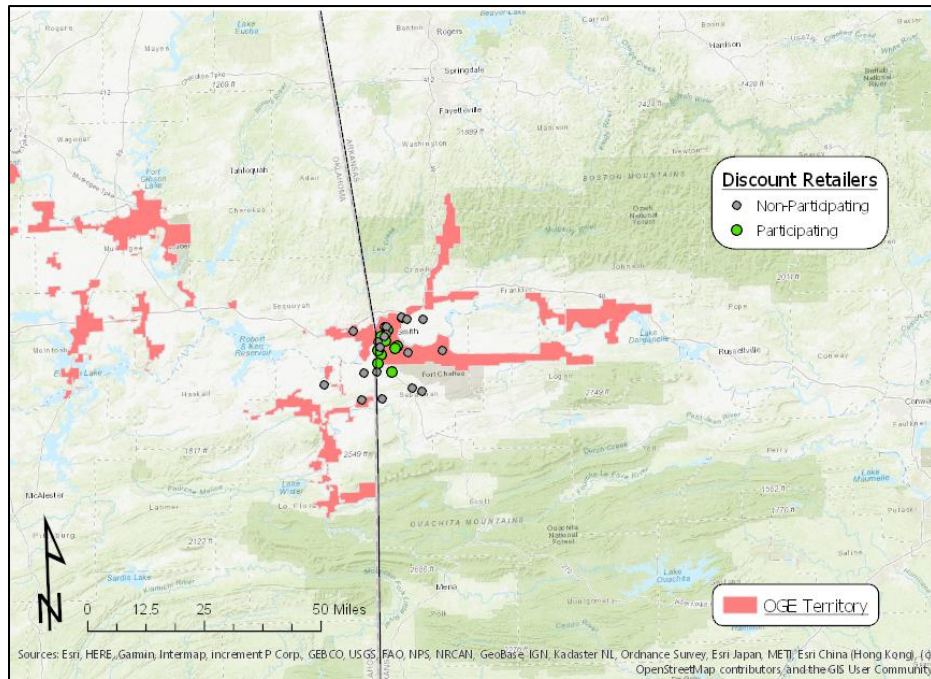


Figure 5-2 Discount Retailer Locations

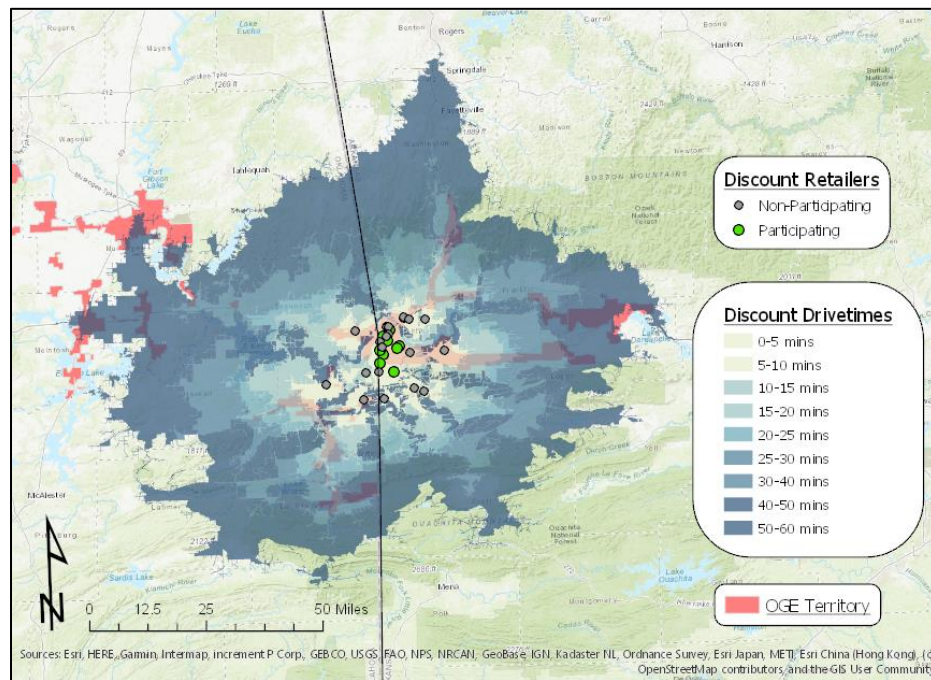


Figure 5-3 Discount Retailer Drive Times

Table 5-8 Drivetime Estimates by Channel

Channel / Drive Time (minutes)	0-5	5-10	10-15	15-19	20-24	25-29	30-40	40-50	50-60	60-70
DIY	9%	15%	13%	28%	17%	6%	6%	0%	0%	7%
Discount	38%	0%	25%	13%	13%	0%	0%	13%	0%	0%
Mass Merchant	8%	22%	20%	15%	17%	3%	5%	2%	0%	7%
Wholesale	14%	16%	25%	16%	9%	5%	6%	4%	1%	4%

The overall estimated program-level leakage rate was 16%, with 10% leakage for Mass Merchant stores, 20% leakage for DIY stores, 8% leakage for Discount stores, and 36% for the single Wholesale store. The table below shows the estimated leakage for each participation channel in the Consumer Products channel for PY2021.

Values presented for Consumer Products are exclusive of leakage effects except where specifically noted.

Table 5-9 PY2021 Leakage Estimates

Measure / Pathway	Leakage Rate	Estimated Net Leakage for Energy Savings (kWh)	Estimated Net Leakage for Demand Savings (kW)	Estimated Net Leakage for Energy Savings (Lifetime kWh)
LEDs (Food Bank)	16%	660,890	107	12,556,913
LEDs (Specialty)	16%	283,251	51	5,474,531
LEDs (Standard)	16%	1,027,110	185	19,515,084
Total	16%	1,971,251	344	37,546,528
Sums may differ due to rounding.				

5.7.1.1 Cross Sector Sales Adjustments

The AR TRM V8.2 estimates that 6.7% of lighting incentivized through a residential retail markdown program will be installed in commercial facilities, and that the Annual Operating Hours (AOH) and Coincidence Factor (CF) for this lighting should align with the average values from commercial programs administered by the sponsoring utility in the same program year. The Evaluators estimated 3,916 AOH and a coincidence factor of 0.73 using a weighted average of AR TRM V8.2 deemed values for the building types found in the CEEP Small Business Direct Install Program. This has the effect of increasing annual energy savings and peak demand reduction for the 6.7% of bulbs estimated to be installed in non-residential settings.

5.8 Residential Solutions (RSOL)

The Evaluators did not conduct field verification studies for RSOL in PY2020 due to the COVID-19 pandemic. For PY2020, the Evaluators applied three-year average Field verification Rates (FVRs) for RSOL. The Evaluators intended to conduct fieldwork in PY2021, but this was supplanted by a request by the IEM that ADM contribute to the statewide Shelving Study. The budget for ADM’s contribution to the Shelving Study came from a reassignment from RSOL field data collection. To that end, the Evaluators then applied the three-year average for RSOL FVR to PY2021 in the same manner as applied in PY2020.

The tables below summarize the average FVRs for PY2017-PY2020 that were applied to PY2021 projects.

Table 5-10 HEEP RSOL Single Family FVR – Three-year Average Applied to PY2021

Measure	RSOL – SF PY2017 FVR	RSOL – SF PY2018 FVR	RSOL – SF PY2019 FVR	RSOL – SF PY2021 FVR
Aerators	100%	N/A	N/A	100%
Air Infiltration	103% / 100%	114% / 100%	N/A	109% / 100%
APS	85%	N/A	100%	93%
Ceiling Insulation	N/A	N/A	N/A	N/A
Duct Sealing	95% / 100%	101% / 100%	100% / 100%	99% / 100%
LEDs	89%	N/A	100%	95%
Pool Pump	N/A	N/A	100%	100%
Showerheads	92%	N/A	100%	96%
Windows	100%	100%	100%	100%

Table 5-11 HEEP RSOL Multi-family FVR – Three-year Average Applied to PY2021

Measure	RSOL – MF PY2017 FVR	RSOL – MF PY2018 FVR	RSOL – MF PY2019 FVR	RSOL – MF PY2021 FVR
Aerators	100%	N/A	N/A	100%
Air Infiltration	103% / 100%	114% / 100%	105% / 100%	107% / 100%
APS	85%	N/A	75% / 108%	97%
Ceiling Insulation	N/A	N/A	N/A	N/A
Duct Sealing	95% / 100%	101% / 100%	102% / 100%	100% / 100%
LEDs	89%	N/A	99%	94%
Pool Pump	N/A	N/A	N/A	N/A
Showerheads	92%	N/A	N/A	92%
Windows	100%	100%	N/A	100%

5.9 Verified Savings by Measure

5.9.1 Residential Solutions (RSOL)

After reviewing the tracking data and inputs for savings calculations, the Evaluators provided verified *ex post* savings per AR TRM V8.2 Protocols. The savings from the measures below were verified, and matched, to the calculations provided by CLEARresult.

- Advanced Power Strips;
- Air Infiltration;
- Ceiling Insulation;
- Duct Sealing;
- ENERGY STAR® Pool Pumps;
- ENERGY STAR® Windows;
- Kitchen Faucet Aerators;
- ENERGY STAR® LEDs (Standard);
- Low-Flow Showerhead; and
- Wall Insulation.

Factors that impacted savings are listed in individual measure sections below. The Evaluators verified measure-level savings per the AR TRM V8.2 guidelines.

5.9.2 RSOL: Advanced Power Strips

This measure was installed at 266 premises. All deemed values matched the AR TRM V8.2. The lower realization rate is due to the single family and multi-family field verification rates from prior program years applied to PY2021.

Table 5-12 Advanced Power Strip Savings Summary

<i>Ex ante</i> Energy Savings (kWh)	<i>Ex post</i> Energy Savings (kWh)	Realization Rate (kWh)	<i>Ex ante</i> Demand Reductions (kW)	<i>Ex post</i> Demand Reductions (kW)	Realization Rate (kW)
59,925	57,439	96%	8	7	96%

5.9.3 RSOL: ENERGY STAR® Windows

There were 400 windows installed at 65 premises.

Table 5-13 ENERGY STAR® Window Savings Summary

<i>Ex ante</i> Energy Savings (kWh)	<i>Ex post</i> Energy Savings (kWh)	Realization Rate (kWh)	<i>Ex ante</i> Demand Reductions (kW)	<i>Ex post</i> Demand Reductions (kW)	Realization Rate (kW)
45,960	45,950	100%	31	31	100%

5.9.4 RSOL: Duct Sealing

This measure was completed at 203 premises. The Evaluators recreated savings estimates based on TRM V8.2 protocols and found 115% realization.

Table 5-14 Duct Sealing Savings Summary

Heating Type	<i>Ex ante</i> Gross Energy Savings (kWh)	<i>Ex post</i> Gross Energy Savings (kWh)	Realization Rate (kWh)	<i>Ex ante</i> Gross Demand Reduction (kW)	<i>Ex post</i> Gross Demand Reduction (kW)	Realization Rate (kW)
Natural Gas Furnace	27,546	31,139	113%	17	19	113%
Air Source Heat Pump	521,941	598,851	115%	81	99	122%
Electric Resistance	0	0	N/A	0	0	N/A
Total	549,487	629,990	115%	98	118	120%
Sums may differ due to rounding.						

5.9.5 RSOL: Air Infiltration

This measure was completed at 194 premises. Field verification activities from prior program years resulted in no adjustments to savings and this was applied to PY2021.

Table 5-15 Air Infiltration Savings Summary

Heating Type	<i>Ex ante</i> Gross Energy Savings (kWh)	<i>Ex post</i> Gross Energy Savings (kWh)	Realization Rate (kWh)	<i>Ex ante</i> Gross Demand Reduction (kW)	<i>Ex post</i> Gross Demand Reduction (kW)	Realization Rate (kW)
Natural Gas Furnace	17,397	17,439	100%	13	13	100%
Air Source Heat Pump	50,383	50,383	100%	7	7	100%
Electric Resistance	0	0	N/A	0	0	N/A
Total	67,780	67,822	100%	20	20	100%
Sums may differ due to rounding.						

5.9.6 RSOL: Ceiling Insulation

This measure was completed at one premise. No adjustments were made to *ex ante* savings estimates.

Table 5-16 Ceiling Insulation Savings Summary

Heating Type	<i>Ex ante</i> Gross Energy Savings (kWh)	<i>Ex post</i> Gross Energy Savings (kWh)	Realization Rate (kWh)	<i>Ex ante</i> Gross Demand Reduction (kW)	<i>Ex post</i> Gross Demand Reduction (kW)	Realization Rate (kW)
Natural Gas Furnace	554	554	100%	0.33	0.33	100%
Air Source Heat Pump	0	0	N/A	0	0	N/A
Electric Resistance	0	0	N/A	0	0	N/A
Total	554	554	100%	0.33	0.33	100%
Sums may differ due to rounding.						

5.9.7 RSOL: Wall Insulation

This measure was completed at three premises. Savings were adjusted due to correction of weather zone entries from Zone 7 to Zone 8.

Table 5-17 Wall Insulation Savings Summary

Heating Type	<i>Ex ante</i> Gross Energy Savings (kWh)	<i>Ex post</i> Gross Energy Savings (kWh)	Realization Rate (kWh)	<i>Ex ante</i> Gross Demand Reduction (kW)	<i>Ex post</i> Gross Demand Reduction (kW)	Realization Rate (kW)
Natural Gas Furnace	3,219	3,233	100%	2	1	90%
Air Source Heat Pump	0	0	N/A	0	0	N/A
Electric Resistance	0	0	N/A	0	0	N/A
Total	3,219	3,233	100%	2	1	90%
Sums may differ due to rounding.						

5.9.8 RSOL: ENERGY STAR® Pool Pumps

This measure was installed at four premises.

The higher realization rate is due to the change in pool pump categorization and deemed savings values in AR TRM 8.2. In AR TRM 8.2, pool pumps are now categorized as self-priming (for inground pools) and non-self-priming (for above-ground pools). The two categories further categorize pool pumps based on motor HP.

The *ex ante* findings were based on the deemed savings values from AR TRM 8.1, whereas the Evaluators applied the new deemed savings values from AR TRM 8.2.

Table 5-18 ENERGY STAR® Pool Pump Savings Summary

<i>Ex ante</i> Gross kWh Savings	<i>Ex post</i> Gross kWh Savings	kWh Realization Rate	<i>Ex ante</i> Gross kW Savings	<i>Ex post</i> Gross kW Savings	kW Realization Rate
12,557	14,982	119%	3	3	119%

5.9.9 RSOL: Faucet Aerators

This measure was installed at six premises. No adjustments were made to *ex ante* savings estimates.

Table 5-19 Faucet Aerator Savings Summary

<i>Ex ante</i> Gross kWh Savings	<i>Ex post</i> Gross kWh Savings	kWh Realization Rate	<i>Ex ante</i> Gross kW Savings	<i>Ex post</i> Gross kW Savings	kW Realization Rate
208	208	100%	0.02	0.02	100%

5.9.10 RSOL: Low-Flow Showerheads

This measure was installed at two premises. All deemed values matched the AR TRM V8.2. The lower realization rate is due to the single family and multi-family field verification rates developed in prior program years and applied to PY2021.

Table 5-20 Showerhead Savings Summary

<i>Ex ante</i> Gross kWh Savings	<i>Ex post</i> Gross kWh Savings	kWh Realization Rate	<i>Ex ante</i> Gross kW Savings	<i>Ex post</i> Gross kW Savings	kW Realization Rate
618	570	92%	0.06	0.06	99%

5.9.11 RSOL: LEDs

There were 896 LEDs installed at 118 premises in PY2021. The lower realization rate is due to the single family and multi-family field verification rates developed in prior program years.

Table 5-21 LEDs Savings Summary

<i>Ex ante</i> Gross kWh Savings	<i>Ex post</i> Gross kWh Savings	kWh Realization Rate	<i>Ex ante</i> Gross kW Savings	<i>Ex post</i> Gross kW Savings	kW Realization Rate
23,967	23,383	98%	4	4	98%

5.9.12 LivingWise® Schools Outreach

After reviewing the tracking data and inputs for savings calculations, the Evaluators provided verified *ex post* savings per AR TRM V8.2 Protocols.

The savings from the measures below were verified, and matched, to the calculations provided in PY2021.

- Faucet Aerators;
- Low-Flow Showerheads; and
- Advanced Power Strips.

Factors that impacted savings are listed in individual measure sections below. The Evaluators verified measure-level savings per AR TRM V8.2 guidelines and obtained results that differed from AM Conservation’s calculations for the following measures.

5.9.13 LivingWise® Schools Outreach: Faucet Aerators

Each kit included one 1.5 GPM kitchen aerator and one 1.0 GPM bathroom aerator. The In-Service Rate (ISR) are listed below:

- Kitchen 1.5 GPM (35%),
- Bathroom 1.0 GPM (35%).

Additionally, the Evaluators determined water heater percent fuel mix from the student survey responses provided by AM Conservation. The water heater percent fuel mix is shown below:

- Natural gas (27%),
- Electricity (58%)
- Propane (15%)

The savings below were calculated by applying only the electric portion of the percent fuel mix.

Table 5-22 Aerator Savings Summary

Measure	<i>Ex ante</i> Gross kWh Savings	<i>Ex post</i> Gross kWh Savings	kWh Realization Rate	<i>Ex ante</i> Gross kW Savings	<i>Ex post</i> Gross kW Savings	kW Realization Rate
1.5 GPM Aerator	16,821	13,030	77%	2	1	78%
1.0 GPM Aerator	25,901	19,518	75%	3	2	75%
Total	42,723	32,548	76%	4	3	76%
Sums may differ due to rounding.						

5.9.14 LivingWise® Schools Outreach: Low-Flow Showerheads

One low-flow showerhead 1.5 GPM is included within each kit. The Evaluators found an ISR of 42% and applied the aforementioned electric fuel mix (58% electric).

Table 5-23 Showerhead Savings Summary

<i>Ex ante</i> Gross kWh Savings	<i>Ex post</i> Gross kWh Savings	kWh Realization Rate	<i>Ex ante</i> Gross kW Savings	<i>Ex post</i> Gross kW Savings	kW Realization Rate
156,390	126,905	81%	16	13	81%

5.9.15 LivingWise® Schools Outreach: Advanced Power Strips

Each kit included one advanced power strip. The Evaluators found an ISR of 65% for APS’ distributed in school kits.

Additionally, the Evaluators calculated weighted deemed savings values from the student survey responses provided by AM Conservation. Students were asked if they installed the power strip for an entertainment (TV) system, a home office system, or if the power strip was used for other types of peripheral devices. The percent of power strip use is shown below:

- Entertainment system (27%)
- Home office (11%)
- Other (47%)

The Evaluators determined the weighted deemed savings based on the deemed average savings for a Tier 1 power strip found in AR TRM 8.2 Table 180:

- 155 kWh savings per unit
- 0.02 kW reductions per unit

Table 5-24 Advanced Power Strip Savings Summary

<i>Ex ante</i> Gross kWh Savings	<i>Ex post</i> Gross kWh Savings	kWh Realization Rate	<i>Ex ante</i> Gross kW Savings	<i>Ex post</i> Gross kW Savings	kW Realization Rate
184,324	170,522	93%	35	20	56%

5.9.16 HVAC Replacement and Tune-up

Air-Conditioning, Heating, and Refrigeration Institute (AHRI) Certificates were matched to all units. Field verification was not conducted in PY2021.

5.9.16.1 Baseline Analysis

In addition to referencing the AR TRM 8.2 for the evaluation of the central heat pump projects, the Evaluators reviewed the program tracking data and noted that all of the heat pump projects were considered as ‘replace-on-burnout’.

In prior experience, the Evaluators have found baseline heating unit type data that was later contradicted in field inputs by the HVAC contractors – heat pump versus electric resistance can be entered incorrectly.

To resolve these discrepancies and identify “false positives” for heat pumps, ADM requested customer billing data for a sample of homes. The billing data was provided ranging between November 2019 and December 2021 for customers in the sample that had that data available.

The goal of this analysis was to identify the space heating equipment type via magnitude of billed use in the pre- and post-retrofit configuration as a basis to determine if the change in energy use is of a significantly enough magnitude to support a hypothesis that the preexisting equipment was an electric resistant furnace. The Evaluators flagged a home as having electric resistance if they demonstrated a greater than 15% reduction in annual heating use following the retrofit. This criterion was developed based on an evaluation of furnace to heat pump conversions completed for SWEPCO Louisiana, in which various heuristics were tested for accuracy in predicting baseline equipment configuration which were then compared to pre-retrofit photographs taken by participating contractors.

The Evaluators found nine homes with sufficient data, all of which were found to have claimed electric resistant as the baseline heat.

Of these projects, six (66.7%) displayed pre-installation energy usage that would indicate electric resistance as the heating baseline. Table 5-25 shows the results from the analysis.

Table 5-25 Overview of Baseline Determinization

Project ID	Heating % kWh Savings	Baseline Determination
262788	-21%	Electric Resistance
260938	-22%	Electric Resistance
266501	11%	Inconclusive
258151	-15%	Electric Resistance
266967	-32%	Electric Resistance
252698	-41%	Electric Resistance
261014	1%	Inconclusive
258259	-46%	Electric Resistance
266644	9%	Inconclusive

The Evaluators applied a weighted average baseline for heat pump retrofits with the claimed electric resistant preexisting equipment. In the early retirement and replace on burnout configurations, this resulted in:

- Early Replacement: $66.7\% * 3.41 \text{ HSPF} + 33.3\% * 6.8 \text{ HSPF} = 4.4 \text{ HSPF}$
- Replace on Burnout: $66.7\% * 3.41 \text{ HSPF} + 33.3\% * 8.2 \text{ HSPF} = 4.8 \text{ HSPF}$

Table 5-26 summarizes the findings for the heat pump replacement projects, as well as the central air conditioner projects that were not affected by this analysis. Additionally, the kW reductions were not affected as the analysis only investigated energy usage for heating.

Table 5-26 HVAC Replacement Savings Summary

Measure	<i>Ex ante</i> Gross kWh Savings	<i>Ex post</i> Gross kWh Savings	kWh Realization Rate	<i>Ex ante</i> Gross kW Savings	<i>Ex post</i> Gross kW Savings	kW Realization Rate
AC Replacement	26,939	26,939	100%	13	13	100%
HP Replacement	33,567	136,608	407%	2	0.16	8%
Total	60,506	163,547	270%	15	13	87%
Sums may differ due to rounding.						

For tune-ups, Program calculations matched the CoolSaver M&V Plan provided by CLEARResult for PY2021.

Table 5-27 Central AC Tune-up Savings Summary

Tune up	<i>Ex ante</i> Gross kWh Savings	<i>Ex post</i> Gross kWh Savings	kWh Realization Rate	<i>Ex ante</i> Gross kW Savings	<i>Ex post</i> Gross kW Savings	kW Realization Rate
M&V	10,121	10,140	100%	6	6	100%
Modeled	20,213	20,217	100%	12	12	100%
Total	30,334	30,357	100%	18	18	100%
Sums may differ due to rounding.						

Table 5-28 Central Heat Pump Tune-up Savings Summary

Tune up	<i>Ex ante</i> Gross kWh Savings	<i>Ex post</i> Gross kWh Savings	kWh Realization Rate	<i>Ex ante</i> Gross kW Savings	<i>Ex post</i> Gross kW Savings	kW Realization Rate
M&V	3,829	3,836	100%	1	1	100%
Modeled	393,936	394,008	100%	89	89	100%
Total	397,765	397,845	100%	90	90	100%
Sums may differ due to rounding.						

5.9.17 Consumer Products

The applied residential Hours of Use (HOU) was defined by the AR TRM V8.2. Savings for Consumer Products are summarized in Table 5-29. The higher overall channel realization rate was primarily driven by the difference in ex ante and ex post calculations for the upstream lighting measures. The Evaluators determined that the *ex ante* calculations did not apply the additional savings for 6.7% of LEDs that are estimated to be installed in commercial facilities.

Table 5-29 Gross Summary for Consumer Products

Measure / Participation Pathway	Ex ante Gross kWh Savings	Ex post Gross kWh Savings	kWh Realization Rate	Ex ante Gross kW Savings	Ex post Gross kW Savings	kW Realization Rate
Advanced Power Strips	220,298	220,298	100%	25	25	100%
Bathroom Ventilation Fan	1,315	698	53%	0.16	0.16	98%
ES Room Air Purifier	18,740	18,689	100%	2	2	100%
LEDs (Food Bank)	783,045	783,045	100%	127	127	100%
LEDs (Specialty)	481,363	607,760	126%	78	110	140%
LEDs (Standard)	1,738,801	2,203,829	127%	283	397	140%
Water Dispenser	12,045	12,045	100%	1.35	1.35	100%
Window AC Replacement	44,704	40,418	90%	28	25	87%
Total	3,300,311	3,886,784	118%	545	687	126%

Sums may differ due to rounding.

5.10 Net Impact Evaluation Approach

5.10.1 Channel- and Measure-level NTG Overview

The following table summarizes the approach and estimate for NTG by channel and by measure.

Table 5-30 PY2021 NTG Summary for HEEP

Channel / Measure	PY2021 NTG	Single-family Free ridership	Single-family Spillover	Single-family NTG	Multi-family Free ridership	Multi-family Spillover	Multi-family NTG	NTG Source
Consumer Products	83%	18%	1%	83%	18%	1%	83%	
APS	52%	48%	0%	52%	48%	0%	52%	Literature Review
Bathroom Ventilation Fan	73%	28%	1%	73%	28%	1%	73%	Literature Review
Room Air Purifier	73%	28%	1%	73%	28%	1%	73%	Literature Review
LEDs (Food Bank)	100%	0%	0%	100%	0%	0%	100%	NTG modeling
LEDs (Specialty)	55%	49%	5%	55%	49%	5%	55%	NTG modeling
LEDs (Standard)	55%	49%	5%	55%	49%	5%	55%	NTG modeling

Channel / Measure	PY2021 NTG	Single-family Free ridership	Single-family Spillover	Single-family NTG	Multi-family Free ridership	Multi-family Spillover	Multi-family NTG	NTG Source
Consumer Products	83%	18%	1%	83%	18%	1%	83%	
Water Dispenser	73%	28%	1%	73%	28%	1%	73%	Literature Review
Window AC Replacement	44%	56%	0%	44%	56%	0%	44%	Literature Review
HVAC	83%	23%	0%	77%	0%	0%	100% <small>⁴⁰</small>	
AC Replacement	81%	19%	0%	81%	19%	0%	81%	Assigned PY2020 NTG value
HP Replacement	74%	26%	0%	74%	26%	0%	74%	Assigned PY2020 NTG value
AC Tune-up M&V	75%	25%	0%	75%	0%	0%	100%	SF is PY2020 NTG, MF from property manager interviews.
AC Tune-up Modeled	75%	25%	0%	75%	0%	0%	100%	
HP Tune-up M&V	100%	25%	0%	75%	0%	0%	100%	
HP Tune-up Modeled	100%	25%	0%	75%	0%	0%	100%	
RSOL	86%	14%	0%	86%	14%	0%	86%	
Advanced Power Strips	78%	12%	0%	78%	12%	0%	78%	Literature Review
Air Infiltration	100%	0%	0%	100%	0%	0%	100%	Participant Surveys
Ceiling Insulation	100%	0%	0%	100%	0%	0%	100%	Assigned value from duct seal / air seal survey
Duct Sealing	100%	0%	0%	100%	0%	0%	100%	Participant Surveys

⁴⁰ NTG is 100% because there was no participation from multifamily customers in the AC Replacement or HP Replacement measures.

Channel / Measure	PY2021 NTG	Single-family Free ridership	Single-family Spillover	Single-family NTG	Multi-family Free ridership	Multi-family Spillover	Multi-family NTG	NTG Source
RSOL	86%	14%	0%	86%	14%	0%	86%	
ENERGY STAR® Pool Pumps	90%	10%	0%	90%	10%	0%	90%	Literature Review for SO, Participant Surveys for FR
ENERGY STAR® Windows	44%	10%	0%	90%	10%	0%	90%	Literature Review
Faucet Aerators	87%	13%	0%	87%	13%	0%	87%	Literature Review
LEDs (Standard)	74%	26%	0%	74%	26%	0%	74%	Literature Review
Low-Flow Showerheads	86%	14%	0%	86%	14%	0%	86%	Literature Review
Wal Insulation	100%	0%	0%	100%	0%	0%	100%	Assigned value from duct seal / air seal survey
LivingWise® Schools Outreach	93%	7%	0%	93%	7%	0%	93%	
Advanced Power Strips	78%	12%	0%	78%	12%	0%	78%	Literature Review
Faucet Aerators	98%	2%	0%	98%	2%	0%	98%	Literature Review
Low-Flow Showerheads	95%	5%	0%	95%	5%	0%	95%	Literature Review
HEEP Total	73%							

NTG was estimated for all program measures in PY2020, at the onset of the new planning period and values from PY2020 were applied to PY2021 except where primary research has been noted.

5.10.2 Literature Review Results

For measures or channels where the approaches described above could not be performed, such as LivingWise® Schools Outreach kit recipients or measures with low participation that were not captured in the participant survey, a literature review was performed.

More information about which measures this pertains to can be found in the tables below. The tables below are labeled PY2020 to reflect the year the research was performed.

5.10.3 Residential Solutions

Literature reviews were utilized to determine NTG for advanced power strips, aerators, ENERGY STAR® windows, LED lamps (direct install), and showerheads. Both free ridership and spillover were determined through this approach.

The literature reviews completed for RSOL in PY2020 were applied in PY2021 and are presented in the tables below for reference.

Table 5-31 PY2020 Literature Review Results for RSOL APS (Direct Install)

Reference Number	FR	SP	NTG	PY	State
1	8%	0%	92%	2016	OK
2	0%	0%	100%	2015	NM
3	0%	0%	100%	2017	NM
Average	3%	0%	97%		
1. https://www.occeweb.com/pu/EnergyEfficiency/2016OGE_DemandProgramsAnnualReport.pdf 2. https://www.pnm.com/documents/396023/3157050/2015+Independent+Measurement+%26+Verification+Report+-+Part+1+ADM+Associates.pdf/87814b15-cc02-4c8f-9fb5-50d39dd65fc0 3. https://www.pnm.com/documents/396023/3157050/2016+Independent+Measurement+and+Verification+Report%2C%20Part+1%2C%20ADM+Associates%2C%20Inc.pdf/011b6c03-4358-4396-acf8-73cd8a24009e					

Table 5-32 PY2020 Literature Review Results for RSOL ENERGY STAR® Windows

Reference Number	FR	SP	NTG	PY	State
1	0%	11%	111%	2015	MD
2	33%	0%	67%	2016	AR
3	0%	0%	100%	2017	AR
4	18%	0%	82%	2014	UT
5	0%	0%	100%	2011	MA
6	22%	2%	80%	2015	CT
Average	13%	2%	90%		
1. http://webapp.psc.state.md.us/newIntranet/casenum/NewIndex3_VOpenFile.cfm?filepath=C:%5CCasenum%5C9100-9199%5C9157%5CItem_655%5C%5C9153-57-EY6NavigantEvaluationMemos-Navigant-102116.pdf 2. http://www.apscservices.info/EEInfo/EEReports/SWEPCO%202016.pdf 3. http://www.apscservices.info/EEInfo/EEReports/SWEPCO%202017.pdf 4. http://www.pacificorp.com/content/dam/pacificorp/doc/Energy_Sources/Demand_Side_Management/2016/2013-2014_Utah_HES_Evaluation.pdf 5. https://www9.nationalgridus.com/non_html/eer/ma/10_MA_E_EEAR_Pt_3.pdf 6. https://www.energizect.com/sites/default/files/R4_HES-HESIE%20Process%20Evaluation,%20Final%20Report_4.13.16.pdf					

Table 5-33 PY2020 Literature Review Results for RSOL LED Lamps (Direct Install)

Reference Number	FR	SP	NTG	PY	State
1	0%	0%	100%	2017	AR
2	0%	0%	100%	2017	AR
3	5%	0%	95%	2017	AR
4	24%	0%	76%	2017	AR
5	24%	0%	76%	2018	WI
Average	11%	0%	89%		
1. SWEPCO AR HPwES, PY2017 2. SWEPCO AR REIP MF, PY2017 3. OG&E AR CWA, PY2017 4. SWEPCO AR REIP SF, PY2017 5. SWEPCO AR REIP SF, PY2018					

Table 5-34 PY2020 Literature Review Results for RSOL Showerheads (Direct Install)

Reference Number	FR	SP	NTG	PY	State
1	12%	0%	88%	2016	WI
2	25%	0%	75%	2015	IN
3	2%	0%	98%	2017	IN
4	16%	0%	84%	2016	NC
Average	14%	0%	86%		
1. https://www.focusonenergy.com/sites/default/files/Evaluation%20Report%20-%202016%20Appendices.pdf 2. https://www.indianamichiganpower.com/global/utilities/lib/docs/info/projects/IMDemandSideManagement/44841%20Jon%20C.%20Walter%20Direct%20Testimony%20&%20Attachments%20Vol%20II.pdf 3. https://iurc.portal.in.gov/_entity/sharepointdocumentlocation/86b05142-05c8-e811-8143-1458d04eaba0/bb9c6bba-fd52-45ad-8e64-a444aef13c39?file=43827DSM8%20IM%20WP%20WP%20JCW%201%20Residential%20100418.pdf 4. http://www.researchintoaction.com/wp-content/uploads/2018/12/P421-Duke-SEWKP-DEP-DEC-2016-PY-Evaluation-Report.pdf					

5.10.4 Consumer Products

The Evaluators used the results from literature reviews performed in PY2020 for LED lamps (upstream) to determine spillover. The spillover from this literature review was combined with the free ridership determined through the econometric modeling described in Section 5.10.6 to develop NTG estimates.

Table 5-35 PY2020 Literature Review Results for LED Lamps (Upstream)

Reference Number	FR	SP	NTG	PY	Region
1		4%		2015	Midwest
2		2%		2019	Midwest
Average		3%			
1. This spillover literature review was previously published by Tetra Tech in the Entergy Arkansas PY2017 Evaluation found here: http://www.apscservices.info/EEInfo/EEReports/Entergy%202017.pdf					

The Evaluators performed a new literature review for upstream appliance NTG ratio. This value was applied for bathroom ventilation fans, room air purifiers, and water dispensers. The Evaluators attempted to find NTG ratios that were technology-specific, but these measures are often low contributors to utility portfolio savings and thus are not typically the subject of targeted NTG research.

Table 5-36 PY2021 Literature Review Results for Appliances (Upstream)

Reference Number	FR	SP	NTG	PY	Region
1	29%	0%	71%	2019	MA
2	42%	0%	58%	2019	OK
3	40%	0%	60%	2019	AR
4	0%	4%	104%	2015	MO
Average	28%	1%	73%		
1 https://ma-eeac.org/wp-content/uploads/MA20X04-E-PRODNTG_Res-Products-NTG-Report_FINAL_2021.06.08.pdf 2 https://oklahoma.gov/content/dam/ok/en/occ/documents/pu/energyefficiency/demand-program-annual-reports/ps0-2019-demand-report.pdf 3 EAL EM&V Report, 2019, RLA Program 4 Ameren Missouri, Equipment Rebate Program, 2015 by Cadmus					

5.10.5 LivingWise® Schools Outreach

The Evaluators conducted a literature review in PY2020 for school kits NTG. Beginning in PY2021, OG&E’s LivingWise kits no longer include LEDs and instead include advanced power strips. This measure could not be found in the kit contents of programs in the Evaluators’ literature review. As a result, the Evaluators applied the school kits literature review value for low flow devices but then applied the NTG ratio value determined for APS’ in RSOL to those in school kits (78%).

Table 5-37 PY2020 School Kits Literature Review Sources

Utility	State	Year
Ameren Missouri	Missouri	2016
Duke Energy	North and South Carolina	2015
ComEd	Illinois	2017
I&M	Indiana	2016
Duke	Kentucky	2015
Energy New Orleans	Louisiana	2015

Table 5-38 PY2021 School Kits NTG by Measure

Program Measure	Number of Studies	Average Value
Advanced Power Strips	N/A	78%
Faucet Aerators	6	98%
Low flow showerheads	6	95%

5.10.6 Econometric Modeling Approach for HEEP CPS channel

This method of free ridership was developed through the estimation of a price response model which will be used to predict sales levels in the absence of the program. The premise of the price response model is that the quantity of the subsidized product will vary based on the price of the product and how well they are promoted. The program tracking data should include sales for each retailer, by model number and week (monthly data works as well). For each retailer and model number combination, original retail price and program price data will be available. As program price discounts and/or retailer original pricing change throughout the year, the tracking data is updated, allowing for the comparison of same-model sales under slightly different pricing conditions. Price effects are the main program tool for encouraging the purchase of high efficiency lighting choices. Due to the inability to observe price effects for other program offerings, this approach will be used only for the lighting portion of the program. The final price response model is used to estimate a free ridership as described in the equation below:

$$Free\ ridership\ ratio = \frac{\sum_i^n (E[Product_{NoProgram_i}] * kWh_i)}{\sum_i^n (E[Product_{Program_i}] * kWh_i)}$$

Where:

$E[Product_{NoProgram_i}]$ = the expected number of products, i, purchased given original retail pricing (as predicted by the model).

$E[Product_{Program_i}]$ = the expected number of products, i, given program discounted pricing (as predicted by the model).

kWh_i = the average gross kWh savings for product, i.

The price response modeling approach is advantageous in that it is built upon actual sales data from participating retailers (as opposed to relying solely on consumer self-report surveys). There are, however, many limitations for the approach. Most importantly, non-program sales

data was not for inclusion in the model. As a result, the modeling of price impacts may fit program sales data well, but it is uncertain whether those price effects apply well to prices outside of program ranges. Finally, there are likely variables that affect sales levels for products that are not captured by the program tracking data; thus, there is a risk of omitted variable bias in addition to the inherent amount of error from statistical modeling.

The Evaluators used a negative binomial model to account for the right-skewed relationship between prices and quantities. The dependent variable was number of packages sold by the program. Independent variables used to predict sales included, month, program price, and a dummy variable for each model type. Model types were defined as a combination of bulb type (i.e., specialty LED vs. standard LED), bulb shape (i.e., A19 vs BR40), lumens range (i.e., 0-500, 500-1000, etc.), rated life, and the number of bulbs per package.

Additional details on the HEEP NTG methods and results can be found in Appendix C Net-to-Gross Approach and Outcomes.

5.11 Gross Evaluation Summary and Findings

5.11.1 Residential Solutions

Table 5-39 presents the verified *ex post* savings results of the PY2021 RSOL channel by measure.

Table 5-39 Residential Solutions Savings Summary for PY2021

Measure	<i>Ex ante</i> Gross Energy Savings (kWh)	<i>Ex post</i> Gross Energy Savings (kWh)	Realization Rate (kWh)	<i>Ex ante</i> Gross Demand Reduction (kW)	<i>Ex post</i> Gross Demand Reduction (kW)	Realization Rate (kW)
Advanced Power Strips	59,925	57,439	96%	8	7	96%
Air Infiltration	67,780	67,822	100%	20	20	100%
Ceiling Insulation	554	554	100%	0.33	0.33	100%
Contractor Payment	0	0	100%	0	0	100%
Duct Sealing	549,487	629,990	115%	98	118	120%
ES Pool Pumps	12,557	14,982	119%	3	3	119%
ES Windows	45,960	45,950	100%	31	31	100%
Faucet Aerators	208	208	100%	0.02	0.02	100%
LEDs (Standard)	23,967	23,383	98%	4	4	98%
Showerheads	618	570	92%	0.06	0.06	99%
Wall Insulation	3,219	3,233	100%	2	1	90%
Total	764,276	844,131	110%	165	185	112%
Sums may differ due to rounding.						

Table 5-40 outlines the verified *ex post* lifetime savings for the RSOL channel by measure.

Table 5-40 Residential Solutions Lifetime Savings Summary for PY2021

Measure	EUL	<i>Ex post</i> Gross Lifetime Energy Savings (kWh)
Advanced Power Strips	10	574,389
Air Infiltration	11	746,045
Ceiling Insulation	20	11,082
Contractor Payment	1	0
Duct Sealing	18	11,339,823
ENERGY STAR® Pool Pumps	10	149,820
ENERGY STAR® Windows	20	918,997
Faucet Aerators	10	2,077
LEDs (Standard)	19	444,279
Low-Flow Showerheads	10	5,700
Wall Insulation	20	64,659
Total		14,256,872
Sums may differ due to rounding.		

5.11.2 LivingWise® Schools Outreach

The table below presents the verified *ex post* energy savings (kWh) results of the PY2021 LivingWise® Schools Outreach channel, by measure.

Table 5-41 PY2021 LivingWise® Schools Outreach Savings Summary

Measure	<i>Ex ante</i> Gross Energy Savings (kWh)	<i>Ex post</i> Gross Energy Savings (kWh)	Realization Rate (kWh)	<i>Ex ante</i> Gross Demand Reduction (kW)	<i>Ex post</i> Gross Demand Reduction (kW)	Realization Rate (kW)
Advanced Power Strips	184,324	170,522	93%	35	20	56%
Faucet Aerators	42,723	32,548	76%	4	3	76%
Low-Flow Showerheads	156,390	126,905	81%	16	13	81%
Total	383,437	329,975	86%	56	36	65%
Sums may differ due to rounding.						

The table below outlines the verified *ex post* lifetime energy savings (kWh) by measure for the LivingWise® Schools Outreach channel.

Table 5-42 PY2021 LivingWise® Schools Outreach Lifetime Savings by Measure

Measure	EUL	<i>Ex post</i> Gross Lifetime Energy Savings (kWh)
Advanced Power Strips	10	1,705,217
Faucet Aerators	10	325,481
Low-Flow Showerheads	10	1,269,055
Total		3,299,753
Sums may differ due to rounding.		

5.11.3 HVAC Replacement and Tune-up

5.11.3.1 HVAC Replacement and Tune-up: HVAC Replacement

The table below outlines the verified *ex post* energy savings (kWh) and demand reductions (kW) for the HVAC replacement projects within the HVAC Replacement and Tune-up channel.

Table 5-43 Gross Savings Summary for HVAC Replacement

Measure	<i>Ex ante</i> Gross Energy Savings (kWh)	<i>Ex post</i> Gross Energy Savings (kWh)	Realization Rate (kWh)	<i>Ex ante</i> Gross Demand Reduction (kW)	<i>Ex post</i> Gross Demand Reduction (kW)	Realization Rate (kW)
Central AC Replacement	26,939	26,939	100%	13	13	100%
Central HP Replacement	33,567	136,608	407%	2	0.16	8%
Total	60,506	163,547	270%	15	13	87%
Sums may differ due to rounding.						

The table below outlines the *ex post* lifetimes savings (kWh) for the HVAC replacement projects within the HVAC Replacement and Tune-up channel.

Table 5-44 PY2021 HVAC Replacement Lifetime Savings Summary

Measure	EUL	<i>Ex post</i> Gross Lifetime Energy Savings (kWh)
Central AC Replacement	19	511,837
Central HP Replacement	16	2,185,731
Total	16	2,697,568
Sums may differ due to rounding.		

5.11.3.2 HVAC Replacement and Tune-up: Tune-up

The tables below outline the verified *ex post* energy savings (kWh) and demand reductions (kW) by savings type for the AC tune-up projects within the HVAC Replacement and Tune-up channel.

Table 5-45 PY2021 HVAC Central AC Tune-up Gross Savings Summary

Tune up	<i>Ex ante</i> Gross Energy Savings (kWh)	<i>Ex post</i> Gross Energy Savings (kWh)	Realization Rate (kWh)	<i>Ex ante</i> Gross Demand Reduction (kW)	<i>Ex post</i> Gross Demand Reduction (kW)	Realization Rate (kW)
ACTU: M&V	10,121	10,140	100%	6	6	101%
ACTU: Modeled	20,213	20,217	100%	12	12	100%
Total	30,334	30,357	100%	18	18	100%
Sums may differ due to rounding.						

Table 5-46 PY2021 HVAC Central HP Tune-up Gross Savings Summary

Tune up	<i>Ex ante</i> Gross Energy Savings (kWh)	<i>Ex post</i> Gross Energy Savings (kWh)	Realization Rate (kWh)	<i>Ex ante</i> Gross Demand Reduction (kW)	<i>Ex post</i> Gross Demand Reduction (kW)	Realization Rate (kW)
HPTU: M&V	3,829	3,836	100%	1	1	101%
HPTU: Modeled	393,936	394,008	100%	89	89	100%
Total	397,765	397,845	100%	90	90	100%
Sums may differ due to rounding.						

The table below outlines the *ex post* lifetimes savings (kWh) for both the AC tune-up and the HP tune-up projects within the HVAC Replacement and Tune-up channel.

Table 5-47 PY2021 HVAC AC & HP Tune-up Lifetime Savings Summary

Tune-up	EUL	<i>Ex post</i> Gross Lifetime Energy Savings (kWh)
ACTU: M&V	9	87,573
ACTU: Modeled	10	193,454
HPTU: M&V	9	33,131
HPTU: Modeled	10	3,770,279
Total	10	4,084,437
Sums may differ due to rounding.		

5.11.4 Consumer Products

The table below outlines the verified *ex post* energy savings (kWh) and demand reductions (kW) for the Consumer Products channel.

Table 5-48 Savings Summary for Consumer Products

Measure	<i>Ex ante</i> Gross Energy Savings (kWh)	<i>Ex post</i> Gross Energy Savings (kWh)	Realization Rate (kWh)	<i>Ex ante</i> Gross Demand Reductions (kW)	<i>Ex post</i> Gross Demand Reductions (kW)	Realization Rate (kW)
Advanced Power Strips	220,298	220,298	100%	25	25	100%
Bathroom Ventilation Fan	1,315	698	53%	0.16	0.16	98%
ES Room Air Purifier	18,740	18,689	100%	2	2	100%
LEDs (Food Bank)	783,045	783,045	100%	127	127	100%
LEDs (Specialty)	481,363	607,760	126%	78	110	140%
LEDs (Standard)	1,738,801	2,203,829	127%	283	397	140%
Water Dispenser	12,045	12,045	100%	1	1	100%
Window AC Replacement	44,704	40,418	90%	28	25	87%
Total	3,300,311	3,886,784	118%	545	687	126%

Sums may differ due to rounding.

The table below outlines *ex post* lifetimes kWh savings for the Consumer Products channel.

Table 5-49 Lifetime Savings Summary for Consumer Products

Measure	EUL	<i>Ex post</i> Gross Lifetime Energy Savings (kWh)
Advanced Power Strips	10	2,202,984
Bathroom Ventilation Fan	19	13,271
ES Room Air Purifier	9	168,201
LEDs (Food Bank)	19	14,877,859
LEDs (Specialty)	19	11,746,489
LEDs (Standard)	19	41,872,758
Water Dispenser	10	120,450
Window AC Replacement	11	424,393
Total	18	71,426,405

Sums may differ due to rounding.

5.12 Net Impact Evaluation Summary and Findings

Table 5-50 below summarizes free ridership (FR), spillover (SO) and NTG by channel for the PY2021 HEEP.

Table 5-50 PY2021 NTG by Channel for HEEP

	<i>Ex post</i> Gross Energy Savings (kWh)	FR	SO	NTG	<i>Ex post</i> Net Energy Savings (kWh)
Consumer Products	3,886,784	38%	2%	64%	2,490,994
HVAC Replacement & Tune-up	591,749	10%	0%	90%	543,523
Residential Solutions	844,131	5%	0%	95%	798,078
LivingWise® Schools Outreach	329,975	13%	0%	87%	285,464
Total	5,652,639	28%	1%	73%	4,118,059
Sums may differ due to rounding.					

5.12.1 Residential Solutions Net Savings Results

Table 5-51 summarizes the measure-level free ridership results for RSOL. Rates of free ridership and spillover were generally low for most measures.

Table 5-51 PY2021 Measure-level NTG Estimates for HEEP Residential Solutions

Measure	<i>Ex post</i> Gross Energy Savings (kWh)	FR	SO	NTG	<i>Ex post</i> Net Energy Savings (kWh)
Advanced Power Strips	57,439	22%	0%	78%	44,802
Air Infiltration	67,822	0%	0%	100%	67,822
Ceiling Insulation	554	0%	0%	100%	554
Duct Sealing	629,990	0%	0%	100%	629,990
ENERGY STAR® Pool Pumps	14,982	10%	0%	90%	13,484
ENERGY STAR® Windows	45,950	56%	0%	44%	20,218
Faucet Aerators	208	13%	0%	87%	181
LEDs (Standard)	23,383	26%	0%	74%	17,303
Low-Flow Showerheads	570	14%	0%	86%	490
Wall Insulation	3,233	0%	0%	100%	3,233
Total	844,131	5%	0%	95%	798,078
Sums may differ due to rounding.					

Table 5-52 summarizes the results of the net savings analysis. Program net savings were calculated by weighting each measure free ridership score by the total savings for the free ridership and adding program spillover savings to the total. The RSOL channel totaled 798,078 net kWh savings and 165 net kW reduction.

Table 5-52 PY2021 Net Savings for HEEP Residential Solutions

Measure	<i>Ex post</i> Gross Energy Savings (kWh)	<i>Ex post</i> Net Energy Savings (kWh)	NTG	<i>Ex post</i> Gross Demand Reductions (kW)	<i>Ex post</i> Net Demand Reductions (kW)
Advanced Power Strips	57,439	44,802	78%	7	6
Air Infiltration	67,822	67,822	100%	20	20
Ceiling Insulation	554	554	100%	0.33	0.33
Duct Sealing	629,990	629,990	100%	118	118
ENERGY STAR® Pool Pumps	14,982	13,484	90%	3	3
ENERGY STAR® Windows	45,950	20,218	44%	31	13
Faucet Aerators	208	181	87%	0.02	0.02
LEDs (Standard)	23,383	17,303	74%	4	3
Low-Flow Showerheads	570	490	86%	0.06	0.05
Wall Insulation	3,233	3,233	100%	1	1
Total	844,131	798,078	95%	185	165
Sums may differ due to rounding.					

Table 5-53 shows net lifetime kWh savings for the Residential Solutions channel by measure.

Table 5-53 PY2021 HEEP RSOL Net Lifetime Savings Summary

Measure	EUL	<i>Ex post</i> Net Lifetime Energy Savings (kWh)
Advanced Power Strips	10	448,024
Air Infiltration	11	746,045
Ceiling Insulation	20	11,082
Duct Sealing	18	11,339,823
ENERGY STAR® Pool Pumps	10	134,838
ENERGY STAR® Windows	20	404,359
Faucet Aerators	10	1,807
LEDs (Standard)	19	328,766
Low-Flow Showerheads	10	4,902
Wall Insulation	20	64,659
Total	17	13,484,306
Sums may differ due to rounding.		

5.12.2 LivingWise® Schools Outreach Net Savings Results

The literature review resulted in a NTG ratio of 87% for LivingWise® Schools Outreach. The table below outline the net energy savings (kWh) and net demand reduction (kW) results for the LivingWise® Schools Outreach channel.

Table 5-54 PY2021 Net Energy (kWh) Savings for HEEP LivingWise® Schools Outreach

Measure	<i>Ex post</i> Gross Energy Savings (kWh)	<i>Ex post</i> Net Energy Savings (kWh)	NTG	<i>Ex post</i> Gross Demand Reductions (kW)	<i>Ex post</i> Net Demand Reductions (kW)
Advanced Power Strips	170,522	133,007	78%	20	15
Faucet Aerators	32,548	31,897	95%	3	3
Low-Flow Showerheads	126,905	120,560	98%	13	13
Total	329,975	285,464	87%	36	31
Sums may differ due to rounding.					

Table 5-55 shows net lifetime energy (kWh) savings for LivingWise® Schools Outreach channel by measure.

Table 5-55 LivingWise® Schools Outreach Net Lifetime Savings Summary

Measure	EUL	<i>Ex post</i> Net Lifetime Energy Savings (kWh)
Advanced Power Strips	10	1,330,069
Faucet Aerators	10	318,972
Low-Flow Showerheads	10	1,205,602
Total	10	2,854,643
Sums may differ due to rounding.		

5.12.3 HVAC Replacement and Tune-up Net Savings Results

In PY2019, the Evaluators administered surveys to single-family and multi-family decision makers who participated in the HEEP program. Results from these decision-makers were applied to PY2021 program participants.

The table below summarize the results of the net savings analysis for the HVAC Replacement and Tune-up channel. The net savings were calculated by weighting each measure free ridership score by the total savings for the free ridership and adding program spillover savings to the total. Due to low participation in the HVAC replacement measure, AC and Heat Pump replacements were aggregated for NTG analysis. HEEP HVAC Replacement and Tune-up channel totaled 543,523 kWh net energy savings and 114 kW net demand reduction.

Table 5-56 PY2021 NTG Results for the HVAC Channel

Measure	<i>Ex post</i> Gross Energy Savings (kWh)	FR	SO	NTG	<i>Ex post</i> Net Energy Savings (kWh)
HVAC Replacement (AC and HP)	163,547	25%	0%	75%	122,910
Central AC/HP Tune-up	428,202	2%	0%	96%	420,613
Total	591,749	10%	0%	90%	543,523
Sums may differ due to rounding.					

The NTG in the HVAC channel differs between demand reductions (kW) and energy savings (kWh) because of the mix of housing type (single versus multifamily), which leads to a different mixture of heating type (i.e., heat pump vs non-heat pump). This difference impacts the NTG.

Table 5-57 below shows net results by measure in the HVAC channel.

Table 5-57 PY2021 Net Savings Summary for HVAC Channel

Measure	<i>Ex post</i> Gross Energy Savings (kWh)	<i>Ex post</i> Net Energy Savings (kWh)	NTG	<i>Ex post</i> Gross Demand Reductions (kW)	<i>Ex post</i> Net Demand Reductions (kW)
Central AC Replacement	26,939	21,820	81%	13	10
Central AC Tune-up: M&V	10,140	7,605	75%	6	5
Central AC Tune-up: Modeled	20,217	15,163	75%	12	9
Central HP Tune-up: M&V	3,836	3,836	100%	0.90	1
Central HP Tune-up: Modeled	394,008	394,008	100%	89	89
Central HP Replacement	136,608	101,090	74%	0.16	0.12
Total	591,749	543,523	92%	121	114
Sums may differ due to rounding.					

The table below outlines the net lifetime energy (kWh) savings for the HVAC Replacement and Tune-up channel.

Table 5-58 Net Lifetime Energy Savings for HVAC Channel

Measure	EUL	<i>Ex post</i> Net Lifetime Energy Savings (kWh)
Central AC Replacement	19	414,588
Central AC Tune-up: M&V	9	65,680
Central AC Tune-up: Modeled	10	145,091
Central HP Tune-up: M&V	9	33,131
Central HP Tune-up: Modeled	10	3,770,279
Central HP Replacement	16	1,617,441
Total	11	6,046,209
Sums may differ due to rounding.		

5.12.4 Consumer Products Net Savings Results

The Evaluators estimated a free ridership rate of 85% for Specialty bulbs and 45% for Standard bulbs for upstream LEDs using the price response model. The model coefficients are shown in the tables below. The coefficients on program price are negative and statistically significant at the 99% level for both Standard and Special bulbs. The overall free ridership rate is 49%. In PY2020, the free ridership rate was 29%, therefore, free ridership has increased by 20% in PY2021. The increase in free ridership is driven by the following factors: An increase of 16% of the share of Specialty LEDs, 25% lower average incentive levels relative to PY2020, and a decrease in the price coefficient for Standard LED bulbs.

The equations below show how free ridership is calculated for a single bulb model (the Specialty bulb model show in the table below) with sales in August, a retail price of \$10, and a program price of \$5.

$$\text{Pre-program Sales} = \exp(3.147 + 2.037 + 0.142 - 0.026 * 10) = 158$$

$$\text{Program Sales} = \exp(3.147 + 2.037 + 0.142 - 0.026 * 5) = 180$$

$$\text{Free ridership (Example Bulb)} = 158/180 = 88\%$$

This calculation is done for each invoiced line item, using retail and program prices, and the month of sale. As mentioned in Section 5.10.6, each bulb model receives its own coefficient but only one bulb model coefficient is shown below for each bulb type for the sake of brevity.

The Evaluators assessed other predictors of sales quantities related to retailer-specific characteristics, such as, retailer type (e.g., DIY, Mass Merchant, etc.), retailer (e.g., Walmart, Home Depot, etc.), and unique store identifier. However, inclusion of one or more of these predictors resulted in model overfitting or non-sensical price coefficients due to limited price variation observed within a particular store for a particular model type. While bias from omitting these retail-specific predictors may exist, a suitable model could not be developed with their inclusion (e.g., price coefficients are positive and non-sensical or there are too many predictors in the model). The Evaluators judge this to be a limitation of this method in estimating free ridership.

NTG is calculated as: $100 * (1 - \text{Free Ridership} + \text{Spillover})$. The Evaluators performed a survey of participants and estimated spillover in PY2021 at 4%. The NTG ratio for the program is 55% ($100 * (1 - 0.494 + 0.0462)$).

Table 5-59 Price Response Model Results, Specialty LEDs

Coefficient	Estimate	Std Err	Statistic	P-Value	CI-low	CI-high
(Intercept)	3.147	0.630	4.996	0.000	1.912	4.382
Program Price	-0.026	0.009	-3.041	0.002	-0.043	-0.009
Aug	0.142	0.116	1.223	0.221	-0.086	0.370
Dec	0.302	0.118	2.552	0.011	0.070	0.534
Feb	0.314	0.123	2.555	0.011	0.073	0.554
Jan	0.329	0.112	2.943	0.003	0.110	0.548
July	0.081	0.110	0.734	0.463	-0.135	0.298
June	-0.221	0.115	-1.918	0.055	-0.447	0.005
Mar	0.097	0.123	0.793	0.428	-0.143	0.338
May	-0.066	0.107	-0.622	0.534	-0.276	0.143
Nov	0.012	0.118	0.100	0.920	-0.220	0.244
Oct	0.512	0.105	4.889	0.000	0.307	0.717
Sept	0.004	0.109	0.037	0.970	-0.210	0.218
Specialty LED_A-Line Omni_500-1000_4_15000	2.037	0.749	2.720	0.007	0.569	3.504

Table 5-60 Price Response Model Results, Standard LEDs

Coefficient	Estimate	Std Err	Statistic	P-Value	CI-low	CI-high
(Intercept)	2.129	0.213	10.017	0.000	1.713	2.546
Program Price	-0.181	0.011	-16.852	0.000	-0.202	-0.160
Aug	-0.294	0.116	-2.529	0.011	-0.522	-0.066
Dec	0.015	0.114	0.133	0.894	-0.208	0.238
Feb	0.131	0.118	1.111	0.266	-0.100	0.361
Jan	0.143	0.114	1.256	0.209	-0.080	0.366
July	-0.267	0.105	-2.542	0.011	-0.473	-0.061
June	-0.201	0.109	-1.850	0.064	-0.414	0.012
Mar	0.068	0.113	0.599	0.549	-0.154	0.290
May	-0.101	0.110	-0.919	0.358	-0.316	0.114
Nov	0.207	0.123	1.684	0.092	-0.034	0.447
Oct	0.167	0.107	1.560	0.119	-0.043	0.378
Sept	-0.331	0.108	-3.065	0.002	-0.542	-0.119
Standard LED_A-Line Omni_0-500_4_20000	1.323	0.216	6.137	0.000	0.900	1.745

The tables below summarize the results of the net savings analysis. The net energy (kWh) savings of the Consumer Products channel totaled 3,886,784 kWh, with a NTG ratio of 64%. Net peak demand (kW) reductions totaled 434 kW with an 63% NTG ratio.

Table 5-61 Net kWh Savings for HEEP Consumer Products

Measure	<i>Ex ante</i> Gross Energy Savings (kWh)	<i>Ex post</i> Gross Energy Savings (kWh)	FR	SO	<i>Ex post</i> Net Energy Savings (kWh)	NTG
Advanced Power Strips	220,298	220,298	48%	0%	114,555	52%
Bathroom Ventilation Fan	1,315	698	27%	0%	512	73%
ES Room Air Purifier	18,740	18,689	27%	0%	13,705	73%
LEDs (Food Bank)	783,045	783,045	0%	0%	783,045	100%
LEDs (Specialty)	481,363	607,760	49%	5%	335,605	55%
LEDs (Standard)	1,738,801	2,203,829	49%	5%	1,216,955	55%
Water Dispenser	12,045	12,045	27%	0%	8,833	73%
Window AC Replacement	44,704	40,418	56%	0%	17,784	44%
Total	3,300,311	3,886,784	38%	2%	2,490,994	64%
Sums may differ due to rounding.						

Table 5-62 Net kW Peak Demand Reductions for HEEP Consumer Products

Measure	<i>Ex ante</i> Gross Demand Reductions (kW)	<i>Ex post</i> Gross Demand Reductions (kW)	FR	SO	<i>Ex post</i> Net Demand Reductions (kW)	NTG
Advanced Power Strips	25	25	48%	0%	13	52%
Bathroom Ventilation Fan	0	0	27%	0%	0	73%
ES Room Air Purifier	2	2	27%	0%	2	73%
LEDs (Food Bank)	127	127	0%	0%	127	100%
LEDs (Specialty)	78	110	49%	5%	60	55%
LEDs (Standard)	283	397	49%	5%	219	55%
Water Dispenser	1	1	27%	0%	1	73%
Window AC Replacement	28	25	56%	0%	11	44%
Total	545	687	35%	2%	434	63%
Sums may differ due to rounding.						

Table 5-63 outlines net lifetime energy (kWh) savings for the Consumer Products channel.

Table 5-63 Net Lifetime Savings Summary for Consumer Products Channel

Measure	EUL	<i>Ex post</i> Net Lifetime Energy Savings (kWh)
Advanced Power Strips	10	1,145,552
Bathroom Ventilation Fan	19	9,732
ENERGY STAR® Room Air Purifier	9	123,342
LEDs (Food Bank)	19	14,877,859
LEDs (Specialty)	19	6,486,411
LEDs (Standard)	19	23,122,137
Water Dispenser	10	88,326
Window AC Replacement	11	186,733
Total	18	46,040,091
Sums may differ due to rounding.		

5.13 Non-Energy Benefits (NEBs)

Protocol L of the AR TRM V8.2 states that EM&V of demand-side management (DSM) programs in Arkansas must account for 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 HEEP Program in PY2021 are avoided replacement costs (ARCs), propane, natural gas, and water savings.

Measures with zero entries are included to ensure consistency of table structure and to demonstrate that no measures or potential energy and non-energy impacts were omitted.

5.13.1 Natural Gas Energy Savings

In HEEP, OG&E customers can have either electric or natural gas heating. When a customer has natural gas heating, OG&E can claim the natural gas therms savings as NEBs. The table below presents the *ex post* net natural gas that can be claimed as NEBs for cost-effectiveness purposes. The natural gas savings estimated in HEEP were all from channels where there are no gas utility partners as there are in the CWA. The natural gas penalties presented for Consumer Products are inclusive of leakage effects.

Table 5-64 Natural Gas Savings (NGS) by Measure, for HEEP in PY2021

Measure	<i>Ex post</i> NGS (Therms)	<i>Ex post</i> Net NGS (Therms)	<i>Ex post</i> Net Lifetime NGS (Therms)	NEB Natural Gas Savings (\$)	NPV NGS (\$)
Consumer Products	(21,556)	(14,181)	(270,078)	\$ (7,521)	\$ (123,413)
LEDs (Food Bank)	(5,086)	(5,086)	(96,629)	\$ (2,697)	\$ (44,261)
LEDs (Specialty)	(3,560)	(1,966)	(37,998)	\$ (1,043)	\$ (17,110)
LEDs (Standard)	(12,910)	(7,129)	(135,451)	\$ (3,781)	\$ (62,043)
RSOL	18,267	17,440	264,404	\$ 9,250	\$ 125,515
Air Infiltration	7,653	7,653	84,182	\$ 4,059	\$ 42,433
Ceiling Insulation	90	90	1,794	\$ 48	\$ 812
Duct Sealing	7,826	7,826	140,861	\$ 4,150	\$ 65,276
ES Windows	1,560	686	13,729	\$ 364	\$ 6,216
LEDs (Standard)	(180)	(133)	(2,534)	\$ (71)	\$ (1,160)
Wall Insulation	1,319	1,319	26,371	\$ 699	\$ 11,939
LivingWise®	3,156	3,017	30,172	\$ 1,600	\$ 15,384
Faucet Aerators	644	6631	6,313	\$ 355	\$ 3,219
Showerheads	2,512	2,386	23,860	\$ 1,265	\$ 12,166
Total	(134)	6,276	24,498	\$ 3,329	\$ 17,486

Natural gas savings were estimated as follows:

- **Consumer Products:** the project data provided heating type, which was used to determine if the project qualified for natural gas savings.
- **Residential Solutions:** the project data provided heating type, which was used to determine if the project qualified for natural gas savings.
- **LivingWise® Schools Outreach:** participant survey responses provided by AM Conservation were used to estimate natural gas savings.

5.13.2 Propane Savings

When a customer has propane, OG&E can claim the savings as NEBs. The table below presents the *ex post* net propane savings can be claimed as NEBs for cost-effectiveness purposes.

Propane was only identified in the surveys delivered to the LivingWise® Outreach participants.

Table 5-65 Propane Savings by Measure, for HEEP in PY2021

Channel	Measure	<i>Ex post</i> Gross LPG Savings (gallons)	<i>Ex post</i> Net LPG Savings (gallons)	LPG Benefit (\$)	NPV LPGS (\$)
LivingWise®	Aerator	108	105	\$ 251	\$ 2,193
Schools Outreach	Showerhead	420	399	\$ 949	\$ 8,288
Total		527	504	\$ 1,200	\$ 10,481
Sums may differ due to rounding.					

5.13.3 Water Savings

The Evaluators applied AR TRM V8.2 Volume 1, Section II, Protocol L1 to calculated water savings from faucet aerators and low-flow showerheads. Avoided costs for water savings is calculated using values from the ‘TRM Clarification Memo’ distributed by the IEM on July 22, 2020. The Evaluators relied on the TRM-calculated marginal water rates. The corrected marginal water rates below are reported for PY2021.

Table 5-66 Total Marginal Water Rates

Customer Class	Original 2020 TRM V8.2 Values			Corrected: For use in 2021
	Water Rates (per 1,000 gallons)	Sewage Rates (per 1,000 gallons)	Marginal Water Rates (per 1,000 gallons)	Marginal Water Rates (per 1,000 gallons)
Residential	\$3.41	\$4.61	\$6.49	\$8.03
Commercial	\$2.76	\$4.16	\$7.25	\$6.92
Average Cost \$/Gallon	\$3.12	\$4.38	\$6.87	\$7.50

The water savings for PY2021 HEEP, for both single-family and multi-family, are presented in the table below.

In PY2021, the water saving measures implemented through the HEEP included faucet aerators and low-flow 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. Table 5-67 below presents the estimates for HEEP.

Table 5-67 Water Savings by Measure Type for HEEP in PY2021

Channel	Measure	<i>Ex post</i> Gross Water/WW Savings (gallons)	<i>Ex post</i> Net Water/ WW Savings (gallons)	NEB Water/ WW Benefit (\$)	NPV Water/ WW (\$)
RSOL	Aerators	2,154	1,874	\$ 14	\$ 129
RSOL	Showerheads	5,636	4,847	\$ 37	\$ 333
LivingWise®	Faucet Aerators	1,690,612	1,656,800	\$ 12,757	\$ 113,884
Schools Outreach	Showerheads	5,171,782	4,913,193	\$ 37,832	\$ 337,601
Total		6,870,184	6,576,713	\$ 50,641	\$ 451,906

Sums may differ due to rounding.

5.13.4 Avoided and Deferred Replacement Costs

To calculate avoided replacement costs (ARCs) and incremental costs for LEDs in OG&E’s HEEP, the AR TRM V8.2 Protocol L calculator was used with the following assumptions:

- 1) Replacement-on-burnout for all bulbs; and
- 2) EUL for omni-directional and decorative LEDs is 19 years, and EUL for directional LEDs is 20 years [1].

LED costs were sourced from OG&E program tracking data where available. For direct install LEDs, the Evaluators assumed that the incentive was equal to the total cost of equipment and labor. In cases where project cost was not available and the project was not direct install, the Evaluators cited costs from IL TRM v6.0 Volume 3⁴¹.

There were no deferred replacement costs (DRC) estimated in the PY2021 HEEP. Table 5-68 below shows the ARC benefits for the PY2021 HEEP.

⁴¹ http://ilsagfiles.org/SAG_files/Technical_Reference_Manual/Version_6/Final/IL-TRM_Effective_010118_v6.0_Vol_3_Res_020817_Final.pdf

Table 5-68 Avoided Replacement Costs (ARCs) by Measure, for HEEP in PY2021

Channel	Measure	Ex post Gross ARCs (\$)	Ex post Net ARC (\$)	NPV of ARC (\$)
Consumer Products	LED Lamp (Food Bank)	\$ 144,855	\$ 144,855	\$ 144,855
	LED Lamp (Specialty)	\$ 110,780	\$ 61,173	\$ 61,173
	LED Lamp (Standard)	\$ 322,694	\$ 178,192	\$ 178,192
RSOL	LED Lamp (Standard)	\$ 4,326	\$ 3,201	\$ 3,201
Total		\$ 582,656	\$ 387,422	\$ 387,422

Sums may differ due to rounding.

5.13.5 NEBs Summary

The table below summarizes the net present value (NPV) of NEBs attributable to HEEP, including natural gas savings, water savings, propane, and avoided replacement cost. There were no deferred replacement costs (DRCs) in the PY2021 HEEP. There were no NEBs identified in the HVAC Replacement & Tune-up channel.

Table 5-69 PY2021 Non-Energy Benefits (NEBs) Summary, OG&E

Channel	Measure	NPV NGS (\$)	NPV LPGS (\$)	NPV Water/WW (\$)	NPV ARC (\$)	Total NPV (\$)
Consumer Products	LEDs (Food Bank)	\$ (44,261)	\$ -	\$ -	\$ 144,855	\$ 100,595
	LEDs (Specialty)	\$ (17,110)	\$ -	\$ -	\$ 61,173	\$ 44,063
	LEDs (Standard)	\$ (62,043)	\$ -	\$ -	\$ 178,192	\$ 116,149
LivingWise®	Faucet Aerators	\$ 3,219	\$ 2,193	\$ 113,844	\$ -	\$ 119,256
	Showerheads	\$ 12,166	\$ 8,288	\$ 337,601	\$ -	\$ 358,055
RSOL	Air Infiltration	\$ 42,433	\$ -	\$ -	\$ -	\$ 42,433
	Ceiling Insulation	\$ 812	\$ -	\$ -	\$ -	\$ 812
	Duct Sealing	\$ 65,276	\$ -	\$ -	\$ -	\$ 65,276
	ES Windows	\$ 6,216	\$ -	\$ -	\$ -	\$ 6,216
	Faucet Aerators	\$ -	\$ -	\$ 129	\$ -	\$ 129
	LEDs (Standard)	\$ (1,160)	\$ -	\$ -	\$ 3,201	\$ 2,041
	Showerheads	\$ -	\$ -	\$ 333	\$ -	\$ 333
	Wall Insulation	\$ 11,939	\$ -	\$ -	\$ -	\$ 11,939
Total		\$ 17,486	\$ 10,481	\$ 451,906	\$ 387,422	\$ 867,296

5.14 Process Evaluation Reasoning

The AR TRM V8.2 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 5-70 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 Program received a process evaluation in PY2020.
Less than Expected Energy Savings or Accomplishments	No. OG&E 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 offerings.
New Vendor or Contractor	No. The program continues to be implemented by CLEAResult and uses installation contractors who were previously involved.
Energy Savings are being Achieved Slower than Expected	No. Energy savings are being achieved at a rate that is consistent with program expectations.

Table 5-71 Determining Process Evaluation Conditions

Component	Status
Impact problems	No. Savings 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	None identified thus far.
Participation problems	None identified thus far.
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 offering has been adequate.
Negative feedback	None identified thus far.
Market effects	None identified thus far.

HEEP received a process evaluation in PY2020. PY2021 process evaluation activities were limited to following up on outstanding program recommendations.

5.15 Process Evaluation Approach and Findings

This section outlines the findings of the PY2021 HEEP process evaluation.

5.15.1 Data Collection Activities

As part of the PY2021 evaluation of HEEP, the Evaluators completed in-depth interviews with program staff working on the program: the program managers from OG&E, and a program

representative from CLEARresult. The Evaluators used the information gleaned in these interviews to identify program updates or changes experienced in PY2021 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 PY2021.

Table 5-72 below summarizes the survey and interview data collection for the PY2021 program evaluation, including data collection type and number of respondents.

Table 5-72 Interview and Survey Data Collection Summary

Target	Component	Activity	n	Precision	Details
Program Staff	OG&E Program Staff	Interview: Program Manager EM&V Analyst	4	N/A	The Program Manager handles day-to-day operations of the program, including interactions with Trade Allies and implementers. The EM&V Analyst liaisons between the program and the Evaluators and ensures that program operations and energy savings calculations are TRM-compliant. The LivingWise® Schools Outreach Program manager manages the LivingWise® Schools Outreach program.
	CLEARresult Staff	Interview: Program Manager	1	N/A	The Program Manager handles overall program oversight for HEEP.

The next few sections present 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.

5.15.2 OG&E Staff Interview Findings

The interviewees identified as the Lead Program Manager, LivingWise® Schools Outreach Program Manager, and EM&V Analyst. Interviewees interact with many staff members at OG&E and CLEARresult. Interviewees meet with CLEARresult members on a weekly basis with additional meetings happening as needed. Interviewees also noted that they receive emails from CLEARresult if a problem or question arises. Due to the pandemic, all communication with CLEARresult and AM Conservation are done remotely.

At the beginning of the current triennial period, LivingWise® Schools Outreach was integrated into the Residential Solutions Program. According to staff, the LivingWise® Schools Outreach program experienced an incredibly successful year in 2021, with more teachers throughout Arkansas becoming aware of and involved in the program. In addition to engaging two schools that had not yet participated in the program, staff also received requests for additional funds from many teachers throughout the state. Staff indicated that much of this success was due to increased marketing campaigns via the help of an outside advertisement collaborator, as well as a first-time pop-up store that provided education materials and pamphlets to teachers about the program. OG&E staff noted that LivingWise® Schools Outreach program is most productive when they can get in front of teachers and school staff and talk to them in person.

OG&E staff create marketing materials for the HEEP programs. CLEARResult and OG&E communicate and coordinate often about marketing strategies. Marketing strategies include social media posts, mail outs, flyers, etc. Staff provide cobranding to Trade Allies and require all Trade Allies to wear an OG&E badge. Social media has proven a successful marketing strategy and CLEARResult tracks which posts and advertisements generate the most interest. Staff also emphasized the importance of word-of-mouth marketing, as well as meeting people in-person .

Interviewees stated they had no concerns or issues with the program data tracked by CLEARResult. Additionally, the interviewees stated they are happy with the amount of data being collected by CLEARResult and the monthly transfers are a smooth process.

5.15.3 CLEARResult Staff Interview Findings

The interviewee identified as the Program Manager. The interviewee stated they interact with various CLEARResult staff members that work within Arkansas specifically. Additionally, the interviewee stated they interact with three staff members specifically from OG&E. The interviewee did not indicate any new measures added to the HEEP programs. In PY2021, there were no changes made to HEEP's incentive design and program participation process.

5.16 Progress on PY2020 Evaluation Recommendations

The table below summarizes the response by OG&E and CLEARResult to PY2020 recommendations for HEEP.

Table 5-73 Status of Recommendations from PY2020 Evaluation

2020 Recommendations	Status	Comment
Add propane heating and water heating to database.	In progress	This has been added to CWA – incorporating to HEEP is ongoing
Track building type for RSOL.	Complete	This has been added to program tracking.

5.17 Planned Program Changes

There are no planned changes for PY2022.

5.17.1 Conclusions

Overall HEEP Performance in PY2021	The program performed relatively well in PY2021, achieving a 7% increase in overall claimed kWh savings compared to PY2020.
	The percent of overall claimed savings increased for both the RSOL and the HVAC channels in PY2021. These two channels accounted for 15% and 10% of overall savings, compared to 8% and 3% in PY2020, respectively.
	The HEEP had 6 more measures for their PY2021 offerings. Of these measures, three of them were new to the program. These measures include bathroom ventilation fans, ENERGY STAR room air purifiers, and water dispensers (or water coolers).
	Multi-family projects represent a significant volume of participation in PY2021, accounting for 89% of HEEP savings where housing type is known. There is no housing type information for LivingWise® Schools Outreach or the upstream component of CPS.
	Overall program NTG ratio decreased from 83% to 73%.
	Although measure NTG ratio values for RSOL, HVAC, and LivingWise® did not change much from PY2020, the 20% increase in free ridership for LEDs in the CPS channel drove the NTG ratio down from 74% in PY2020 to 55% in PY2021.

5.17.2 Recommendations

Consider adding an EER requirement for heat pump replacements

There were 7 projects for which the demand (kW) reductions resulted in a negative value due to the installed units having EERs being less than the federal standard EER value of 11.8 for replace-on-burnout projects.

The overall kW realization rate was 8% for central heat pump replacement projects.

Consider aggregating all program data together to address macro-level database inconsistencies

The datasets for the various program channels often have inconsistent heading titles for the same datapoint. Additionally, each channel is provided in unique and separate tabs. It is a time-consuming effort to combine them for the program-level evaluation of HEEP.

6 Consistent Weatherization Approach (CWA) Program

6.1 Overview of Evaluation Findings

Table 6-1 through Table 6-4 outline the *ex ante* and *ex post* energy (kWh) savings and demand (kW) reductions by measure, respectively, for the CWA and Low Income channels.

Table 6-1 PY2021 Gross Electric Energy Savings Summary by Measure – CWA

Measure	<i>Ex Ante</i> Annual Energy Savings (kWh)	<i>Ex Post</i> Gross Annual Savings (kWh)	Realization Rate (kWh)
Advanced Power Strip	34,716	5,786	17%
Air Infiltration	176,607	130,562	74%
Ceiling Insulation	228,867	229,720	100%
Duct Sealing	1,066,959	1,004,506	94%
Faucet Aerators	1,155	1,120	97%
LEDs (Standard)	69,476	65,931	95%
LEDs (Specialty)	5,245	5,214	99%
Low-Flow Showerheads	3,460	3,555	103%
Total	1,586,485	1,446,394	91%

Sums may differ due to rounding.

Table 6-2 PY2021 Gross Electric Energy Savings Summary by Measure – Low Income

Measure	<i>Ex Ante</i> Annual Energy Savings (kWh)	<i>Ex Post</i> Gross Annual Savings (kWh)	Realization Rate (kWh)
Advanced Power Strip	33,625	19,615	58%
Air Infiltration	185,678	148,254	80%
Ceiling Insulation	127,706	127,559	100%
Duct Sealing	1,093,541	1,019,137	93%
Faucet Aerators	1,467	1,423	97%
LEDs (Standard)	102,074	88,883	87%
LEDs (Specialty)	8,958	8,541	95%
Low-Flow Showerheads	2,546	2,470	97%
Walk Through Assessment	0	0	100%
Total	1,555,594	1,415,880	91%

Sums may differ due to rounding.

Table 6-3 PY2021 Gross Electric Demand Savings Summary by Measure – CWA

Measure	<i>Ex Ante</i> Annual Demand Savings (kW)	<i>Ex Post</i> Gross Demand Savings (kW)	Realization Rate (kW)
Advanced Power Strip	4	1	17%
Air Infiltration	52	37	71%
Ceiling Insulation	70	70	100%
Duct Sealing	271	249	92%
Faucet Aerators	0.12	0.12	97%
LEDs (Standard)	11	10	95%
LEDs (Specialty)	0.83	0.82	98%
Low-Flow Showerheads	0.36	0.37	103%
Total	410	369	90%
Sums may differ due to rounding.			

Table 6-4 Gross Electric Demand Savings Summary by Measure – Low Income

Measure	<i>Ex Ante</i> Annual Demand Savings (kW)	<i>Ex Post</i> Gross Demand Savings (kW)	Realization Rate (kW)
Advanced Power Strip	4	2	58%
Air Infiltration	55	42	77%
Ceiling Insulation	43	43	100%
Duct Sealing	320	291	91%
Faucet Aerators	0.15	0.15	97%
LEDs (Standard)	16	14	84%
LEDs (Specialty)	1	1	95%
Low-Flow Showerheads	0.26	0.26	97%
Total	441	395	90%
Sums may differ due to rounding.			

Table 6-5 and Table 6-6 outline the *ex ante* and verified *ex post* natural gas savings (therms) claimed by OG&E, by measure, for the PY2021 CWA and Low Income channels, respectively. The Evaluators found that therms shown in program tracking were not claimable by OG&E as they were in almost all cases in line items that indicated that the home had received funding from AOG. In prior program years, OG&E would obtain significant therms savings from homes weatherized in the fourth quarter of the program year, as AOG would often run out of funds while OG&E still had budget. In these cases, OG&E would still weatherize homes with natural gas service and claim the gas savings as a NEB. In PY2021, AOG had budget available for the full program year, and as a result the gas savings had all received incentive payments and were claimed by AOG.

While this does reduce the NEBs claimable by OG&E, this is nonetheless a positive development as all fuel savings are going to their primary utility; by reducing the amount spent by OG&E on homes with gas service (due to all such homes getting AOG co-funding), this improves the Utility Cost Test benefit-cost ratio of the program.

Measures with zero entries are included to ensure consistency of table structure and to demonstrate that no measures or potential energy and non-energy impacts were omitted.

Table 6-5 PY2021 Gross Therms Savings Summary by Measure – CWA

Measure	<i>Ex Ante</i> Annual Therms Savings	<i>Ex Post</i> Annual Therms Savings	Realization Rate (kW)
Advanced Power Strip	0	0	N/A
Air Infiltration	24,151	0	0%
Assessment	0	0	N/A
Ceiling Insulation	12,093	0	0%
Duct Sealing	70,648	150	0%
Faucet Aerators	0	0	N/A
LEDs (Standard)	-476	-396	83%
LEDs (Specialty)	-38	-35	91%
Low-Flow Showerheads	0	0	N/A
Total	106,379	-281	0%
Sums may differ due to rounding.			

Table 6-6 PY2021 Gross Therms Savings Summary by Measure – Low Income

Measure	<i>Ex Ante</i> Annual Therms Savings	<i>Ex Post</i> Annual Therms Savings	Realization Rate (kW)
Advanced Power Strip	0	0	N/A
Air Infiltration	25,570	0	0%
Assessment	0	0	N/A
Ceiling Insulation	7,978	0	0%
Duct Sealing	91,540	0	0%
Faucet Aerators	0	0	N/A
LEDs (Standard)	-783	-657	84%
LEDs (Specialty)	-61	-60	99%
Low-Flow Showerheads	0	0	N/A
Total	124,244	-717	-1%
Sums may differ due to rounding.			

Table 6-7 and Table 6-8 outline the EUL and *ex post* lifetime energy (kWh) savings by measure for the PY2021 CWA and Low Income channels.

Table 6-7 PY2021 Gross Lifetime Savings Summary by Measure – CWA

Measure	EUL	<i>Ex Post</i> Gross Lifetime kWh Savings
Advanced Power Strip	10	57,861
Air Infiltration	11	1,436,178
Ceiling Insulation	20	4,594,398
Duct Sealing	18	18,081,111
Faucet Aerators	10	11,203
LEDs (Standard)	19	1,252,695
LEDs (Specialty)	19	99,728
Low-Flow Showerheads	10	35,548
Total	18	25,568,722
Sums may differ due to rounding.		

Table 6-8 PY2021 Gross Lifetime Savings Summary by Measure – Low Income

Measure	EUL	<i>Ex Post</i> Gross Lifetime kWh Savings
Advanced Power Strip	10	196,146
Air Infiltration	11	1,630,798
Ceiling Insulation	20	2,551,172
Duct Sealing	18	18,344,464
Faucet Aerators	10	14,227
LEDs (Standard)	19	1,688,770
LEDs (Specialty)	19	165,336
Low-Flow Showerheads	10	24,697
Total	17	24,615,611
Sums may differ due to rounding.		

Table 6-9 presents the net savings summary, by channel, for the PY2021 CWA. The overall program NTG ratio is 97%.

Table 6-9 Ex Post Net Savings Summary

Program Channel	# Homes	Ex Post Net Annual kWh Savings	Ex Post Net kW Savings	Ex Post Net Lifetime kWh Savings	NTG Ratio
CWA	399	1,354,135	348	23,933,120	94%
Low Income	468	1,415,880	395	24,615,611	100%
Total	867	2,770,015	743	48,548,731	97%

Sums may differ due to rounding.

Figure 6-1 and Figure 6-2 summarize the gross and net energy savings (kWh) by program channel.

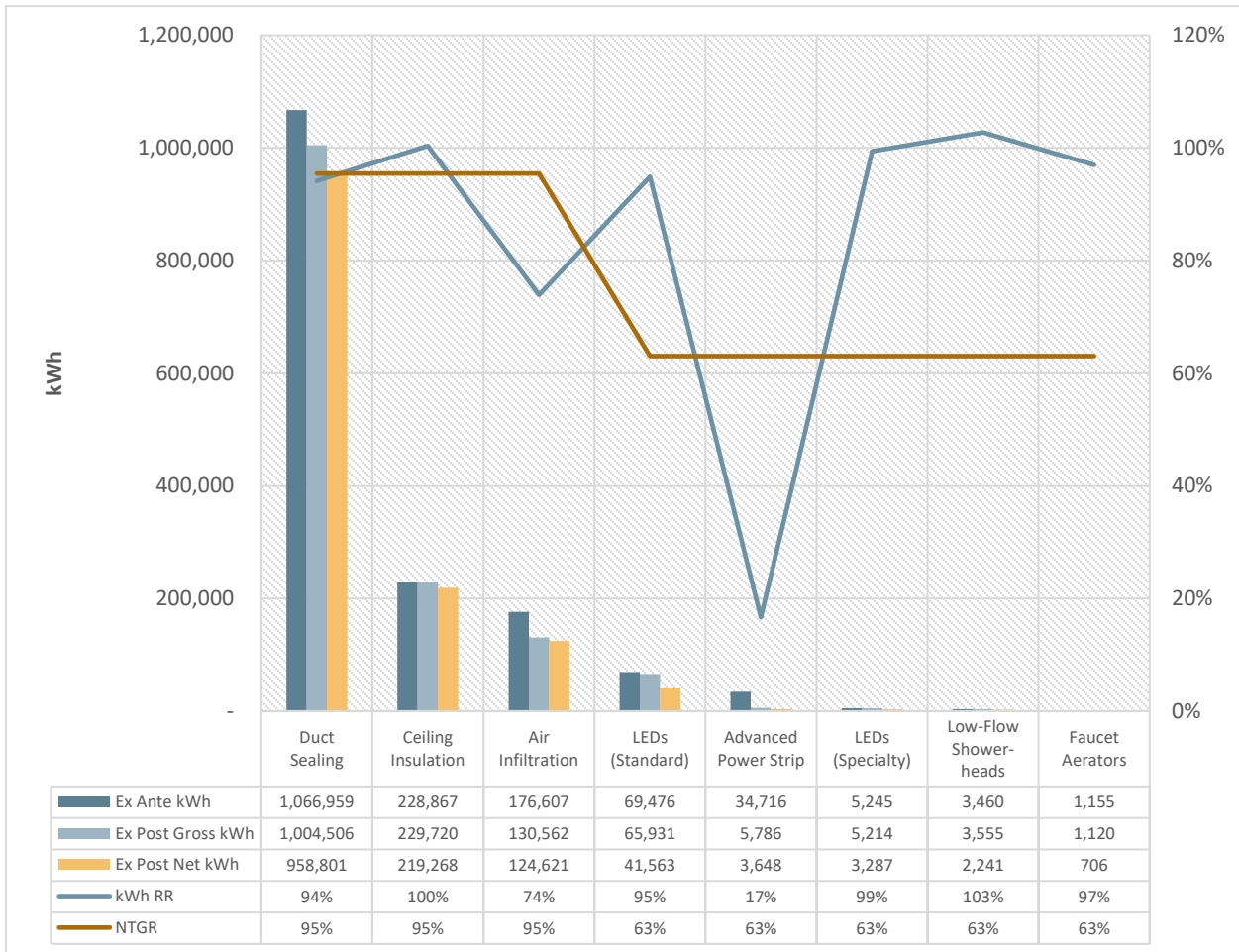


Figure 6-1 CWA Energy Savings (kWh) Summary

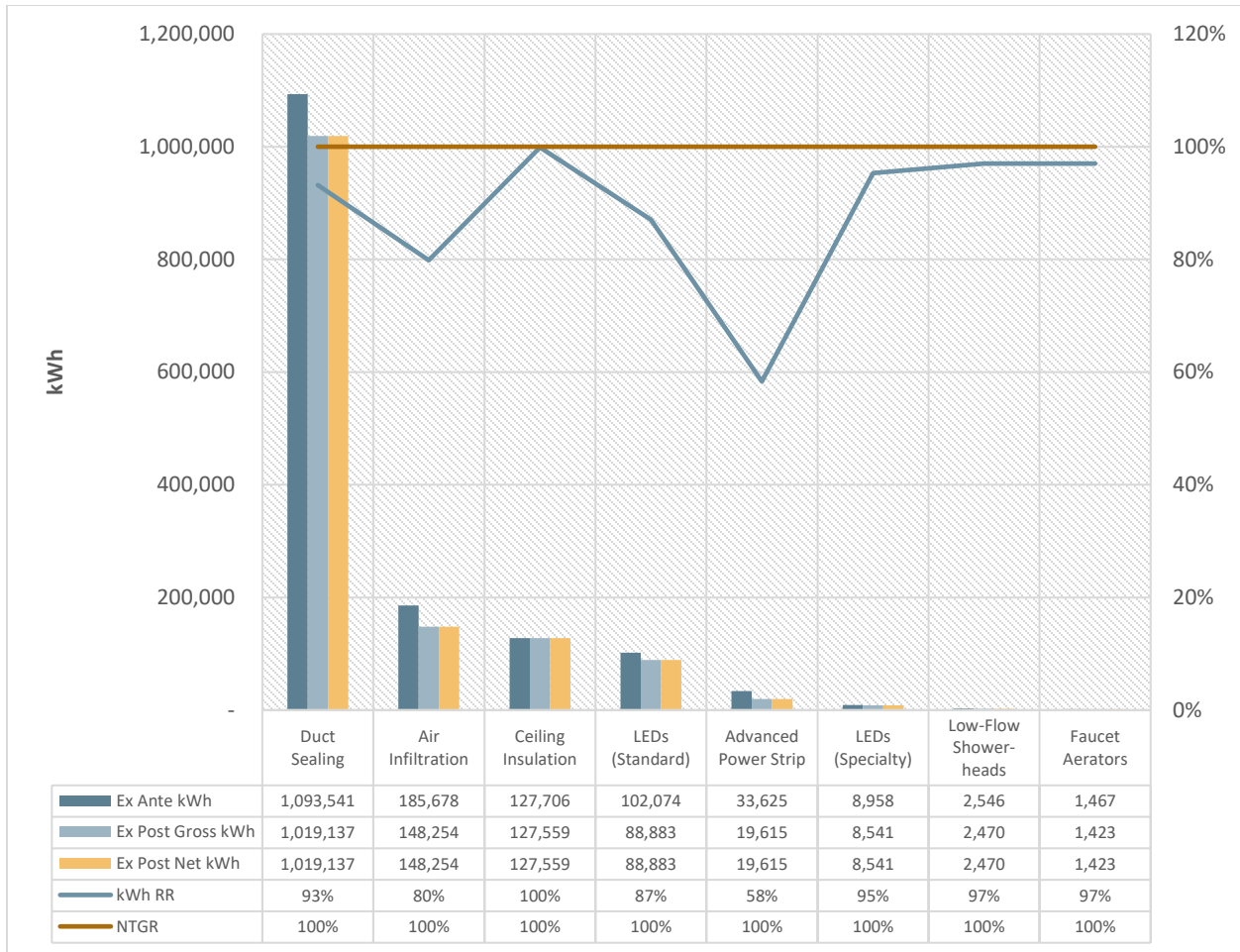


Figure 6-2 Low Income Energy Savings (kWh) Summary

Figure 6-3 and Figure 6-4 summarize the gross and net demand savings (kW) by program channel.

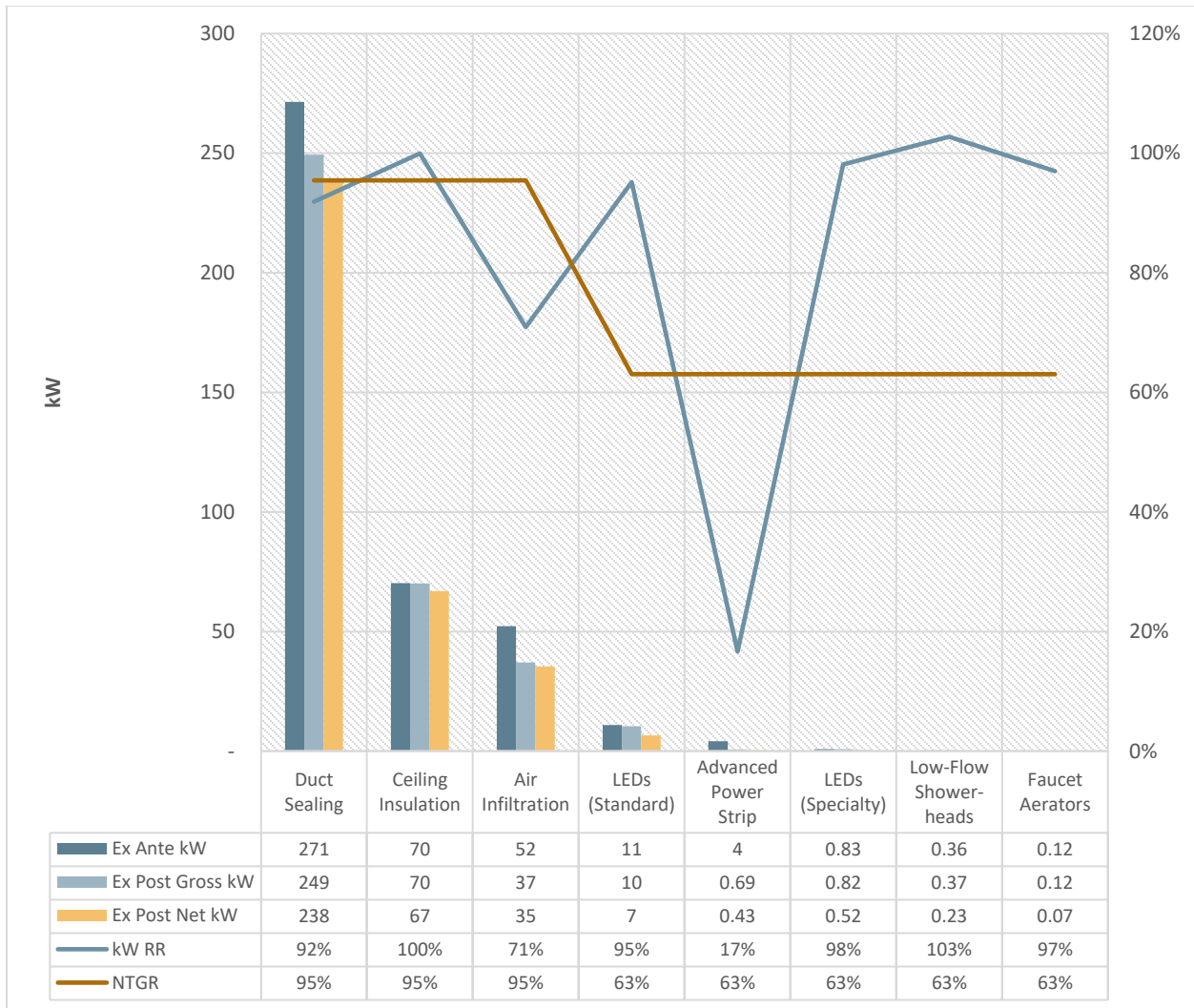


Figure 6-3 CWA Demand Reduction (kW) Summary

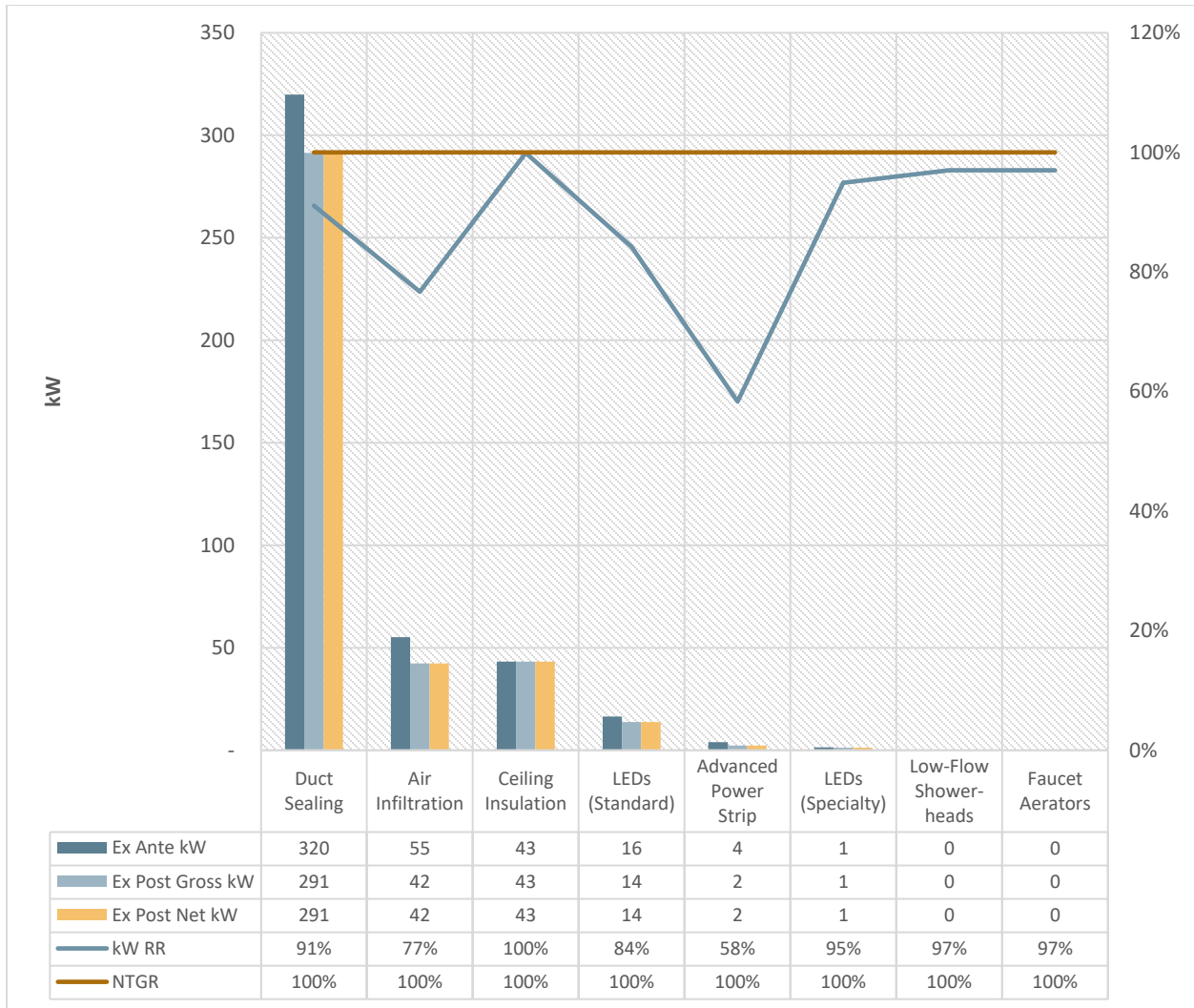


Figure 6-4 Low Income Demand Reduction (kW) Summary

Table 6-10 and Table 6-11 present the total participants, measures, and incentives by program channel.

Table 6-10 Measures and Incentives Summary - CWA

Measure	Total Participants	Total Measures	Total Incentives
Advanced Power Strip	112	139	\$ 4,170
Air Infiltration	216	216	\$ 29,699
Assessment	374	374	\$ 72,450
Ceiling Insulation	97	99	\$ 82,222
Duct Sealing	268	298	\$ 65,763
Faucet Aerators	13	20	\$ 72
Health & Safety	276	363	\$ 2,745
LEDs (Standard)	247	2,578	\$ 12,935
LEDs (Specialty)	16	188	\$ 916
Low-Flow Showerheads	12	16	\$ 204
Total	1,631	4,291	\$ 271,175
Total participants is the sum of unique electric account numbers to represent households. Sums may differ due to rounding.			

Table 6-11 Measures and Incentives Summary – Low Income

Measure	Total Participants	Total Measures	Total Incentives
Advanced Power Strip	117	134	\$ 4,020
Air Infiltration	255	255	\$ 31,752
Assessment	458	458	\$ 87,450
Ceiling Insulation	66	70	\$ 54,516
Duct Sealing	314	346	\$ 73,317
Faucet Aerators	16	27	\$ 100
Health & Safety	375	471	\$ 213
LEDs (Standard)	327	3,742	\$ 18,710
LEDs (Specialty)	26	305	\$ 1,654
Low-Flow Showerheads	9	11	\$ 120
Walk Through Assessment	1	1	\$ 150
Total	1,964	5,820	\$ 272,002
Total participants is the sum of unique electric account numbers to represent households. Sums may differ due to rounding.			

6.2 Program Overview

The CWA, administered by CLEAResult under contract to OG&E, provides energy audits and whole house retrofit services to OG&E residential customers. The program is administered with significant coordination with AOG due to their high level of overlap in their service territory.

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 CWA was developed by the Parties Working Collaboratively (PWC) Weatherization Collaborative comprised of Arkansas IOUs and other stakeholders to provide a consistent and comprehensive weatherization offering across the state of Arkansas. The former OG&E/AOG Weatherization Program designed and implemented by OG&E and AOG was the model for the rest of the state's IOUs CWA programs.

The IOUs are responsible for delivering the Program. 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 approach when delivering weatherization services but is able to supplement the Program with complementary program elements such as additional measure offerings. While all IOUs are required to offer weatherization services under the CWA framework, each IOU offers its own iteration of the framework and may or may not deliver weatherization through a joint utility offering. OG&E's CWA is an example of a joint utility offering, 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 a minimum energy usage cost per square foot of ten cents for electricity based on the customer's highest bill in the past 12 months.

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 CWA framework, including:

- Ceiling Insulation;
- Air Infiltration;
- Duct Sealing;
- Advanced Power Strips;
- LEDs (Standard);
- 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. The program contracts with four installation contractors who perform the weatherization and measure implementation services. After the measures are installed, CLEAResult staff members perform post-inspections on a sample of homes to verify that all measures have been properly implemented.

Beginning in PY2020, the program included the Low Income channel per requirements outlined in Act 1102. Act 1102 programs target low income and elderly (age 65+) customers and are intended to provide enhanced health and safety (H&S) improvements along with the energy efficiency improvements included under the CWA.

In PY2021, the CWA directed a significant amount of funding towards the Low Income channel. The CWA channel treated 369 homes and the Low Income channel treated 468 homes. Participants received in-home energy assessments and one or more of the following measure types:

- Attic Insulation;
- Air Infiltration;
- Duct Sealing;
- Advanced Power Strips;
- LEDs (Standard);
- LEDs (Specialty);
- Low Flow Showerheads;
- Faucet Aerators; and
- Health & Safety Measures.

Depending on the location of customers and the fuel sources used in their homes, services for each customer are funded by OG&E, AOG, or both OG&E and AOG. Figure 6-5 cross-tabulates the number of participating homes by channel and fuel type. Homes with electric and natural gas service were all served by (and co-funded by) AOG. 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 OG&E and AOG. These utilities included municipal utilities, co-ops, propane service providers, or other investor-owned utilities that do not pay into the CWA.

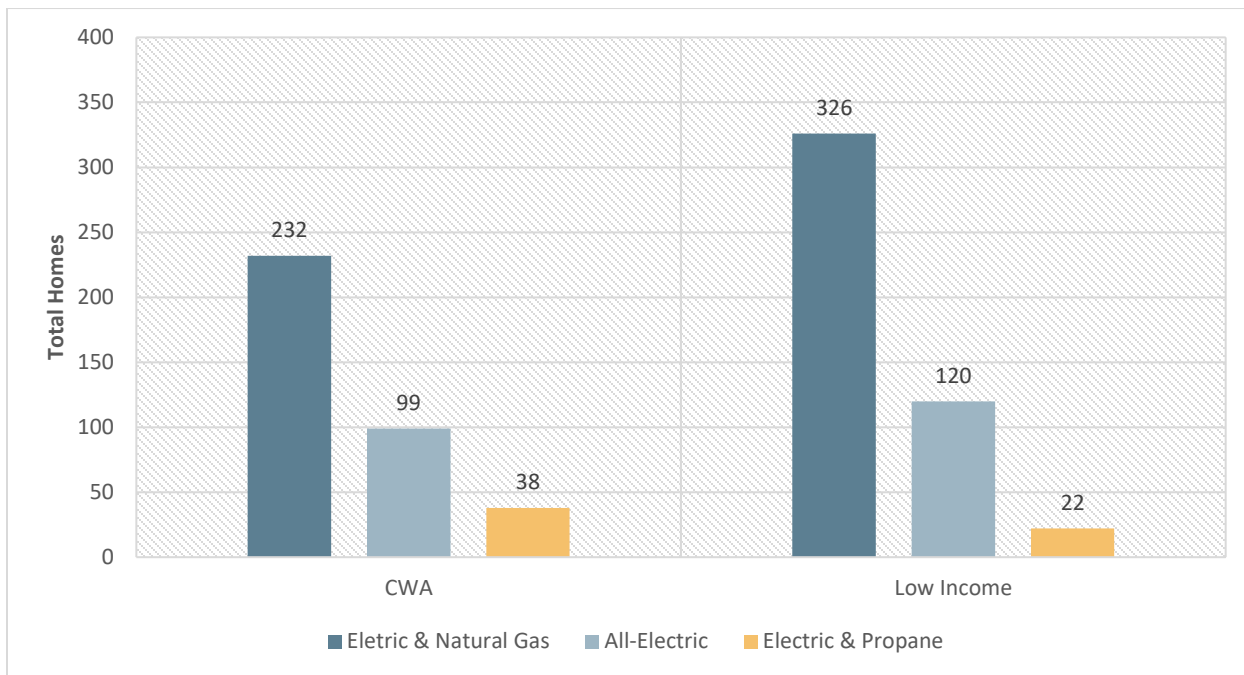


Figure 6-5 Participant Homes by Channel and Fuel Type

Figure 6-6 below displays the month of weatherization for homes serviced during PY2021, based on the installation date listed in program tracking data.

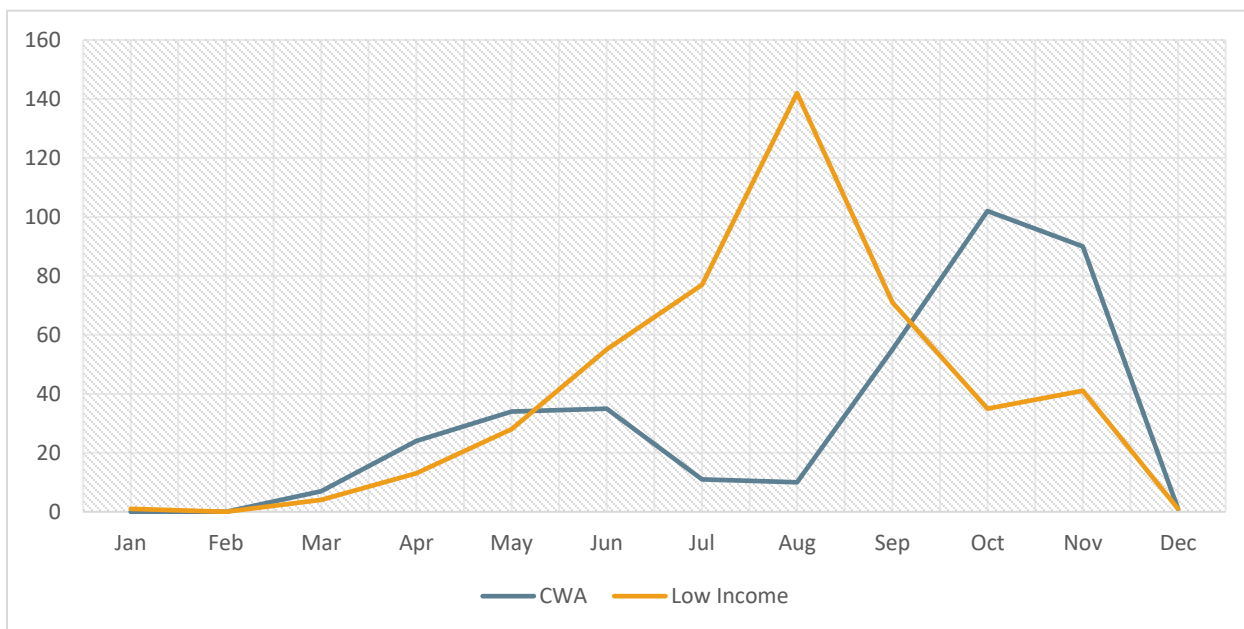


Figure 6-6 Homes Participating by Month, PY2021

6.2.1 Consistent Weatherization Approach Metrics

Table 6-12 summarizes the CWA metrics for the core CWA program offering (excluding Act 1102).

Table 6-12 CWA Metrics for the PY2021 Evaluation

Metric	Value	
	PY2020	PY2021
Program Name	Consistent Weatherization Approach	Consistent Weatherization Approach
CWA Implementation	Yes	Yes
Total Audits Completed	1,184	369
Total Submitted Projects	1,184	399
Conversion Rate	100%	100%
Measures installed per-project	6.4	2.47
Cost per participant	\$1,968	\$1,027
Percent of contractors promoting program	100% (3 Contractors)	100% (4 Contractors)

Table 6-13 CWA Metrics for the PY2021 Evaluation – Low Income Pilot

Metric	PY2021
Program Name	Low Income Pilot
CWA Implementation	Yes
Total Audits Completed	358
Total Submitted Projects	468
Conversion Rate	100%
Measures installed per-project	2.41
Cost per participant	\$580
Percent of contractors promoting program	100% (4 Contractors)

6.2.2 Act 1102 Pilot Evaluation Metrics

Beginning in PY2020, CWA included a low-income pilot per Act 1102. The participants are tracked in the CWA database. Table 6-14 shows how OG&E has met the Act 1102 Pilot evaluation metrics.

Table 6-14 ACT 1102 Metrics

Topic Area	Metric	Tracked by OG&E	Reported by Evaluators
Marketing Efforts	Track how program is marketed	Yes	Yes
	Identify effectiveness of each method	No	Yes
	Indicate if and how utility is working with CAP agency/social service agency	No	N/A
Site Visit Assessment	Track if customer qualifies as LI, Age or Both	Yes	Yes
	Catalog measures not installed and why	No	No
	Track if customer is receiving benefits from other programs	No	No
	Track NEBs such as eliminating arrearages, collectibles, LIHEAP payments, etc.	Yes	Yes
Deferred Homes	Identify if program referral methods were left behind	No	Yes
	Identify reasons for deferral	No	No
	Track health and safety repairs completed	Yes	Yes
	Identify any measures installed	Yes	Yes
	Identify if home was tracked to CAP agency	No	No
	Track reasons for customer denial in program	No	No
Post Installation	Track participation in other utility programs	No	No
	Assess participant's satisfaction with all aspects of the pilot program	No	Yes
	Track number of times a participant was visited	Yes	Yes
	Track number of hours spent in the home	No	No
	Calculate average project cost-effectiveness-	Yes	Yes
	TRC for each project	No	No
	SIR for each project	Yes	Yes
	Cost range of projects	Yes	Yes
	Average cost of projects	Yes	Yes
	Track home type	Yes	Yes
	Identify neighborhoods where the pilot would be effective	Yes	No
Identify methods to certify age/income	Yes	Yes	

6.3 Gross Impact Evaluation Approach

This section presents the methodologies for, and key findings from, the gross impact evaluation of the PY2021 program.

For measures implemented through the PY2021 program, savings verification was performed according to methodologies described in AR TRM V8.2. For savings verification involving lighting and NEBs, methodologies described in AR TRM V8.2 were performed. Table 6-15 identifies the sections in the AR TRM V8.2 that were used for verification of measure-level savings under the CWA.

Table 6-15 AR TRM V8.2 Sections by Measure

Measure Type	AR TRM V8.2 Section
Ceiling Insulation	2.2.2
Duct Sealing	2.1.11
Air Infiltration	2.2.9
Advanced Power Strips	2.4.4
LEDs (Standard)	2.5.1.4
Low-Flow Showerheads	2.3.5
Faucet Aerators	2.3.4

The calculation methodologies for these measures are detailed in the AR TRM V8.2.

6.4 Field Verification Rates and Survey Procedures and Findings

ADM conducted field verification at 56 homes in the CWA. Measures included in this sample were as follows:

- Air Infiltration: 28 homes
- Ceiling Insulation: 12 homes
- Duct Sealing: 43 homes, 48 HVAC systems
- LEDs: 40 homes
- Advanced Power Strips: 15 homes, 21 units

The Evaluators conducted duct blast and blower door tests at all homes that received duct sealing and air sealing (respectively).

6.4.1 Duct Sealing

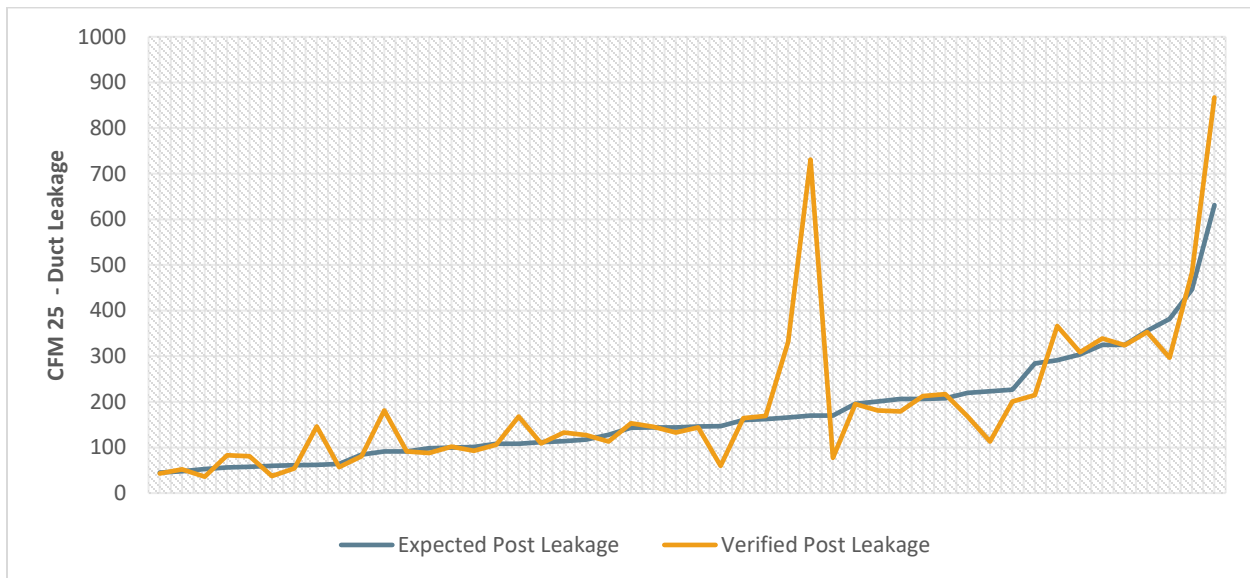


Figure 6-7 Duct Sealing Field Data Collection Results (n=49)

The Evaluators found higher duct leakage than shown in ex ante estimates. This resulted in an overall in-service rate (ISR) of 96% for CWA homes and 95% for Low Income homes.

6.4.2 Air Infiltration

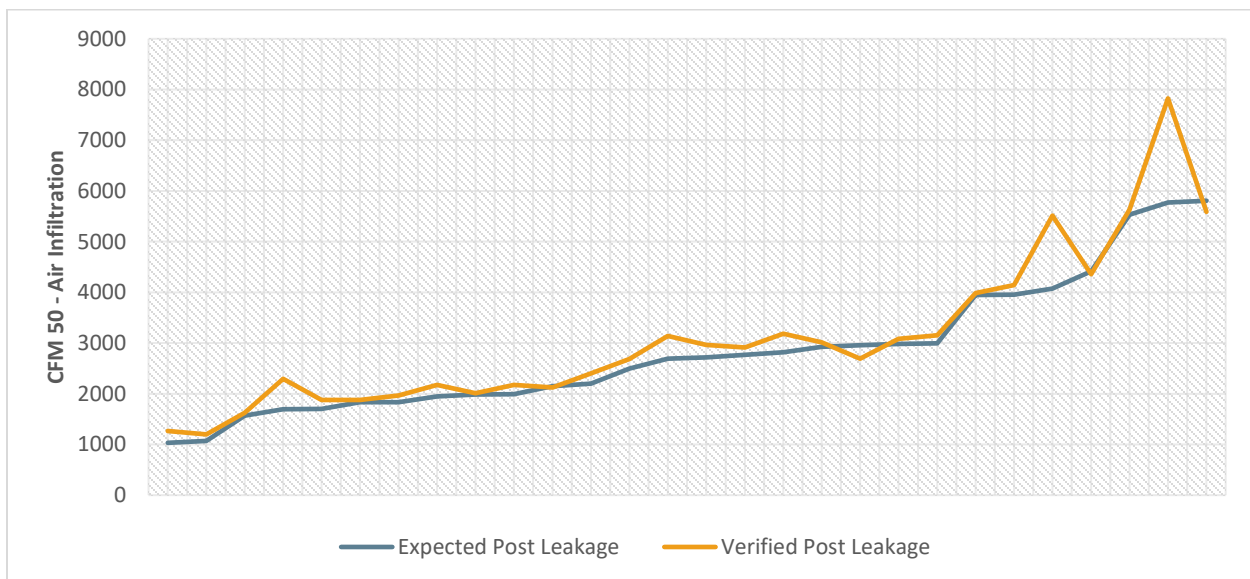


Figure 6-8 Air Infiltration Field Data Collection Results (n=29)

The Evaluators found higher infiltration than shown in ex ante estimates, particularly in homes with higher ex ante post-retrofit infiltration values. This resulted in an overall ISR of 78% for CWA homes and 82% for Low Income homes.

6.4.3 Direct Install Measures

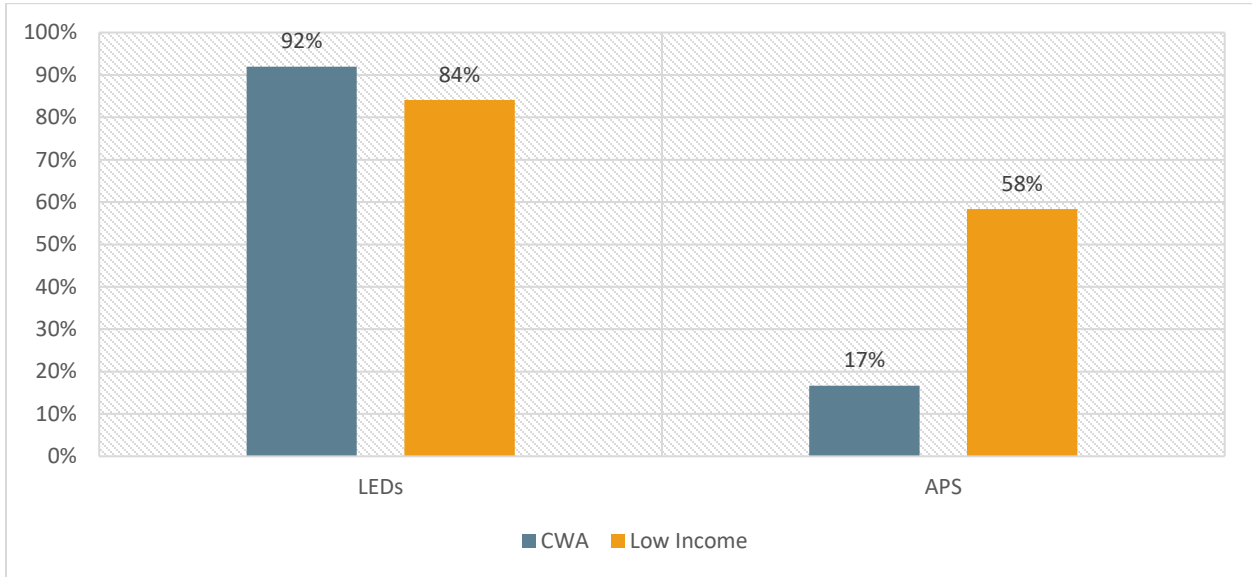


Figure 6-9 ISRs for LEDs and Advanced Power Strips

LEDs had a high ISR (92% and 84% for CWA and Low Income, respectively). As found in prior years, advanced power strips had low ISRs (17% and 48% for CWA and Low Income, respectively).

6.5 Net Impact Evaluation Approach

6.5.1 Major-Measure Free-ridership

The scoring mechanism for major measure free-ridership is summarized in Figure 6-10.

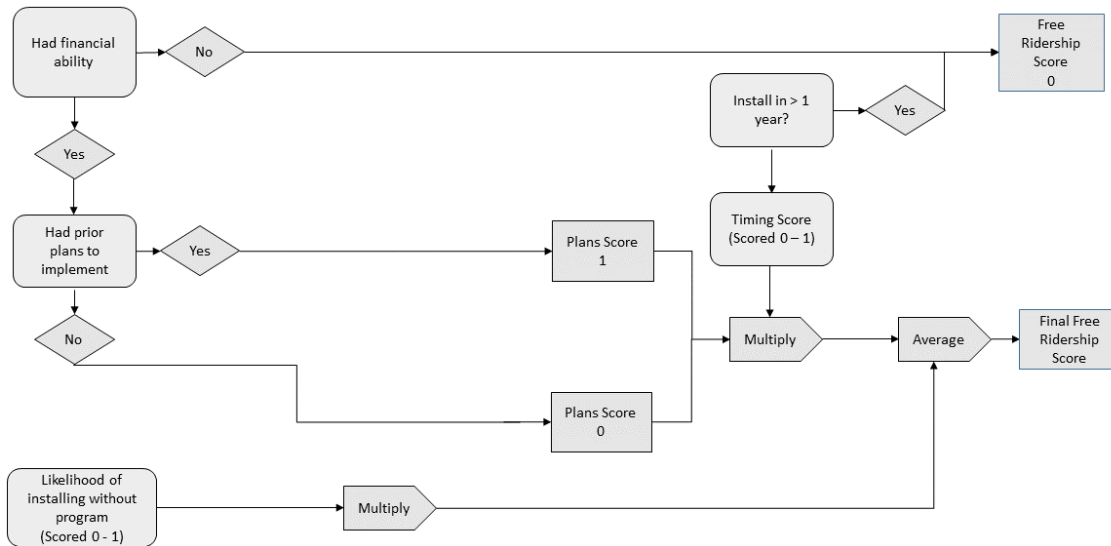


Figure 6-10 Major Measure Free-ridership

To assess the program’s influence on major measures (i.e., duct sealing, air sealing, and insulation), program participants were asked questions regarding:

- If they could afford to install the equipment if it had not been provided for free through the program;
- If they had plans to complete the project;
- The likelihood of installing the equipment if it had not been provided for free; AND
- The timing of the project in the absence of the program.

The procedures for developing a free-ridership score based on the survey responses are summarized below.

In this methodology, financial ability 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. Respondents that reported they could have afforded to implement the improvements were assigned an overall free-ridership score based on a prior plan score, a likelihood of installing the measure in the absence of the program, and a timing score.

Prior Plans and Deferred Free-ridership

The prior plans score was based on a response to a question regarding the presence of plans. Specifically, respondents were considered to have had prior plans if they answered “Yes” to the following question:

- Prior to learning about the program, did you have plans to implement the [Measure]?

The program influence on the timing of the project was incorporated into the estimation of free-ridership in one of two ways. First, consistent with the Arkansas TRM definition of free-ridership, respondents who indicated that the project would have been completed in more than one year if the program were not available were assigned a free-ridership score of 0. For all other respondents, the plans score was factored by the program impact on timing. Specifically,

- If the respondent stated that they would have installed the measure in 6 months to one year, then the prior plans score was reduced by one-half.
- If the respondent stated that they would have installed the measure at the same time or within 6 months of when it was installed, the prior plans score was not adjusted.

Likelihood of Implementing Measure without Program

A likelihood of installing the measure in the absence of the program was developed based on respondents stated likelihood of installing a measure if the financial support was not provided or if the measure had not been recommended through the energy assessment. Specifically, responses to this question were scored as follows:

- Very likely: 1
- Somewhat likely: .75
- Neither particularly likely nor unlikely: .5
- Somewhat unlikely: .25
- Very unlikely: 0

The likelihood score was based on the lower value of the likelihood of installing the measure if the program financial support was not available or if the measure was not recommended through the energy assessment.

The overall free-ridership score for participants with the financial ability to install the measures was based on the average of the prior plans and the likelihood scores.

6.5.2 Direct Install Measures Free-ridership

The approach to estimating free-ridership for the direct install measures was similar to the approach described above but differed in three regards. First, because the direct install measures are relatively low-cost items, financial ability is less likely to be a factor for participants. Second, because of their relatively low cost and the ability to easily self-install the items, it is unlikely that participants would have had plans to install the equipment for an extended period. As such, the free-ridership methodology did not factor in financial ability or the program’s impact on the projects timing. Third, for LED light bulbs, which respondents received several of, the respondent’s plans may have been to install fewer than the total number of bulbs received through the program. The average percent of the bulbs received that these respondents reported installing was used to adjust the free-ridership score for respondents that were not asked this question.

The free-ridership scoring is summarized in Figure 6-11. Under this approach, a respondent was considered to have prior plans to implement the measure if they 1) stated that they had prior plans and 2) that they had previously purchased that measure type.

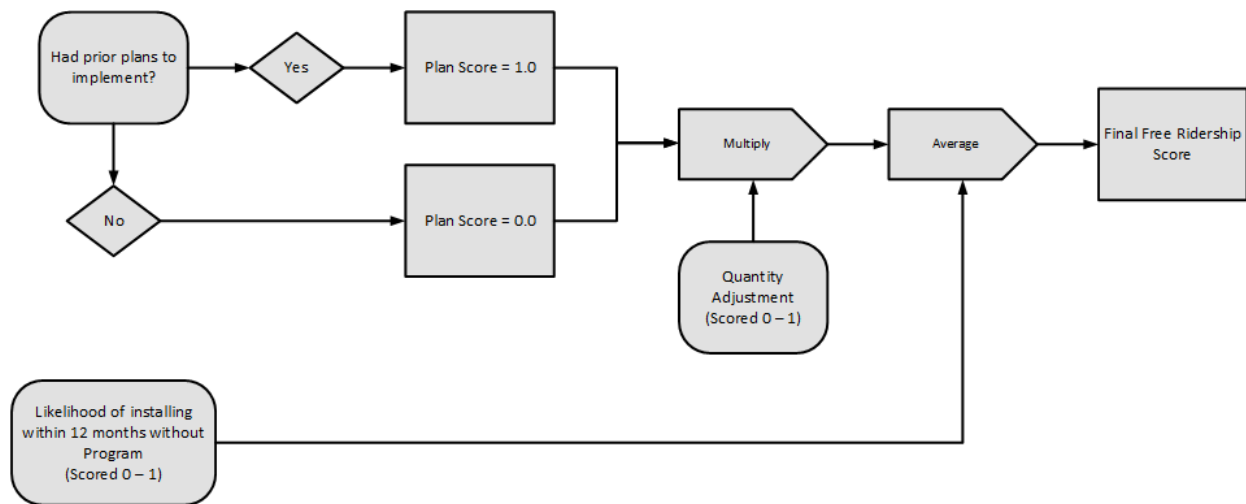


Figure 6-11 Direct Install Free-ridership

6.5.3 Low Income Net-to-Gross

The Evaluators researched existing literature on NTG for low income programs. The Evaluators concluded from this that assigning a 100% NTG ratio would be within industry best-practices. This is cited in:

- Uniform Methods Project ⁴²
- DOE Federal Weatherization Assistance Program⁴³
- California Energy Savings Assistance Program⁴⁴

6.5.4 NTG Results

The Evaluators performed surveys to determine NTG ratios. The resulting NTG ratios were as follows:

- CWA:
 - Major measures: 95%
 - Direct-install measures: 63%
- Low Income: 100% NTG

Additional details on the NTG approach and results can be found in Appendix C Net-to-Gross Approach and Outcomes.

6.6 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 AR TRM V8.2. *Ex post* gross electricity and gas savings were within 3% of *ex ante* estimates for the program.

Table 6-16 presents the *ex post* gross energy savings (kWh) achieved by program channel.

Table 6-16 *Ex Post* Gross Energy Savings

Program Channel	# of homes	<i>Ex Post</i> Gross Peak Demand Savings (kW)	<i>Ex Post</i> Gross Annual Savings (kWh)	<i>Ex Post</i> Gross Lifetime Savings (kWh)	<i>Ex Post</i> Gross Realization Rate
CWA	399	369	1,446,394	25,568,722	91%
Low Income	468	395	1,415,880	24,615,611	91%
Total	867	764	2,862,274	50,184,332	91%
Sums may differ due to rounding.					

⁴² <https://www.nrel.gov/docs/fy17osti/68578.pdf>

⁴³ <https://eta.lbl.gov/news/events/2009/09/11/estimating-the-impacts-of-low-income-weatherization-assistance-using-a-random>

⁴⁴ <https://liob.cpuc.ca.gov/wp-content/uploads/sites/14/2020/12/ESA-Program-Impact-Evaluation-Program-Years-2015-2017-042619.pdf>

Table 6-17 and Table 6-18 summarizes the PY2021 *ex post* gross energy (kWh) and demand reductions (kW) by measure for OG&E.

Table 6-17 *Ex Post* Gross Savings by Measure - CWA

Measure	<i>Ex Post</i> Gross Annual Savings (kWh)	<i>Ex Post</i> Gross Lifetime Savings (kWh)	<i>Ex Post</i> Gross Peak Demand Savings (kW)
Advanced Power Strip	5,786	57,861	0.69
Air Infiltration	130,562	1,436,178	37
Ceiling Insulation	229,720	4,594,398	70
Duct Sealing	1,004,506	18,081,111	249
Faucet Aerators	1,120	11,203	0.12
LEDs (Standard)	65,931	1,252,695	10
LEDs (Specialty)	5,214	99,728	0.82
Low-Flow Showerheads	3,555	35,548	0.37
Total	1,446,394	25,568,722	369
Sums may differ due to rounding.			

Table 6-18 *Ex Post* Gross Savings by Measure – Low Income

Measure	<i>Ex Post</i> Gross Annual Savings (kWh)	<i>Ex Post</i> Gross Lifetime Savings (kWh)	<i>Ex Post</i> Gross Peak Demand Savings (kW)
Advanced Power Strip	19,615	196,146	2.33
Air Infiltration	148,254	1,630,798	42.35
Ceiling Insulation	127,559	2,551,172	43.24
Duct Sealing	1,019,137	18,344,464	291.35
Faucet Aerators	1,423	14,227	0.15
LEDs (Standard)	88,883	1,688,770	13.81
LEDs (Specialty)	8,541	165,336	1.33
Low-Flow Showerheads	2,470	24,697	0.26
Total	1,415,880	24,615,611	395
Sums may differ due to rounding.			

Table 6-19 presents overall energy savings (kWh) and demand reductions (kW) *ex post* gross realization rates by measure.

Table 6-19 Overall Gross Realization Rates by Measure

Measure	Ex Post Gross Realization Rate (kWh)		Ex Post Gross Realization Rate (kW)	
	CWA	Low Income	CWA	Low Income
Advanced Power Strip	17%	58%	17%	58%
Air Infiltration	74%	80%	71%	77%
Ceiling Insulation	100%	100%	100%	100%
Duct Sealing	94%	93%	92%	91%
Faucet Aerators	97%	97%	97%	97%
LEDs (Standard)	95%	87%	95%	84%
LEDs (Specialty)	99%	95%	98%	95%
Low-Flow Showerheads	103%	97%	103%	97%

6.7 Net Impact Evaluation Summary and Findings

Table 6-20 and Table 6-21 summarize *ex post* net kWh and kW savings by measure and program channel.

Table 6-20 Ex Post Net Savings by Measure - CWA

Measure	Ex Post Net Peak Demand (kW)	Ex Post Net Savings (kWh)	Ex Post Net Lifetime Savings (kWh)
Advanced Power Strip	0	3,648	36,475
Air Infiltration	35	124,621	1,370,832
Assessment	0	0	0
Ceiling Insulation	67	219,268	4,385,353
Duct Sealing	238	958,801	17,258,421
Faucet Aerators	0	706	7,063
LEDs (Standard)	7	41,563	789,699
LEDs (Specialty)	1	3,287	62,869
Low-Flow Showerheads	0	2,241	22,409
Total	348	1,354,135	23,933,120
Sums may differ due to rounding.			

Table 6-21 *Ex Post* Net Savings by Measure – Low Income

Measure	<i>Ex Post</i> Net Peak Demand (kW)	<i>Ex Post</i> Net Savings (kWh)	<i>Ex Post</i> Net Lifetime Savings (kWh)
Advanced Power Strip	2	19,615	196,146
Air Infiltration	42	148,254	1,630,798
Assessment	0	0	0
Ceiling Insulation	43	127,559	2,551,172
Duct Sealing	291	1,019,137	18,344,464
Faucet Aerators	0	1,423	14,227
LEDs (Standard)	14	88,883	1,688,770
LEDs (Specialty)	1	8,541	165,336
Low-Flow Showerheads	0	2,470	24,697
Total	395	1,415,880	24,615,611
Sums may differ due to rounding.			

6.8 Non-Energy Benefits (NEBs)

Protocol L of the AR TRM V8.2 states that EM&V of DSM programs in Arkansas must account for 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 CWA in PY2021 are natural gas savings, liquid propane savings, water savings, and avoided replacement costs.

Measures with zero entries are included to ensure consistency of table structure and to demonstrate that no measures or potential energy and non-energy impacts were omitted.

6.8.1 Electricity, Natural Gas, and Liquid Propane Energy Savings

In the CWA, the participating utilities are OG&E and AOG. Typically, the amount that either utility pays for a participating home depends on whether the utility is serviced by OG&E, by AOG, or by both utilities. Weatherization of a home receiving both electric service from OG&E and gas service from AOG would typically be paid for by both utility companies.

Table 6-22 and Table 6-23 present the *ex post* net natural gas savings NEBs by channel.

Table 6-22 Natural Gas (Therms) NEBs - CWA

Measure	Ex Post Gross Natural Gas Savings (therms)	Net Natural Gas Savings (therms)	Net Lifetime N. Gas Savings (therms)	NEB Natural Gas Savings (\$)	NPV NGS (\$)
APS	0	0	0	\$ -	\$ -
Air Infiltration	0	0	0	\$ -	\$ -
Assessment	0	0	0	\$ -	\$ -
Ceiling Insulation	0	0	0	\$ -	\$ -
Duct Sealing	150	143	2,569	\$ 76	\$ 1,191
Faucet Aerators	0	0	0	\$ -	\$ -
LEDs (Standard)	(396)	(249)	(4,738)	\$ (132)	\$ (2,170)
LEDs (Specialty)	(35)	(2)	(417)	\$ (12)	\$ (190)
Showerheads	0	0	0	\$ -	\$ -
APS	(281)	(128)	(2,586)	\$ (68)	\$ (1,169)
Sums may differ due to rounding.					

Table 6-23 Natural Gas (Therms) NEBs – Low Income

Measure	Ex Post Gross Natural Gas Savings (therms)	Net Natural Gas Savings (therms)	Net Lifetime N. Gas Savings (therms)	NEB Natural Gas Savings (\$)	NPV NGS (\$)
APS	0	0	0	\$ -	\$ -
Air Infiltration	0	0	0	\$ -	\$ -
Assessment	0	0	0	\$ -	\$ -
Ceiling Insulation	0	0	0	\$ -	\$ -
Duct Sealing	0	0	0	\$ -	\$ -
Faucet Aerators	0	0	0	\$ -	\$ -
LEDs (Standard)	(657)	(657)	(12,480)	\$ (348)	\$ (5,717)
LEDs (Specialty)	(60)	(60)	(1,165)	\$ (32)	\$ (524)
Showerheads	0	0	0	\$ -	\$ -
Total	(717)	(717)	(13,646)	\$ (380)	\$ (6,240)
Sums may differ due to rounding.					

Table 6-24 and Table 6-25 present *ex post* net propane savings in gallons and the monetization of these benefits by program channel.

Table 6-24 Propane (Gallons) Savings - CWA

Measure	<i>Ex Post</i> Gross LPG Savings (gallons)	Net LPG Savings (gallons)	LPG Benefit (\$)	NPV LPGS (\$)
Air Infiltration	2,279	2,175	\$ 5,179	\$ 49,022
Ceiling Insulation	6,586	6,286	\$ 14,970	\$ 226,572
Duct Sealing	21,037	20,080	\$ 47,819	\$ 669,835
LEDs (Standard)	(92)	(58)	\$ (138)	\$ (2,015)
LEDs (Specialty)	(6)	(4)	\$ (8)	\$ (123)
Total	29,804	28,480	\$ 67,822	\$ 943,231
Sums may differ due to rounding.				

Table 6-25 Propane (Gallons) Savings – Low Income

Measure	<i>Ex Post</i> Gross LPG Savings (gallons)	Net LPG Savings (gallons)	LPG Benefit (\$)	NPV LPGS (\$)
Air Seal	1,867	1,867	\$ 4,446	\$ 42,086
Ceiling Insulation	2,043	2,043	\$ 4,864	\$ 73,621
Duct Seal	9,410	9,410	\$ 22,408	\$ 313,892
LEDs (Standard)	(44)	(44)	\$ (106)	\$ (1,542)
LEDs (Specialty)	0	0	\$ 0	\$ 0
Total	13,275	13,275	\$ 31,614	\$ 428,057
Sums may differ due to rounding.				

6.8.2 Avoided and Deferred Replacement Cost

To calculate avoided or deferred replacement costs and incremental costs for LEDs in OG&E's CWA Program, the AR TRM V8.2 Protocol L calculator was used with the following assumptions: 1) replacement-on-burnout for all bulbs and 2) EUL for LEDs is 19 years [1]. LED costs were sourced from OG&E program tracking data where available. For direct install LEDs, the Evaluators assumed that the incentive was equal to the total cost of equipment and labor.

Table 6-26 shows the avoided or deferred replacement costs for LED lamps in PY2021. The total net avoided replacement cost for CWA was \$22,351. There were no deferred replacement costs for CWA in PY2021.

Table 6-26 Avoided Replacement Costs

Measure	Net ARC (\$) CWA	Net ARC (\$) Low Income	Total Net ARC (\$)
LEDs (Standard)	\$ 6,273	\$ 14,444	\$ 20,717
LEDs (Specialty)	\$ 457	\$ 1,177	\$ 1,635
Total	\$ 6,730	\$ 15,621	\$ 22,351
Sums may differ due to rounding.			

6.8.3 Water Savings

During PY2021 the water saving measures implemented through the CWA included faucet aerators and low flow showerheads. The program tracking data included flow rates for these measures, and the Evaluators applied these flow rates to the AR TRM V8.2 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 (OG&E or AOG), 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 OG&E and AOG, water savings were attributed based on water heater fuel type. For example, water savings for a home receiving electric service from OG&E and gas service from AOG 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 6-27 and Table 6-28 present water savings verified water savings.

Table 6-27 PY2021 Water (gallons) Savings by Measure - CWA

Measure	Ex Post Gross Water/ WW Savings (gallons)	Ex Post Net Water/ WW Savings (gallons)	Water/ WW Benefit (\$)	NPV Water/WW (\$)
Faucet Aerators	11,621	7,326	\$ 56	\$ 503
Showerhead	35,146	22,156	\$ 171	\$ 1,522
Total	46,767	29,482	\$ 227	\$ 2,026
Sums may differ due to rounding.				

Table 6-28 PY2021 Water (gallons) Savings by Measure – Low Income

Measure	Ex Post Gross Water/ WW Savings (gallons)	Ex Post Net Water/ WW Savings (gallons)	Water/ WW Benefit (\$)	NPV Water/WW (\$)
Faucet Aerators	14,757	14,757	\$ 114	\$ 1,014
Showerhead	24,418	24,418	\$ 188	\$ 1,678
Total	39,174	39,174	\$ 302	\$ 2,692
Sums may differ due to rounding.				

6.8.4 NEBs Summary

Table 6-29 summarizes the net present value (NPV) of NEBs attributable to OG&E for the PY2021 CWA (inclusive of all channels), including avoided and deferred replacement costs, natural gas savings, water savings, and propane savings.

Table 6-29 Non-Energy Benefits (NEBs) Summary

Measure	NPV NGS (\$)	NPV LPGS (\$)	NPV Water/ WW (\$)	NPV ARC (\$)	Total NEB NPV (\$)
Ceiling Insulation	\$ -	\$ 300,193	\$ -	\$ -	\$ 300,193
Duct Sealing	\$ 1,191	\$ 983,727	\$ -	\$ -	\$ 984,917
Air Infiltration	\$ -	\$ 91,108	\$ -	\$ -	\$ 91,108
LEDs (Standard)	\$ (7,887)	\$ (3,557)	\$ -	\$ 20,717	\$ 9,273
LEDs (Specialty)	\$ (714)	\$ (123)	\$ -	\$ 1,635	\$ 798
APS	\$ -	\$ -	\$ -	\$ -	\$ -
Showerheads	\$ -	\$ -	\$ 3,200	\$ -	\$ 3,200
Faucet Aerators	\$ -	\$ -	\$ 1,517	\$ -	\$ 1,517
Total	\$ (7,410)	\$ 1,371,348	\$ 4,718	\$ 22,351	\$ 1,391,007

Sums may differ due to rounding.

6.9 Process Evaluation Summary and Findings

The AR TRM V8.2 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 6-30 Determining Process Evaluation Timing

Variable Name	Variable Type
New and Innovative Components	No. Program offering has been consistent with past evaluations.
No Previous Process Evaluation	No. The program received a process evaluation in PY2017
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	Yes. The program transitioned to being implemented under CLEAResult.
Energy Savings are being Achieved Slower than Expected	No. Energy savings are being achieved at a rate that is consistent with program expectations.

Table 6-31 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 CWA program received a limited process evaluation in PY2021 to address the change in implementation contractor.

6.9.1 Data Collection Activities

As part of the PY2021 evaluation of the CWA, the Evaluators completed an in-depth interview with the program managers from OG&E and CLEAResult. The Evaluators used the information gleaned in this interview to identify program updates or changes experienced in PY2021 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 PY2021.

Telephone surveys were completed with CWA participants. 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. The Evaluators received, and

reviewed program population data queried from tracking data received through CLEARResult. The program tracking data provides contact information on participating customers and measure descriptions of equipment installed through the program.

The Evaluators surveyed 57 participants from a population of 703 participants. The survey was intended to meet $\pm 10\%$ precision at 90% confidence. However, due to lower response rates than observed in past evaluations, the precision level met was $\pm 10.5\%$ at 90% confidence. The final sample distribution and response rate for this survey can be found in Appendix C.

Table 6-32 below summarizes the survey and interview data collection for the PY2021 program evaluation, including data collection type and number of respondents.

Table 6-32 Interview and Survey Data Collection Summary

Target	Component	Activity	n	Precision	Details
Program Staff	OG&E Program Staff	Interview	1	N/A	The program director and three program staff responsible for coordinating program data, managing program resources, directing installation contractors, and communicating with OG&E, AOG, and CLEARResult staff as needed during the program process.
Program Staff	CLEARResult Program Staff	Interview	1	N/A	CLEARResult program manager responsible for implementation of the residential and commercial programs.
Program Participants	Telephone Survey	Survey	57	NTG: $\pm 10.5\%$ Process: $\pm 10.5\%$	This consisted of a satisfaction questionnaire and a series of questions related to program and energy efficiency awareness and engagement.

6.9.2 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.

6.9.3 Program Delivery

The primary focus for the PY2021 process evaluation was on two key program delivery items 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.

6.9.4 OG&E Program Staff Interview

The most significant change that occurred to the CWA program in 2021 was the transition from self-implementation by OG&E to external implementation by CLEAResult. Although the handoff resulted in a brief slowdown due to program operations, OG&E staff indicated that thus far CLEAResult has met their expectations and they are excited to see how the programs continue to grow next year. While CLEAResult staff manage the day-to-day logistics and concerns of the program, OG&E staff continue to call Trade Allies to check in on them to solicit feedback. When taking over implementation of the weatherization program, CLEAResult brought in its own network of Trade Allies. While existing OG&E weatherization Trade Allies were provided the opportunity to remain in the network, all three opted to leave. OG&E staff indicated that new Trade Allies seem pleased with the program and their workload.

CLEAResult and OG&E communicate and coordinate often about marketing strategies. Marketing strategies include social media posts, mail outs, flyers, etc. Staff provide cobranding to Trade Allies and require all of their allies to wear an OG&E badge. Social media has proven a successful marketing strategy and CLEAResult tracks which posts and advertisements generate the most interest. Staff also emphasized the importance of word-of-mouth marketing, as well as meeting people in-person. OG&E's marketing department is restructuring and determining OG&E's new brand identity.

Interviewees stated they had no concerns or issues with the program data tracked by CLEAResult. Additionally, the interviewees stated they are happy with the amount of data being collected by CLEAResult and the monthly transfers are a smooth process.

6.9.5 CLEAResult Staff Interview Findings

The interviewee identified as the Program Manager. The interviewee stated they interact with various CLEAResult staff members that work within Arkansas specifically. Additionally, the interviewee stated they interact with three staff members specifically from OG&E.

The CWA did not meet savings goals for 2021. CLEAResult staff indicated that they are invested in building a stronger presence in Arkansas and have hired a full-time manager and other support staff, as well as have enhanced their performance and support. As part of the program's transition, CLEAResult modified the payment model of the weatherization program. Rather than the previous version's first-come-first-serve model, the revamped weatherization

program uses an allocation model. CLEAResult allocates leads to contractors throughout the year, striving to distribute jobs evenly across participating contractors. In order to be a certified weatherization Trade Ally for the OG&E program, contractors must complete a variety of trainings and certifications. CLEAResult staff noted a willingness to expand the network by one or two Trade Allies, assuming they meet the criteria, but that they do not want to increase network size too much as they want the program to be lucrative for their Trade Allies. CLEAResult staff noted that their weatherization Trade Allies completed over 800 homes in 2021.

6.9.6 Participant Survey

The Evaluators survey 57 program participants from a random sample of 703 participants.

6.9.6.1 Program Awareness

Program awareness is driven mostly by OG&E bill inserts and word-of-mouth from past participants.

Respondents first learned about OG&E’s CWA program through a variety of avenues, including bill inserts (26%), word of mouth from friends and family (21%), and OG&E website (12%) (

Figure 6-12).

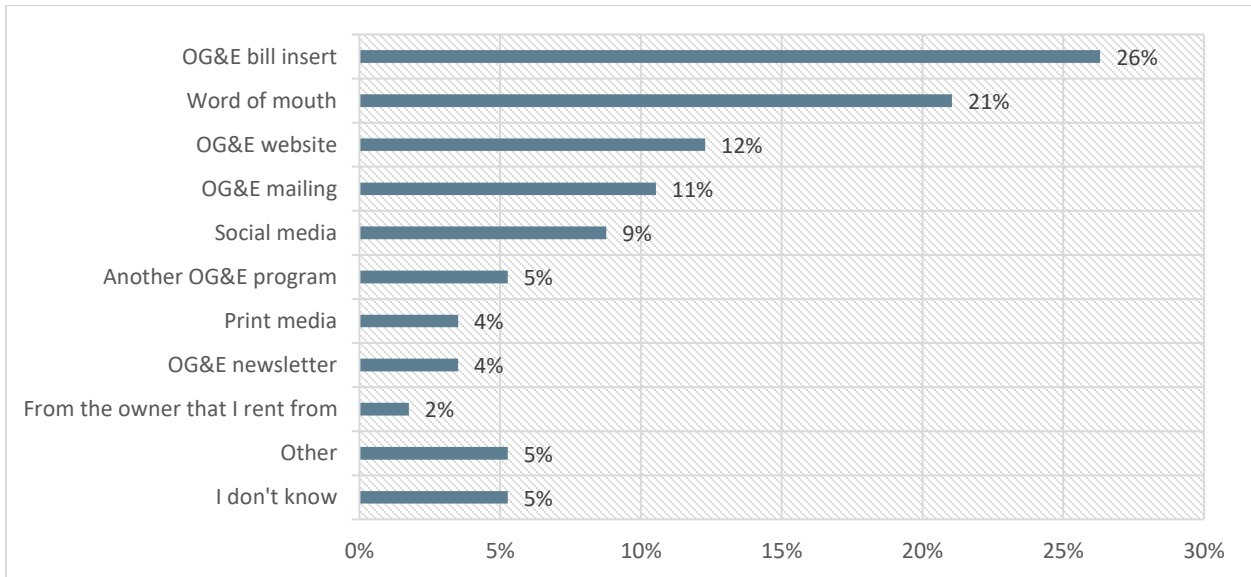


Figure 6-12 Initial Program Awareness (n=57)

A little less than half of respondents wanted to participate in the program to save money on utility bills (44%). Other popular reasons included to improve the comfort of their home, to replace inefficient equipment, to lower energy use (Figure 6-13).

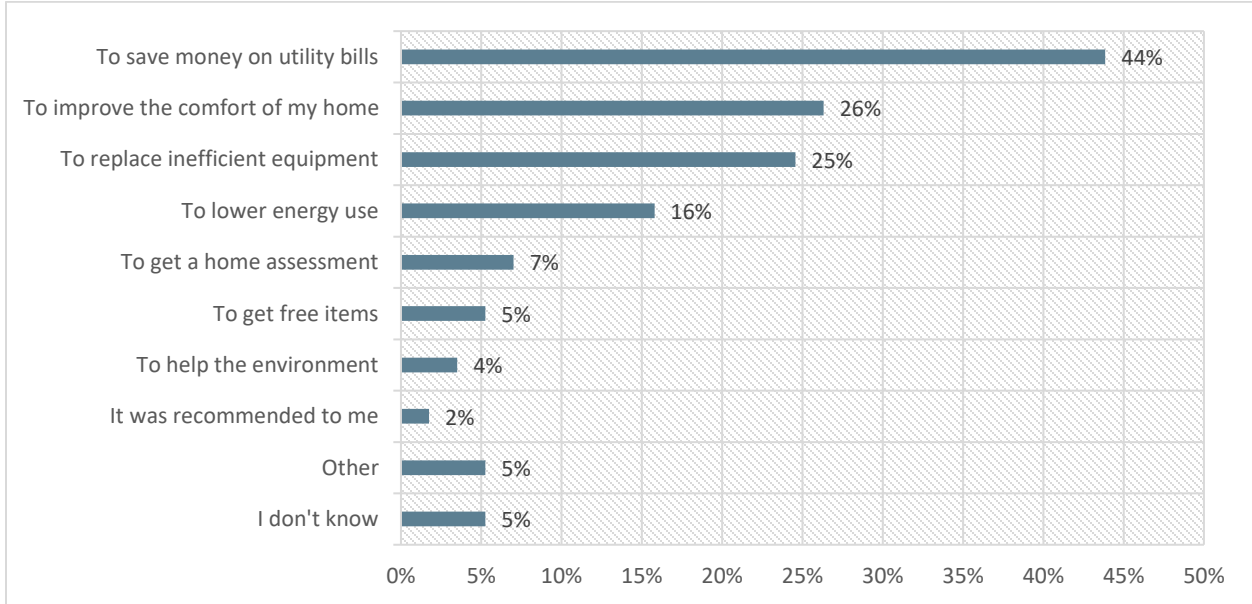


Figure 6-13 Motivation for Participation (n=57)

Respondents were primarily interested in making improvements to their home to increase the efficiency of their equipment (Figure 6-14).

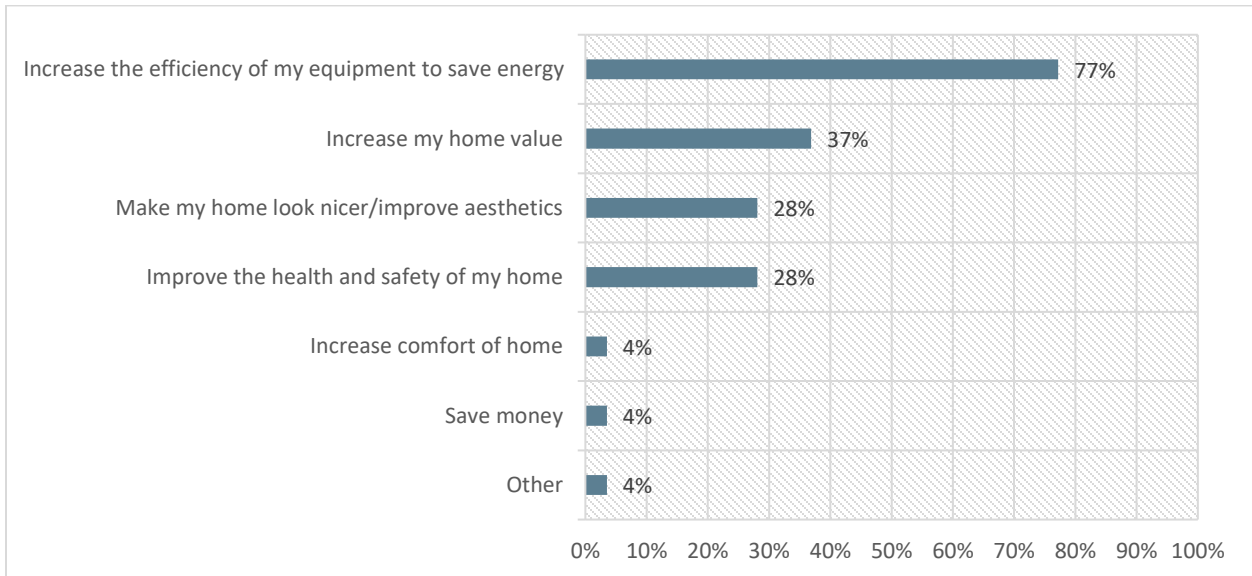


Figure 6-14 Motivation for Home Improvements (n=57)

6.9.6.2 Home Energy Assessment

All respondents received a home assessment as part of their participation in the program. Seventy-two percent scheduled their own assessment and almost all respondents (91%) were home during the assessment. Respondents were most interested in the home assessment to save energy to save money (30%), as well as to make their homes more comfortable (25%), and to better understand the condition of their home (23%) (Figure 6-15).

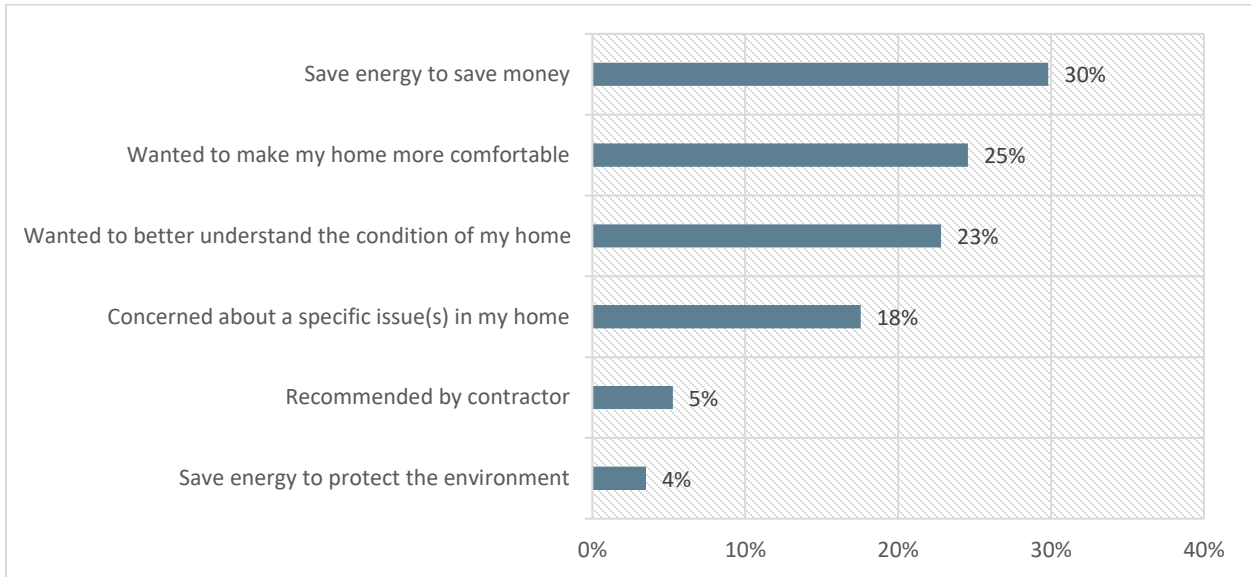


Figure 6-15 Motivation for Home Energy Assessment (n=57)

In general, respondents were satisfied with their experience with the energy assessor. About three-quarters were very satisfied with the overall assessment (75%), the quality of work performed (71%), the professionalism of the assessor (77%), and the time it took to complete the assessment (75). Over half were very satisfied with the amount of time in between scheduling and assessment (59%) (Figure 6-16). Respondents also found the information provided by the program useful (Figure 6-16).

<i>"It was very useful because I feel like it added value to my house and made my life more comfortable"</i>	<i>"All the stuff we needed to do we did, and we have seen improvements with the air, we would not have known if they had not come and done it."</i>
<i>"It was a new house, I had no idea with how things worked and they were very helpful"</i>	
<i>"Well we learned a lot we didn't know, they gave us a guideline to proceed which helped."</i>	<i>"Because they are telling you how to help the environment and save money at the same time."</i>

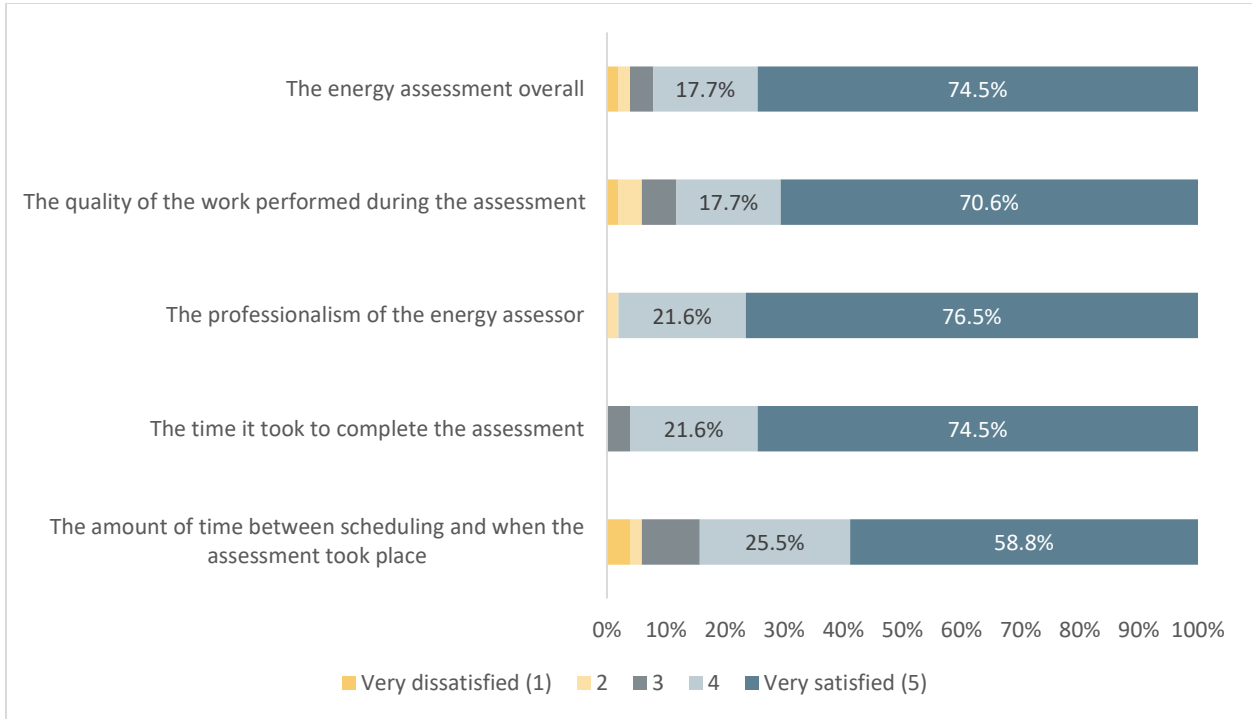


Figure 6-16 Satisfaction with Assessment (n=51)

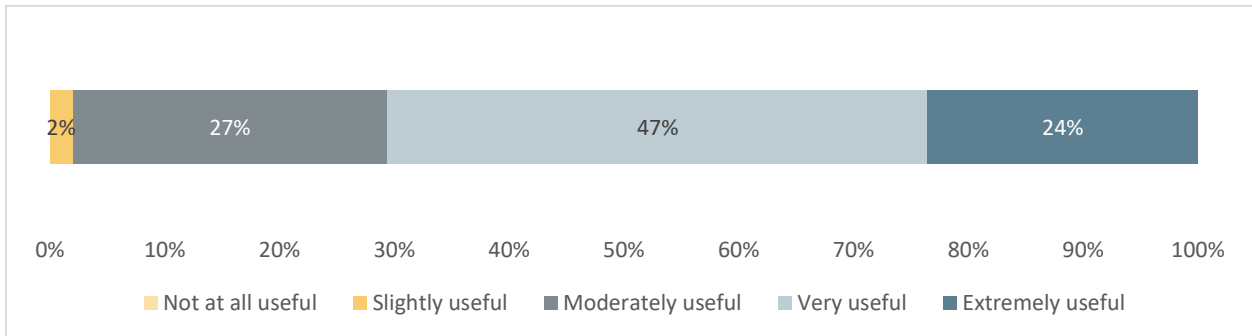


Figure 6-17 Usefulness of Information Provided (n=51)

6.9.6.3 Program Participation

Respondents got connected to a contractor through a variety of ways. Just over a third of respondents were contacted by a contractor directly (39%), a quarter were assigned a contractor by OG&E (25%), and a quarter found someone via the “Find a Contractor Tool” (25%) (Figure 6-18).

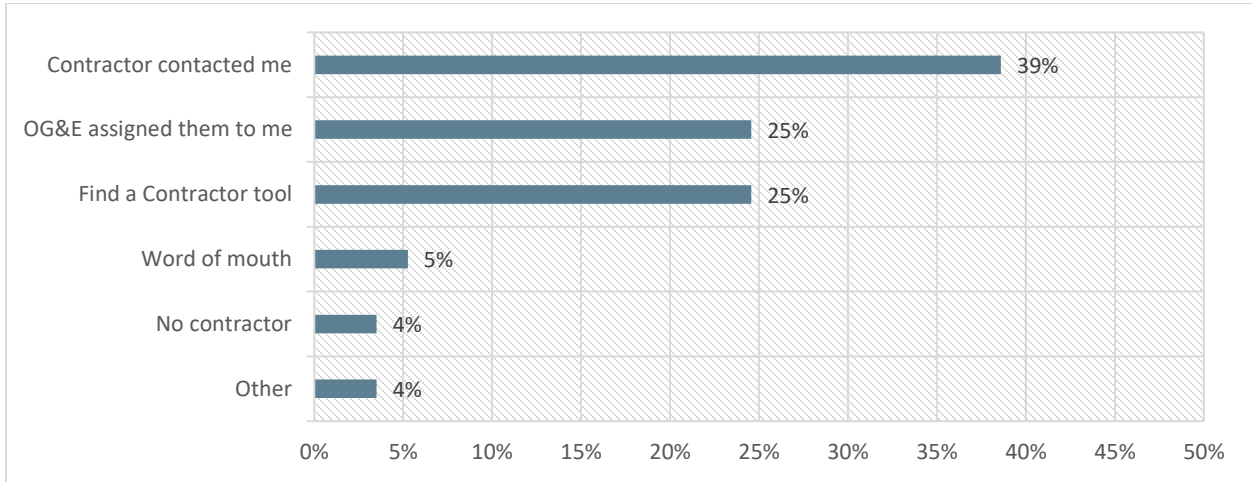


Figure 6-18 Connection with Contractor (n=57)

About half of respondents indicated they interacted with an OG&E representative during their participation in the program (51%). In general, respondents noted the interactions were helpful, positive, and informative.

Just over a third of respondents have noticed a decrease in their energy bill since participating in the program (39%) (Figure 6-19). Only one respondent noticed an increase in their bill. Half of respondents have noticed the benefits of their energy efficient equipment.

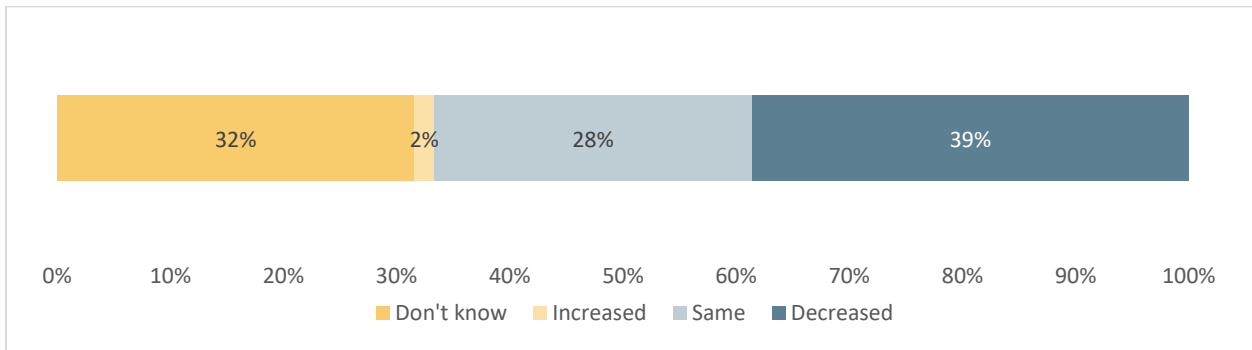


Figure 6-19 Changes in Energy Bill (n=57)

6.9.6.4 Satisfaction

In general, respondents were satisfied with OG&E as their electric service program as well as the CWA program, though satisfaction with the program is significantly lower than that observed in PY2020.

The percent that are either “satisfied” or “very satisfied” with the program declined from 97% to 81% from PY2020 to PY2021.

Though about two-thirds (65%) were very satisfied with the overall program experience and over two-thirds (69%) were very satisfied with the performance of the equipment installed (Figure 6-20), the Evaluators note that the percent expressing that they are either “Very Satisfied” or “Satisfied” with the program has dropped from 97% to 81%.

About two-thirds were very satisfied with the program (65%) and a little more than two-thirds were very satisfied with the equipment installed (69%), the experience with the contractor (68%), the usefulness of information received (68%), and the process of scheduling an assessment (61%).

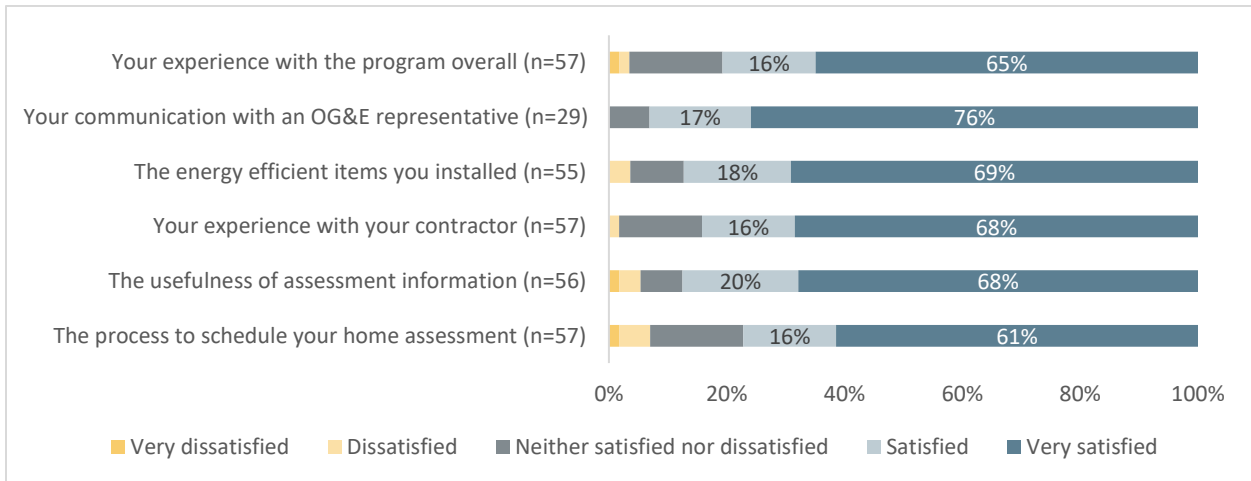


Figure 6-20 Program Satisfaction

Although overall satisfaction was high, respondents had some suggestions for improvement. Respondents suggested more oversight of third-party contractors, increased advertising, and more measures offered. Just under two-thirds of respondents have recommended the program to someone (65%).

“Just I guess more regulation on the 3rd party contractors”⁴⁵

“Maybe they should have trained these people a little better, they came in and I expected them to know exactly what they were doing”

“Maybe more public awareness, if more people knew about sealing windows etc. its expensive contractor stuff. Push public awareness, it’s a great program.”

“Offer more energy efficient options for the homes”

The majority of respondents were satisfied or very satisfied with OG&E as their utility provider (86%) and many indicated the program increased their satisfaction with OG&E (68%).

6.9.7 Adherence to Protocol A

With implementation moving to CLEARResult, program tracking transitioned from the Frontier Associates EnerTrek database to the CLEARResult DSMT database. In accordance with Protocol A, 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 tracking data contained all required fields for calculation of energy savings.

6.9.8 Customer, Premise, Cost, and Vendor Information

Each of these factors was assessed individually based on the guidelines stated in AR TRM V8.2. Overall, the Evaluators conclude the following regarding tracking data completeness:

- Participating customer information was complete for all participants. This included Job IDs, telephone numbers, addresses, and full names. In PY2021, 93% of all projects had complete customer information. Few email addresses were tracked, however. For each of the CWA and the Low Income channel, roughly 13% of participants in the tracking data had email addresses.

⁴⁵ The Evaluators note that based on contextual information from other verbatim answers by this respondent, this quote refers to Trade Allies and not to the implementation contractor, CLEARResult.

- 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.
- Key parameters (square footage, duct/blower test values, AC system tons) were tracked.

6.9.9 Measure Specific Information

The content of tracking data was found to include sufficient information for all measures in PY2021. There were no large issues with measure specific information in the PY2021 program tracking data.

6.9.10 Trade Ally Performance

The Evaluators examined work completed by program Trade Allies to prior Trade Allies. This effort was intended to address both the impact of the change in Trade Allies as well as the change in payment structure from time and materials to a per-kWh performance-basis. As the Trade Ally network fully turned over in this program transition, these two factors are comingled.

As shown in Figure 6-21, there are broad discrepancies in terms of the types of measures installed by each Trade Ally.

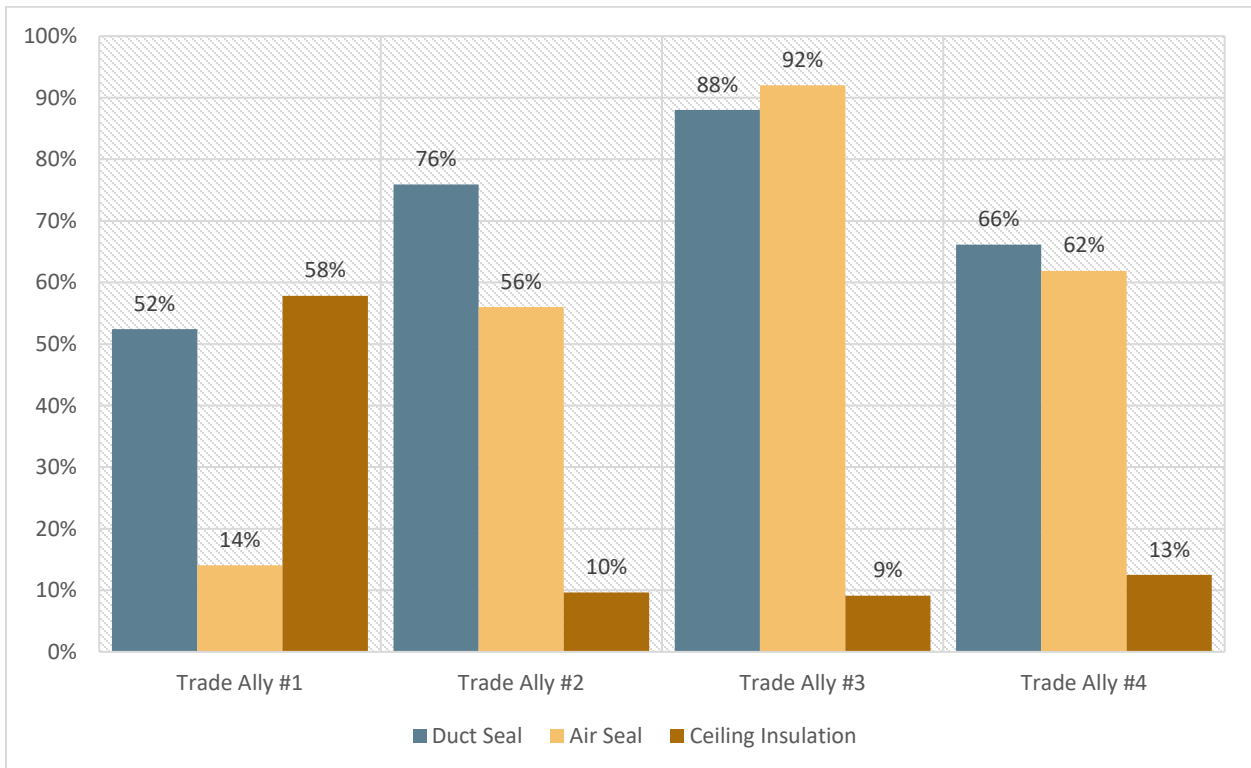


Figure 6-21 Percent of Projects with Key Measures by Trade Ally – PY2021

For context, Figure 6-22 presents the percent of projects with each major weatherization measure in PY2021 compared to PY2020. Though more savings have come from duct sealing in PY2021 than PY2020, the percent of projects with duct sealing has nonetheless declined along with air sealing and ceiling insulation as the average number of measures per-project has declined.

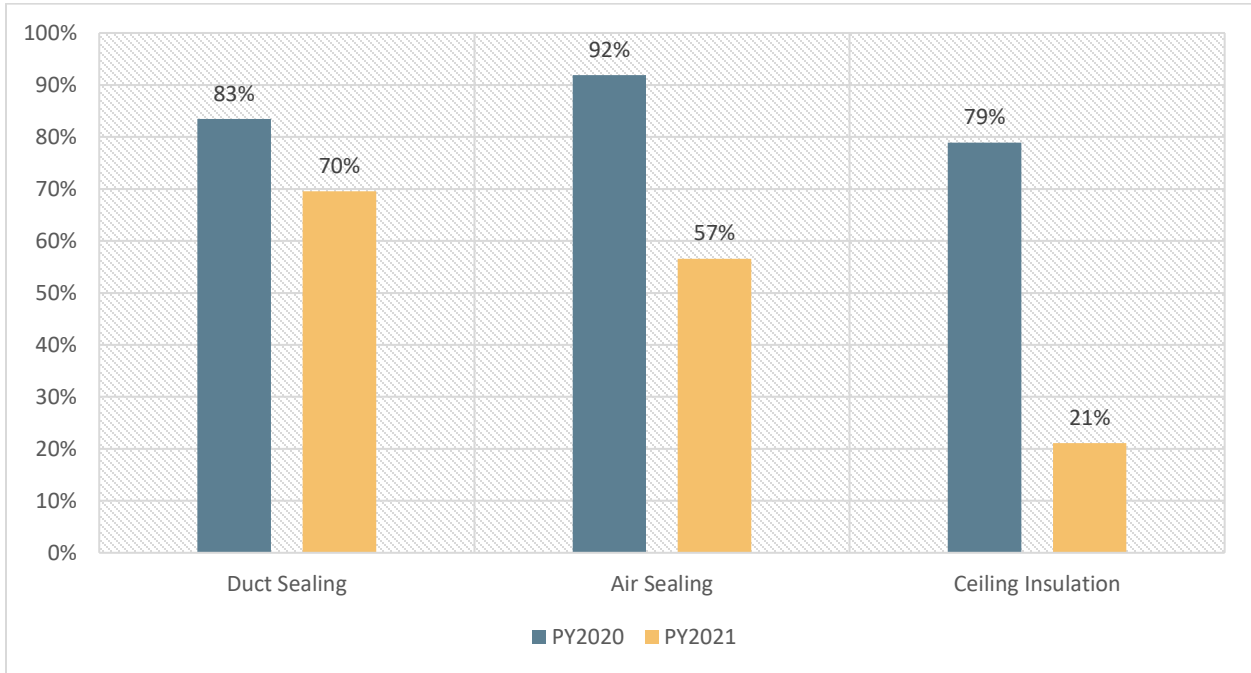


Figure 6-22 Percent of Projects with Key Measures– PY2020 vs. PY2021

The Evaluators conclude from this that the new program Trade Allies need to be directed to provide more comprehensive weatherization services. Historically, the acquisition cost of savings by measure has had a clear pattern in terms cost per kWh from core weatherization measures:

- Highest: duct sealing
- Middle: air sealing
- Lowest: ceiling insulation

Prior to PY2021, with the program paying based on work completed, measures beyond lower-hanging fruit were incented in the program. With the move to performance payment in PY2021, the new Trade Allies in the program appear to be focusing on duct sealing at the expense of other measures.

The Evaluators recommend that CLEAResult and OG&E address this issue of project comprehensiveness with Trade Allies. Possible strategies include:

1. Acceleration payments for homes based on measure count.
2. Performance benchmarks based on measure count (variable based on number of weatherization measures versus number of direct install measures).
3. Program-funded training in other weatherization measures should the Trade Ally lack technical background (such as instruction on operation of a blower door or duct blaster).

6.9.11 Health and Safety Measures

Act 1102 specifies required spending on health and safety (H&S) improvements for qualified homes. OG&E was already including H&S measures prior to Act 1102, such as appliance combustion testing, carbon monoxide alarms, and smoke detectors.

In PY2021, a total of \$2,958 was spent on H&S measures across the entirety of the CWA program. Within the Low Income channel, a total of \$213 was spent. Across the entirety of the CWA, the amount spent per-participant declined from \$84 to \$4 (95% decline). The Trade Ally network had complete turnover from PY2020 to PY2021, and the new Trade Ally network to-date has not provided H&S improvements for most participants.

The program did provide lead paint brochures to 75% of participants (83 participants received more than one brochure). The Evaluators did not include this in H&S measure estimates as this has an incentive value of \$0 per program tracking and does not constitute an improvement to the residence.

6.9.12 Progress on PY2020 Evaluation Recommendations

OG&E responded to the Evaluators’ PY2020 recommendations. The status of these recommendations is summarized in Table 6-33.

Table 6-33 Status of Recommendations from PY2020 Evaluation

2020 Recommendations	Status	Comment
Add propane heating and water heating to database.	Adopted	This has been added.
Increase budget to reach additional Act 1102 customers.	Adopted	The allocation within CWA that went to Act 1102 customers was increased.

6.10 Conclusions

Changes in program administration resulting from the hand-off from OG&E internal implementation to third-party implementation by CLEAResult	While existing OG&E weatherization Trade Allies were provided the opportunity to remain in the network, all three opted to leave, and were subsequently replaced with four new trade allies.
	The program migrated from per-measure payments to per-kWh payments.
	The program met 49% of its net savings goal while spending 36% of its program budget.
	The program installed 2.47 measures at \$1,027 per home, compared to 6.40 measures at \$1,968 per home in PY2020.
Changes in tracking data from Frontier EnerTrek system to CLEAResult DSMT System	Program tracking data now presents an individual measure in each line item, with multiple rows of data per home. This simplifies the process for energy savings calculations in the evaluation.
Changes in measures & services after hand-off to CLEAResult	Savings per-home increased from 1,129 to 3,430 kWh.
	Program NTG ratio increased from 84% to 97%.
	Increased funding by AOG has resulted in a decline in natural gas NEBs. In prior program years, AOG would run out of budget in the fourth quarter, and as a result OG&E would derive significant NEBs from homes that have gas service but received no funding from AOG. AOG claimed all available Therms in PY2021 – this resulted in lower NEBs for OG&E but overall improved cost-effectiveness (particularly with the Utility Cost Test) as OG&E and CLEAResult were able to better-focus program funds on obtaining electric benefits.
	The percent of survey respondents indicating that they are “Satisfied” or “Very Satisfied” with the program overall has declined from 97% to 81%.
Health & safety measure delivery	Prevalence of H&S measures has declined significantly, as spending per-participant has declined from \$84 to \$4, and the percent of participants receiving any H&S measures declined from 79% to .72%.

6.11 Recommendations

Modify performance-payment scheme to better-incentivize comprehensive projects	<p>Direct payment per-kWh results in projects focusing on fewer high-return measures. The program should address this with incentives for deeper retrofits. Options include:</p> <ul style="list-style-type: none">(1) differing values per kWh by measure (analogous to electric utility C&I programs paying higher incentives for non-lighting).(2) payment accelerators for multiple measures.(3) program requirements tied to comprehensiveness.
Impose greater H&S requirements on Trade Allies	<p>Four percent of program participants received any H&S measures, and the amount spent was very limited. There two possible scenarios for this:</p> <ul style="list-style-type: none">1: Program Trade Allies are visiting homes that need H&S but are not delivering them – this would require further training or performance requirements to be imposed.2: Program Trade Allies are not visiting homes that need H&S. This would mean the program needs to readdress how it targets participants, if the program is not reaching customers with H&S issues. <p>OG&E, CLEAResult, and the Evaluators should collaborate to diagnose this matter, and provide guidance to the Trade Allies as appropriate.</p>
Address decline in project comprehensiveness, tailored to identifiable issues by each Trade Ally	<p>The decline in project comprehensiveness could be attributable to multiple factors. Recommendations to address this include:</p> <ul style="list-style-type: none">(1) Conduct training for Trade Allies to ensure technical capability (for example, ensuring that Trade Allies can capably use a duct blaster or blower door.(2) Conduct QA/QC audits of new Trade Allies’ projects that had been completed in PY2021 to identify rate of missed / ignored opportunities for energy savings and instruct Trade Allies to follow up and provide all eligible major measures.(3) Release funding allocations on a quarterly basis (or half-year basis) based on Trade Ally compliance with comprehensiveness guidelines.

7 Commercial Energy Efficiency Program (CEEP)

7.1 Evaluation Findings Overview

The verified *ex post* kWh and kW savings for the PY2021 CEEP are summarized by sampling stratum in Table 7-1.

Table 7-1 *Ex Ante* and *Ex Post* Gross kWh Savings by Sampling Stratum

Stratum Name	<i>Ex Ante</i> Gross kWh Savings	<i>Ex Post</i> Gross kWh Savings	Realization Rate - kWh	<i>Ex Ante</i> Gross kW Savings	<i>Ex Post</i> Gross kW Savings	Realization Rate - kW
C&I Solutions (Certainty)	8,215,045	7,354,809	90%	1,320	1,154	87%
C&I Solutions 1	2,127,291	1,926,225	91%	356	358	100%
C&I Solutions 2	2,460,705	2,501,927	102%	406	428	105%
C&I Solutions 3	1,671,899	1,671,899	100%	201	199	99%
SBS (Certainty)	238,366	185,925	78%	14	36	253%
SBS 1	489,041	452,830	93%	88	157	178%
SBS 2	1,146,677	1,096,861	96%	200	362	181%
SBS 3	842,370	768,054	91%	153	176	115%
SAGE (Certainty)	267,796	267,796	100%	35	35	100%
SAGE 1	293,592	293,592	100%	46	46	100%
SAGE 2	432,249	432,249	100%	62	62	100%
Midstream	2,064,070	2,089,405	101%	386	392	102%
CEI	1,359,001	1,341,004	99%	258	254	98%
RCx	944,723	944,723	100%	64	64	100%
HVAC Tune-up	404,332	400,277	99%	242	294	121%
Total	22,957,157	21,727,576	95%	3,831	4,015	105%
Sums may differ due to rounding.						

Table 7-2 and Table 7-3 present the net kWh and kW savings summary, by program channel, for the PY2021 CEEP, respectively.

Table 7-2 CEEP Net kWh Savings Summary

Channel	<i>Ex Ante</i> Gross kWh Savings	<i>Ex Post</i> Gross kWh Savings	Realization Rate - kWh	NTG	<i>Ex Post Net</i> kWh Savings
C&I Solutions	14,879,271	13,855,137	93%	100%	13,855,137
SBS	2,716,455	2,503,670	92%	97%	2,428,560
SAGE	993,637	993,637	100%	100%	993,637
Midstream	2,064,070	2,089,405	101%	100%	2,089,405
CEI	1,359,001	1,341,004	99%	100%	1,341,004
RCx	944,723	944,723	100%	100%	944,723
Totals	22,957,157	21,727,576	95%	100%	21,652,466

Sums may differ due to rounding.

Table 7-3 CEEP Net kW Savings Summary

Channel	<i>Ex Ante</i> Gross kW Savings	<i>Ex Post</i> Gross kW Savings	Realization Rate - kW	NTG	<i>Ex Post Net</i> kW Savings
C&I Solutions	2,526	2,433	98%	100%	2,433
SBS	455	731	160%	97%	709
SAGE	142	142	100%	100%	142
Midstream	386	392	102%	100%	392
CEI	258	254	98%	100%	254
RCx	64	64	100%	100%	64
Totals	3,831	4,015	106%	100%	3,993

Sums may differ due to rounding.

Table 7-4 outlines the verified *ex post* lifetime kWh savings by channel for the PY2021 CEEP.

Table 7-4 CEEP Gross and Net Lifetime Savings by Channel

Channel	<i>Ex Post</i> Gross Savings (kWh)	<i>Ex Post</i> Gross Lifetime Energy Savings (kWh)	NTG	<i>Ex Post</i> Net Lifetime Savings (kWh)
C&I Solutions	13,855,137	203,908,151	100%	203,908,151
SBS	2,503,670	35,378,617	97%	34,317,258
SAGE	993,637	14,855,781	100%	14,855,781
Midstream	2,089,405	30,120,977	100%	30,120,977
CEI	1,341,004	1,341,004	100%	1,341,004
RCx	944,723	7,557,784	100%	7,557,784
Totals	21,727,576	293,162,314	100%	292,100,955

Sums may differ due to rounding.

Additional details on the evaluation of the CEEP are provided in the following sections.

7.2 Program Overview

The CEEP provides financial incentives to all commercial and industrial (C&I) customers and includes six channels to participation. The channels are designed to maximize participation among the C&I customer base.

The program seeks to combine the provision of financial inducements with access to technical expertise to maximize program penetration across the range of potential C&I customers. The primary goal of the program is to generate energy and demand savings for large and small commercial and industrial customers through the promotion of high efficiency electric end-use products including (but not limited to): lighting, retrofit of existing equipment, and HVAC replacement. 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 has the following additional goals:

- Increase customer awareness of applicable energy saving measures;
- Achieve customer cost savings;
- Increase the market share of commercial grade high efficiency technologies sold through market channels; and
- Increase the installation rate of high efficiency technologies in C&I facilities by businesses that would not have done so absent the program.

The program offers prescriptive incentives for electric energy efficiency equipment upgrades and improvements. Incentives are provided for qualified equipment installed as a retrofit or equipment replacement, and as new construction or major refurbishment. The program also offers incentives for custom measures that are not included in the program as prescriptive measures.

Energy savings from prescriptive measures are calculated using deemed values and savings algorithms provided in the AR TRM V8.2. Savings from custom projects are calculated using various methods, including on-site monitoring, engineering calculations, whole building energy modeling, billing data regression analysis, etc. Custom projects may use some deemed values from the TRM, but do not necessarily follow savings algorithms.

In 2021, the CEEP was implemented with six program channels. These include:

- **C&I Solutions:** The C&I Solutions channel of CEEP offers incentives to customers with a peak demand of greater than 150 kW at a single site. Incentives are paid directly to customers who install energy efficient equipment. This channel focuses on five key areas; lighting, retrofit of existing equipment, new constructions built above minimum building code, high efficiency industrial equipment, and HVAC replacement. The C&I

Solutions channel is the largest of the six channels offered through CEEP. In PY2021, this channel accounted for 65% of *ex ante* savings. There were four custom projects in the C&I Solutions channel in PY2021, accounting for 60% of *ex ante* channel savings.

- **Small Business Solutions (SBS):** This channel offers incentives to customers with a peak demand of less than 150 kW at a single site, for lighting audits and equipment installation through approved Trade Allies. The Small Businesses Solutions Channel was the second largest channel offered through CEEP in 2021. During PY2021 this channel accounted for 12% of program *ex ante* savings. No custom projects were incentivized through this channel.
- **Schools & Governmental Entities (SAGE):** The SAGE channel of CEEP is marketed towards public school districts, private schools, universities and colleges, and all government agencies. This channel includes financial incentives for both lighting and non-lighting measures and both prescriptive and custom projects. In PY2021 this channel accounted for 4% of *ex ante* savings.
- **Midstream:** The Midstream channel 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. Energy savings associated with the Midstream channel are calculated using custom calculations developed by the program implementer, CLEAResult. The custom calculations are based on the mix of facility types in the OG&E service territory to determine baseline lamp wattages and the distribution of facility types which allows for deemed hours from the AR TRM V8.2 to be applied to local market conditions. The combination of baseline lamp wattages blended deemed annual operating hours, and program tracking data of actual counts and wattages of lamps sold allow for custom savings calculations to be performed. This channel accounts for 9% of program *ex ante* kWh savings.
- **Continuous Energy Improvement (CEI):** Continuous Energy Improvement is a behavioral channel of CEEP that aims to engage larger customers with a goal of cost savings from low to no cost measures. PY2021 was the second year the CEI channel was offered. Nine customers participated in the CEI program. The CEI channel is a 36-month behavioral program that provides energy conservation training to all levels of employees within a customer's organization with a focus on low/no cost savings opportunities. The program also offers a facility wide assessment of energy usage and provides customers with continuous energy usage monitoring. PY2021, this channel accounted for 6% of program *ex ante* savings.

- **Retro-Commissioning (RCx):** In PY2021 the CEEP Retro-Commissioning channel provided customers with comprehensive system energy optimization studies to assist customers in identifying low and no-cost improvement strategies. In PY2021 the RCx channel had three projects completed. This channel accounted for 4% of program *ex ante* savings.

CLEAResult was contracted to implement all channels of CEEP for PY2021. CLEAResult was responsible for program planning, development of marketing material, quantifying *ex ante* energy savings estimates and paying appropriate incentives to customers. CLEAResult also identified and approved Trade Allies and distributors for participation in the SBS and Midstream Lighting channels of the program. For PY2021, service providers (Trade Allies and distributors) were recruited to participate by submitting rebate applications on behalf of customers implementing qualifying energy efficiency measures.

The results of the M&V efforts for the program are intended to provide $\pm 10\%$ precision at the 90% confidence interval for the overall program based upon site-by-site verification activities. In PY2021, the CEEP resulted in 237 projects being implemented through the six program channels. The reported performance of the program is summarized in Table 7-5. The projects completed during PY2021 resulted in a gross *ex ante* savings of 22,957,157 kWh and a peak demand reduction of 3,831 kW. In PY2021 CEEP had \$2,511,376 in incentive spending.

Table 7-5 OG&E’s PY2021 CEEP Program Summary

Channel	Number of Projects	<i>Ex Ante</i> Gross kWh Savings	<i>Ex Ante</i> Gross Peak kW Savings	Percent of kWh Savings
C&I Solutions	54	14,879,271	2,526	65%
SBS	128	2,716,455	455	12%
SAGE	9	993,637	142	4%
Midstream	78	2,064,070	386	9%
CEI	9	1,359,001	258	6%
RCx	3	944,723	64	4%
Total	237⁴⁶	22,957,157	3,831	100%
Sums may differ due to rounding.				

Figure 7-1 below shows the gross *ex ante* savings and completed projects by month for the PY2021 CEEP. The C&I Solutions channel accounted for the largest portion of the reported *ex ante* savings, with the 64 projects totaling 14,879,271kWh, 65% of the overall program savings. The highest savings during PY2021 occurred during the month of September with only 36 projects being paid, resulting in 7,127,123 kWh. During this month, one participant accounted

⁴⁶ Sum total does not match as some individual premises participated in multiple channels.

for 4,086,216 kWh. That was the second largest single project in PY2021. The largest savings project during PY2021 occurred during the month of March accounting for 4,468,550 kWh in *ex ante* savings.

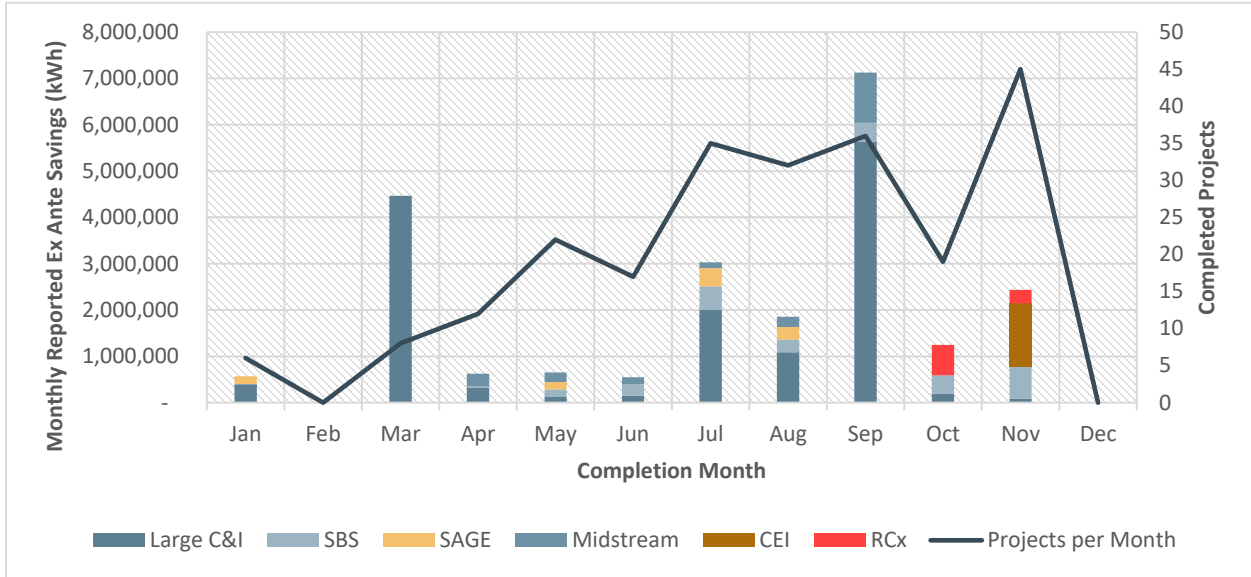


Figure 7-1 PY2021 CEEP Savings and Project by Month

As shown in Figure 7-2, CEEP had participation in six measure categories: lighting retrofit, custom, lighting new construction, HVAC, CEI, and RCx. The lighting retrofit measure was the single highest contributor to ex ante savings, accounting for 10,603,432 kWh, 47% of the program savings. Custom projects including air compressors, chillers, horticulture grow lighting and VFDs accounted for 8,625,882 kWh, 38% of the program savings. New Construction lighting accounted for 975,595 kWh, 4% of the program savings.

Table 7-6 Contribution to Ex Ante Savings by Measure Type by Channel

Measure Type	C&I Solutions	SBS	SAGE	Midstream	CEI	RCx	Total	% Total
Lighting Retrofit	4,846,663	2,716,455	976,245	2,064,070	0	0	10,603,432	46%
Custom	8,625,882	0	0	0	0	0	8,625,882	38%
CEI	0	0	0	0	1,359,001	0	1,359,001	6%
NC Lighting	975,595	0	0	0	0	0	975,595	4%
RCx	0	0	0	0	0	944,723	944,723	4%
HVAC	431,132	0	17,392	0	0	0	448,524	2%
Total	14,879,271	2,716,455	993,637	2,064,070	1,359,001	944,723	22,957,157	100%

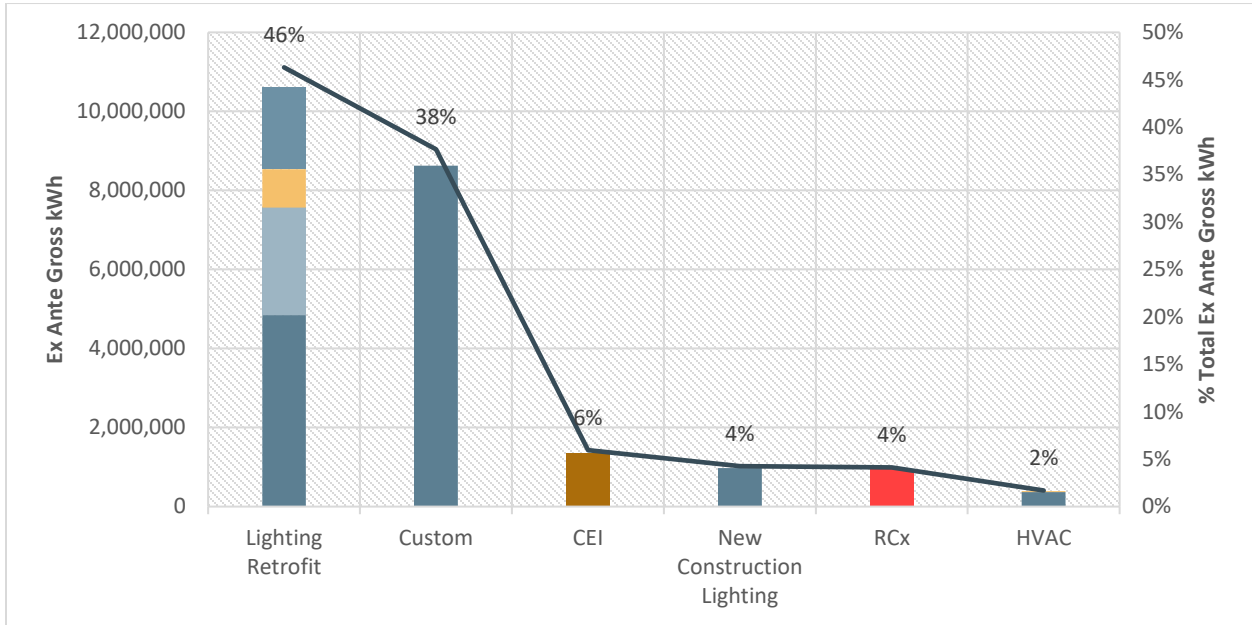


Figure 7-2 Contribution to Savings by Measure

7.3 Gross Impact Evaluation Approach

The evaluation of gross energy savings and peak demand reduction from projects rebated through the CEEP can be broken down into the following steps:

- First, CLEAResult’s tracking database was reviewed to determine the scope of the program and to ensure there were no duplicate entries. The tracking database was used to define a discrete set of rebated projects that made up the PY2021 program population. A random sample of projects was then drawn from the population established in the tracking system review. For the PY2021, a total of 31 projects from the C&I Solutions, SBS, SAGE, and RCx program channels were selected for the M&V sample. For the Midstream and Continuous Energy Improvement channels, a database review resulted in a census of projects being reviewed.
- 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 the Evaluators’ 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 V8.2⁴⁷ and calculation input assumptions.

- After reviewing the project materials, detailed desk reviews of the sampled projects in the C&I Solutions, SBS, SAGE, and RCx channels were completed. Sites with higher uncertainty or discrepancies in project documentation were selected for site visits and on-site verifications were completed at these sites. In PY2021, a total of ten sites were visited for on-site verification.
- Next, the project documents that were reviewed during the desk reviews 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 (determined through on-site monitoring), changes were made to reflect actual operating conditions more accurately.
- For the Midstream channel, no on-site inspections were conducted. Instead, the Evaluators reviewed the implementation contractor's database to determine methodologies and assumptions used to determine *ex ante* savings. For this channel, *ex post* savings are determined through the database review process. A more detailed description of the methodology used to determine *ex post* savings for the Midstream channel is included in the following sections.
- For the CEI channel, no on-site inspections were conducted. The Evaluators conducted whole facility analysis using utility billing regression.
- For the RCx channel, no on-site inspections were conducted. The Evaluators conducted desk reviews of implementer provided project documentation.
- Finally, after determining the *ex post* 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 *ex post* energy (kWh) savings with a given amount of sampling precision and confidence. For the CEEP, the sample was designed to ensure $\pm 10\%$ or better relative precision at the 90% confidence level for kWh savings.

7.3.1 Midstream Impact Evaluation Activities

Ex post savings from the Midstream channel were determined through a review of the database used by CLEAResult for tracking lamps and fixtures sold through the program. The Midstream channel accounted for 9% of CEEP *ex ante* savings. Because of the relatively small amount of savings associated with this channel, the M&V effort was focused on a review of the

⁴⁷ Many of the deemed or prescriptive *ex ante* savings are based on algorithms provided in the Arkansas TRM, V8.1.

ex ante model used to determine savings. In PY2021, the evaluator used the average in-service rate (ISR) from the previous years for the *ex post* savings model.

The model used to determine *ex ante* savings associated with the Midstream lighting channel uses several sources to determine typical baseline lamp wattage, annual operating hours (AOH), coincident factors (CF), and mix of facility types to allow for calculation of energy savings. Baseline lamp wattages were determined using data from the “2010 U.S. Lighting Market Characterization” study published by the US Department of Energy in January 2012. The results of this study allow for the determination of the number of lamps installed in specific facility types and the energy usage associated with those lamps. This study did not include LED lamps as the research was conducted in 2010 when LEDs had a lower market share.

The annual operating hours, coincidence factors, and facility types were determined using the deemed values provided in the AR TRM V8.2. The 2012 version of the “Commercial Buildings Energy Consumption Survey (CBECS)”, published by the U.S. Energy Information Administration was used to determine the total floor space of commercial buildings, by facility type, in the service territory. The data from the CBECS allowed for CLEARResult to develop a weighted average AOH and CF. Combining these data with the baseline wattage data allowed the models to estimate a weighted average baseline wattage, AOH, and CF for each lamp type included in the program.

In future years, the Evaluators will employ an engineering analysis to determine the *ex post* verified energy savings. The verified energy savings per fixture or lamp will be calculated with methods developed by the Evaluators and consistent with chapter 6 of *The Uniform Methods Project: Methods for Determining Energy Efficiency Savings for Specific Measures*. The calculations will use the following equations:

$$\text{Annual kWh savings} = \left(\frac{(W_{\text{baseline}} - W_{\text{measure}}) * HOU_{\text{annual}} * HCIF}{1000} \right)$$

$$\text{Peak kW savings} = \left(\frac{(W_{\text{baseline}} - W_{\text{measure}}) * HOU_{\text{annual}} * HCIF * CF}{1000} \right)$$

Where:

W_{baseline} = baseline wattage per category determined from sales data supplied by CLEARResult and verified by the Evaluators.

W_{measure} = measure wattage as determined by the average for that measure category in the current program year. This will be calculated based on

	Point of Sale (POS) data for each program year and will be adjusted as necessary to reflect actual lamps sold.
1000	= conversion factor for Watts per kW
HOU_{annual}	= annual hours of use, calculated using <i>ex ante</i> model values
HCIF	= “Heating & Cooling Interactive-effects Factor”, determined using deemed values from the appropriate version of the TRM and weighted average facility types.
CF	= Coincidence factor, a ratio between 0.0 and 1.0 that adjusts the change in connected electric load from lighting efficiency projects for electric peak demand savings. CF will be calculated using <i>ex ante</i> model values.

7.4 Impact Evaluation Data Collection Activities

Data for the evaluation were collected through review of program materials, on-site inspections, end-use metering, and interviews with participating customers and service providers. Based on program tracking data provided by CLEAResult, 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 CLEAResult. 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 overall program.

Desk reviews of project documentation and site visits were used to collect data for gross impact calculations, to verify measure installation, and to determine measure operating parameters. Projects were selected for on-site inspections at random, except for those with a higher level of uncertainty (custom sites, etc.). After receiving and reviewing the provided project documentation, if it was determined that the measures or *ex ante* calculations had a higher level of uncertainty, the site would then be selected for an on-site inspection. The Evaluators completed 31 desk reviews and 10 on-sites. When deemed values were used to determine *ex post* energy savings, including equivalent full load hours for heating and cooling projects, or annual operating hours for lighting projects, the Evaluators referred to the AR TRM V8.2.

Table 7-7 below presents the sample design. The 31 projects that were sampled for measurement and verification in the C&I Solutions, SBS, SAGE, and RCx channels account for 44% of reported *ex ante* kWh savings within these channels. With the inclusion of the census of Midstream Lighting projects and CEI that received M&V, the total program sample accounts for 53% of program *ex ante* savings.

Table 7-7 CEEP Sample Design

Stratum Name	Ex ante Gross kWh Savings	Strata Minimum (kWh)	Strata Maximum (kWh)	Population of Projects	Design Sample Size	Desk Review	Site Visit
C&I Solutions (Certainty)	8,215,045	1,000,000	N/A	2	2	1	1
C&I Solutions 1	2,127,291	0	150,000	46	8	4	4
C&I Solutions 2	2,460,705	150,000	500,000	9	2	2	0
C&I Solutions 3	1,671,899	500,000	1,000,000	2	1	1	0
SBS (Certainty)	238,366	100,000	N/A	1	1	0	1
SBS 1	489,041	0	14,000	70	6	4	2
SBS 2	1,146,677	14,000	40,000	46	4	2	2
SBS 3	842,370	40,000	100,000	16	3	3	0
SAGE (Certainty)	267,796	300,000	N/A	1	1	1	0
SAGE 1	293,592	0	300,000	5	2	2	0
SAGE 2	432,249	200,000	300,000	3	1	1	0
Midstream	2,064,070	N/A	N/A	19	Census	Census	0
CEI	1,359,001	N/A	N/A	9	Census	Census	0
RCx	944,723	N/A	N/A	3	Census	Census	0
HVAC Tune Up	404,332	N/A	N/A	5	Census	Census	0
Total	22,957,157			237	31	21	10
Sums may differ due to rounding.							

In addition to the 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 7-8 shows the achieved sample sizes for the different types of data collection employed for this study.

Table 7-8 Sample Sizes for Data Collection Efforts

Data Collection Activity	Sample Size
On-Site M&V visits	10
Desk Review of Project Documentation	31
In-depth Interviews with Implementation Staff	1
In-depth Interviews with Program Staff	1

The achieved sampling precision for the CEEP gross impact evaluation is $\pm 7.6\%$.

7.5 Gross Impact Evaluation Findings

The reported *ex ante* savings for CEEP was 22,957,157 kWh. The Evaluators found *ex post* gross savings of 21,727,576 kWh (95% gross realization). The *ex post* net savings was 21,652,466 kWh which was 128% of the program's net savings goal of 16,940,396 kWh.

The PY2021 sample resulted in *ex post* gross kWh estimates with $\pm 7.6\%$ relative precision at the 90% confidence interval. *Ex post* gross energy savings were relatively close to the original reported values at the program level (96% gross realization rate).

The sample also resulted in *ex post* gross kW estimates with $\pm 9.2\%$ relative precision at the 90% confidence interval.

7.5.1 C&I Solutions Gross Impact Findings

Summary

- **14,879,271 *ex ante* kWh**
- **13,855,137 *ex post* verified kWh (93% gross realization)**
- **2,433 *ex post* verified kW (98% gross realization)**

- Program population: 64 projects
- 5 HVAC Tune Up projects
- M&V sample: 13 projects
- Four M&V strata:
 - Certainty stratum: 90% realization
 - Two projects, accounting for 57% of C&I Solutions channel savings (EA-0000399992 and EA-0000516734)
 - Stratum 1: 91%
 - EA-0000392721 had a 30% realization rate. This project represented 24% of Stratum 1 total *ex ante* savings
 - Stratum 2: 102%
 - Stratum 3: 100%

7.5.2 Small Business Solutions Gross Impact Findings

Summary <ul style="list-style-type: none">■ 2,716,455 <i>ex ante</i> kWh■ 2,503,670 <i>ex post</i> verified kWh (92% gross realization)■ 731 <i>ex post</i> verified kW (160% gross realization)	<ul style="list-style-type: none">■ Program population: 133 projects■ M&V sample: 14 projects■ Four M&V strata:<ul style="list-style-type: none">○ Certainty stratum: 78% realization○ Stratum 1: 93%○ Stratum 2: 96%○ Stratum 3: 91%
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7.5.3 SAGE Gross Impact Findings

Summary <ul style="list-style-type: none">■ 993,637 <i>ex ante</i> kWh■ 993,637 <i>ex post</i> verified kWh (100% gross realization)■ 142 <i>ex post</i> verified kW (100% gross realization)	<ul style="list-style-type: none">■ Program population: 9 projects■ M&V sample: 4 projects■ Three M&V strata, with 100% realization in all sampled projects
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7.5.4 Midstream Gross Impact Findings

Summary <ul style="list-style-type: none">■ 2,064,070 <i>ex ante</i> kWh■ 2,089,405 <i>ex post</i> verified kWh (101% gross realization)■ 392 <i>ex post</i> verified kW (102% gross realization)	<ul style="list-style-type: none">■ Program population: 2911 fixtures purchased by 19 participants■ Database review: examined data for input errors, project repeat entries.■ Assigned AOH/CF/baseline based on lamp/fixture type, and wattage based on manufacturer's / DLC specifications.
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7.5.5 Continuous Energy Improvement Gross Impact Findings

Summary	
<ul style="list-style-type: none">■ 1,359,001 <i>ex ante</i> kWh■ 1,341,004 <i>ex post</i> verified kWh (99% gross realization)■ 254 <i>ex post</i> verified kW (98% gross realization)	<ul style="list-style-type: none">■ Program population: 9 Projects■ Census of projects analyzed in the evaluation■ Minor corrections made to models to improve model fit

7.5.6 Retro Commissioning (RCx) Gross Impact Findings

Summary	
<ul style="list-style-type: none">■ 944,723 <i>ex ante</i> kWh■ 944,723 <i>ex post</i> verified kWh (100% gross realization)■ 64 <i>ex post</i> verified kW (100% gross realization)	<ul style="list-style-type: none">■ Program population: 3 Projects■ Census of projects analyzed in the evaluation■ No adjustments needed to implementer's models, 100% realization found

7.6 Net Impact Evaluation Approach

Details on the CEEP NTG approach and results can be found in Appendix C Net-to-Gross Approach and Outcomes.

7.7 Net Impact Evaluation Findings

The Evaluators conducted new net-to-gross analysis in PY2021 for C&I Solutions and SBS.

7.7.1 C&I Solutions

The C&I Solutions channel free-ridership was based on survey responses from participants. The C&I solutions channel NTG was 100%. Table 7-9 and Table 7-10 summarize the *ex post* gross net kWh savings and peak kW demand reductions of the channel. Net impacts totaled 13,855,137 kWh and 2,433 kW in peak demand.

Table 7-9 Summary of Net Annual Energy Savings (kWh) – C&I Solutions

Channel	<i>Ex ante</i> Gross kWh Savings	<i>Ex post</i> Gross kWh Savings	Realization Rate – kWh	NTG	<i>Ex post</i> Net kWh Savings
C&I Solutions	14,879,271	13,855,137	93%	100%	13,855,137

Table 7-10 Summary of Net Peak Demand Reductions (kW) – C&I Solutions

Channel	<i>Ex ante</i> Gross kW Savings	<i>Ex post</i> Gross kW Savings	Realization Rate – kW	NTG	<i>Ex post</i> Net kW Savings
C&I Solutions	2,526	2,433	98%	100%	2,433

7.7.2 SBS

Table 7-11 and Table 7-12 summarize the realized net kWh savings and peak kW demand reductions of the SBS channel. Channel free-ridership was based on surveys collected from the previous program year because there were no program changes for PY2021. Program channel free-ridership (kWh) is estimated at 3%.

Table 7-11 Summary of Net Annual Energy Savings (kWh) – SBS

Channel	<i>Ex ante</i> Gross kWh Savings	<i>Ex post</i> Gross kWh Savings	Realization Rate – kWh	NTG	<i>Ex post</i> Net kWh Savings
SBS	2,716,455	2,503,670	92%	97%	2,428,560

Table 7-12 Summary of Net Peak Demand Reductions (kW) – SBS

Channel	<i>Ex ante</i> Gross kW Savings	<i>Ex post</i> Gross kW Savings	Realization Rate – kW	NTG	<i>Ex post</i> Net kW Savings
SBS	455	731	160%	97%	709

7.7.3 SAGE

Table 7-13 and Table 7-14 summarize the realized net kWh savings and peak kW demand reductions for SAGE. The SAGE channel’s free-ridership was based on the PY2019 surveys and there were no program changes between then and PY2021. The program channel free-ridership of 0% from PY2019 is applied in PY2021. Net savings totaled to 993,637 kWh and 142 kW in peak demand (100% NTG).

Table 7-13 Summary of Net Annual Energy Savings (kWh) – SAGE

Channel	<i>Ex ante</i> Gross kW Savings	<i>Ex post</i> Gross kW Savings	Realization Rate – kW	NTG	<i>Ex post</i> Net kW Savings
SAGE	993,637	993,637	100%	100%	993,637

Table 7-14 Summary of Net Peak Demand Reductions (kW) – SAGE

Channel	<i>Ex ante</i> Gross kW Savings	<i>Ex post</i> Gross kW Savings	Realization Rate – kW	NTG	<i>Ex post</i> Net kW Savings
SAGE	142	142	100%	100%	142

7.7.4 Midstream

Channel free-ridership was based on surveys collected from downstream respondents. The Midstream NTG will be re-examined in PY2022. Table 7-15 and Table 7-16 summarize the realized net kWh savings and peak kW demand reductions of the Midstream channel.

Table 7-15 Summary of Net Annual Energy Savings (kWh) – Midstream Lighting

Channel	<i>Ex ante</i> Gross kWh Savings	<i>Ex post</i> Gross kWh Savings	Realization Rate - kWh	NTG	<i>Ex post</i> Net kWh Savings
Midstream	2,064,070	2,089,405	101%	100%	2,089,405

Table 7-16 Summary of Net Peak Demand Reductions (kW) – Midstream Lighting

Channel	<i>Ex ante</i> Gross kW Savings	<i>Ex post</i> Gross kW Savings	Realization Rate - kW	NTG	<i>Ex post</i> Net kW Savings
Midstream	386	392	102%	100%	392

7.7.5 Continuous Energy Improvement

Table 7-17 and Table 7-18 summarize the realized net kWh savings and peak kW demand reductions of the CEI channel.

Table 7-17 Summary of Net Annual Energy Savings (kWh) – CEI

Channel	<i>Ex ante</i> Gross kWh Savings	<i>Ex post</i> Gross kWh Savings	Realization Rate - kWh	NTG	<i>Ex post</i> Net kWh Savings
CEI	1,359,001	1,341,004	99%	100%	1,341,004

Table 7-18 Summary of Net Demand Reductions (kW) – CEI

Channel	<i>Ex ante</i> Gross kW Savings	<i>Ex post</i> Gross kW Savings	Realization Rate - kW	NTG	<i>Ex post</i> Net kW Savings
CEI	258	254	98%	100%	254

7.7.6 Retro-Commissioning (RCx)

Table 7-19 and Table 7-20 summarize the realized net kWh savings and peak kW demand reductions of this program channel.

Table 7-19 Summary of Net Demand Reductions (kWh) – RCx

Channel	<i>Ex ante</i> Gross kW Savings	<i>Ex post</i> Gross kW Savings	Realization Rate - kW	NTG	<i>Ex post</i> Net kW Savings
RCx	944,723	944,723	100%	100%	944,723

Table 7-20 Summary of Net Demand Reductions (kW) – RCx

Channel	<i>Ex ante</i> Gross kW Savings	<i>Ex post</i> Gross kW Savings	Realization Rate - kW	NTG	<i>Ex post</i> Net kW Savings
RCx	64	64	100%	100%	64

7.7.7 Summary of Net Savings Results

Table 7-21 and Table 7-22 summarize CEEP net savings.

Table 7-21 Summary of CEEP Net Annual Energy Savings (kWh)

Channel	<i>Ex ante</i> Gross kWh Savings	<i>Ex post</i> Gross kWh Savings	Realization Rate - kWh	NTG	<i>Ex post</i> Net kWh Savings
C&I Solutions	14,879,271	13,855,137	93%	100%	13,855,137
SBS	2,716,455	2,503,670	92%	97%	2,428,560
SAGE	993,637	993,637	100%	100%	993,637
Midstream	2,064,070	2,089,405	101%	100%	2,089,405
CEI	1,359,001	1,341,004	99%	100%	1,341,004
RCx	944,723	944,723	100%	100%	944,723
Totals	22,957,157	21,727,576	95%	100%	21,652,466
Sums may differ due to rounding.					

Table 7-22 Summary of CEEP Net Peak Demand Reductions (kW)

Channel	<i>Ex ante</i> Gross kW Savings	<i>Ex post</i> Gross kW Savings	Realization Rate - kW	NTG	<i>Ex post</i> Net kW Savings
C&I Solutions	2,526	2,433	96%	100%	2,433
SBS	455	731	160%	97%	709
SAGE	142	142	100%	100%	142
Midstream	386	392	102%	100%	392
CEI	258	254	98%	100%	254
RCx	64	64	100%	100%	64
Totals	3,831	4,015	105%	100%	3,993
Sums may differ due to rounding.					

7.8 Non-Energy Benefits (NEBs)

Protocol L of the AR TRM V8.2 states that EM&V of demand-side management (DSM) programs in Arkansas must account for 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 CEEP Program in PY2021 are natural gas savings and avoided replacement costs (ARCs). There were no propane or water savings in PY2021. Measures with zero entries are included to ensure consistency of table structure and to demonstrate that no measures or potential energy and non-energy impacts were omitted.

7.8.1 Natural Gas Energy Savings

In the CEEP, OG&E customers can have either electric or natural gas heating. When a customer has natural gas heating, OG&E can claim the natural gas therms savings as NEBs. Conversely, when a customer has natural gas space heating, there are negative natural gas savings from lighting retrofits associated with the heating-cooling interactive factor of lighting and HVAC. For CEEP, the primary driver of savings is lighting retrofits and as a result the overall effect is a negative NEB from natural gas. The table below presents the *ex post* net natural gas that can be claimed as NEBs for cost-effectiveness purposes. There were no natural gas savings calculated for RCx or CEI.

Table 7-23 Natural Gas (NGS) Savings by Measure, for CEEP in PY2021

Channel	Measure	Ex post Gross NGS (therms)	Ex post Net NGS (therms)	Ex post Net Lifetime NGS (therms)	NGS Benefit (\$)	NPV NGS (\$)
SAGE	Linear LED Lamps	(20,292)	(20,292)	(304,386)	\$ (10,762)	\$ (146,158)
SAGE	Exterior LED	(791)	(791)	(11,858)	\$ (419)	\$ (5,694)
SAGE	LED High Bay	(11,509)	(11,509)	(172,629)	\$ (6,104)	\$ (82,892)
SAGE	LED Troffer	(11,261)	(11,261)	(168,919)	\$ (5,973)	\$ (81,111)
SAGE	Screw-based LED Lamp	(1,453)	(1,453)	(5,811)	\$ (770)	\$ (3,111)
SBS	Linear LED Lamps	(20,292)	(19,684)	(295,255)	\$ (10,440)	\$ (141,774)
SBS	Exterior LED	(791)	(767)	(11,503)	\$ (407)	\$ (5,523)
SBS	LED High Bay	(11,509)	(11,163)	(167,450)	\$ (5,921)	\$ (80,405)
SBS	Screw-based LED Lamp	(1,453)	(1,409)	(5,637)	\$ (747)	\$ (3,018)
SBS	Interior LED	(915)	(888)	(13,314)	\$ (471)	\$ (6,393)
Large C&I	Linear LED Lamps	(20,292)	(20,292)	(304,386)	\$ (10,762)	\$ (146,158)
Large C&I	LED Retrofit - Exterior LED	(791)	(791)	(11,858)	\$ (419)	\$ (5,694)
Large C&I	LED Retrofit - LED High Bay	(11,509)	(11,509)	(172,629)	\$ (6,104)	\$ (82,892)
Large C&I	LED Retrofit - LED Troffer	(11,261)	(11,261)	(168,919)	\$ (5,973)	\$ (81,111)
Large C&I	Screw-based LED Lamp	(1,453)	(1,453)	(5,811)	\$ (770)	\$ (3,111)
Large C&I	Interior LED	(915)	(915)	(13,726)	\$ (485)	\$ (6,591)
Large C&I	Custom - Lighting Controls	(64)	(64)	(515)	\$ (34)	\$ (268)
Large C&I	NC Lighting - Interior LED	(4,596)	(4,596)	(68,935)	\$ (2,437)	\$ (33,101)
Large C&I	NC Lighting - LED High Bay	(1,363)	(1,363)	(20,438)	\$ (723)	\$ (9,814)
Large C&I	De-Lamp	(312)	(312)	(937)	\$ (166)	\$ (503)
Large C&I	NC Lighting - Exterior LED	(17)	(17)	(253)	\$ (9)	\$ (122)
Midstream	LED High Bay	(6,561)	(6,561)	(93,927)	\$ (3,480)	\$ (44,660)
Midstream	LED Reflector	(88)	(88)	(959)	\$ (47)	\$ (489)
Midstream	LED Linear T8	(172)	(172)	(2,573)	\$ (91)	\$ (1,235)
Midstream	2x2 LED Linear Fixture	(18)	(18)	(255)	\$ (10)	\$ (123)
Midstream	Downlight LED	(2)	(2)	(17)	\$ (1)	\$ (9)
Midstream	2x4 LED Linear Fixture	(461)	(461)	(6,911)	\$ (244)	\$ (3,319)
Total		(140,139)	(139,090)	(2,029,810)	\$ (73,769)	\$ (975,278)
Sums may differ due to rounding.						

The bullets below outline how the Evaluators determined if there were natural gas savings:

- **C&I Solutions:** natural gas savings were estimated using heating type information in the project data provided by the TPI.
- **SBS:** natural gas savings were estimated using heating type information in the project data provided by the TPI.
- **Midstream:** natural gas savings were estimated using heating type information in the project data provide by the TPI.

- **SAGE:** natural gas savings were estimated using heating type information in the project data provided by the TPI.
- **CEI:** there are no natural gas savings in PY2021.
- **RCx:** natural gas savings are included in this program so natural gas savings reported are the realized savings.

7.8.2 Propane Savings

When a customer has propane, OG&E can claim the savings as NEBs. There were no propane savings in PY2021 for CEEP.

7.8.3 Water Savings

When a customer installs a water saving device, OG&E can claim the water savings (gallons) as a NEBs. There were no water savings in PY2021 for CEEP.

7.8.4 Avoided and Deferred Replacement Costs

To calculate avoided replacement costs (ARC) and incremental costs for LEDs in the CEEP the AR TRM V8.2 Protocol L calculator was used.

Avoided replacement cost NEBs were calculated for lighting projects by lighting fixture and bulb types. The implementer provided detailed lamp and fixture types for all participants and the Evaluators used that data to estimate avoided replacement cost. Equipment costs were taken from program tracking where available and citing Illinois TRM V8.2⁴⁸ where not available.

The AR TRM V8.2 lists the EUL for HID as 16 years and this is longer than the EUL of common LED fixtures (15 years) which would result in no avoided replacement cost. The Evaluators reviewed the calculation used to derive the EUL in AR TRM V8.2 and recalculated the EUL because AR TRM V8.2 used the ballast lifetime to calculate EUL. The Evaluators used the lamp life of 15,000 hours for exterior HIDs and 18,000 hours for high/low bay HIDs, divide them by weighted average of 3,205 AOH (the same AOH used to calculate EUL from AR TRM V8.2). The resulting EUL for exterior HID was 4 years and high/low bay HID was 6 years. The value of the avoided replacement cost NEB was determined using a calculator provided by the IEM, which accounts for differences in EULs, changing baseline fixtures in future years (per EISA tiers), and the Net Present Value (NPV) of the avoided replacement cost.

The table below shows the ARCs for the PY2021 CEEP. There were no ARCs for CEI.

⁴⁸ Ibid.

Table 7-24 Avoided Replacement Costs (ARCs) by Measure, for CEEP in PY2021

Channel	Measure	Ex post Gross ARC (\$)	Ex post Net ARC (\$)	NPV of ARC (\$)
SAGE	LED Retrofit - Linear LED Lamps	\$ 67,559	\$ 67,559	\$ 67,559
SAGE	LED Retrofit - Exterior LED	\$ 137,031	\$ 137,031	\$ 137,031
SAGE	LED Retrofit - LED High Bay	\$ 131,856	\$ 131,856	\$ 131,856
SAGE	LED Retrofit - LED Troffer	\$ 41,618	\$ 41,618	\$ 41,618
SAGE	LED Retrofit - Screw-based LED Lamp	\$ 2,086	\$ 2,086	\$ 2,086
SBS	LED Retrofit - Linear LED Lamps	\$ 67,559	\$ 65,532	\$ 65,532
SBS	LED Retrofit - Exterior LED	\$ 137,031	\$ 132,920	\$ 132,920
SBS	LED Retrofit - LED High Bay	\$ 131,856	\$ 127,900	\$ 127,900
SBS	LED Retrofit - Screw-based LED Lamp	\$ 2,086	\$ 2,024	\$ 2,024
SBS	LED Retrofit - Interior LED	\$ 37,105	\$ 35,992	\$ 35,992
Large C&I	LED Retrofit - Linear LED Lamps	\$ 67,559	\$ 67,559	\$ 67,559
Large C&I	LED Retrofit - Exterior LED	\$ 137,031	\$ 137,031	\$ 137,031
Large C&I	LED Retrofit - LED High Bay	\$ 131,856	\$ 131,856	\$ 131,856
Large C&I	LED Retrofit - LED Troffer	\$ 41,618	\$ 41,618	\$ 41,618
Large C&I	LED Retrofit - Screw-based LED Lamp	\$ 2,086	\$ 2,086	\$ 2,086
Large C&I	LED Retrofit - Interior LED	\$ 37,105	\$ 37,105	\$ 37,105
Large C&I	NC Lighting - Interior LED	\$ 82,466	\$ 82,466	\$ 82,466
Large C&I	NC Lighting - LED High Bay	\$ 13,979	\$ 13,979	\$ 13,979
Large C&I	NC Lighting - Exterior LED	\$ 19,064	\$ 19,064	\$ 19,064
Midstream	LED High Bay	\$ 150,001	\$ 150,001	\$ 150,001
Midstream	Exterior LED Flood Light	\$ 24,941	\$ 24,941	\$ 24,941
Midstream	LED Linear T8	\$ 2,844	\$ 2,844	\$ 2,844
Midstream	2x2 LED Linear Fixture	\$ 215	\$ 215	\$ 215
Midstream	Downlight LED	\$ 827	\$ 827	\$ 827
Midstream	2x4 LED Linear Fixture	\$ 6,136	\$ 6,136	\$ 6,136
Total		\$ 1,473,512	\$ 1,462,243	\$ 1,462,243
Sums may differ due to rounding.				

7.8.5 NEBs Summary

The table below summarizes the NPV of NEBs attributable to CEEP, including natural gas savings, water savings, propane, and avoided replacement cost. There were no propane savings (gallons), no water savings (gallons) and no DRCs in the PY2021 CEEP.

Table 7-25 PY2021 CEEP Non-Energy Benefits (NEBs) Summary

Channel	Measure	NPV NGS (\$)	NPV ARC (\$)	Total NPV (\$)
SAGE	LED Retrofit - Linear LED Lamps	\$ (146,158)	\$ 67,559	\$ (78,600)
SAGE	LED Retrofit - Exterior LED	\$ (5,694)	\$ 137,031	\$ 131,336
SAGE	LED Retrofit - LED High Bay	\$ (82,892)	\$ 131,856	\$ 48,964
SAGE	LED Retrofit - LED Troffer	\$ (81,111)	\$ 41,618	\$ (39,493)
SAGE	LED Retrofit - Screw-based LED Lamp	\$ (3,111)	\$ 2,086	\$ (1,025)
Large C&I	LED Retrofit - Linear LED Lamps	\$ (146,158)	\$ 67,559	\$ (78,600)
Large C&I	LED Retrofit - Exterior LED	\$ (5,694)	\$ 137,031	\$ 131,336
Large C&I	LED Retrofit - LED High Bay	\$ (82,892)	\$ 131,856	\$ 48,964
Large C&I	LED Retrofit - LED Troffer	\$ (81,111)	\$ 41,618	\$ (39,493)
Large C&I	LED Retrofit - Screw-based LED Lamp	\$ (3,111)	\$ 2,086	\$ (1,025)
Large C&I	LED Retrofit - Interior LED	\$ (6,591)	\$ 37,105	\$ 30,514
Large C&I	Custom - Lighting Controls	\$ (268)	\$ -	\$ (268)
Large C&I	New Construction Lighting - Interior LED	\$ (33,101)	\$ 82,466	\$ 49,365
Large C&I	New Construction Lighting - LED High Bay	\$ (9,814)	\$ 13,979	\$ 4,165
Large C&I	LED Retrofit - De-Lamp	\$ (503)	\$ -	\$ (503)
Large C&I	New Construction Lighting - Exterior LED	\$ (122)	\$ 19,064	\$ 18,942
Midstream	LED High Bay	\$ (44,660)	\$ 150,001	\$ 105,341
Midstream	Exterior LED Flood Light	\$ -	\$ 24,941	\$ 24,941
Midstream	LED Reflector	\$ (489)	\$ -	\$ (489)
Midstream	LED Linear T8	\$ (1,235)	\$ 2,844	\$ 1,608
Midstream	2x2 LED Linear Fixture	\$ (123)	\$ 215	\$ 92
Midstream	Downlight LED	\$ (9)	\$ 827	\$ 818
Midstream	2x4 LED Linear Fixture	\$ (3,319)	\$ 6,136	\$ 2,818
SBS	LED Retrofit - Linear LED Lamps	\$ (141,774)	\$ 65,532	\$ (76,242)
SBS	LED Retrofit - Exterior LED	\$ (5,523)	\$ 132,920	\$ 127,396
SBS	LED Retrofit - LED High Bay	\$ (80,405)	\$ 127,900	\$ 47,495
SBS	LED Retrofit - Screw-based LED Lamp	\$ (3,018)	\$ 2,024	\$ (994)
SBS	LED Retrofit - Interior LED	\$ (6,393)	\$ 35,992	\$ 29,598
Total		\$ (975,278)	\$ 1,462,243	\$ 486,965
Sums may differ due to rounding.				

7.9 Process Evaluation

The AR TRM V8.2 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 7-26 Determining Process Evaluation Timing

Variable Name	Variable Type
New and Innovative Components	No. The program is unchanged from PY2020
No Previous Process Evaluation	No. The program received process evaluations in prior program years.
Less than Expected Energy Savings or Accomplishments	No. CEEP has exceeded energy savings expectations in prior program years.
Participant Reported Problems or Low Participant Satisfaction	No. Participants have consistently reported high satisfaction.
New Vendor or Contractor	No. The program continues to be implemented by CLEAResult.
Energy Savings are being Achieved Slower than Expected	No. Energy savings are being achieved at a rate that is consistent with program expectations.

Table 7-27 Determining Process Evaluation Conditions

Component	Status
Impact problems	No. CEEP has consistently high realization rates.
Informational/educational objectives	Addressed. CEEP has met program goals for outreach and education of OG&E customers and Trade Allies.
Participation problems	No. CEEP has consistently met participation targets.
Operational challenges	None identified thus far.
Cost-effectiveness issues	No. The program is highly cost-effective. Prescriptive measures are screened during triennial planning and custom measures are screened for cost-effectiveness.
Negative feedback	No. Participants and Trade Allies have consistently provided positive feedback about their program experience.
Market effects	Addressed. Staff interviews and contractor interviews determined that CEEP offering resulted in minor market effects where vendors have changed stocking practices. This manifests especially as a result of the Midstream channel.

The program received a limited process for PY2021.

Table 7-28 CEEP Process Evaluation Interview and Survey Data Collection Summary

Target	Component	Activity	n	Precision	Details
Program Staff	OG&E Program Staff	Interview	3	N/A	OG&E staff interview included the Program Manager that is responsible for overall oversight of CEEP, and two EM&V analysts.
Program Staff	CLEAResult Program Staff	Interview	1	N/A	CLEAResult staff interviewed included the Program Manager that is responsible for overall day-to-day implementation of CEEP.
Program Participants	Large C&I Solutions	Participant Survey	10	NTG: $\pm 9.5\%$ Process: $\pm 23.8\%$	Survey effort was used for NTG and process evaluation feedback.
	Small Business Solutions	Participant Survey	26	NTG: $\pm 20.5\%$ Process: $\pm 14.5\%$	
	Midstream	Distributor Interview	3	-	Interviews with distributors were used to obtain process evaluation feedback. Three out of four distributors were interviewed.

The Evaluators note that the SBS survey only achieved $\pm 20.5\%$ precision for NTG. There was one participant in the PY2021 SBS that had an unusually large project for the channel, with 238,366 ex ante kWh. To provide context, the second largest project had ex ante savings of 69,982 kWh. Excluding this outlier project, the survey achieved $\pm 9.9\%$ precision.

The project in question was included in the impact evaluation sample but declined to participate in the survey. Achieving greater than $\pm 10\%$ precision without this respondent would have required greater than an 80% response rate out of the remaining projects and was for budgetary and logistical purposes infeasible.

7.9.1 Program Staff Interviews

The Evaluators completed in-depth interviews with one AR CEEP program manager and two EM&V analysts at OG&E and the manager at CLEAResult. The Evaluators used these program staff interviews to identify program updates or changes in PY2021. Further, these interviews

explored energy efficiency staff roles and responsibilities, program communications and marketing, and the overall program delivery processes in place during PY2021.

In PY2021, OG&E met all goals in the commercial programs. OG&E staff noted that they were able to make in-roads with various government offices and public use facilities throughout their service area and they suspect that these in-roads will open many opportunities for the program to grow and expand in the coming years. According to both OG&E and CLEAResult staff, although the SBS pathway struggled to gain traction in the beginning of the year, it eventually found its stride.

OG&E and CLEAResult staff work together to market the CEEP. Marketing strategies include social media posts, mail outs, flyers, etc. Staff provide cobranding marketing collateral to Trade Allies and require all of their allies to wear an OG&E badge. Social media has proven a successful marketing strategy and CLEAResult tracks which posts and advertisements generate the most interest. OG&E and CLEAResult staff also emphasized the importance of word-of-mouth marketing, as well as meeting people in-person.

CLEAResult manages relationships with Trade Allies for the CEEP. Although the small business program has a list of about 16-18 approved contractors, if a customer wants to use a contractor not on the approved list, they can file their project under the large commercial program and use whomever they want, provided the contractor is licensed, insured, and meets other relevant program guidelines. The incentive structure varies between the small business program and larger commercial program, so depending on project type, using an approved contractor through the small business program may be more cost-effective for some customers. Small business program contractors must complete an annual training; they also have regular communication with CLEAResult.

OG&E staff stated that their quality control and assurance process involve checking with customers on the process of the program and checking if they have any issues or concerns. OG&E staff has no concerns about CLEAResult's quality control and assurance processes. There are Quality Assurance & Quality Control mechanisms in place, which include a pre-construction inspection and a post-construction inspection. The contractors and customers are also required to supply the implementer spec sheets and cut sheets, so that it can be verified that the measures meet program qualification requirements.

All SAGE and C&I channel projects receive quality assurance before and after project completion. For the SBS channel, quality assurance is conducted for the first five projects new contractors complete and the first five projects of the year for contractors that have worked with the program previously. After the first five projects of the year, the quality assurance rate for each contractor is 20%. For all potential projects generating savings greater than 300,000

kWh, CLEAResult staff worked with the Evaluators to determine appropriate savings calculation methodology.

7.9.2 OG&E CEEP Program Participant Surveys and Interviews

7.9.2.1 OG&E Large C&I Program Participant Survey

Ten participants in OG&E’s Large C&I program were surveyed. Respondents learned about Large C&I program through a variety of avenues including a contractor and past experience (Figure 7-3). Respondents also noted that bill inserts (50%), email (40%), and contractor contacts (20%) are the most effective way for OG&E to provide program information.

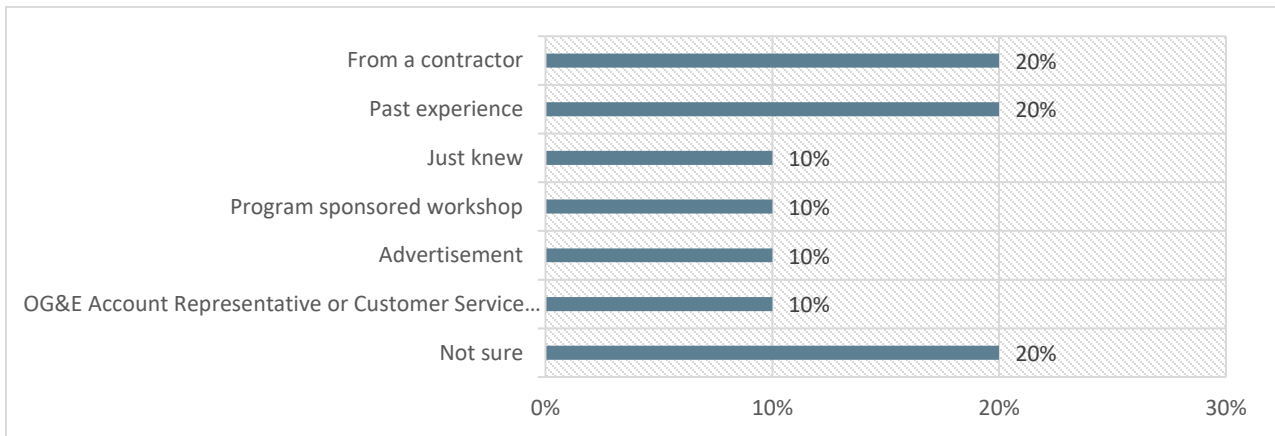


Figure 7-3 Source of Program Awareness (n=10)

In addition to the equipment improvements they received, respondents were most familiar with the HVAC improvements, lighting, and lighting control measures offered by the program (Figure 7-4).

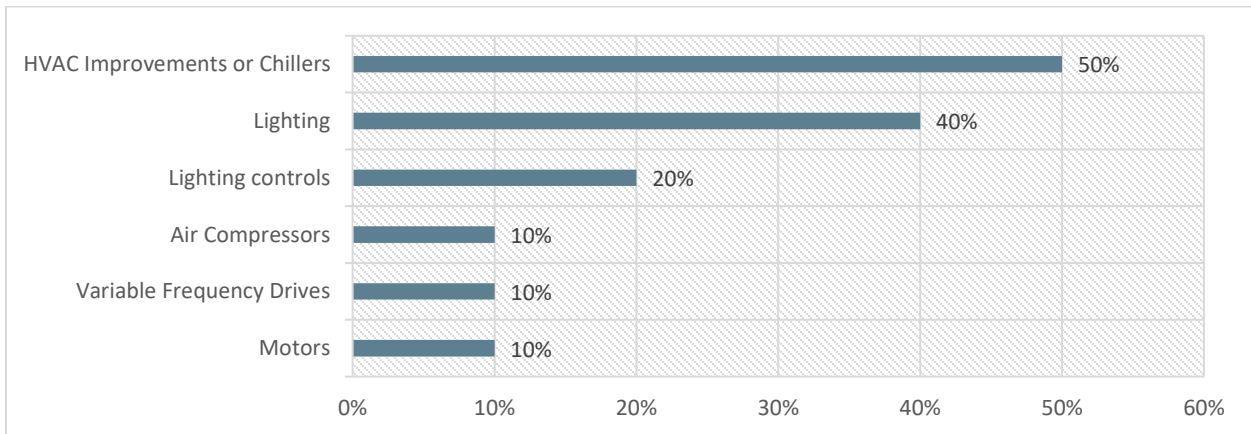


Figure 7-4 Awareness of Program Measures (n=10)

Almost all respondents were interested in participating in OG&E’s Large C&I program to save money on their utility bills (90%); many respondents were also interested in reducing maintenance costs (70%) and saving energy (70%) (Figure 7-5).

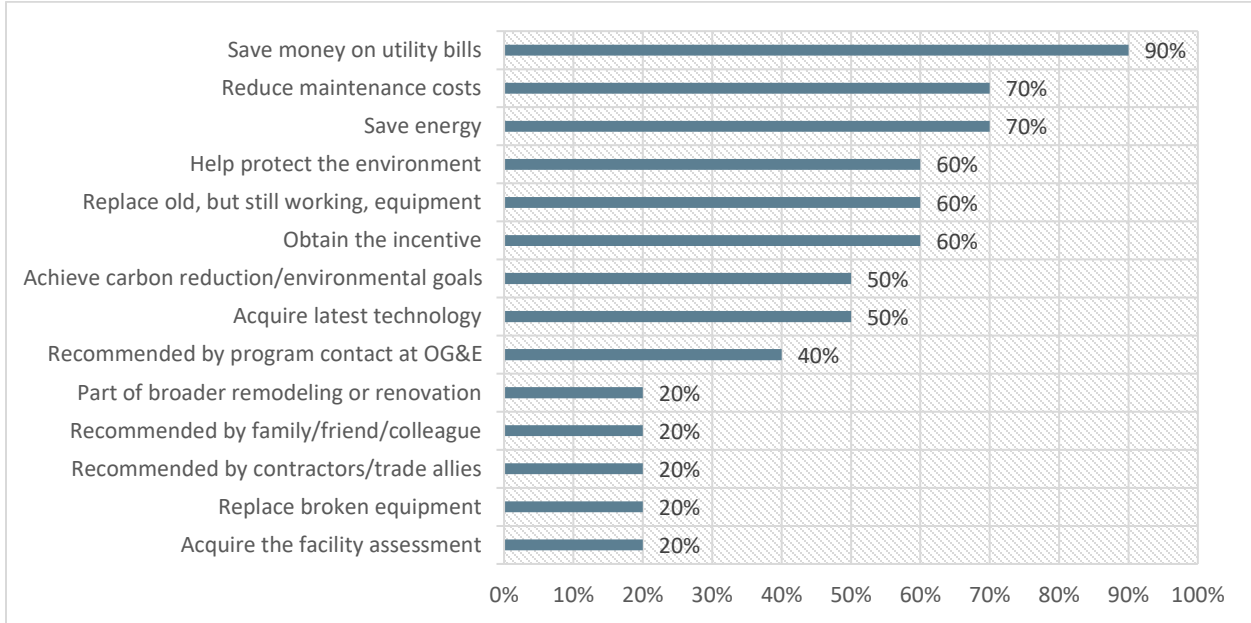


Figure 7-5 Motivation for Participation (n=10)

Respondents reported energy efficiency ENERGY STAR rating of equipment and payback period/return on investment as the most important priorities when making equipment upgrades. When asked to rate priorities on a scale of 0-10 with 0 being “not at all important” and 10 being “extremely important”, 70% of respondents noted they ENERGY STAR rating of the equipment was a 9-10 and 50% reported the payback period was a 9-10 (Figure 7-6).

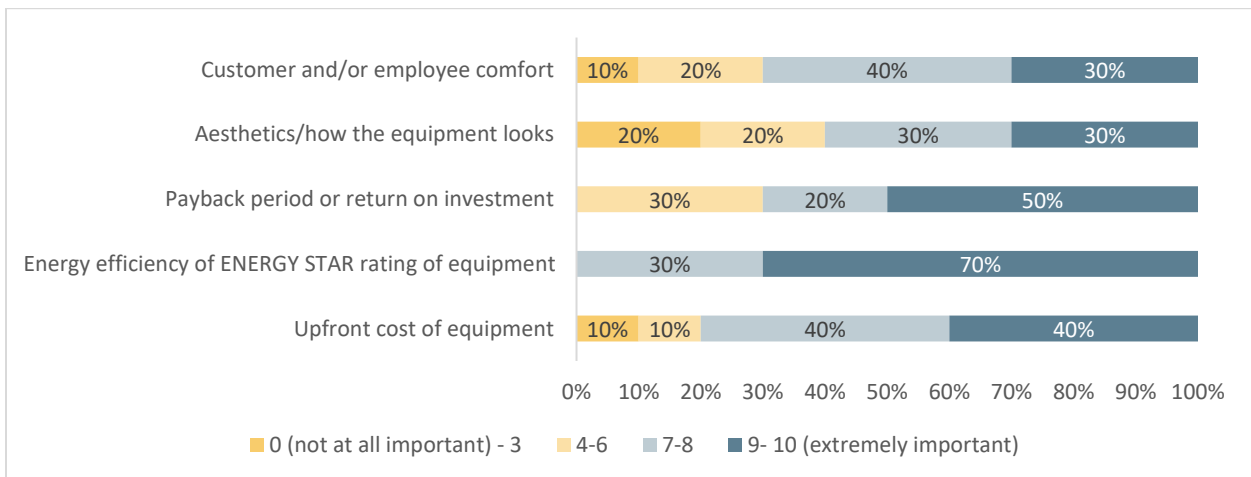


Figure 7-6 Importance of Various Factors in Deciding to Upgrade (n=10)

No respondent reported receiving an energy assessment as part of their participation. Thirty percent reported receiving any sort of technical assistance when deciding which equipment to select.

Respondents indicated that the application process and communication with OG&E staff went smoothly. Over half of respondents completed the application themselves (60%) and all six of these respondents indicated it was very easy. Moreover, among the 80% of respondents who communicated with an OG&E representative during the program, all of them indicated they had positive experiences.

The majority of respondents reported a decrease in their energy bill since participating in the program; no respondent reported an increase in their energy bill.

Program Challenges

Although few respondents reported challenges with participating in the program, many respondents reported challenges with upgrading to efficiency equipment more generally. The two respondents who reported program challenges noted high initial cost of equipment, confusion over the application process, and difficulty finding a Trade Ally to work with. Similarly, half of all respondents (50%) reported high initial cost as a barrier in upgrading equipment and 40% reported the long payback period was a barrier (Figure 7-7). Respondents indicated that OG&E can help mitigate these challenges by providing more technical support, higher incentives, and an improved application process (Figure 7-8).

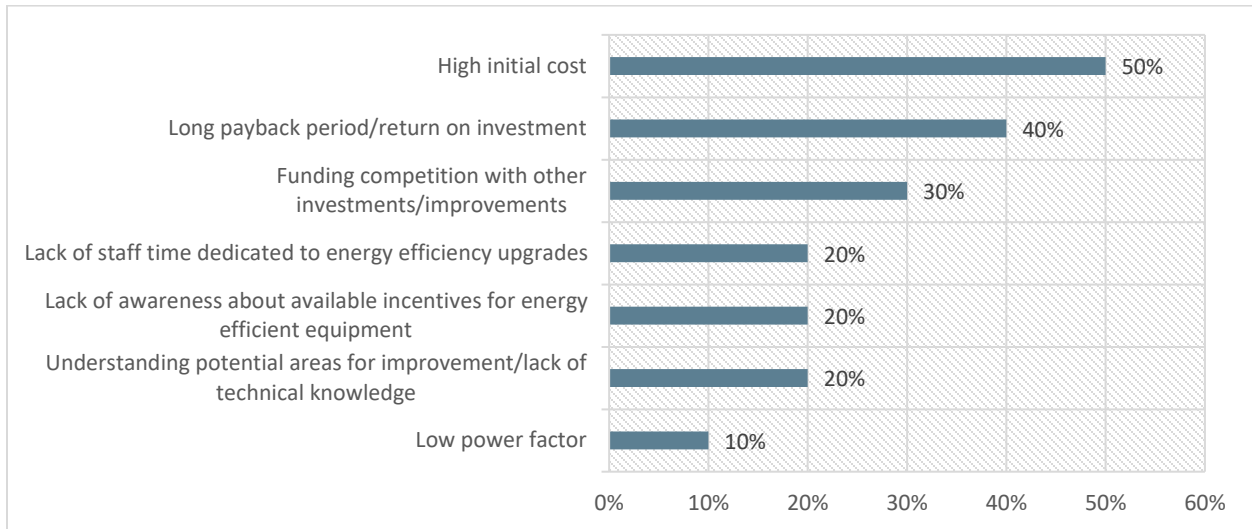


Figure 7-7 Barriers to Making Energy Efficient Equipment Upgrades (n=10)

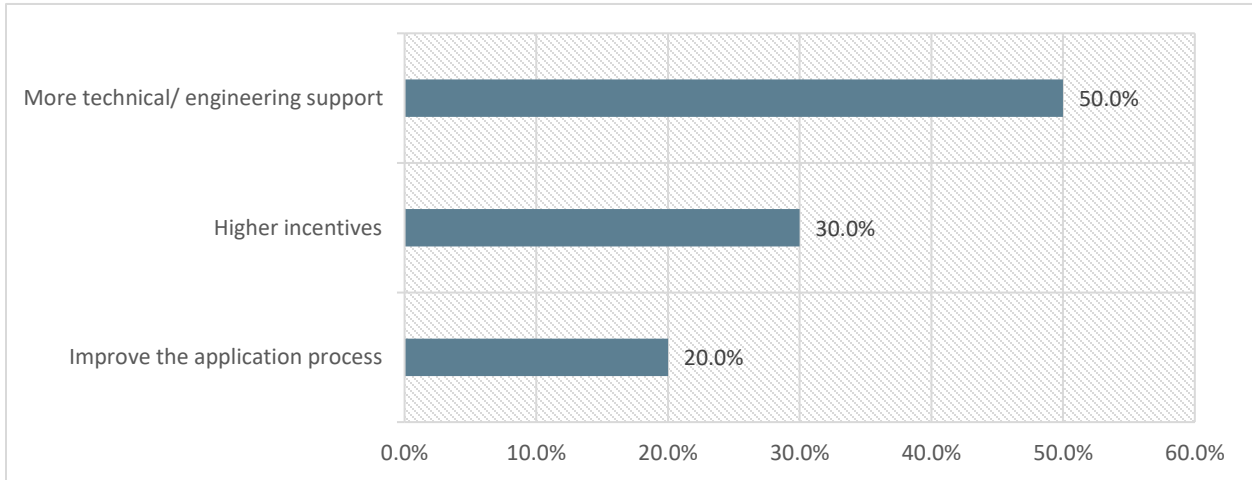


Figure 7-8 Strategies to Address Challenges (n=10)

The majority of respondents noted that COVID-19 impacted their business over the past year (70%). Although no respondent reported that the pandemic impacted their organization’s decision process in regard to equipment upgrades, 50% reported staff illness/death, budget limitations, and a decrease in production.

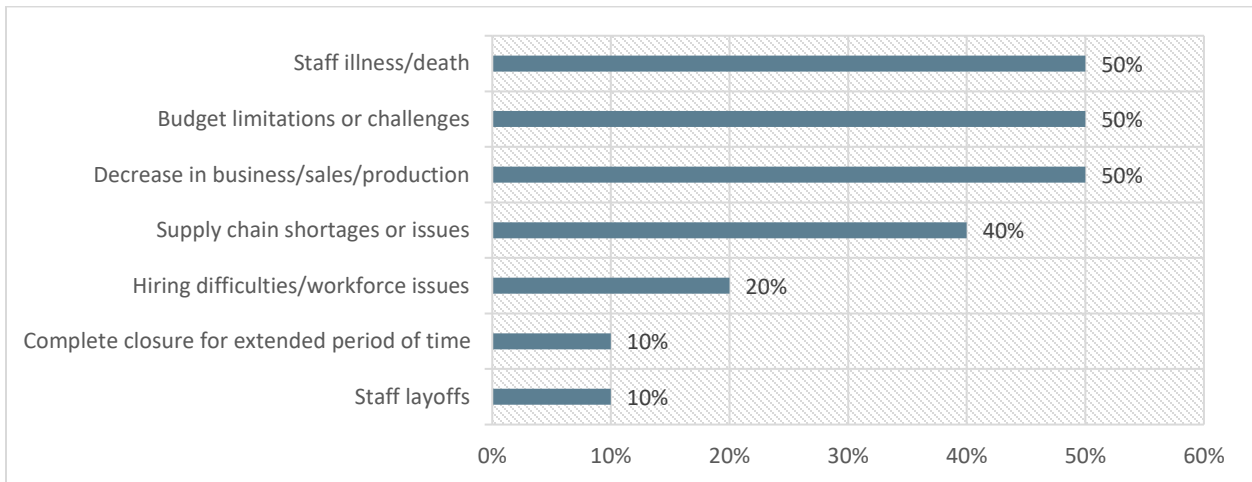


Figure 7-9 COVID-19 Related Challenges (n=10)

Program Satisfaction

Respondents were satisfied with OG&E’s program (Figure 7-10). Not only were all respondents satisfied or very satisfied with the overall program, but they were also satisfied or very satisfied with the equipment installed, the quality of work, the time it took to receive the incentive, and the incentive amount.

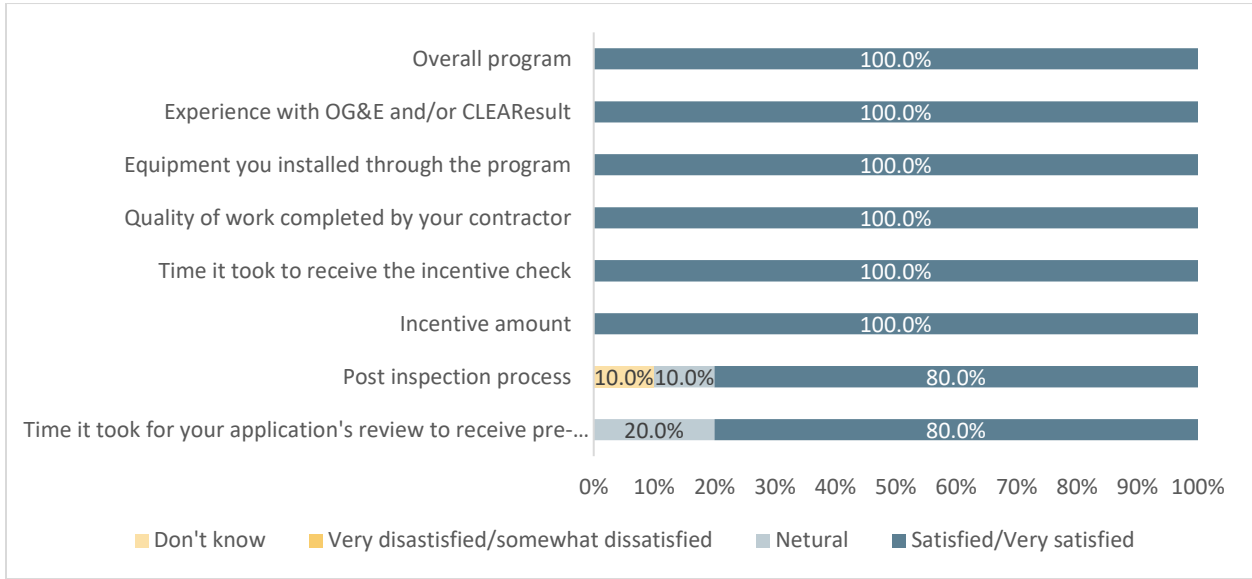


Figure 7-10 Program Satisfaction (n=10)

“no issues from start to finish”

“it was just any easy process with a good payback”

“It was very simple and straight forward. Had no issues and had a good contact that walked us through the process very efficiently”

All respondents were satisfied or very satisfied with OG&E as their utility service provider. Respondent did not provide any suggestions for how OG&E could have improved their overall experience of the program.

Firmographics

The majority of respondents indicated the facility is one of many facilities owned by the company (80%) and most respondents own and occupy the facility in question (70%). Figure 7-11 demonstrates facility type of the participating respondents.

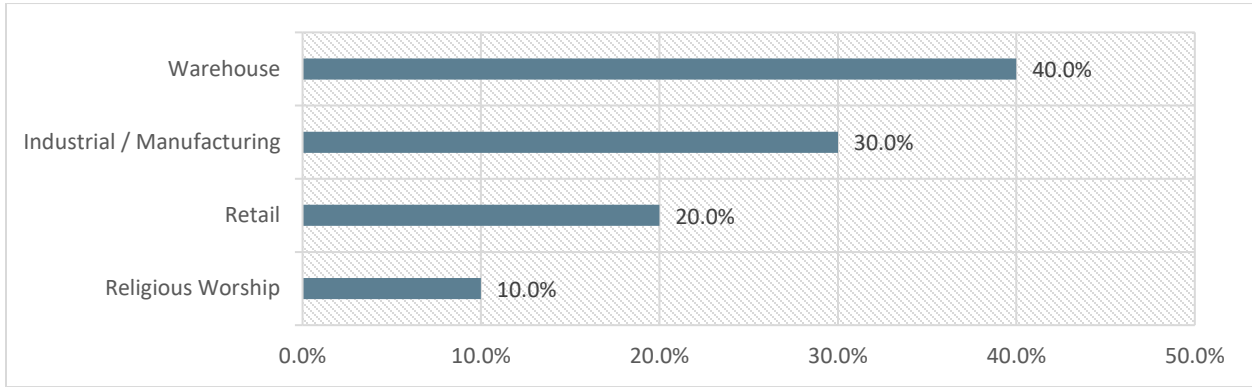


Figure 7-11 Facility Type (n=10)

7.9.2.2 OG&E Small Business Solutions Participant Surveys

Twenty-six participants in OG&E’s Small Business Solutions program channel were surveyed. Respondents learned about the small business solutions program through a variety of avenues including a contractor (38%) and OG&E account representative (27%) (

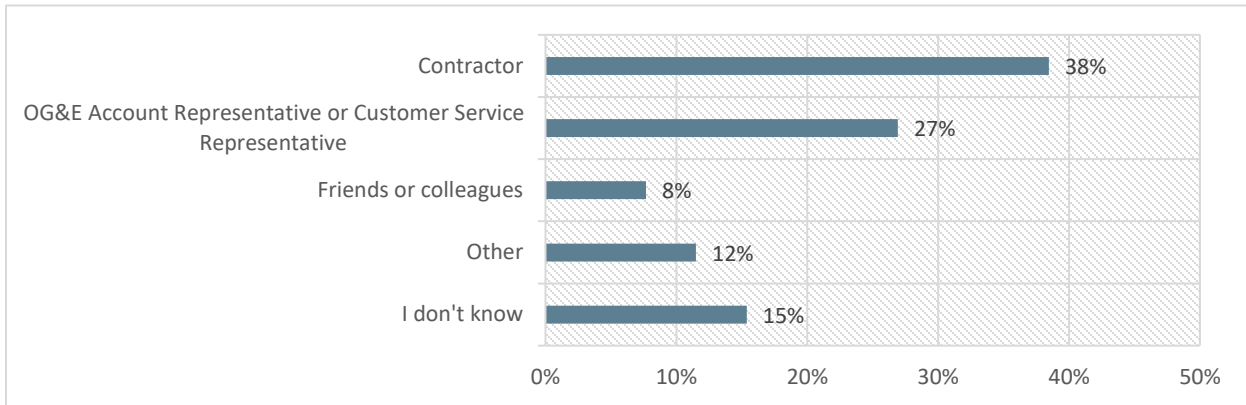


Figure 7-12). Respondents also noted that email (37%), bill inserts (26%), and letter/flyer/mailings (22%) are the most effective way for OG&E to provide companies with energy saving tips.

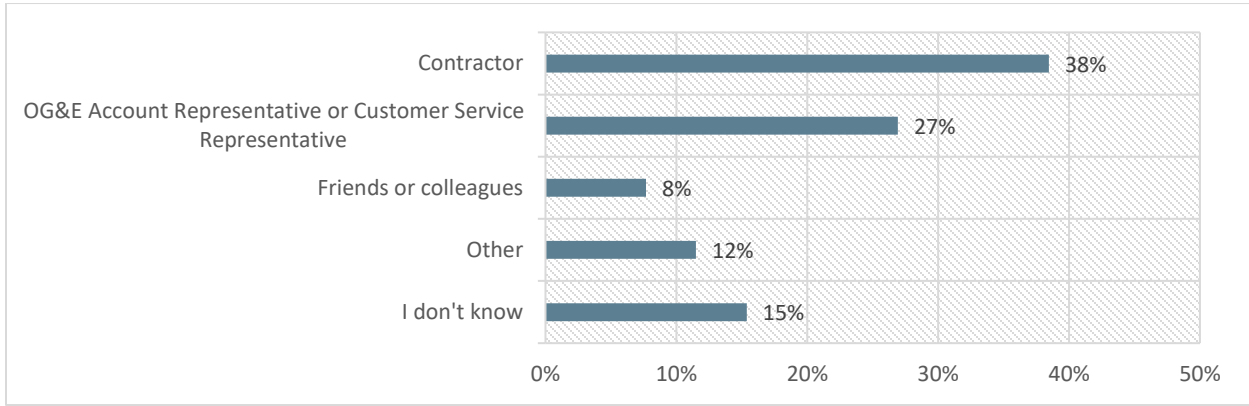


Figure 7-12 Source of Program Awareness (n=26)

Respondents were not very familiar with the other incentives and offerings provided by OG&E to increase energy efficiency. Less than a quarter knew OG&E offered other incentives (23%), but the majority of those respondents (67%) were not sure what the other incentives were for. Respondents were interested in OG&E’s small business solutions program for a variety of reasons. Almost all respondents reported wanting to save energy (96%), to save money on utility bills (92%), and replace old equipment (81%) (Figure 7-13).

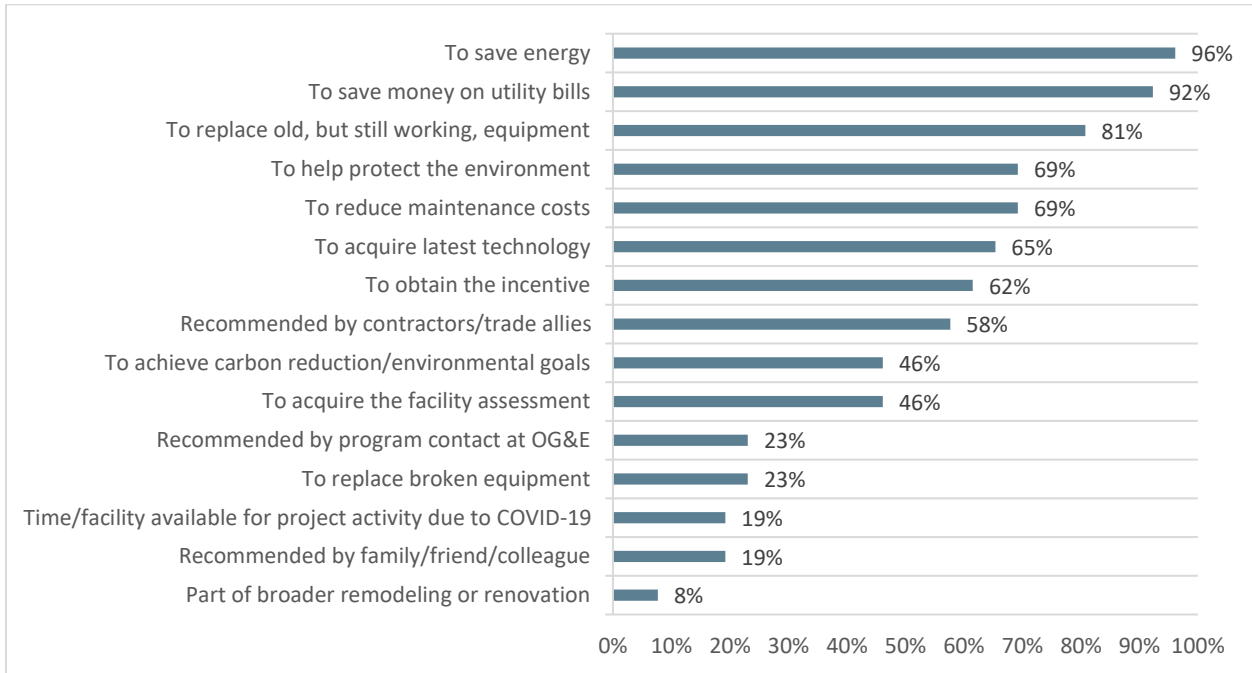


Figure 7-13 Motivation for Participation (n=10)

Respondents reported energy efficiency ENERGY STAR rating of equipment and the upfront cost of equipment as the most important priorities when making equipment upgrades. When asked

to rate priorities on a scale of 0-10 with 0 being “not at all important” and 10 being “extremely important”, 58% of respondents noted they ENERGY STAR rating of the equipment was a 9-10 and 54% reported the upfront cost of the equipment was a 9-10 (Figure 7-14).

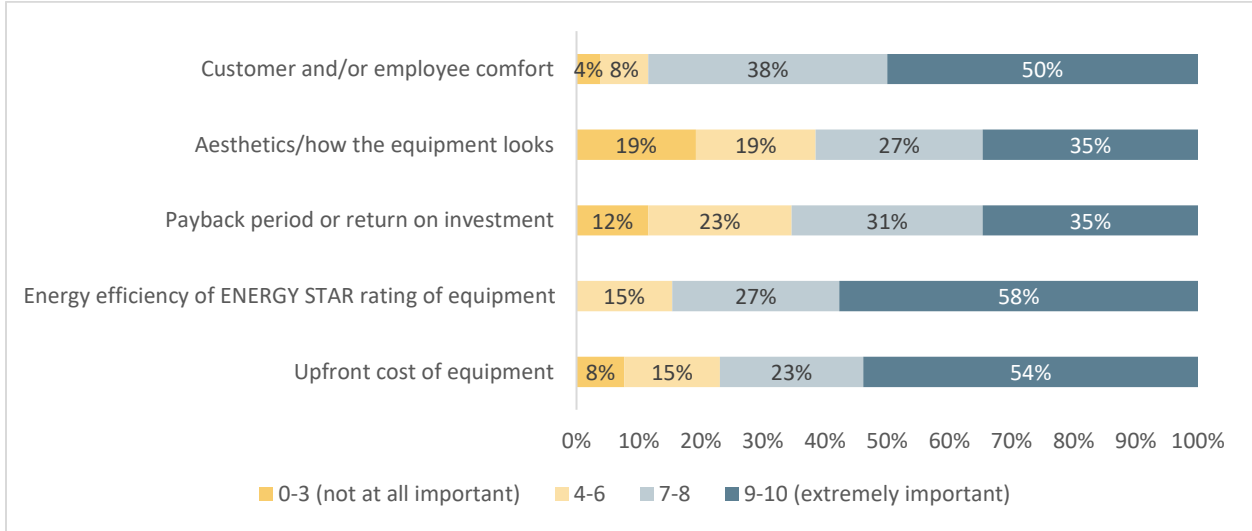


Figure 7-14 Importance of Various Factors in Deciding to Upgrade (n=26)

Respondents had positive experiences with their energy assessment. Just under a quarter of respondents reported receiving an energy assessment as part of their participation (23%). All respondents thought the assessment was at least moderately useful (Figure 7-15). Among the participants who received an energy assessment, half wanted one to save energy and money (50%) and a third wanted one to better understand their business’s systems (33%) and to improve comfort (33%).

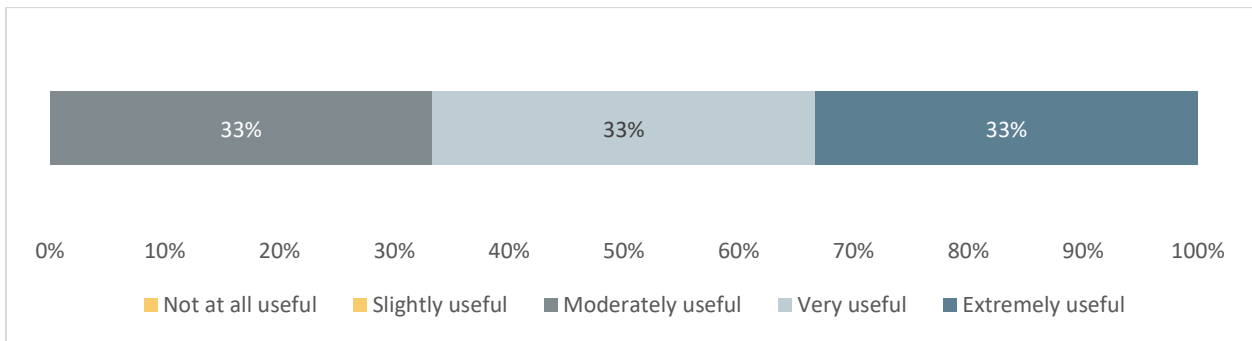


Figure 7-15 Usefulness of Energy Assessment (n=6)

Respondents indicated that the application process and communication with OG&E staff went smoothly. About a quarter of respondents completed the application themselves (23%) and a little less than half had help from their contractor (46%). All six respondents who completed the application themselves said it was very easy and among the 27% of respondents who

communicated with an OG&E representative during the program (n=7), all of them indicated they had positive experiences.

More than half of respondents reported a decrease in their energy bill since participating in the program; no respondent reported an increase in their energy bill (Figure 7-16).

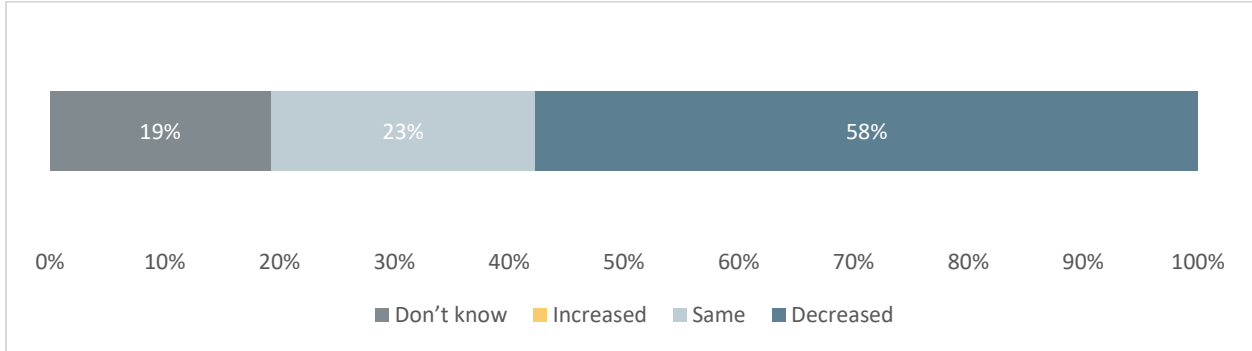


Figure 7-16 Change in Energy Bill (n=26)

Program Challenges

Although few respondents reported challenges with participating in the program, many respondents reported challenges with upgrading to efficiency equipment more generally. The two respondents who reported program challenges (8%) noted high initial cost of equipment, confusion over the application process, and difficulty finding a Trade Ally to work with. Similarly, one-third of all respondents (35%, n=9) reported high initial cost as a barrier in upgrading equipment and 31% (n=8) reported not owning the building as barriers (Figure 7-17). Respondents indicated that OG&E can help mitigate these challenges by providing more technical support, higher incentives, and an improved application process (Figure).

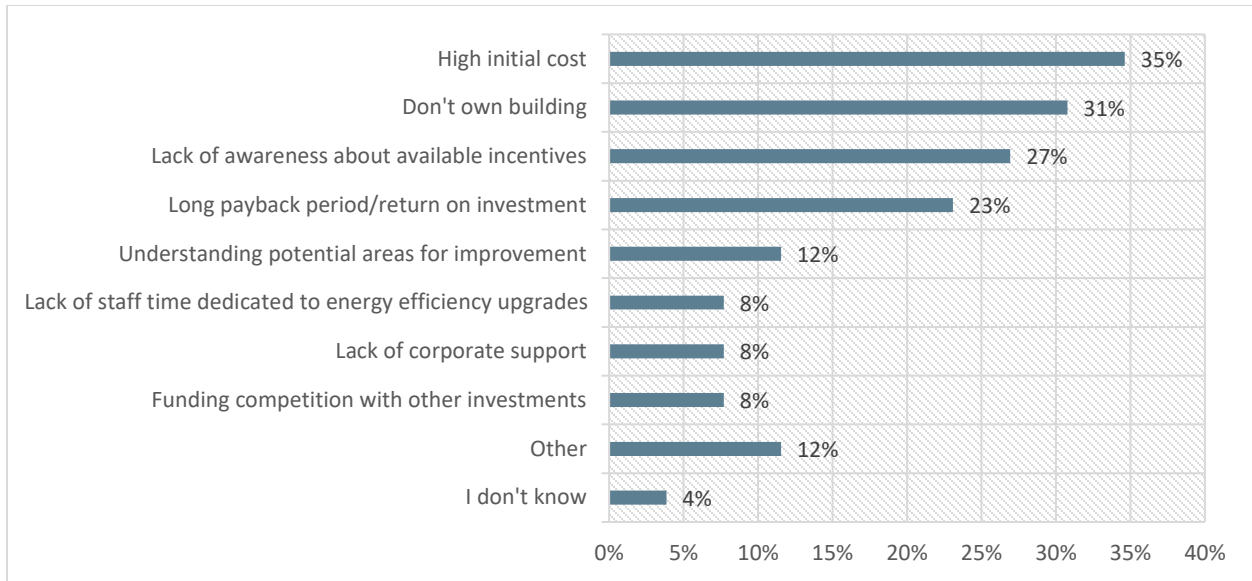


Figure 7-17 Barriers to Making Energy Efficient Equipment Upgrades (n=26)

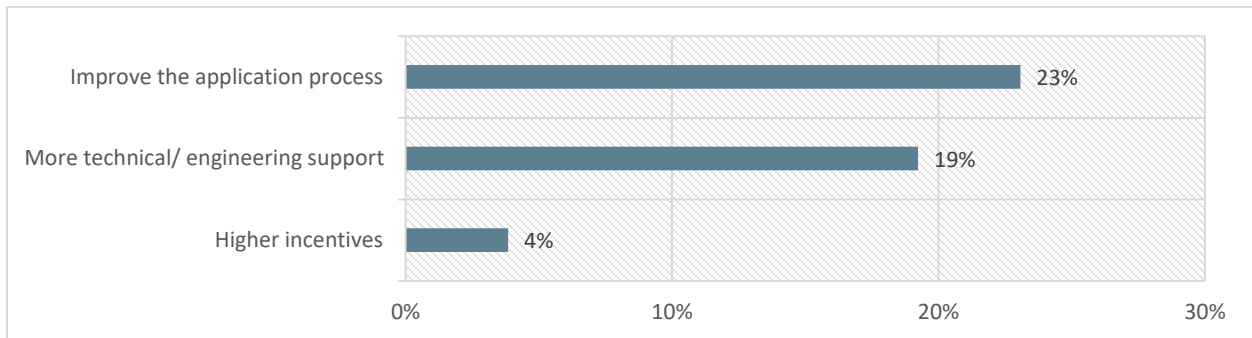


Figure 7-18 Strategies to Address Challenges (n=26)

Half of respondents noted that COVID-19 impacted their business over the past year (54%, n=14). Decrease in business, hiring difficulties/workforce issues, and supply chain shortages/issues were the most common COVID-19 related challenges (Figure 7-19).

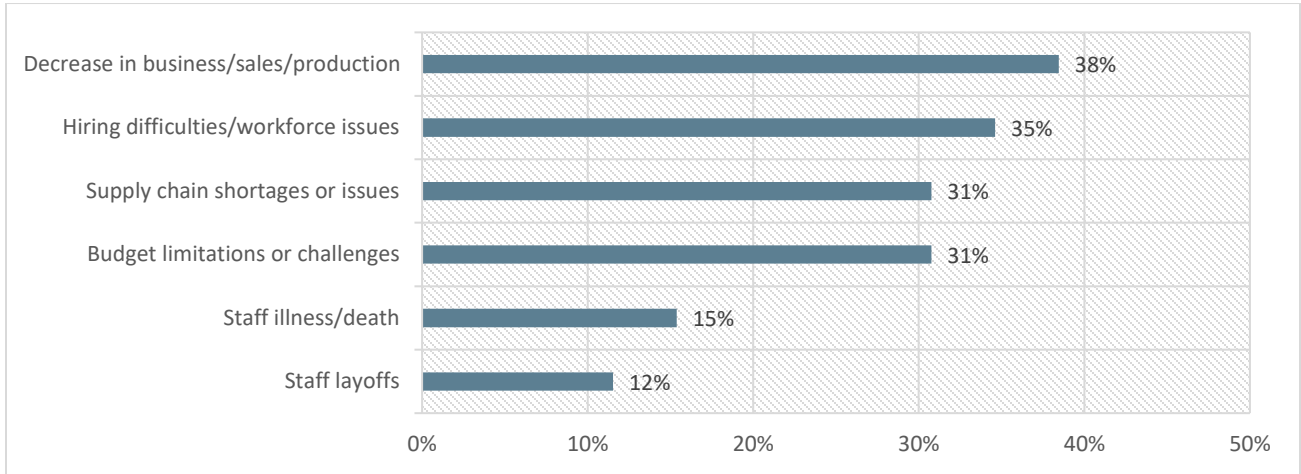


Figure 7-19 COVID-19 Related Challenges (n=26)

Program Satisfaction

Respondents were satisfied with OG&E’s program (Figure 7-20). Not only were 96% respondents satisfied or very satisfied with the overall program (n=25), but they were also satisfied or very satisfied with their experience with OG&E and/or CLEAResult, the equipment installed, and the quality of work.

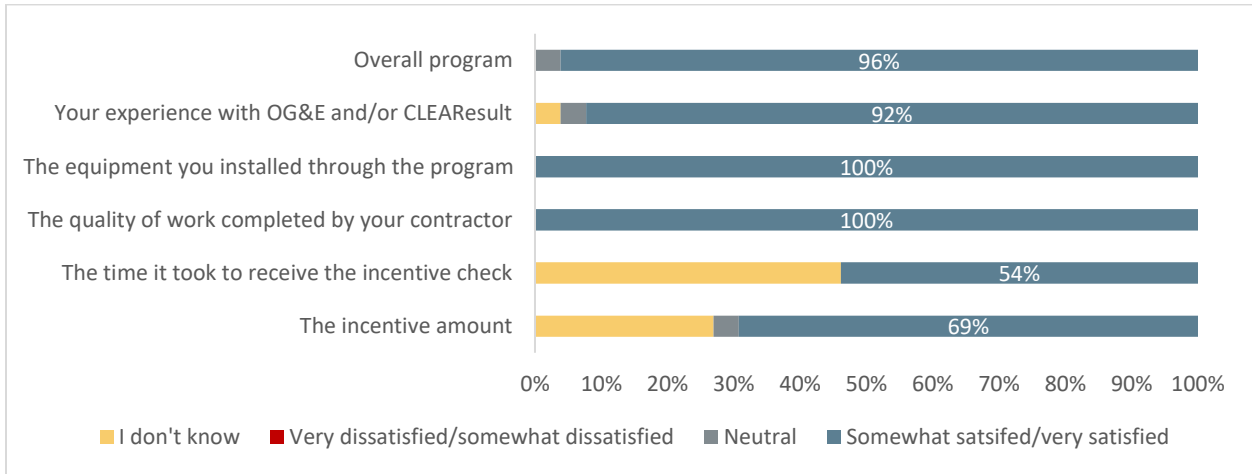


Figure 7-20 Program Satisfaction (n=26)

“They got the job done and helped me out and saved me money”

“They came and worked inside my office and around the entire place and I didn’t have to clean up after them and were not in the way at all. No time down at all.”

“Everything was smooth, and the guy was quick polite, and everything so far has helped”

All respondents were satisfied or very satisfied with OG&E as their utility service provider (n=26). Respondents recommended OG&E provide more information about the program and provide more notice when a contractor would be coming.

Firmographics

The majority of respondents indicated the facility is the company’s only location (73%) and most respondents rent their space (62%). Figure 7-21 presents facility type of the participating respondents.

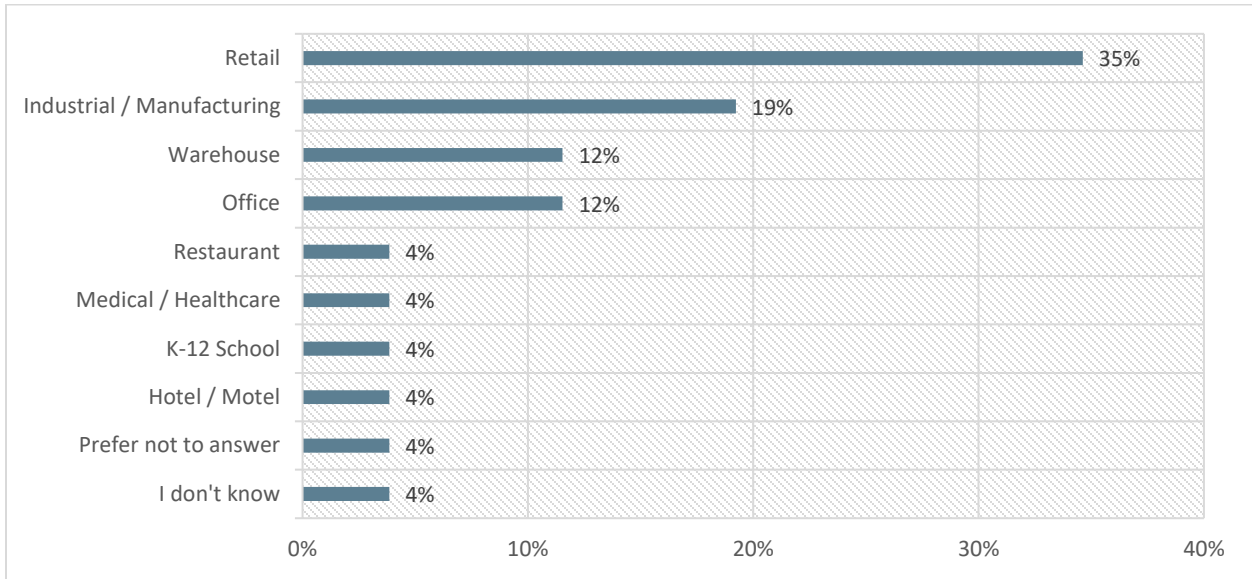


Figure 7-21 Facility Type (n=26)

7.9.2.3 OG&E Midstream Distributor Trade Ally Interviews

OG&E had four midstream distributor Trade Ally participants in 2021. Three of the four distributors agreed to participate in an interview. All three respondents were representatives of electrical distributors that provide electrical equipment and materials to the public. The average clientele varied across distributors with some working primarily with contractors and small business owners and others working primarily with industrial facilities. Distributors also indicated that some customers are residential homeowners who buy equipment over the counter but noted that these customers do not make up a large proportion of sales.

Motivation for Participating in OG&E Midstream Program

Distributors joined the midstream program as a way to attract more customers.

Most of the distributors learned about the program directly from OG&E or CLEAResult and saw the incentives as an opportunity to increase their business by lowering prices for customers. Respondents said that the OG&E midstream program does not make up a large proportion of their annual sales. They explained that the program allocates a certain amount of incentive funds at the beginning of the year and then they use those funds throughout the year for interested customers. All four distributors receive the same incentive amount at the beginning of the year; distributors can request more funds if they run out early.

Customer Engagement and Marketing

Distributors emphasized a general lack of awareness about the program among their customer-base, noting minimal advertising and marketing.

Although they try to tell their customers about the midstream program when it is applicable, most customers have not heard about the program or confuse it with some of OG&E's other rebate programs. When distributors tell eligible customers about the rebates, most customers are interested and receptive. Some customers do not engage in the program because their jobs are too large; distributors often refer these customers to OG&E's other incentive programs such as Large C&I Solutions. Other customers conflate the midstream program with other OG&E programs, like Small Business Solutions, and decline to participate due to paperwork requirements.

The distributors noted that contractors also do not promote the midstream program much when they are out in the field. Based on distributors understanding of the program, program savings are passed down to customers, and therefore contractors themselves do not receive a rebate for participating in the program. One distributor recommended including a stronger motivation for contractors to participate.

Overall, the distributors indicated that the program is not well advertised, and that participation might improve with increased marketing on the part of CLEAResult and OG&E. Respondents recommended OG&E and CLEAResult provide more posters, window decals, and other signage they can display in their distribution center to help promote the program. One

respondent also recommended including information about the program in customer’s bill inserts or other mailing materials.

Sales

Across the four distributors – including the one who was not interviewed – low and high bay lights, as well as linear LED lights were the most popular item in the midstream program.

Distributors use a variety of techniques to sell high efficiency lighting and electrical equipment including upselling, advertising, and reducing costs. All three distributors explained they promote high efficiency equipment to their customers every day and that many customers are receptive. Hesitant customers tend to be older and/or have buildings or facilities that they believe would require structural changes to allow for the high efficiency products. Two of the distributors noted that they try to ensure a healthy stock of eligible equipment in case customers express interest in the program. These two distributors have increased their stock of troffers, downlights, T8 LED lamps, LED low- and high-bay lamps and LED PAR lamps because of the program.

Although one of these distributors noted their sales did not increase as much as expected from the program, sales did still increase. This distributor also mentioned that they likely would not have promoted some of the equipment as much if not for the program. Another distributor noted that the program has greatly helped some of his smaller customers, who would otherwise not have been able to afford the equipment purchased. The third distributor could not provide specific information regarding how the program impacted or modified his overall sales. To his knowledge his company has not participated much in the program this past year; this inclination was supported by the data.

Impact of COVID-19

All three distributors cited price increases as a major impact of COVID-19 on their businesses.

While two of the distributors noted that sales have continued to be strong despite the rising prices – one distributor even went as far as to say that 2021 was one of his best years yet and that “*if anything sales have gone up*” – the third distributor noted a drop in sales, citing difficulties in meeting customers face-to-face, as well as supply chain issues and equipment delays.

Room for Improvement

All three distributors emphasized a need for more marketing and promotion.

Among the two more active participating distributors program satisfaction was high. These distributors noted that the program is simple to navigate and that the rebates help bring in additional sales. All three distributors emphasized a need for more marketing and promotion; not enough customers are aware of nor understand the midstream program and thus maximal benefit has not been achieved. One distributor also suggested increasing the fund allocations, as well as including additional measures such as T12 strip light fixtures.

7.9.2.4 Large C&I Trade Ally Interviews

The Evaluators attempted to contact three major program Trade Allies: one Schools & Government program Trade Ally and two Large C&I Trade Allies, to request an interview. Evaluators reached out via email and phone calls. None of the Trade Allies agreed to participate in an interview; one formally declined and the remaining two did not respond to recruitment attempts. The non-responding Trade Allies were contacted seven times (three emails and four phone calls).

7.9.2.5 Key Findings

Overall, the survey participants were satisfied with their experiences in the OG&E CEEP program. Here are some key takeaways from the survey.

- Many participants became aware of OG&E's Large C&I and Small Business Solutions programs through a contractor, previous experience, or an OG&E Account Representative.
- The desire to reduce maintenance costs, save money on utility bills, and save energy were strong motivating factors to participate in the Large C&I and Small Business Solutions programs.
- Large C&I and Small Business Solutions participants found the application process to participate in the program to be very clear and straightforward.
- Most participants reported a decrease in their energy bill following participation in the CEEP programs.
- Midstream Distributors emphasized a general lack of awareness about the program among their customer-base, noting minimal advertising and marketing.

- The CEEP program was a major influence on the participants decision to implement the energy efficiency measures; were it not for CEEP many of the participants would not have implemented the measures.

7.10 Deviations from the AR TRM V8.2

The following are deviations from the AR TRM V8.2.

- The AR TRM V8.2 lists the EUL for HID as 16 years and this is longer than EUL of common LED fixtures (15 years) which would result in no avoided replacement cost. The Evaluators reviewed the calculation used to derive the EUL in AR TRM V8.2 and recalculated the EUL because AR TRM V8.2 used the ballast lifetime to calculate EUL. The Evaluators used the lamp life of 15,000 hours for exterior HIDs and 18,000 hours for high/low bay HIDs, divide them by weighted average of 3,205 AOH (the same AOH used to calculate EUL from AR TRM V8.2). The resulting EUL for exterior HID was 4 years and high/low bay HID was 6 years.
- Protocols for midstream lighting measures are not available in AR TRM and conventional lighting retrofit protocols cannot be used because the incentive was provided at the point of sale without a site inspection to verify preexisting fixtures. Baselines were estimated based on a market saturation study completed by the DOE. The Evaluators reviewed the proposed approach from the implementation contractor which has been approved by IEM.

7.10.1 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 the project, and date completed.
- **Measure Specific Information** – Generally includes the type of measures installed but did not include detailed information for all projects. Most of the projects listed in the database were missing detailed information, including equipment type, equipment fuel, equipment size, and equipment efficiency. The database, in general, has the fields necessary for verification of TRM compliance, but few of the fields are populated.
- **Vendor Specific Information** – The database included a “Payee”, but did not list a contact name, nor contact information for the Contractor associated with the project, if applicable. The Payee data field could be used to determine if a third-party contractor

received the payment for the project, but no other identifying information was provided.

- **Program Tracking Information** – Generally all program tracking information was provided in the database. Incentive amounts and paid dates were both included in the database.
- **Program Costs** – While the main database used to track program progress did not include overall budgets or expenditures to date, these data were available from the Implementation Contractor or OG&E throughout the year.
- **Marketing and Outreach Activities** – Similar to program costs, these data were not tracked in the main program database used for EM&V purposes. Additional data was provided by the implementer or OG&E when requested.

7.10.2 Small Business Market Assessment

The Evaluators conducted a literature review to summarize the current state of the small business environment in Arkansas to help inform program design and delivery. This included investigation of the characteristics of small businesses in the United States and Arkansas, assessing the impacts of COVID-19 on small businesses, identifying trends in business startups and closures, assessing local resources that might explain trends, and evaluating how these findings may affect small business participation in OG&E programs.

Table 7-29 summarizes the data sources for this analysis.

Table 7-29 Sources of Primary Data Accessed

Study or Source Name	Description	Link
County Business Patterns 2019	These data are an annual series that provide county level economic data by industry.	CBP Census Data
Small Business Pulse Survey, 2020-to-date	This is a high-frequency survey, gathering data on the effect of changing business conditions during the COVID-19 pandemic on small businesses (single establishments under 500 employees).	Small Business Pulse Survey - Census
Business Formation Statistics	These data track business initiation activity at a state and regional level.	Business Formation Statistics
Retailer Sales Data	This interactive visualization allows users to understand the change in sales for retailers from 2019 to 2020.	Estimated Sales for US Retailers 19-20

7.10.3 Key Market Findings

- **After an initial decline in business applications at the start of the pandemic, there was a dramatic increase in business applications for mostly non-employer businesses.** These new businesses are primarily self- or single-employer businesses. It is unclear what is driving this; however, this means that the sharp increase in businesses does not necessarily mean a sharp increase in the customer base for SBS. This trend is consistent in Arkansas and the United States (Dinlersoz, Dunne, Haltiwanger, & Penciakova, 2021) (Crane, Decker, Flaaen, Hamins-Puertolas, & Kurz, 2021) (U.S. Census Bureau, 2021).
- **Many small businesses have been significantly impacted by increasing supply chain disruptions and most expect this to continue for at least 5 months or longer.** In a survey conducted by the NFIB on small businesses and their impacts during COVID-19, 48% of businesses reported that they experienced significant impacts to their business from supply chain disruptions (NFIB Research Center, 2021). 34% of businesses reported moderate impacts from supply chain disruptions. Over half (62%) reported that these disruptions are worse than they were three months ago. Most (90%) anticipate that these disruptions will continue to affect their business for at least five months or longer. According to a 2020 Business Dynamics Survey by the Bureau of Labor Statistics, 36% of businesses experienced supply shortages and 11% of businesses experienced challenges in transporting goods due to the pandemic.
- **Most small business owners are responding to staffing shortages by working more themselves. 48% of small businesses reported significant or moderate staffing shortages.** This has led to a significant or moderate loss of sales for 51% of those businesses. In response, 91% of business owners are working more hours themselves to make up for this shortage (NFIB Research Center, 2021). This means that small business owners have less time available to consider applying for and participating in energy efficiency programs, or prioritizing upgrades or projects to their building.
- **An analysis of alternative indicators suggests that business closure nationwide during the pandemic was most common in small businesses and in the leisure and hospitality sector.** A study by the Federal Reserve Board on business exit during the COVID-19 pandemic used alternative measures like ADP (a payroll processing service), WOMPLY (credit card transaction processor), and Homebase (clocking in/out software) to track business trends. This showed that the leisure and hospitality sector has the greatest amount of establishments that closed. (Crane, Decker, Flaaen, Hamins-Puertolas, & Kurz, 2021)
- **The top business types of small businesses' in OG&E's territory are retail, healthcare, scientific/technical services, accommodation/food services, and construction.** Over

half of small businesses in OG&E’s territory have five or fewer employees. As shown in the data summaries below, the retail section especially had relatively disparate outcomes in terms of effects on sales during 2020, with some retailers doing better and others doing worse.

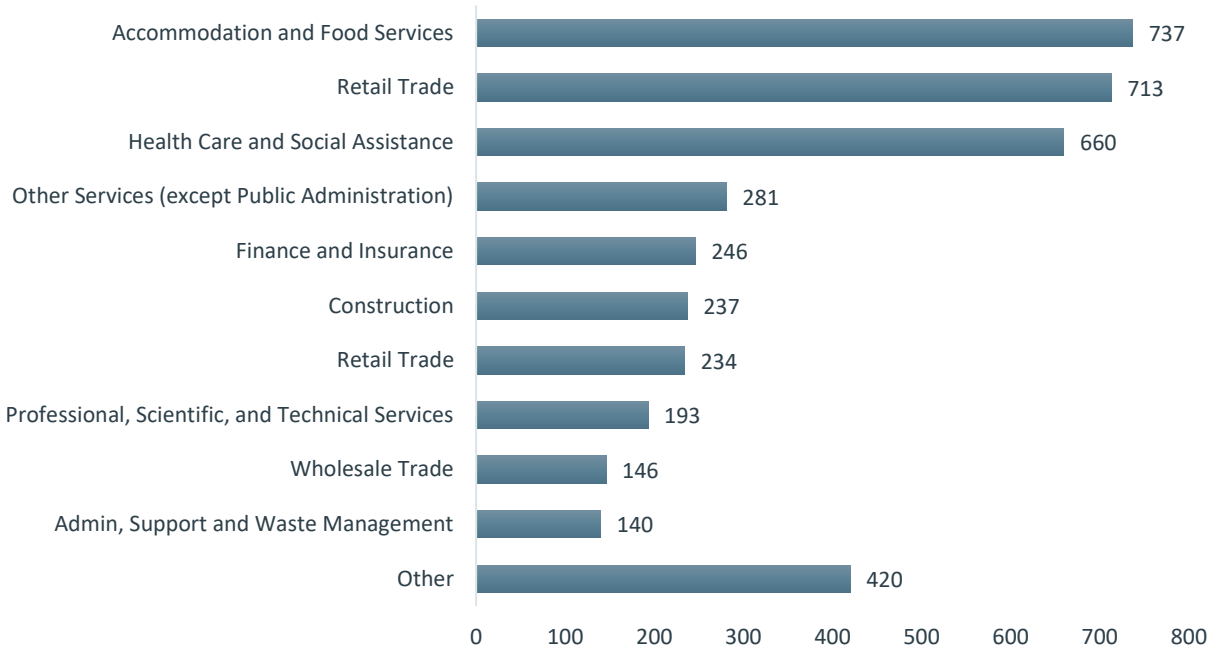
7.10.4 Summary of Census Data

7.10.4.1 County Business Patterns

The evaluators reviewed an overarching summary of business patterns and statistics using the County Business Patterns dataset from the U.S. Census Bureau. The most recent version of these data are from 2019, providing a baseline understanding of businesses in Arkansas prior to the COVID-19 pandemic. It should be noted that the Evaluators had hoped to compare 2019 data to 2020 data, but these data will now not be released until late spring of 2022. The Evaluators found additional sources of recent data on small businesses (discussed more below), but it may be useful to conduct an additional comparison of 2019 to 2020 County Business Pattern data once those are made public to understand if there have been major shifts in the makeup of small businesses in OG&E’s territory.

To summarize these data, the Evaluators selected data for the state of Arkansas and only included Sebastian, Franklin, and Crawford counties. For the purposes of this summary, “small businesses” is defined as fewer than 50 employees, and “microbusinesses” as five or fewer employees. The data visualizations below summarize the concentration of small or microbusinesses both geographically and across the ten top NAICS code groupings.

Small Businesses by NAICS Code (5-50 Employees)



Microbusinesses by NAICS Code (<5 Employees)



Figure 7-22 Summary of Small & Microbusinesses – Sebastian, Crawford, & Franklin County

7.10.4.2 U.S. Census - Small Business Pulse Survey

Most notably, the U.S. Census Bureau has been conducting a pulse survey of small businesses (single-location businesses with fewer than 500 employees) across the country every few weeks from April 2020 until present (and continuing into the future). This survey gathered information on a suite of questions relating to the impact of the COVID-19 pandemic on small businesses, including employee illness, vaccination, hiring challenges, and supply chain disruption on small business operations and outlooks. This survey also gathered information on small businesses’ perspectives on economic outlooks and upcoming challenges. These data are able to be tracked over time to identify trends. In the charts and graphs following, the Evaluators limited the data to just Arkansas businesses to hone in on their experiences, and compared businesses’ responses from October of 2020 to those from October of 2021 to identify any changes.

The following graph (pulled directly from the Small Business Pulse Survey data visualization tool) shows small businesses’ perspectives on how much the COVID-19 pandemic has affected their business, if at all, just for those in the state of Arkansas. Notably, the majority of small businesses in Arkansas say it has affected their business negatively, and this has not changed much from October 2020 to October 2021.

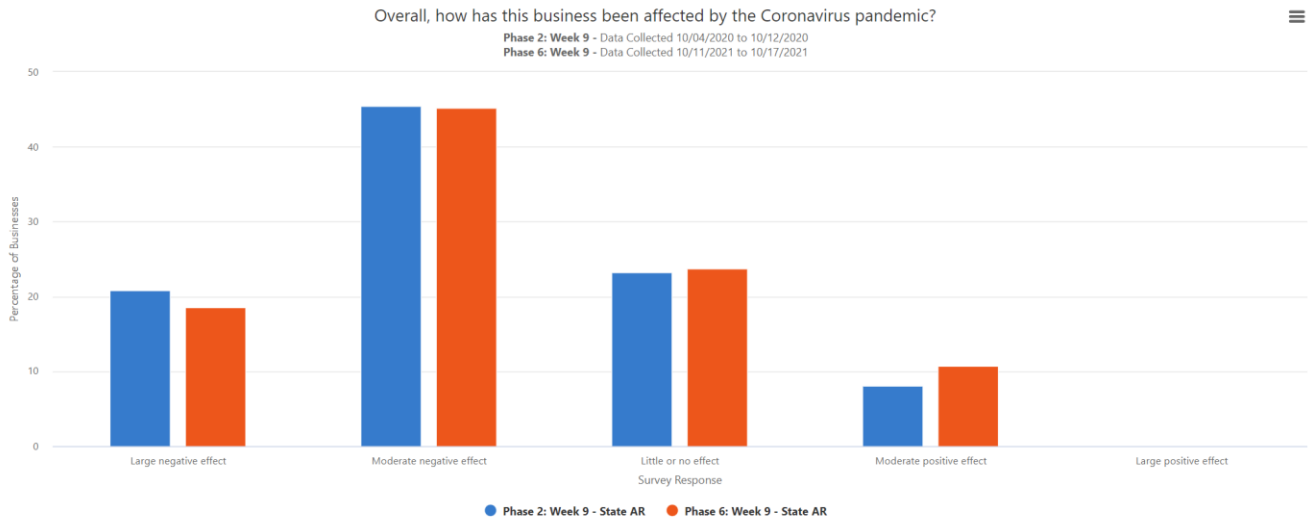


Figure 7-23 Overall Effect of Pandemic

The below graph (pulled from the Small Business Pulse Survey data visualization tool) shows the differences over time of business priorities. It highlights that in fall of 2020 slightly more small businesses were concerned with their economic outlook/needing to obtain additional capital, while in fall of 2021 considerably more small businesses were concerned with supply chain or hiring/staffing challenges. This aligns with results from the NFIB study, described more below.

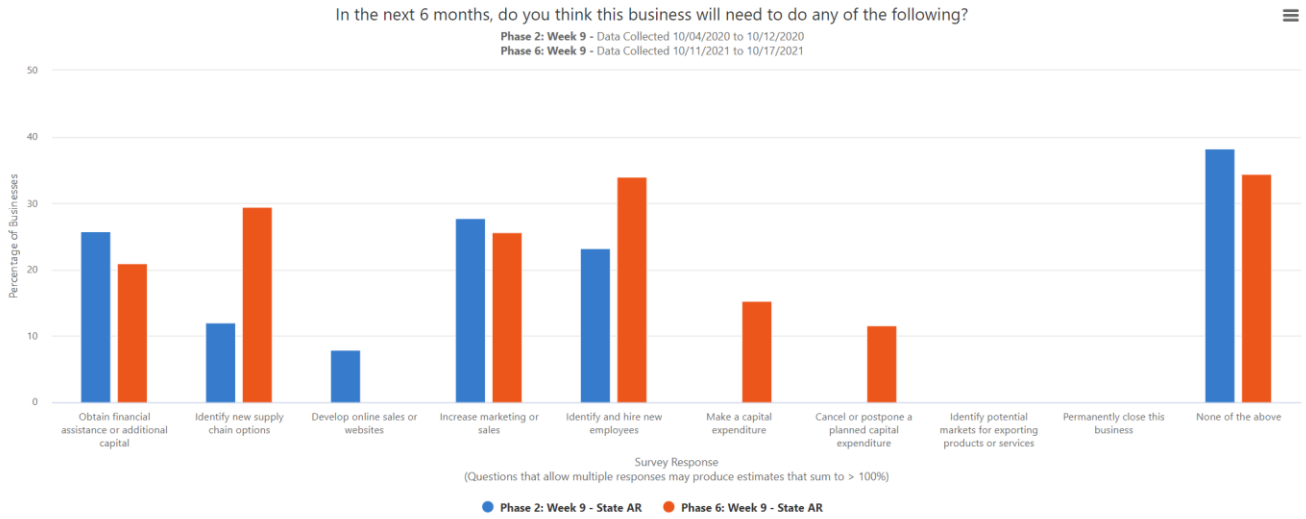


Figure 7-24 Next Steps for Small Businesses

Small businesses were also asked their perspectives on future outlooks for their business; when it would return to “normal.” In October of 2020, small businesses in Arkansas were slightly more optimistic that their business would return to normal in a relatively short amount of time; however, by October 2021 the number of businesses who said that they felt it would be a longer time before their business returned to normal, or that it would never return to normal, increased. A proportion of businesses said their business had already returned to normal, and this number increased from 2020 to 2021.

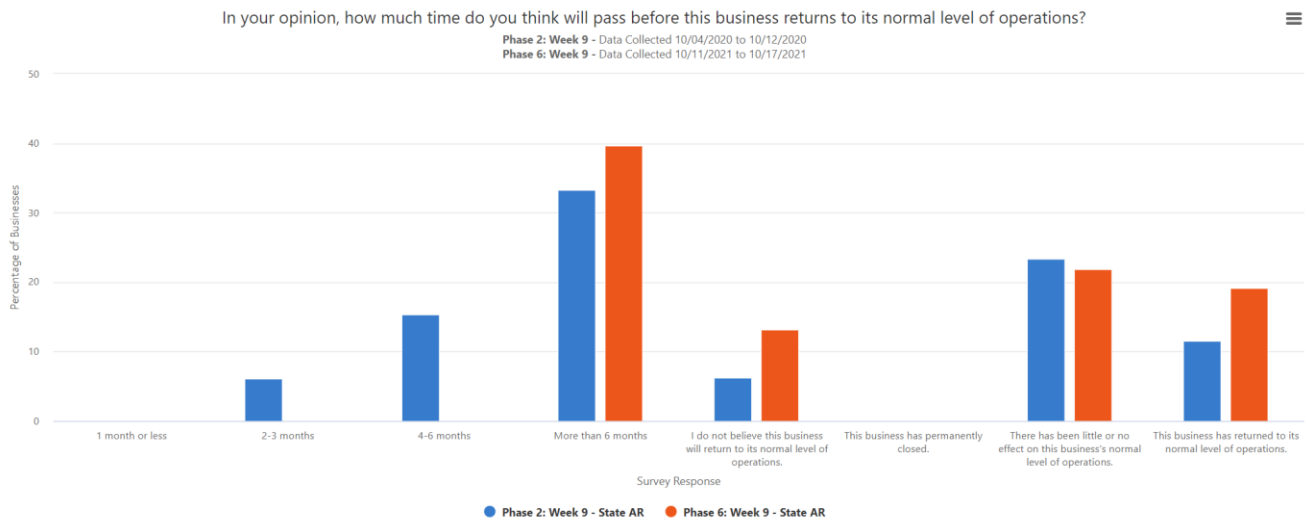


Figure 7-25 Perspectives on When Business Will Return to Normal

7.10.4.3 Business Formation/Application Data

As another means of assessing the state of the economy and small business environment, the Evaluators examined business formation data from the U.S. Census. The below graphic (pulled from a summary on the Census website) shows the number of business applications across the last 16 years. Notably – while business applications decreased in the early months of the pandemic, they rose sharply later in 2020 and continued to maintain a high rate into 2021. However, the rate of applications from businesses that have planned wages only increased a small amount. This is discussed more in an additional data source below; however, this indicates that the majority of new businesses starting since the beginning of the pandemic are single-owner entities which may be much less likely to have a storefront or office. This may indicate that while business applications increased, the majority may be in businesses that are not eligible for OG&E C&I energy efficiency programs.

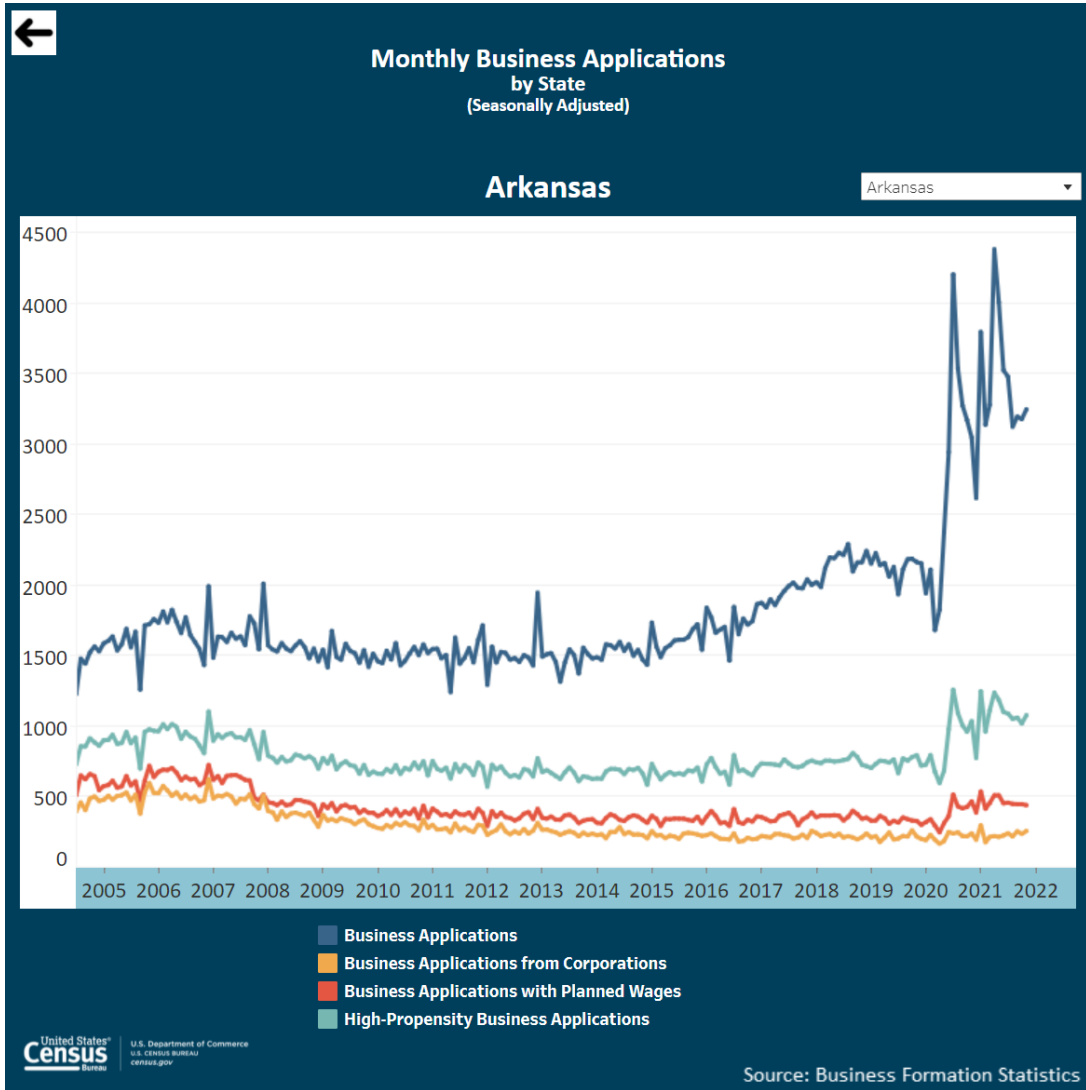


Figure 7-26 Monthly Business Applications - Arkansas

7.10.4.4 Retail Sales Data

Finally, the Evaluators also reviewed Census data for information on trends relating to sales pre-pandemic and during the pandemic. The U.S. Census gathers data for the retail sector, specifically via their Annual Retail Trade Survey. The graphic below, pulled directly from the U.S. Census website, highlights growth or declining trends in terms of sales from 2019 compared to 2020 for retail businesses nationwide. Since the largest category of small businesses in Arkansas’s territory falls into “retail trade,” this information may be helpful to understand context around which specific types of businesses struggled in 2020 (and potential further on). Stores that sold electronics and appliances, clothing or accessories, and gas stations struggled

the most in terms of reduces sales in 2020. It is unclear how much these trends have continued or reversed in 2021 and 2022 to-date, as well as how other challenges such as supply chain and hiring issues may compound them.



Figure 7-27 Change in Sales 2019 to 2020 – US Retailer by Category

7.10.5 Progress on PY2020 Evaluation Recommendations

OG&E responded to the Evaluators’ PY2020 recommendations. The status of these recommendations is summarized in Table 7-30.

Table 7-30 Status of Recommendations from PY2020 Evaluation

PY2020 Recommendations	Status	Comment
<p>In PY2020, commercial screw-in LED bulbs are subject to tier savings as the EISA baseline of CFL must be applied in lifetime savings. The existing project tracking database contains the row to keep track of both measure and baseline lighting fixture types but does not have columns for wattage. Please include measure and baseline fixture types and wattage in the tracking database for all channels in the PY2020.</p>	<p>Adopted</p>	<p>This recommendation has been implemented.</p>
<p>New construction lighting (to account for unintended inclusion of non-project costs); replacement of HVAC and compressed air systems (to align cost basis with savings basis, i.e., normal versus early replacement); and multi-phase projects (aligning costs to specific project outcomes for large facilities with phased retrofits).</p>	<p>In progress</p>	<p>Continuation of recommendation from PY2019 – adoption is ongoing.</p>
<p>The tracking database has informative columns that the evaluators can utilize if they are filled for all projects, if applicable. Items such as building type, annual operating hours, heating/cooling type, and quantities. In PY2020, three channels, Large C&I, SAGE, and Midstream channels had numerous projects with missing and or severely simplified reporting on the tracking database.</p>	<p>Adopted</p>	<p>Building type, annual operating hours, heating/cooling type, and quantities columns are populated in the 2021 data sets for most channels. Midstream's data set is also pulling in more information in 2020 and 2021 than in previous year's systems.</p>
<p>During the program year the implementer will reach out to the evaluator with large kWh savings projects to have them go through a pre-review process. Often the project name during the pre-review process is different than the project name that is submitted with the ex-ante claim (facility name vs. installing contractor name). The inconsistency in project names can cause confusion between implementers and evaluators. The evaluators recommend being more consistent in project naming.</p>	<p>In progress</p>	<p>CLEAResult has indicated that they will endeavor to maintain consistent project naming.</p>
<p>Often when a non-prescriptive project or non-lighting project is reported, all that is listed in the tracking database for efficient measure is "Custom". The evaluator recommends reporting the efficient measure description for all measures and projects.</p>	<p>In progress</p>	<p>This is being addressed as part of the transition to the new tracking system (DSMT)</p>

7.10.6 Planned Program Changes

There are no significant changes for this program for PY2022.

7.11 Conclusions

<p>Staff are actively engaged with participating Trade Allies</p>	<p>OG&E staff have regular daily interactions with Trade Allies to answer questions and provide training. CLEARResult staff has regular one-on-one communications with Trade Allies about submitted projects. Information about program changes is generally provided to Trade Allies through the project review process.</p>
<p>Continuous Energy Improvement and Retrocommissioning have significantly increased their contribution to program-level savings</p>	<p>In PY2020, CEI and RCx totaled 245,803 gross kWh savings (less than 1% of total CEEP gross kWh). In PY2021, this has increased to 1,151,862 gross kWh (11% of total CEEP gross kWh). This is a significant and meaningful increase in CEEP savings, and this will be of increasing importance should commercial lighting savings potential decline due to saturation or advancing codes and standards.</p>
<p>Small Business Solutions significantly surpassed performance expectations</p>	<p>Prior to PY2021, OG&E and CLEARResult staff indicated concern for the performance of SBS as the small business sector had been significantly impacted by COVID-19 and the associated economic downturn. However, SBS outperformed expectations, with gross kWh increasing by 42% compared to PY2020 (constituting 12% of CEEP savings, compared to 9% in PY2020).</p>
<p>Midstream distributors are satisfied with the program, but stated that they believe the program would benefit from broader promotion</p>	<p>Although Midstream participating lighting distributors were satisfied with the program and its benefits, they reported a general lack of awareness of the program across their customer base. Distributors stated that their sales in the program would increase if the program was more broadly promoted so that customers were aware of this option prior to engaging with the distributor.</p>
<p>The COVID-19 pandemic has impacted small businesses across the country and in Arkansas significantly</p>	<p>As reported in the Census data analysis, many small business owners are working more hours and struggling with major challenges like supply chain issues, employee illness, and hiring challenges. For small businesses that lack a dedicated facility manager or sustainability team, capital projects and/or energy efficiency improvements may have been deprioritized as the pandemic has continued and new and more pressing challenges continue to arise.</p>

7.12 Recommendations

Enforce greater consistency in tracking data across program channels	In PY2021, how efficient measures were reported in the tracking data changed for SBS but for none of the other channels. The new efficient measure listings for SBS are not consistent with the other channels which makes assigning measure categories more difficult and less accurate for the final program evaluation. SBS now reports fixture model numbers, rather than the traditional format (i.e., LED014-FIXT).
Improve facility designations for prescriptive lighting	Consistent with past years, the greatest cause of discrepancies in <i>ex ante</i> and <i>ex post</i> savings on prescriptive lighting projects is incorrect facility type identification, particularly in the SBS channel.
Small Business Solutions Measure Cost Reporting	The SBS tracking data does not list out specific measure costs associated with the reported efficient equipment and count. Currently it lists out the total project cost. Listing out the total project precludes the passivity of an incremental cost audit – when this activity was performed for Large C&I Solutions in prior program years, the Evaluators often found areas of significant cost reductions (typically associated with misalignment of savings basis and cost basis).
Small Business Marketing & Messaging	Consider including marketing messages to small businesses about how SBS can reduce their stress or concerns on their plate, reduce operating costs, etc. and messages should also highlight the ease of turnkey services. Some businesses may have deprioritized upgrades and may need to be convinced that upgrading their equipment will contribute to improving other, more pressing challenges.

Appendix A. Portfolio Cost-Effectiveness

Overview

The Evaluators estimated the cost-effectiveness for the overall energy efficiency and demand response portfolio of programs, based on PY2021 costs and savings estimates provided by OG&E and their third-party implementers, AM Conservation and CLEAResult. This appendix provides the cost-effectiveness results, as well as a brief overview of the approach taken by the Evaluators. The portfolio and energy efficiency programs pass all the cost-effectiveness tests except the RIM test. The table below presents the cost-effectiveness results for the PY2021 portfolio.

Table A-1 PY2021 Cost-effectiveness Results

Program	TRC	UCT	RIM	PCT	TRC Net Benefits
HEEP	4.34	3.27	0.55	12.51	\$ 3,048,555
CWA	3.19	2.03	0.56	9.53	\$ 2,674,135
CEEP	3.02	3.16	0.54	7.90	\$ 9,388,080
EEA	0.00	0.00	0.00	0.00	\$ (5,204)
Total	3.22	2.96	0.54	8.69	\$ 15,105,567

Approach

The California Standard Practice Model was used as a guideline for the calculations, along with guidance from the AR TRM V8.2. The cost-effectiveness analysis methods that were used in this analysis are among the set of standard methods used in this industry and include the Utility Cost Test (UCT)⁴⁹, 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 (CSPM).

The 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.

⁴⁹ The UCT is also referred to as the Program Administrator Cost Test (PACT).

The 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 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 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 would 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 the table below.⁵⁰

⁵⁰<http://www.epa.gov/cleanenergy/documents/suca/cost-effectiveness.pdf>

Table A-2 Questions Addressed by the Various Cost Tests

Cost Test	Questions Addressed
Participant Cost Test (PCT)	<ul style="list-style-type: none"> ■ Is it worth it to the customer to install energy efficiency?
	<ul style="list-style-type: none"> ■ Is it likely that the customer wants to participate in a utility program that promotes energy efficiency?
Ratepayer Impact Measure (RIM)	<ul style="list-style-type: none"> ■ What is the impact of the energy efficiency project on the utility's operating margin?
	<ul style="list-style-type: none"> ■ Would the project require an increase in rates to reach the same operating margin?
Utility Cost Test (UCT)	<ul style="list-style-type: none"> ■ Do total utility costs increase or decrease?
	<ul style="list-style-type: none"> ■ What is the change in total customer bills required to keep the utility whole?
Total Resource Cost Test (TRC)	<ul style="list-style-type: none"> ■ What is the regional benefit of the energy efficiency project (including the net costs and benefits to the utility and its customers)?
	<ul style="list-style-type: none"> ■ Are all of the benefits greater than all of the costs (regardless of who pays the costs and who receives the benefits)?
	<ul style="list-style-type: none"> ■ Is more or less money required by the region to pay for energy needs?

Overall, the results of all four cost-effectiveness tests provide a more comprehensive picture than the use of any one test alone. The TRC cost test addresses 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 the table below.⁵¹

⁵¹ Ibid.

Table A-3 Benefits and Costs Included in each Cost-Effectiveness Test

Test	Benefits	Costs
PCT (Benefits and costs from the perspective of the customer installing the measure)	<ul style="list-style-type: none"> ■ Incentive payments ■ Bill Savings ■ Applicable tax credits or incentives 	<ul style="list-style-type: none"> ■ Incremental equipment costs ■ Incremental installation costs
UCT (Perspective of utility, government agency, or third party implementing the program)	<ul style="list-style-type: none"> ■ Energy-related costs avoided by the utility ■ Capacity-related costs avoided by the utility, including generation, transmission, and distribution 	<ul style="list-style-type: none"> ■ Program overhead costs ■ Utility/program administrator incentive costs
TRC (Benefits and costs from the perspective of all utility customers in the utility service territory)	<ul style="list-style-type: none"> ■ Energy-related costs avoided by the utility ■ Capacity-related costs avoided by the utility, including generation, transmission, and distribution ■ Additional resource savings ■ Monetized non-energy benefits as outlined by the TRM version 8.0 	<ul style="list-style-type: none"> ■ Program overhead costs ■ Program installation costs ■ Incremental measure costs
RIM (Impact of efficiency measure on non-participating ratepayers overall)	<ul style="list-style-type: none"> ■ Energy-related costs avoided by the utility ■ Capacity-related costs avoided by the utility, including generation, transmission, and distribution 	<ul style="list-style-type: none"> ■ Program overhead costs ■ Lost revenue due to reduced energy bills ■ Utility/program administrator installation costs

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 V8.2. 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.⁵²

“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:

- o benefits of electricity, natural gas, and propane energy savings (i.e., other fuels);*
- o benefits of public water and wastewater savings; and*
- o 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 in 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
- 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 PY2021.

- **HEEP:** this program captured propane (LivingWise® Schools Outreach), natural gas (Residential Solutions, Consumer Products and LivingWise® Schools Outreach), water (Residential Solutions and LivingWise® Schools Outreach) and ARCs (Residential Solutions and Consumer Products).
- **CWA:** this program captured natural gas, propane, water and ARCs.
- **CEEP:** this program captured natural gas (C&I Solutions, SAGE, Midstream and Small Business Solutions) and ARCs (C&I Solutions, SAGE, Midstream and Small Business Solutions).

Methodologies and measure-level results for each NEB are found in each of the program chapters within this report.

⁵² Arkansas TRM version 8.2, Protocol L.

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.

Marginal line losses, provided by OG&E, were utilized in the PY2021 evaluation.

The rates utilized for avoided water and avoided propane use were from Protocol L in the Arkansas TRM V8.2.

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 PY2021 Plan. The Weighted Average Cost of Capital (WACC) was utilized for the TRC, UCT and RIM tests.

Table A-4 outlines the economic inputs used in the cost benefit analysis.

Table A-4 PY2021 Economic Inputs for Cost Effectiveness Analysis

Discount Rates	
Utility (TRC)	5.42%
Utility (UCT)	5.42%
Utility (RIM)	5.42%
Societal (SCT)	1.29%
Participant (PCT)	6.04%
Marginal Line Losses	
Line Losses (demand)	7.83%
Line Losses (energy)	7.25%
Line Losses (therm)	2.67%
Escalation rate	2.20%
Avoided Costs	
Avoided Energy (\$/kWh)	\$ 0.03
Avoided Demand (\$/kW)	\$ 95
Avoided Natural Gas (\$/therm)	\$ 0.517
Avoided Water (\$/gallon)	\$ 0.008
Avoided Propane (\$/gallon)	\$ 2.38

Results

The tables below outline the results for each test, for both the programs and the portfolio as a whole. Summations may differ due to rounding.

Table A-5 PY2021 Cost-Effectiveness Results by Program

Program	TRC	UCT	RIM	PCT
HEEP	4.34	3.27	0.55	12.51
CWA	3.19	2.03	0.56	9.53
CEEP	3.02	3.16	0.54	7.90
EEA	0.00	0.00	0.00	0.00
Total	3.22	2.96	0.54	8.69

Table A-6 PY2021 Cost-Effectiveness Benefits by Program

Program	TRC Benefits	UCT Benefits	RIM Benefits	PCT Benefits
HEEP	\$ 3,960,390	\$ 3,093,095	\$ 3,093,095	\$ 5,905,993
CWA	\$ 3,896,594	\$ 2,505,587	\$ 2,505,587	\$ 5,035,003
CEEP	\$ 14,038,682	\$ 13,551,717	\$ 13,551,717	\$ 22,682,997
EEA	\$ -	\$ -	\$ -	\$ -
Total	\$ 21,895,666	\$ 19,150,398	\$ 19,150,398	\$ 33,623,993

Table A-7 PY2021 Cost-Effectiveness Costs by Program

Program	TRC Costs	UCT Costs	RIM Costs	PCT Costs
HEEP	\$ 911,835	\$ 946,912	\$ 5,623,525	\$ 471,965
CWA	\$ 1,222,459	\$ 1,237,306	\$ 4,469,889	\$ 528,330
CEEP	\$ 4,650,602	\$ 4,291,068	\$ 25,228,794	\$ 2,870,910
EEA	\$ 5,204	\$ 5,204	\$ 5,204	\$ -
Total	\$ 6,790,099	\$ 6,480,491	\$ 35,327,411	\$ 3,871,205

Table A-8 PY2021 Cost-Effectiveness Net Benefits by Program

Program	TRC Net Benefits	UCT Net Benefits	RIM Net Benefits	PCT Net Benefits
HEEP	\$ 3,048,555	\$ 2,146,182	\$ (2,530,430)	\$ 5,434,027
CWA	\$ 2,674,135	\$ 1,268,280	\$ (1,964,303)	\$ 4,506,673
CEEP	\$ 9,388,080	\$ 9,260,648	\$ (11,677,077)	\$ 19,812,088
EEA	\$ (5,204)	\$ (5,204)	\$ (5,204)	\$ -
Total	\$ 15,105,567	\$ 12,669,908	\$ (16,177,013)	\$ 29,752,788

Appendix B. CEEP Custom Project Site Reports

ADM Site Report: EA-0000399992

Executive Summary

This facility is a manufacturing facility which constructed a new building and installed multiple VFDs to control fans on production equipment. The project had a verified annual energy savings of 3,905,492 kWh and a peak demand savings of 465 kW resulting in realization rates of 95% and 97% respectively.

Project Description

This project includes six process related fans at the facility:

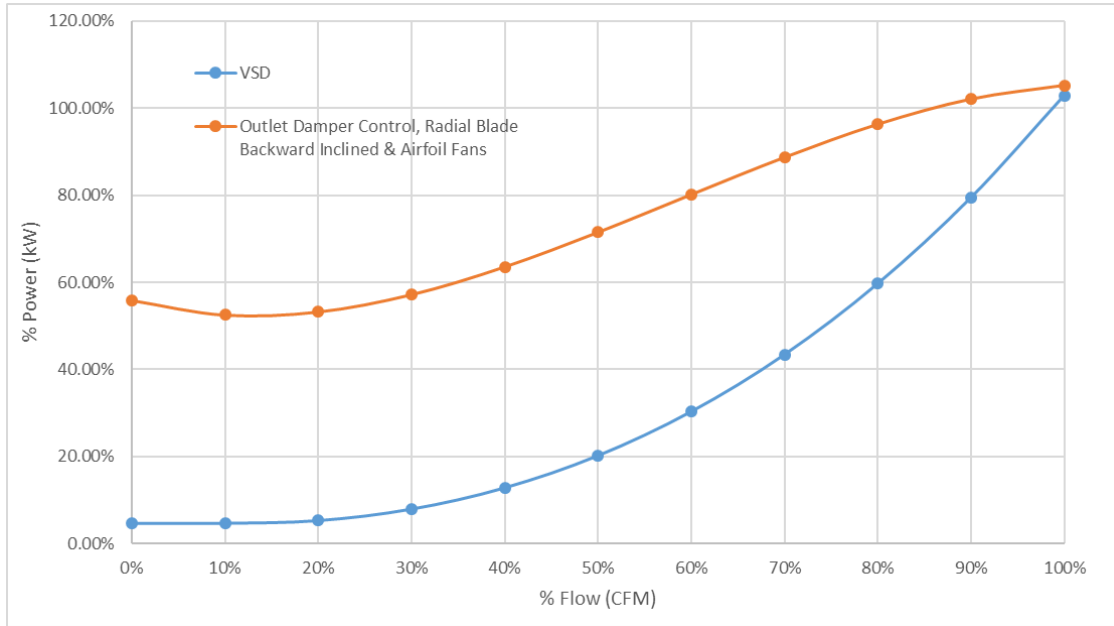
- (4) 125 HP Fans
- (5) 100 HP Fans
- (2) 60 HP Fans
- (1) 50 HP Fan
- (4) 40 HP Fans
- (4) 20 HP Fans
- (2) 2 HP Fans

Measurement and Verification Effort

ADM performed a desk review to evaluate the project based on trended data. The implementer provided 14 days of post-installation trend data. The facility is new construction, so the baseline for this project is assumed to be typical industrial baseline practices which is to use outlet dampers on the fan to control flow. ADM assumed the facility operates steadily throughout the year and the trended data was extrapolated to the entire year. The trended data showed nearly continuous operation and the facility claimed to shut down the facility for 12 hours on every 3rd Thursday.

ADM used a default fan curve method according to the Uniform Methods Project to calculate energy savings from this project in addition to trended data from the facility. This would qualify as IMPVP option A, partial measure retrofit isolation. Both the as-built and baseline fan curves are shown in the figure below.

Baseline and As-Built Fan Curves



The following table shows the average percent flow, baseline kW, and as-built kW over 2 weeks of the post-installation monitoring period.

Average Flow and Power Consumption During the Monitoring Period

Measure Equipment	% Flow	Baseline kW	As-Built kW
2 HP Fan	32%	0.89	0.87
2 HP Fan	37%	0.89	0.85
20 HP Fan	66%	12.81	7.07
20 HP Fan	61%	12.28	7.02
20 HP Fan	62%	12.22	6.99
20 HP Fan	58%	11.25	6.46
40 HP Fan	63%	23.56	13.79
40 HP Fan	36%	17.40	14.03
40 HP Fan	35%	17.19	14.05
40 HP Fan	35%	17.21	14.06
50 HP Fan	95%	36.84	6.57
60 HP Fan	45%	28.60	25.68
60 HP Fan	76%	40.15	18.32
100 HP Fan	38%	28.30	25.92
100 HP Fan	74%	65.10	30.70
100 HP Fan	73%	64.55	31.18
100 HP Fan	66%	60.19	32.21
100 HP Fan	30%	41.51	40.00
125 HP Fan	78%	83.87	37.24
125 HP Fan	64%	73.88	40.08
125 HP Fan	55%	67.30	51.06
125 HP Fan	59%	70.14	

The following equations were used to calculate the annual energy savings from the retrofit:

$$kWh_{Savings} = \frac{\sum_{hour} [kW_{hour}]_{pre} - [kW_{hour}]_{post}}{Hr} \times AOH$$

$$kW_{Savings} = \overline{kW}_{pre} - \overline{kW}_{post}$$

Where:

- $kWh_{savings}$ = Annual energy savings
- $kW_{savings}$ = Peak energy demand reduction
- kW_{hour} = Fan energy demand at hours of the week
- Hr = The total number of monitored hours
- AOH = Annual operating hours based on monitoring data, the table below

\overline{kW} = The average energy demand during monitoring pperiod
pre = Denotes pre-installation state
post = Denotes post-installation state

The following table shows AOH of each fan based on monitoring data, accounting for 12 hours of downtime on every 3rd Thursday of the month, average savings per hour, and annual savings for each unit.

Annual Savings per Unit

Measure Equipment	AOH	Average Savings (kW)	Annual Savings (kWh)
2 HP Fan	8,616	0.87	7,512.68
2 HP Fan	8,616	0.85	7,328.43
20 HP Fan	8,580	7.07	60,656.77
20 HP Fan	8,580	7.02	60,269.43
20 HP Fan	8,580	6.99	59,973.58
20 HP Fan	8,580	6.46	55,384.42
40 HP Fan	8,508	13.79	117,298.29
40 HP Fan	8,513	14.03	119,432.19
40 HP Fan	8,513	14.05	119,574.62
40 HP Fan	8,513	14.06	119,734.32
50 HP Fan	8,471	6.57	55,676.43
60 HP Fan	8,498	25.68	218,248.43
60 HP Fan	8,472	18.32	97,327.75
100 HP Fan	8,454	25.92	219,170.85
100 HP Fan	8,502	30.70	261,013.68
100 HP Fan	8,457	31.18	263,730.46
100 HP Fan	8,456	32.21	272,413.39
100 HP Fan	8,543	40.00	341,679.53
125 HP Fan	8,518	37.24	317,176.02
125 HP Fan	8,616	40.08	345,364.28
125 HP Fan	8,616	51.06	439,900.88
125 HP Fan	8,510	40.73	346,625.80
TOTAL		464.89	3,905,492.24

Results

The calculated ex post savings for this project is shown in the summary table below.

Verified Gross Savings/Realization Rates

SUMMARY			
Metric	Ex-Ante	Ex-Post	Realization Rate:
Coincident Peak kW:	477.47	464.89	97%
Annual kWh:	4,128,829	3,905,492	95%

The kWh realization rate for the project is 95% and the peak coincidence kW realization rate is 97%.

The ex-post savings have a lower realization rate due to ADM's method of calculating the AOH for the fan motors and the Uniform Methods Project Fan Curves which differed from the fan curves used by the implementer.

ADM Site Report: EA-0000583556

Executive Summary

This facility is a new construction horticulture grow facility that installed efficient LED grow lights in their facility. The space has standard cooling and gas heating throughout the facility. The kWh realization rate for this project is 84% and the peak coincidence kW realization rate is 82%.

Project Description

This project consisted of the installation of the following fixtures:

- (840) 1000W LED Grow Lights
- (274) 420W LED Grow Lights
- (160) 18W LED Propagation lights

Measurement and Verification Effort

ADM performed a site visit to verify the installation of lighting fixtures. During the site visit the fixture quantity, fixture model number, and space conditioning were verified. Savings for this project are calculated using an ADM methodology drafted for New Construction Horticultural LED Lighting. Energy savings are determined by using the PPF of the baseline and LED technologies to determine the number of baseline fixtures necessary to produce an equivalent amount of PPF as the efficient condition. Baseline quantity is determined with the following equation:

$$Qty_{Base,i} = \left(\frac{Qty_{As-Built} \times PPF_{As-Built}}{PPF_{Base}} \right)_i$$

Where,

i denotes the *i*th portion involved in the lighting project. For M&V purposes, a project is broken down into *i* distinct portions, with the portion generally defined by separate hours of use, separate spaces, or separate fixture types.

Qty_{Base} is the quantity of baseline fixtures necessary to generate the same amount of PPF as the as-built condition.

Qty_{Efficient} is the quantity of LED fixtures to be installed in a grow room for a growth stage.

PPF_{Base} is the PPF of the baseline technology as determine from Table 1.

PPF_{Efficient} is the PPF of the LED technology as published on the fixture's cutsheet or by the DLC.

Once the baseline quantity has been determined, savings are calculated using a similar equation to what would be used for a standard lighting application:

$$Savings(kWh) = \sum_{i=1}^{All\ Portions} \left((kW_{Base} \times hours_{Base}) - (kW_{Efficient} \times hours_{Efficient}) \right)_i \times (1 + WHF_{kWh,i})$$

Demand Reduction (kW)

$$= \sum_{i=1}^{All\ Portions} \left((kW_{Base} - kW_{Efficient}) \times CF_{Base} + (kW_{Efficient} \times CF_{Efficient}) \right)_i \times (1 + WHF_{kW,i})$$

Where,

i denotes the *i*th portion involved in the lighting project. For M&V purposes, a project is broken down into *i* distinct portions, with the portion in this project defined as each room type. All parameters defined below may take on separate values for each of the *i* portions of the project

kW_{Efficient} is the total connected lighting load in the efficient case. This is the product of the quantity of efficient fixtures, and the per-fixture alternating current wattage.

kW_{Base} is the total connected lighting load in the base case. This is the product of the quantity of baseline fixtures determined in the equation above.

hours_{Base} is the total annual full load hours of operation for the given fixture group in the base case. The hours of use are to account for the control type (e.g., dimming capabilities of the baseline).

hours_{Efficient} is the total annual full load hours of operation for the given fixture group in the efficient or “as-built” case. The hours of use are to account for the control type (e.g., dimming schedules of the installed equipment).

WHF_{kWh} is the average annual heating and cooling interactive effect for the space. If the total wattage inside a space is reduced by X watts, then the cooling system would have a lower cooling load (some fraction of X watts) as a result. Likewise, due to the reduction of “waste heat” of X watts, the heating system will have to work harder (again, by some fraction of X watts) to maintain the desired space temperature. *WHF_{kWh}* values vary by crop type.

Baseline Technology and Corresponding Typical Metrics Based on Growth Stage

Growth Stage	Baseline Technology	PPF ($\mu\text{mol/s}$)	Wattage (Watts/fixture)	Photoperiod (hours/day)
Propagation, Seedling, Cloning	T5 Fluorescent	48	58	18
Vegetative	2x315W Metal Halide	817	651	18
Flowering	1000W DE High-Pressure Sodium	1759	1037	12

Growth Stage Lighting Specifications and Savings

Growth Stage	Efficient Fixture	Efficient Fixture Quantity	Efficient Fixture PPF ($\mu\text{mol/s}$)	Efficient Fixture Wattage (W)	Baseline Fixture PPF ($\mu\text{mol/s}$)	Baseline Fixture Quantity	Baseline Fixture Wattage (W)	Ex Ante Savings (kWh)	Ex Ante Savings (kW)
Flowering	1000W LED	840	2,556	1,059	1,759	1,221	1,037	3,142,675	694
Propagation, Seeding, Cloning	420W LED	60	1,071	442	48	1,339	58	388,759	60
Early Vegetative	420W LED	144	1,071	442	817	189	651	448,028	69
Flowering	420W LED	70	1,071	442	1,759	43	1,037	67,977	15
Propagation, Seeding, Cloning	18W LED	160	40	18	48	132	58	38,778	6
Total		1,274	5,809	2,403	4,431	2,924	2,841	4,086,217	843

Results

Verified Gross Savings/Realization Rates

Metric	Expected	Verified	Realization Rate
Coincident Peak kW:	843	693	82%
Annual kWh:	4,086,216	3,422,386	84%

The kWh realization rate for this project is 84% and the peak coincidence kW realization rate is 82%.

The ex-post calculator used the fixture wattages and fixture PPF provided by the fixture spec sheet. The realization rate for annual kWh and for Coincident Peak reduction is less than 100% because the model numbers for the 1000W grow lights were different than the model numbers claimed in the ex-ante calculations. The on-site verified model number confirmed a lower

fixture wattage and a lower fixture PPF than what was claimed in the ex-ante calculations. Due to this discrepancy between claimed wattage, fixture reported wattage, a one-time power measurement was performed to verify the wattage of the 100W LED fixtures. The table below shows the fixture discrepancies:

Fixture Discrepancies

Metric	Ex-ante Claim	Ex Post Claim	Reason
1000W Grow Light Wattage	1,036 W	992	Updated calculator to use the one-time power measurement wattage verified on site.
1000W Grow Light PPF	2,897	2,556	Updated calculator to match the DLC listing and Spec sheets for the verified model number.
420W Grow Light Wattage	420	442.5	Updated calculator to match the DLC listing and Spec sheets for the verified model number.
420W Grow Light PPF	1,008	1,071	Updated calculator to match the DLC listing and Spec sheets for the verified model number.

Appendix C. Net-to-Gross Survey Outcomes

Consistent Weatherization Approach Survey

Major Measures

Note that for this survey, Measure 1 and Measure 2 refer to the most prevalent measure (by savings) for the respondent. The mix of measures comprised in this framework is summarized at the beginning of the table below.

Measure Discussed in Survey	MEASURE 1	MEASURE 2
Duct Sealing	69%	13%
Air Infiltration	4%	78%
Ceiling Insulation	27%	9%
Did you know that you could save energy by sealing your ducts before you learned of the $\{e://Field/CHANNEL_NAME\}$ program?	MEASURE 1 (n = 13)	MEASURE 2 (n = 3)
Yes	62%	67%
No	38%	33%
Prior to the completion of the home energy assessment, did you know that your ducts were leaking air?	MEASURE 1 (n = 13)	MEASURE 2 (n = 3)
Yes	23%	0%
No	77%	100%
Prior to learning about the [Field-CHANNEL_NAME] program, did you have plans to [Field-INSTALL1/2] the [Field-EFF_MEASURE1/2]?	MEASURE 1 (n = 22)	MEASURE 2 (n = 23)
Yes	18%	48%
No	82%	52%
Was the [Field-EFF_MEASURE1/2] recommended during the home energy assessment?	MEASURE 1 (n = 22)	MEASURE 2 (n = 23)
Yes	73%	65%
No	27%	35%
Would you have been financially able to $\{e://Field/INSTALL1/2\}$ the $\{e://Field/EFF_MEASURE1/2\}$ without the financial assistance provided through the program?	MEASURE 1 (n = 22)	MEASURE 2 (n = 23)
Yes	41%	22%
No	59%	78%

How likely is it that you would have $\{e://Field/INSTALLED1/2\}$ the same $\{e://Field/EFF_MEASURE1/2\}$ within a year of when you received it if the financial assistance was not available?	MEASURE 1 (n = 22)	MEASURE 2 (n = 23)
Very unlikely	41%	48%
Somewhat unlikely	32%	17%
Neither likely nor unlikely	18%	9%
Somewhat likely	5%	13%
Very likely	5%	13%

How likely is it that you would have $\{e://Field/INSTALLED1/2\}$ the same $\{e://Field/EFF_MEASURE1/2\}$ within one year of when you received it if it was not recommended through the home energy assessment?	MEASURE 1 (n = 16)	MEASURE 2 (n = 15)
Very unlikely	50%	60%
Somewhat unlikely	13%	7%
Neither likely nor unlikely	19%	0%
Somewhat likely	13%	20%
Very likely	6%	13%

Did you $\{e://Field/INSTALL1/2\}$ the $\{e://Field/EFF_MEASURE1/2\}$ sooner than you would have if the information and financial assistance from the program had not been available?	MEASURE 1 (n = 22)	MEASURE 2 (n = 22)
Yes	50%	17%
No	50%	83%
When might you have installed the same $\{e://Field/EFF_MEASURE1\}$ if you had not participated in the program?	MEASURE 1 (n = 11)	MEASURE 2 (n = 4)
Within 6 months of when you had it completed	9%	25%
Between 6 months and 1 year	0%	0%
In more than 1 year to 2 years	9%	25%
In 2 to 3 years	9%	0%
In more than 3 years	27%	0%
Never	45%	50%

Direct Install Measures

Had you purchased and installed any [Field-DIMEASURE] before you received them for free through the program?	Percent Selected (n = 46)
Yes	46%
No	54%
Did you have plans to purchase and install [Field-DIMEASURE] before you learned about the [Field-CHANNEL_NAME] Program?	Percent Selected (n = 46)
Yes	41%
No	59%
Just to be clear, did you have plans to purchase an energy saving power strip or plans to purchase a standard power strip?	Percent Selected (n = 1)
I had plans to purchase an energy saving power strip	100%
I had plans to purchase a standard power strip	0%
How many of the \${e://Field/DIMEASURE}'s that you received had you already planned to purchase?	(n = 1)
Count	6
How familiar were you with smart power strips as a technology to save energy before you participated in the \${e://Field/CHANNEL_NAME} Program?	Percent Selected (n = 10)
Very unfamiliar	60%
Somewhat unfamiliar	10%
Neither familiar nor unfamiliar	0%
Somewhat familiar	20%
Very familiar	10%
If you had not received the free [Field-DIMEASURE], how likely is it that you would have installed them within 12 months of when you received them anyways?	Percent Selected (n = 46)
Very unlikely	26%
Somewhat unlikely	9%
Neither likely nor unlikely	11%
Somewhat likely	15%
Very likely	39%

CEEP Survey

Not including the project that your organization received an incentive for in [Field-YEAR], has your organization completed any significant energy efficiency projects in the last three years?	Large C&I (n = 10)	SBS (n = 26)
Yes	70%	12%
No	30%	88%
I don't know	0%	0%
Not including the project that your organization received an incentive for in [Field-YEAR], has your organization completed any significant energy efficiency projects in the last three years?	Large C&I (n = 7)	SBS (n = 3)
Yes	43%	67%
No	43%	33%
I don't know	14%	0%
In the last three years, did you complete any energy efficiency projects similar to the [Field-MEASURE1] project implemented at the facility located at [Field-LOCATION]?	Large C&I (n = 7)	SBS (n = 3)
Yes	29%	100%
No	71%	0%
I don't know	0%	0%
Did you have previous experience with the [Field-CHANNEL_NAME] Program prior to [Field-IMPLEMENTING1] the [Field-MEASURE1] in [Field-YEAR]?	Large C&I (n = 10)	SBS (n = 26)
Yes	50%	15%
No	50%	81%
I don't know	0%	4%
How important was your previous experience with the program in making your decision to [Field-IMPLEMENT1] the [Field-MEASURE1] at your facility?	Large C&I (n = 5)	SBS (n = 4)
Within 6 months of when you had it completed	20%	0%
Between 6 months and 1 year	0%	25%
In more than 1 year to 2 years	40%	50%
In 2 to 3 years	40%	25%
In more than 3 years	0%	0%
Never	0%	0%
Did a [Field-CHANNEL_NAME] Program representative or other [Field-UTILITY] representative recommend that you [Field-IMPLEMENT1] the [Field-MEASURE1] at your facility?	Large C&I (n = 10)	SBS (n = 26)
Yes	30%	38%
No	60%	58%
I don't know	10%	4%

Was the [Field-MEASURE1] recommended through the technical support or facility assessment that you received?	Large C&I (n = 3)	SBS (n = 6)
Yes	67%	100%
No	33%	0%
I don't know	0%	0%
Did you have plans to [Field-IMPLEMENT1] the [Field-MEASURE1] at the facility before deciding to participate in the [Field-CHANNEL_NAME] Program?	Large C&I (n = 10)	SBS (n = 26)
Yes	70%	46%
No	30%	54%
I don't know	0%	0%
Would you have completed the [Field-MEASURE1] project even if you had not participated in the program?	Large C&I (n = 10)	SBS (n = 26)
Yes	50%	31%
No	40%	58%
I don't know	10%	12%
If the [Field-CHANNEL_NAME] Program representative had not recommended [Field-IMPLEMENTING1] the [Field-MEASURE1], how likely is it that you would have [Field-IMPLEMENTED1] it anyway?	Large C&I (n = 1)	SBS (n = 5)
Definitely would have	100%	40%
Probably would have	0%	0%
Probably would not have	0%	0%
Definitely would not have	0%	60%
I don't know	0%	0%
Would have been financially able to [Field-IMPLEMENT1] the [Field-MEASURE1] at your facility if the incentives from the [Field-CHANNEL_NAME] Program were not available?	Large C&I (n = 10)	SBS (n = 26)
Yes	40%	50%
No	50%	50%
I don't know	10%	0%
To confirm, your organization would NOT have allocated the funds to complete a similar energy saving project if the program incentive was not available. Is that correct?	Large C&I (n = 5)	SBS (n = 13)
Yes, that is correct	100%	92%
No, that is not correct	0%	8%
I don't know	0%	0%

If the incentive from the [Field-CHANNEL_NAME] Program had not been available, how likely is it that you would have [Field-IMPLEMENTED1] the [Field-MEASURE1] at your facility anyway?	Large C&I (n = 10)	SBS (n = 26)
Definitely would have	20%	15%
Probably would have	40%	23%
Probably would not have	40%	42%
Definitely would not have	0%	19%
I don't know	0%	0%
Did you [Field-IMPLEMENT1] more [Field-MEASURE1] than you otherwise would have without the program?	Large C&I (n = 10)	SBS (n = 24)
Yes, that is correct	30%	33%
No, that is not correct	70%	63%
I don't know	0%	4%
Did you choose [Field-MEASURE1B] equipment that was more energy efficient than you would have chosen had you not participated in the program?	Large C&I (n = 10)	SBS (n = 24)
Yes, that is correct	30%	35%
No, that is not correct	60%	62%
I don't know	10%	4%
Did you [Field-IMPLEMENT1] the [Field-MEASURE1] earlier than you otherwise would have without the program?	Large C&I (n = 10)	SBS (n = 16)
Yes	50%	58%
No	50%	38%
I don't know	0%	4%
When would you otherwise have [Field-IMPLEMENTED1] the [Field-MEASURE1]?	Large C&I (n = 5)	SBS (n = 15)
Within 6 months	0%	13%
7 months to 1 year	0%	20%
More than 1 year to up to 2 years	80%	20%
More than 2 years to up to 3 years	0%	7%
More than 3 years to up to 5 years	0%	0%
More than 5 years	0%	33%
I don't know	20%	7%

Appendix D. Additional National Research for Small Business Sector

In addition to reviewing available U.S. Census data, the Evaluators searched for additional sources to provide additional context on the characterization and challenges of small business during the pandemic. The following are overviews of each study that was used to inform our analysis. Many of these studies or sources provided nationwide data that could not be limited to only Arkansas, but we present them here as they may provide useful context into the overall small business environment in the U.S. during the last two years.

NFIB COVID-19 Small Business Survey

The National Federation of Independent Businesses (NFIB) Research Center has conducted 19 surveys of small business health since the start of the pandemic. Their first COVID-19 Small Business survey was published in March 2020 and the 19 following surveys have been published at 3-6 week intervals since then. The latest survey was conducted on October 25-27 and they received 613 responses via email from their database of about 300,000 small business owners who are NFIB members.

The latest survey results reported on sales levels, business owner perceptions of the economy, supply chain disruptions, staffing shortages, vaccination, holiday sales, prices, and COVID-19 small business programs. Nearly half (48%) of small business owners reported significant impacts to their business from supply chain disruptions and 34% reported moderate impacts from supply chain disruptions. 62% of owners reported that the supply chain disruptions have worsened in the last three months, while 34% report that the disruptions are the same as three months ago. Nearly all (90%) of small business owners report that these disruptions will continue for five months or longer.

Most (72%) small business owners are also experiencing staffing shortages to some degree. 26% are experiencing significant staffing shortages and 22% are having moderate staffing shortages. Of those that are experiencing these shortages, 23% have had significant sales lost because of that and 28% have had moderate sales loss. Many (61%) owners report that these staffing shortages are the same as 2 months ago and 32% said it was worse. To compensate, (91%) of owners are themselves working more hours, 79% of are increasing wages, and 39% are changing business operation hours.

The table below provides summaries of a large sample of nationwide small business responses in October 2020, October 2021, and January 2022 – to compare and contrast different concerns at these points. Notably, most small businesses reported a decline in their sales in the fall of 2020 compared to pre-pandemic times. Small businesses report that their sales have improved over time, but as of October 2021, the vast majority of small businesses noted at least some disruption from supply chain issues, and nearly half noted staffing shortages. These challenges have improved slightly as of January 2022 but still remain for many businesses. These findings indicate that small businesses may have been, and continue to be, focused on devoting resources to critical staffing and supply needs which may result in deprioritization of other needs, like building improvements or energy efficiency projects. As noted below, approximately 90% of small business owners said they are working more hours in fall of 2021 and early 2022, which may mean their focus and attention is likely stretched thin.

NFIB Small Business COVID-19 Survey - National Trends

	October 2020 Survey	October 2021 Survey	January 2022 (early look at 2022)
Sales Levels	50% less than pre-crisis levels: 21% 50-74% of pre-crisis levels: 26% 75-100% of pre-crisis levels: 34% Exceeding pre-crisis levels: 17%	50% less than pre-crisis levels: 14% 51-75% of pre-crisis levels: 22% 76-100% of pre-crisis levels: 37% Exceeding pre-crisis levels: 27%	50% less than pre-crisis levels: 9% 50-74% of pre-crisis levels: 22% 75-99% of pre-crisis levels: 32% Exceeding pre-crisis levels: 36%
Outlook on when economic conditions return to normal	Now (Oct 2020): 5% End of 2020: 5% Sometime in 2021: 59% Sometime in 2022: 24% After 2022: 8%	Now (Oct 2021): 18% Second half of 2021: 7% First half of 2022: 17% Second half of 2022: 32% 2023 or later: 27%	Now (2022): 21% First half of 2022: 13% Second half of 2022: 27% 2023 or later: 39%
Paycheck Protection Program (PPP)	90% of borrowers have spent entire loan and ready to apply for loan forgiveness 26% submitted a loan forgiveness application If eligible, 44% would apply for a second PPP loan	96% of borrowers submitted a loan forgiveness application for their 2020 loan 43% received a second-draw PPP loan 70% submitted a loan for forgiveness on second-draw loan	31% received a second PPP loan in 2021 88% applied for loan forgiveness for second PPP loan
Economic Injury Disaster Loan	34% applied	24% applied	No data
Covid-19	<u>Concerns of contracting COVID</u> 42% very or moderately concerned about employees contracting COVID 30% very or moderately concerned about contracting COVID themselves	<u>Vaccination</u> 25% asking if employees are vaccinated 35% encouraging employees to get vaccinated	<u>Omicron variant surge</u> 11% significant negative impact 23% moderate negative impact 29% no impact Of those impacted, 42% report significant or moderate impact to employee work attendance. 36% report a significant or moderate impact to sales

Other	<p>88% of owners are involved in 100% of operations 37% expect a net operating loss in 2020</p> <p>20% will have to close if conditions do not improve in the next 6 months 19% will have to close if conditions do not improve in next 7 to 12 months 62% do not expect near-term problems</p>	<p>48% significant impact from supply chain disruptions 34% moderate impact from supply chain disruptions</p> <p>26% significant staffing shortages 22% moderate staffing shortages</p> <p>Of those with staffing shortages, 51% are experiencing significant or moderate loss of sales opportunities.</p> <p>In response to staffing shortages: 79% are increasing wages 23% enhanced health insurance benefits 42% offering more hours to part-time employees 67% offering overtime to full-time employees 34% new technology to increase productivity 91% owners are working more hours 39% adjusting business operating hours</p>	<p>47% significant impact from supply chain disruptions 27% moderate impact from supply chain disruptions</p> <p>23% significant staffing shortages 20% moderate staffing shortages</p> <p>Of those with staffing shortages, 37% are experiencing significant or moderate loss of sales opportunities</p> <p>In response to staffing shortages: 83% increasing wages 29% enhanced health insurance benefits 24% increased paid time off 43% offering more hours to part-time employees 61% offering overtime to full-time employees 33% new technology to enhance productivity 88% owners working more hours 38% adjusting business operating hours 29% reduced variety of goods and services sold</p>
Link	https://assets.nfib.com/nfibcom/Covid-19-Small-Business-Survey-13-Web.pdf	https://assets.nfib.com/nfibcom/Covid-19-20-Survey-FINAL.pdf	https://assets.nfib.com/nfibcom/Covid-19-Survey-21.pdf

Business Formation: A Tale of Two Recessions

This research paper is written by authors from the U.S. Census Bureau, the Federal Reserve Bank of Atlanta, the University of Notre Dame, and the University of Maryland. This seeks to compare trends in business applications during the Great Recession and the COVID-19 Recession. During the Great Recession, business applications and transitions to employer startups decreased for a long period. Instead, in the COVID-19 Recession, after an initial decrease in business applications, there was sharp increase. In addition, the composition of these applications is more likely to be nonemployee businesses. In other words, there is an increase in business applications in industries which are primarily non-employers and a decrease in business applications which intend to have a payroll with employees or are likely to transition to a payroll with employees.

As shown in the Figure below, directly following the Great Recession there was a steady decrease in business applications. For the COVID-19 pandemic, however, there was a much sharper decrease in business applications following by an equally sharp increase. The transition rate of business applications that are likely to become employer businesses for the Great Recession steadily increased after an initial period of decrease. By contrast, in the COVID-19 pandemic the transition rate has steadily decreased and perhaps leveled out at a low rate for the last few weeks of the data. These data show that there is an increase in non-employer business applications in 2020, but a reduction in employer business applications and ones that are likely to transition to employer applications. For OG&E's SBS program, this means that although small business applications are increasing as a whole, they may not be increasing the customer base for the types of businesses that would apply for this program.

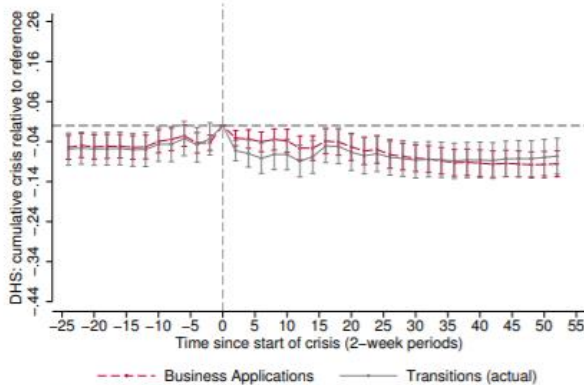


Figure 1a: Great Recession — Applications and Transitions

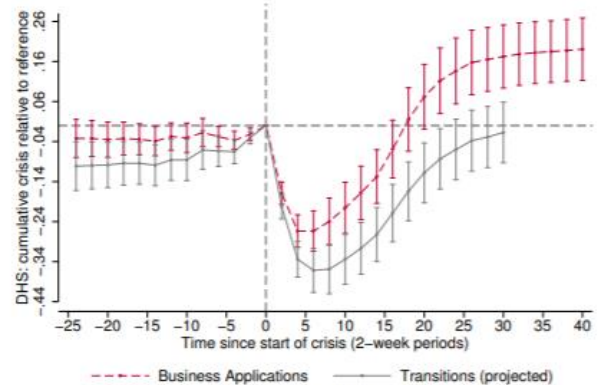


Figure 1b: COVID — Applications and Transitions

Figure 1: Business Applications and Transitions

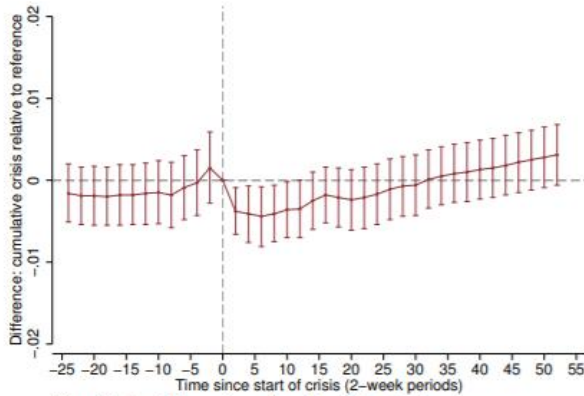


Figure 2a: Great Recession — Transition Rate (actual)

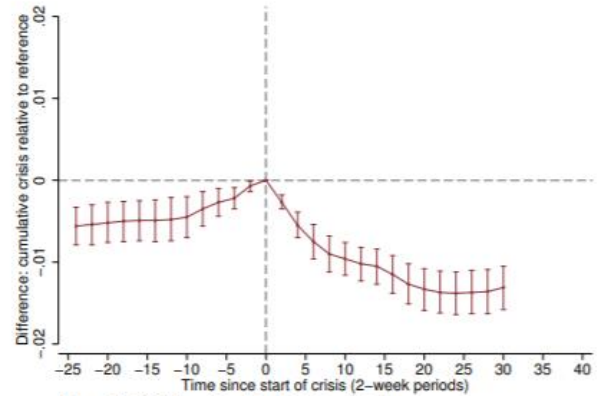


Figure 2b: COVID — Transition Rate (projected)

Figure 2: Transition Rates

Business Formation and Transition information

Business Exit During the COVID-19 Pandemic: Non-traditional Measures in Historical Context

This research paper is written by Crane 2021 and others and published by the Washington Board of Governors of the Federal Reserve System. This seeks to understand employer business exit during the first year of the pandemic by using non-traditional measures such as payroll processing services and credit card transaction processors. These alternative measures are used because while establishment closure can be readily observed, establishment death cannot be observed until three quarters later, meaning that firm death in 2020 will not be available until 2023. Within the context of the naturally cyclic nature of business exit at about 7.5% per year,

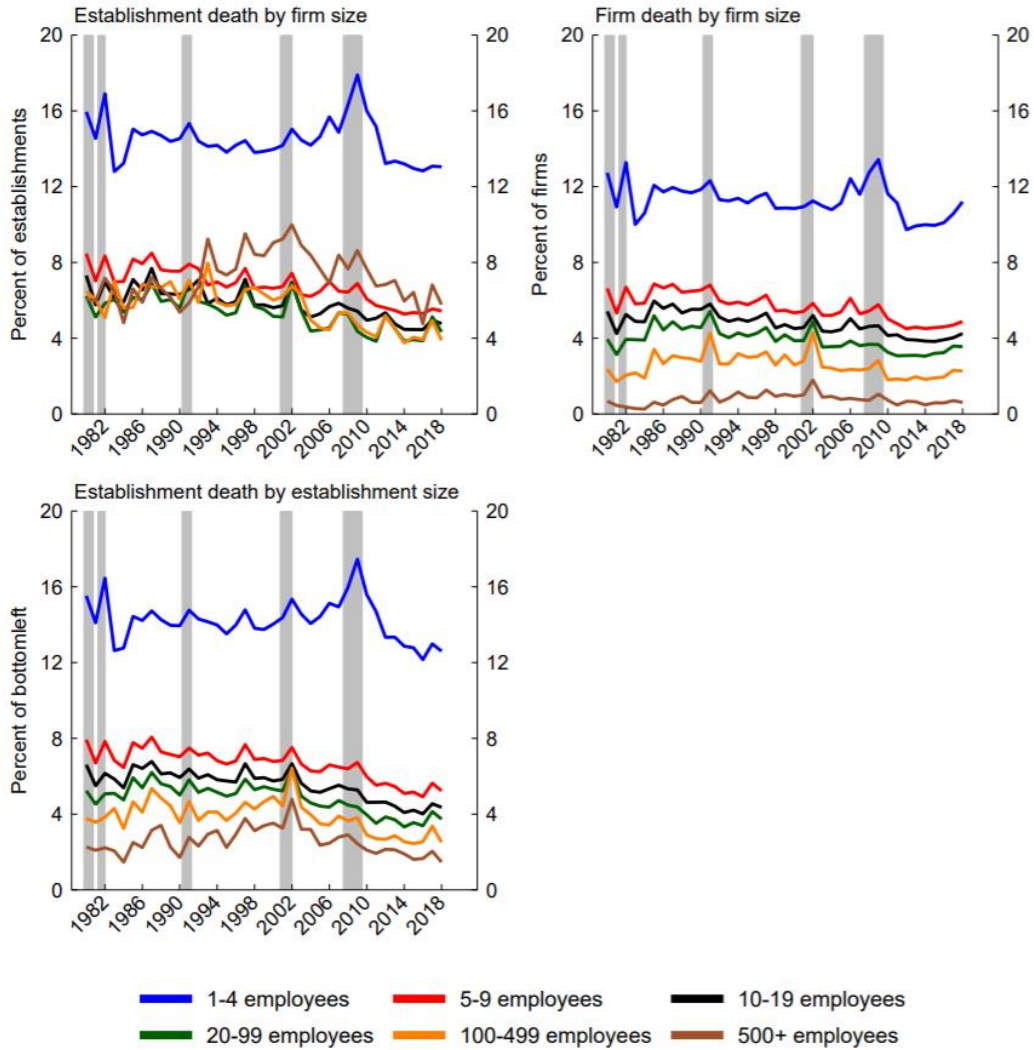
Crane and others found that exit was higher in certain sectors and lower in others. They also found some potentially optimistic findings that suggest business exit is not as widespread as expected, or as impactful to U.S. employment as expected and that businesses are optimistic about their future.

This study uses alternative measures to estimate business exit such as ADP payroll which gives an indication of employment, SafeGraph cell phone geolocation data which gives an indication of permanent business exit, Womply and Homebase which give an indication of business operation, and Census Bureau survey data to indicate business expectations. These data are evaluated in the historical context of business exit patterns. Crane and others show that historically business exit is elevated in small firms and establishments, those which has 5 or less employees. This is shown in the figure below. This observation of historical patterns is particularly useful for OG&E because the results from the census data analysis show that over half of the businesses in their service territory have 5 or fewer employees. The figure below shows establishment closure rates in 2019 and 2020, both unweighted and weighted by employment. The next figure shows these closure rates compared to the average rate in 2015-2019 and the maximum closure rate in the Great Recession to provide context. This shows that the leisure and hospitality sector along with other service (which includes hair salons nail salons) were most elevated. Crane notes that historically about half of establishment closure results in permanent business death. However, Crane highlights that this may not be the case in the pandemic as there might be a high rate of temporary business closures.

The results from Crane's analysis with the payroll processing ADP data suggest that business closure was elevated in the late spring of 2020 and then back at normal rates by the end of 2020. These data show no impact from the COVID-19 increase from November 2020 to February 2021. This suggests that permanent business shutdown has not been as dramatic as expected. Crane also uses data from the credit card transaction processor Womply and the clocking in and out software Homebase to understand patterns in small customer-facing firms. These data show that many businesses closed in March and April of 2020 and re-opened in May and June of 2020, but closure levels remained elevated even in well recovered industries through February 2021. One drawback of these data that Crane notes is this may be more indicative of client attrition rather than business closure.

Overall, Crane's analysis suggests that business exit was elevated during the first year of the pandemic and establishment death were highest in full-service restaurants, personal care services, automotive repair, and certain retail stores. Business death was also elevated in small firms in general. Crane notes that within each sector there are some industries which were highlight affected and some that were less affected, which leads to "partially or fully offsetting,

such that most sectors likely have not seen dramatically elevated exit” with the exception of other services, which overall saw higher than usual levels compared to historical trends. Based on analysis from the Census Bureau Small Business Pulse Survey, small businesses reported expectations to permanently shut down within 6 months at levels which were elevated compared to 2015-2018 data. These were elevated in the fall, winter, and then lower than historical levels in the spring.



Note: Unweighted exit rates with DHS denominators. BDS data are noisy in Economic Census years (2's and 7's).
 Source: Census Bureau Business Dynamics Statistics (BDS).

Figure 3: Business death rates by firm and establishment size

Establishment Death by Size

Attachment B: Samples of OG&E Promotional and Educational Materials

HOME ENERGY EFFICIENCY PROGRAM

Higher efficiency, lower costs



At OG&E, our goal is to help customers save energy and live more comfortably.

That's why our Home Energy Efficiency Program provides energy-saving tools, programs and incentives to all our neighbors across Arkansas. Get started on the path toward a more comfortable, energy-efficient home at oge.com/arheep.

TODAY'S HIGH: **YOUR COMFORT**

If your home is over 10 years old, you may qualify for energy-saving improvements through our Weatherization Program at no additional cost to you.

Your home improvements may include:

- Adding attic insulation
- Air sealing, caulking and weatherstripping
- Sealing around doors and windows
- Installing LED bulbs

Sign up now at oge.com/weatherization.



Complete your online Tracker profile to see if your home could benefit from our In-Home Assessment. Valued at \$250, the assessment includes all the following with no out-of-pocket costs required:

- An expert walk-through analysis of your home's energy efficiency
- LED bulbs (up to 15)
- Advanced power strips (up to two as needed)
- Showerheads and aerators (up to two as needed)
- A custom Home Energy Report with recommended improvements
- Access to additional services, incentives and offerings to help you manage energy costs



TUNE UP YOUR ENERGY COSTS

An OG&E A/C Tune-up can boost your A/C unit's efficiency by up to 30 percent. Valued at \$200, the tune-up typically requires no out-of-pocket costs from qualifying customers.

INSTANT INCENTIVES

Look for "Special Pricing from OG&E" signs at your local retailer for special deals on energy-efficient products.



EVEN MORE WAYS TO SAVE

Want to become a more energy-conscious consumer? OG&E rebates and incentives let you pay less for the technology that saves you more.*

Insulation

We offer rebates for professionally installed insulation.

Rebates: \$0.15/sq. ft. for attic insulation; \$0.50/sq. ft. for wall insulation

Windows

We offer a \$50 rebate for each professionally installed ENERGY STAR® certified window (limit 7).

Pool Pumps

ENERGY STAR certified multi-speed (≥ 1 hp) and variable-speed (≥ 0.5 hp) pool pumps qualify for a \$300 rebate.

Air Sealing

We offer rebates for professionally installed air sealing.

Rebates: \$100 for ≥ 15 percent reduction in air leakage; \$150 for ≥ 30 percent reduction in air leakage

A/C or Heat Pump Replacement

We offer rebates for high-performance A/C and heat pump replacement systems.

Rebates: \$80/ton for 16 SEER; \$100/ton for 17 SEER; \$120/ton for 18 SEER

*Incentive funds are limited. Please call 844-413-3065 to confirm fund availability and schedule work.

For more ways OG&E can help you manage your energy costs, visit oge.com/arheep or contact us at 844-413-3065.





We Energize Life



<Full name>
<Street address>
<City, state ZIP>

TODAY'S FORECAST: COMFY WITH A CHANCE OF NAPS

Dear <First name>,

The weather inside is always delightful with OG&E's Weatherization Program. Sign up today and we'll send a trained crew to install a variety of weatherization improvements throughout your home—at **no additional cost to you**.

The program has already helped thousands of our customers lower their energy costs and improve their home's year-round comfort. To qualify, you must be a current OG&E residential customer who owns or rents a single-family home or duplex that's at least 10 years old.*

Your improvements may include:

- **Adding attic insulation** to lower energy costs and improve year-round comfort
- **Air sealing, caulking and weatherstripping** to reduce energy waste, allergens and outside noise
- **Sealing around doors and windows** to reduce drafts and save energy
- **Installing LEDs** to save on energy and maintenance costs



A more efficient home is in the forecast. To see which upgrades you qualify for, sign up now at oge.com/weatherization or give us a call at **844-413-3065**.

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.*



We Energize Life





We Energize Life



<Full name>
<Street address>
<City, state ZIP>

IT'S RAINING SAVINGS.

Dear <First name>,

Today's inside weather calls for smiles. Sign up for OG&E's Weatherization Program today and we'll send a trained crew to install a variety of energy-saving weatherization improvements throughout your home—**at no additional cost** to you.

The program has already helped thousands of our customers lower their energy costs and improve their home's year-round comfort. To qualify, you must be a current OG&E residential customer who owns or rents a single-family home or duplex that's at least 10 years old.*

Your improvements may include:



Adding attic insulation to lower energy costs and improve year-round comfort



Air sealing, caulking and weatherstripping to reduce energy waste, allergens and outside noise



Sealing around doors and windows to reduce drafts and save energy



Installing LEDs to save on energy and maintenance costs

Lower energy costs are in the forecast. To see which upgrades your home qualifies for, sign up now at oge.com/weatherization or give us a call at **844-413-3065**.

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.*



We Energize Life



**TODAY'S FORECAST:
LOUNGE PANTS
AND LOWER BILLS**

OG&E



WEATHERIZATION UPGRADES AT NO EXTRA COST

APSC FILED Time: 4/29/2022 9:55:15 AM: Recvd 4/29/2022 9:33:02 AM: Docket 07-075-TF-Doc. 459

The weather inside is always delightful with OG&E's Weatherization Program. See if you qualify for energy-saving weatherization improvements at no additional cost.

[Sign up](#)

Or call **844-413-3065**.

The Weatherization Program is available to homeowners and renters whose homes are at least 10 years old.* Sign up today to see how we can help lower your energy costs and improve your home's year-round comfort.

Your home improvements may include:

- Attic insulation
- Air sealing, caulking and weatherstripping throughout your home
- Sealing around doors and windows
- Energy-saving LEDs

[Get started](#)

**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.*

This email was sent by: OGE Energy Corp, PO Box 321 Oklahoma City, OK, 73101-0321, US

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www.oge.com

**TODAY'S FORECAST:
LOUNGE PANTS
AND LOWER BILLS**



WEATHERIZATION UPGRADES AT NO EXTRA COST

The weather inside is always delightful with OG&E's Weatherization Program. See if you qualify for energy-saving weatherization improvements at no additional cost.

[Sign up](#)

APSC FILED Time: 4/29/2022 9:55:15 AM: Rec

Or call **844-413-3065**.

The Weatherization Program is available to homeowners and renters whose homes are at least 10 years old.* Sign up today to see how we can help lower your energy costs and improve your home's year-round comfort.

Your home improvements may include:

- Attic insulation
- Air sealing, caulking and weatherstripping throughout your home
- Sealing around doors and windows
- Energy-saving LEDs

[Get started](#)

**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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www.ogee.com



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.....

LOOKS LIKE ANOTHER BEAUTIFUL DAY INSIDE



The weather inside is always delightful with OG&E's Weatherization Program. Enroll today to receive energy-saving weatherization improvements at no additional cost to you.

Your home improvements may include:

- Adding attic insulation to lower energy costs and improve year-round comfort
- Air sealing, caulking and weatherstripping to reduce energy waste, allergens and outside noise
- Sealing around doors and windows to reduce drafts and save energy
- Installing LEDs to save on energy and maintenance costs

Eligibility

The program is open to current OG&E Arkansas or AOG residential customers who own or rent a single-family home or duplex that's at least 10 years old.*

FPO SPACE FOR
CONTRACTOR LOGO

Get started

See if you qualify at oge.com/weatherization or give us a call at **844-413-3065**.



*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.

CLEARResult[®]



OG&E ARKANSAS

Weatherization Campaign - Social Media

:30 VIDEO ADS

GENERAL VERSION

This is a Facebook ad for the OG&E Weatherization Program. The ad features a large image of a two-story blue house with a white picket fence. The text on the image reads "OG&E WEATHERIZATION PROGRAM" in large white letters, followed by "Home energy upgrades at no extra cost" in smaller white text. The OG&E logo is at the bottom of the image. Above the image, the text says "Today's high: your comfort. See if you qualify for energy-saving weatherization upgrades at no extra cost." The ad includes a "Like Page" button, a "Sponsored" label, and a "Learn More" button. At the bottom, it shows 20 likes, 562 comments, and 311 shares, along with "Like", "Comment", and "Share" buttons.

OG&E
Sponsored

Like Page

Today's high: your comfort. See if you qualify for energy-saving weatherization upgrades at no extra cost.

OG&E WEATHERIZATION PROGRAM
Home energy upgrades at no extra cost

OG&E

Home Weatherization at No Extra Cost

OG.E.COM/WEATHERIZATION

Learn More

20 562 Comments 311 Shares

Like Comment Share

LOWER-INCOME VERSION

This is a Facebook ad for the OG&E Weatherization Program, specifically a lower-income version. The ad features a large image of a single-story tan house with a concrete walkway leading to the front door. The text on the image reads "OG&E WEATHERIZATION PROGRAM" in large white letters, followed by "Home energy upgrades at no extra cost" in smaller white text. The OG&E logo is at the bottom of the image. Above the image, the text says "Today's low: your energy costs. See if you qualify for money-saving weatherization upgrades at no extra cost." The ad includes a "Like Page" button, a "Sponsored" label, and a "Learn More" button. At the bottom, it shows 20 likes, 562 comments, and 311 shares, along with "Like", "Comment", and "Share" buttons.

OG&E
Sponsored

Like Page

Today's low: your energy costs. See if you qualify for money-saving weatherization upgrades at no extra cost.

OG&E WEATHERIZATION PROGRAM
Home energy upgrades at no extra cost

OG&E

Home Weatherization at No Extra Cost

OG.E.COM/WEATHERIZATION

Learn More

20 562 Comments 311 Shares


Like Comment Share

SINGLE IMAGE ADS

AD 1

OG&E **OG&E** Sponsored Like Page

Today's high: your comfort. See if you qualify for energy-saving weatherization upgrades at no extra cost.



COMFY WITH A CHANCE OF NAPS

OG+E

Home Weatherization at No Extra Cost Sign Up

OGE.COM/WEATHERIZATION

20 562 Comments 311 Shares

Like Comment Share

AD 2

OG&E **OG&E** Sponsored Like Page

Inside is always delightful with OG&E's Weatherization Program. See if you qualify for upgrades at no extra cost.



TODAY'S FORECAST: LOWER BILLS

OG+E

Weatherization Upgrades at No Added Cost Sign Up

OGE.COM/WEATHERIZATION

20 562 Comments 311 Shares

Like Comment Share

AD 3

OG&E **OG&E** Sponsored Like Page

Looks like another beautiful day inside. Find out if you qualify for insulation, air sealing and more at no extra cost.



COZY WITH 0% CHANCE OF DRAFTS

OG+E

Home Weatherization at No Extra Cost Sign Up

OGE.COM/WEATHERIZATION

20 562 Comments 311 Shares

Like Comment Share

AD 4

OG&E **OG&E** Sponsored Like Page

Today's inside weather calls for smiles. See if you qualify for energy-saving weatherization upgrades at no extra cost.



WEATHERIZATION UPGRADES AT NO ADDED COST

OG+E


Today's High: Your Comfort Sign Up


OGE.COM/WEATHERIZATION

20 562 Comments 311 Shares


Like Comment Share

CAROUSEL A - STATIC IMAGES

 **OG&E**
Sponsored

 Like Page

Today's forecast: comfy with a chance of naps. See if you qualify for weatherization upgrades at no extra cost to you.



Looks Like Another Beautiful Day Inside [Sign Up](#)

20 10 Comments 250 Shares


[Like](#) [Comment](#) [Share](#)




Attic Insulation at No Extra Cost [Sign Up](#)



LED Bulbs at No Extra Cost [Sign Up](#)





Air Sealing at No Extra Cost [Sign Up](#)




Weatherstripping at No Extra Cost [Sign Up](#)


CAROUSEL B - ANIMATED




 **OG&E**
Sponsored




 Like Page

Today's forecast: comfy with a chance of naps. See if you qualify for weatherization upgrades at no extra cost to you.



Looks Like Another Beautiful Day Inside 

 20  10 Comments  250 Shares

 Like  Comment  Share

**ATTIC
INSULATION AT
NO EXTRA
COST**

OG&E


Attic Insulation at No Extra Cost 



LED Bulbs at No Extra Cost 

**AIR SEALING
AT NO EXTRA
COST**

OG&E

Air Sealing at No Extra Cost 



Weatherstripping at No Extra Cost 



EFFICIENCY AND COMFORT, TOGETHER AT LAST

Our Home Energy Assessment is the first step to a more comfortable and energy-efficient home. Available as a virtual or in-person appointment at no out-of-pocket cost to you, the assessment provides up to \$250 worth of energy-saving products, recommendations and resources.

Get started with our quick online Home Review or give us a call to schedule your assessment today.

[Start Home Review](#)

Or call [844-413-3065](tel:844-413-3065).

Here's how it works:

1. Complete an online Home Review or call [844-413-3065](tel:844-413-3065) to get started.
2. Receive a comprehensive analysis of your home's energy use by a trained assessor.
3. Get up to 15 LED bulbs and up to two advanced power strips (if needed).
4. Review your custom Home Energy Report outlining your recommended improvements.
5. Take advantage of generous rebates and track your progress through our HEETracker tool.

[Get started](#)

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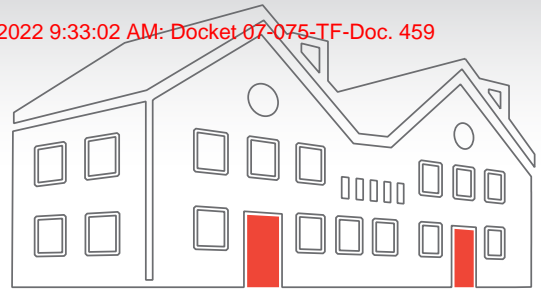
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[View this email as a webpage.](#)

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www.oge.com

MULTI-FAMILY ENERGY EFFICIENCY

ADD VALUE TO YOUR PROPERTY WITH REBATES FROM OG&E.



The OG&E Home Energy Efficiency Program offers multi-family property owners and managers the following benefits to you and your tenants:

- Add value to your property while reducing electricity and water costs.
- Lower tenant turnover due to increased comfort and lower utility bills.
- Reducing energy use by 15 percent 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, EnergyStar.gov

MULTI-FAMILY EFFICIENCY PROGRAM

Through the Home Energy Efficiency Program, qualified participating contractors will install energy-saving products including LED light bulbs, energy-efficient showerheads and faucet aerators, and advanced power strips at no cost. In addition, units may qualify for 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 tenants' duct systems, 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 participating contractor at the property's convenience
- Labor and materials supplied by the participating contractor
- Replaced fixtures removed by participating contractor
- Participating contractor submits rebate paperwork to the program
- Rebate checks mailed in 4 to 6 weeks

To speak with an energy advisor, call [844-413-3065](tel:844-413-3065) or email residential.ar@oge.com.

OG&E[®]

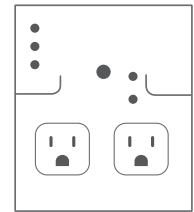
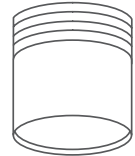
We Energize Life
.....



MULTI-FAMILY EFFICIENCY PROGRAM

PROGRAM PARTICIPANTS RECEIVE THESE UPGRADES

- Energy-efficient faucet aerators (kitchen and bath)
- Energy-efficient showerheads
- Advanced power strips
- LED bulbs
- Air and duct leakage improvements



NEXT STEPS

There are more opportunities to save money on improvements. To speak with an energy advisor, call **844-413-3065** or email residential.ar@oge.com.

SAVINGS BY THE NUMBERS

A 100-unit apartment complex with all upgrades installed can see savings of:

450,000 kWh
annually

362,700 gallons
of water annually

\$1,000
incentive





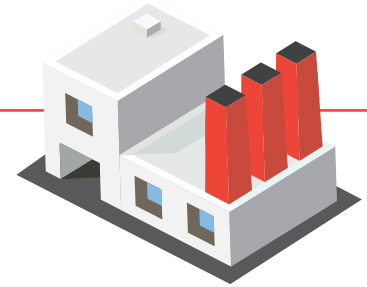
We Energize Life

ENERGY SAVINGS THAT WORK HARD FOR YOU

The OG&E Commercial Energy Efficiency Program offers financial incentives when energy efficiency measures are implemented at large commercial facilities like yours. We'll provide an energy assessment at no out-of-pocket cost to help you identify and financially qualify potential energy-saving projects that could even include solutions with little or no cost.

To make reducing your energy costs even easier, we also offer significant incentives for each energy efficiency upgrade installed. Incentives are available for the following measures:

- HVAC – DX Retrofit
- HVAC – DX New Construction
- Chiller Retrofit
- Chiller New Construction
- LED Lighting Retrofit
- Lighting New Construction
- Vending Misers
- Door Heater Controls
- ECM Evaporator Fan
- Electronic Defrost Controls
- Solid Door Reach-Ins
- Strip Curtains
- Night Covers
- Cooler Door Gaskets
- Lighting Controls
- Lodging Occupancy Controls
- Compressed Air
- Combined Custom Measures
- Retrocommissioning
- Variable Frequency Drives



MORE WAYS TO SAVE

**CONTACT US FOR
MORE INFORMATION:**

844-413-3065
commercial.ar@oge.com





We Energize Life

SAVING ENERGY HAS NEVER BEEN COOLER.

Want to know something cool? A state-of-the-art OG&E A/C Advanced Tune-up can improve the energy efficiency of your A/C unit by up to 30 percent, resulting in longer-lasting, better-working equipment with improved comfort and humidity control. We'll even cover the cost, based on the tonnage of the unit, see chart below. (Additional charges may apply.)

During your tune-up, a participating contractor will:

- Measure indoor airflow and recommend adjustments if needed.
- Clean outdoor condenser coils.
- Inspect indoor coil and blower and clean as needed.
- Test your A/C to measure its cooling output.

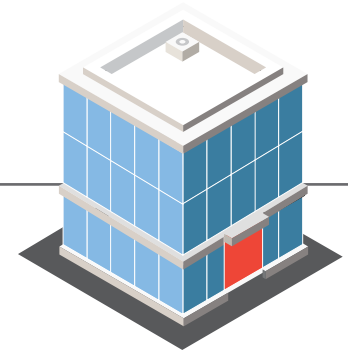
Don't wait to start saving.

Contact us at commercial.ar@oge.com to schedule your OG&E A/C Advanced Tune-up today. To learn more, visit oge.com/arceep.

Incentives Available

Commercial Customers

1–3.5 Tons	\$225
4–5 Tons	\$275
6–10 Tons	\$450
11–15 Tons	\$650
16–25 Tons	\$800
26–30 Tons	\$850
31–50 Tons	\$1,400
51–80 Tons	\$2,000
80+ Tons	\$2,500



Save up to

\$400

on an OG&E
A/C Advanced
Tune-up.

A POSITIVE ENERGY FUTURE

BUSINESS SUCCESS

OG&E EFFICIENCY PARTNER

**CONTACT US FOR
MORE INFORMATION:**

844-413-3065
commercial.ar@oge.com

SCHOOLS AND GOVERNMENT EFFICIENCY PROGRAM

Design

OG&E provides incentive funding for energy-efficient upgrades and retrofits to all educational and publicly funded facilities within our service territory. Based on the energy-efficient measures you choose, we'll help you secure the largest incentives available. In many cases the incentive will cover 50 percent or more of the initial cost of the project. Free educational activities are also available, which are designed to help administrative personnel at facilities to identify and quantify energy efficiency opportunities.

Goals

Over the long term, we're here to help participants save money on utility bills, improve comfort and protect the environment through education, increased efficiency and responsible energy consumption.

Implementation

Program representatives will help facilities with participation in all our available services, and help determine what energy efficiency measures will work best for them.

At your request, our building science team can perform a no-cost walk-through of your facilities and recommend energy-saving improvements. Your facilities may also be compared to others that operate similarly in a benchmark study.

Recognition

Realizing energy and fiscal savings is an important milestone that's worth celebrating. OG&E will partner with you to help make sure you have an opportunity to publicly share your success through a variety of media channels.

Eligibility

All publicly funded facilities located within the OG&E service territory are eligible to participate.

Timeframe

Participation is based on a first-come, first-served basis now through December 15 of the current program year, or while funds last.



**MORE WAYS
TO SAVE**

**CONTACT US FOR
MORE INFORMATION:**

844-413-3065
commercial.ar@oge.com





Available incentives

Planning an energy efficiency project? Get with the program. Our Small Business Efficiency Program offers incentives that can cover up to 90 percent of the cost of a project.

Incentive rates:

- \$0.15/kWh reduced for eligible LED lighting fixtures & tube lamp measures
- \$0.12/kWh reduced for refrigeration door gaskets

Eligible projects

Incentives are available for a wide variety of energy efficiency projects, including:

- LED lighting upgrades* (tube lights, bulbs, fixtures)
- Occupancy sensor installations
- LED exit sign retrofits
- Refrigerator door gaskets
- Refrigerator anti-sweat heater controls
- And more!

LED retrofits must be either DesignLights Consortium® approved or ENERGY STAR® certified to receive incentives.



We Energize Life



Take control of your energy use—and your bottom line.



To get started, contact a program representative by email at

oge.ar.sbdi@clearesult.com

OR CALL

844-413-3065

Products and services are provided solely by approved participating Service Providers. OG&E does not sell goods or services in its energy efficiency programs.

Big savings for your small business

OG&E offers energy-efficient solutions for small business customers.



SMALL BUSINESS EFFICIENCY PROGRAM



Program benefits

We'll provide everything you need to help your business achieve long-term energy savings, including:

- No out-of-pocket costs and no-obligation lighting assessment to identify energy-saving opportunities
- Recommendations and estimates for energy savings, project costs and payback periods
- Installation of approved energy-saving equipment by a local, pre-qualified contractor
- Incentives paid directly to the contractor by the program to reduce your upfront cost

It's with programs like this that OG&E is able to keep rates among the lowest in the country.

Eligibility

The program is open to any small commercial customers with a valid OG&E account meter and no more than 100 kW peak demand at any one facility.

Get started today

- 1 Email oge.ar.sbdi@clearesult.com or call 844-413-3065 for a list of participating contractors and select a contractor.
- 2 Contact the contractor you selected and provide your customer account number to verify your eligibility.
- 3 The participating contractor will provide a no-cost walk-through assessment of your facility.
- 4 Review your energy-saving proposal and sign the customer proposal to approve the recommended measures.
- 5 The participating contractor will install the approved measures within 60 days of receiving the signed agreement.

Typical project scenario

To give you an idea of the potential savings available through the program, below is an example of some commonly proposed retrofits. The projected savings and costs for these retrofits are on the right.



EXISTING INTERIOR LIGHTING:

32 4 ft. 4-lamp fluorescent fixtures
16 60W incandescent bulbs
2 exit signs

INTERIOR LIGHTING RETROFIT:

32 4 ft. 36W LED fixtures
16 10W LEDs
2 LED exit signs

Incentives, actual savings and payback periods vary depending on the equipment installed, building characteristics, energy-use patterns, age of existing equipment, location and other parameters specific to the project.



Example project by the numbers

11,638 kWh

total energy savings

3.28 kW

total peak demand savings

\$3,712

estimated incentives

\$1,979

net cost to customer

\$4,712

estimated project cost

1.7 years

project payback

\$1,163.84

estimated annual savings

INSTANT REBATES FOR SMALL BUSINESS LONG-TERM SAVINGS

LEDS

LED Pin-Base CFL Direct Replacement Lamp **\$5**

LED REFLECTORS

R/BR30 **\$3** PAR16 **\$5**

R/BR20 **\$3** PAR30 **\$4**

R/BR40 **\$3** MR16 **\$5**

PAR20 **\$5** PAR38 **\$4**

LED LINEAR FIXTURES

2X2 LED Linear Fixture **\$20**

2X2 LED Linear Fixture w/ Integrated Sensor **\$25**

2X4 LED Linear Fixture **\$30**

2X4 LED Linear Fixture w/ Integrated Sensor **\$35**

LED WALL PACK/ FLOOD/ POLE MOUNT

LED Wall Pack/Flood 7 W – 29 W **\$20**

LED Wall Pack/Flood 30 W – 80 W **\$50**

LED Wall Pack/Flood 80 W + **\$80**

LINEAR

LED 8' tube **\$12**

LED T8 Replacement **\$3**

LED T5 Replacement **\$5**

LED LOWBAY/HIGHBAY

LED Lowbay/Highbay 30 W – 60 W **\$65**

LED Lowbay/Highbay 61 W – 100 W **\$75**

LED Lowbay/Highbay 100 + W **\$100**

OTHER REBATES

LED Downlight/Trim Kit **\$8**

Wall Sensor **\$20**

Ceiling Sensor **\$30**

Ask our sales staff for more details.

DISTRIBUTOR LOGO AREA

Sample Company Name
XXX-XXX-XXXX
samplecompanyname.com

Contact us for more information:

ogemidstreamar@clearesult.com or
oge.com/ceep or call: 479-414-2071



Funds are limited and available on a first-come, first-served basis.

LivingWise® Program Contents

Each program includes the following materials:

Student Materials

- *Student Guide*
- *Take-Home Workbook*
- *LivingWise Kit (shown below)*
- *Parent Letter/Pledge Form*
- *Student Survey Form*
- *Certificate of Achievement*
- *Unlimited Website Access*
- *Toll-Free HELP Line*
- *“OG&E” Wristband*

Teacher Materials

- *Teacher Book*
- *Step-by-Step Program Checklist*
- *Program At A Glance*
- *State Academic Standards Sheets*
- *Electricity, Water, and Natural Gas Posters*
- *Teacher Survey Form*
- *Unlimited Website Access*
- *Toll-Free HELP line*
- *Self-Addressed Postage-Paid Envelope*

LivingWise Kit*

- *High-Efficiency Showerhead*
- *Two LED Light Bulbs*
- *Kitchen Faucet Aerator*
- *Bathroom Faucet Aerator*
- *Digital Thermometer*
- *LED Night Light*
- *Flow Rate Test Bag*
- *Parent/Guardian Program Evaluation*
- *Quick Start Guide*
- *Installation Instruction Booklet*
- *Spanish-Translated Materials*



*Actual kit items may vary.

Hurry and enroll today - spots are filling up fast!

We know you are busy, so we've made enrolling a snap. Choose the ONE option that works best for you!

- Fax this completed form to 1-800-544-8051
- Call toll free at 1-888-GET-WISE
- Email the information requested below to info@getwise.org
- Enroll online at www.getwise.org/enroll

YES! Please enroll me in the FREE LivingWise® Program!
I have verified that the contact information below is correct.

Contact Name: _____

School Name: _____

City: _____ State: _____ ZIP Code: _____

School Phone: _____ Fax: _____

Email: _____

Phone (alternative): _____ Grade Level: **5th**

Which month would you like to receive the materials? (circle one)

Soonest Available Sept Oct Nov # of Students: _____

I would like to be contacted via: (circle all that apply)

School phone Alternate phone Fax Email

Please enroll the following additional teachers to participate in the FREE program. These teachers will also receive a \$50.00 Mini Grant once they have submitted at least 80% of the completed student surveys by February 1, 2022.

Name: _____ # of Students: _____

Name: _____ # of Students: _____

Name: _____ # of Students: _____



LIVINGWISE®
PROGRAM

A SPECIAL \$50.00
MINI GRANT FOR YOUR
CLASSROOM

\$50.00

when 80% of the completed
Surveys are submitted
by February 1, 2022











Three reasons to enroll your classroom in LivingWise today!

1. Each student receives a FREE LivingWise Kit containing educational materials and energy-efficient products that can be installed in the student's home! For your convenience, we have enclosed a flyer describing the products.
2. Each participating teacher will receive a \$50.00 Mini Grant when returning 80% of the completed Student Surveys by February 1, 2022.
3. Each teacher receives a FREE LivingWise® Kit to take home and use!

**SUPPORTS
STATE ACADEMIC
STANDARDS**

How do Teachers Benefit?

-  NOTHING TO ADD - the program is meant as an enhancement to your current curriculum.
-  The rigorous curriculum provided by this program adheres to the academic standards set for: ELA, Math, Next Generation Science, Technology, and College and Career Readiness.
-  Program comes complete with a teacher manual and FREE LivingWise kits for each student.
-  Implementation time is minimal and the time frame is flexible - you set the pace!
-  PARENTS/GUARDIANS are encouraged to be directly involved in their child's education.
-  Students learn how to help their FAMILIES save electricity, natural gas, and water.
-  The FREE kits and exciting projects engage students to make learning fun!
-  Partnerships in the community are fostered to create support for schools.

P: 1-888-438-9473
F: 1-800-544-8051
www.getwise.org/enroll



LIVINGWISE®
PROGRAM

OG+E®

We Energize Life



TEACHER SURVEY

APSC FILED Time: 4/29/2022 9:55:15 AM; Rec'd: 4/29/2022 9:33:02 AM; Docket 07-075-TF-Doc. 459

Your feedback is greatly appreciated.

Program brought to you by:



Date: _____

School: _____

Teacher name: _____

Email: _____

Number of Student Survey forms returned: _____

Teacher Signature: _____

Please assess the LivingWise® Program Program by filling out this Teacher Survey form. Upon completion, return this Teacher Survey form, your Student Survey forms, student thank-you notes, and a letter from you to **Oklahoma Gas & Electric** in the postage-paid return envelope provided.

PLEASE FILL IN THE CIRCLE THAT BEST DESCRIBES YOUR OPINION:

1. The materials were clearly written and well organized.

- Strongly Agree Agree Disagree Strongly Disagree

2. The products in the kit were easy for students to use.

- Strongly Agree Agree Disagree Strongly Disagree

3. Students indicated that their parents supported the program.

- Yes No

4. Would you conduct this program again?

- Yes No

5. Would you recommend this program to other colleagues?

- Yes No

6. Would you be willing to participate on a local Teacher Focus Group?

- Yes No

7. If my school is eligible for participation next year, I would like to enroll.

- Yes No

8. What did students like best about the program? Explain.

9. What did you like best about the program? Explain.

10. What would you change about the program? Explain.

GET YOUR \$50.00 MINI GRANT!

Return the following by
February 1, 2022

- 80% of Student Survey forms
- This Survey form
- Student thank-you notes
- A letter from you





We Energize Life
.....

WELCOME

Thank you for choosing to participate! The LivingWise Program will help your students and their families learn the importance of natural resources and immediately lower their utility bills. **Oklahoma Gas & Electric** has fully paid for and provided this program for your class.

Program materials are continually updated using feedback from teachers just like you. This year, the following enhancements have been made:

- **TEACHER MATERIALS.** The *Teacher Book* includes a Program At A Glance, chapters, lessons, hands-on classroom activities, and teaching ideas.
- **STUDENT MATERIALS.** The *Student Guide* includes easy-to-use chapters and lessons, visual aids, charts and graphs, vocabulary exercises, engagement exercises, and “think and apply” discussion topics.
- **PARENT MATERIALS.** The introduction letters to parents and the kit contain information specifically designed to engage parents. Materials reinforce the concepts taught and will effectively help parents become an active participant in their child’s education.
- **SUPPORT OF MORE STATE STANDARDS.** The materials meet or exceed state academic standards in science, math, and language arts.

To ensure program success and your eligibility for a Mini Grant, please do the following:

- **HAVE YOUR STUDENTS INSTALL ALL OF THE PRODUCTS IN THE KIT.** Installation of all of the products is essential for learning how to conserve at home. The more products that are installed, the higher probability that the program will be available in future years.
- **IMPLEMENT THE PROGRAM.** Most teachers find that they can implement the program in two weeks or less. Find a time to fully implement the program so that students and their families have the best opportunity to save natural resources and money on the utility bill.
- **RETURN PROGRAM RESULTS.** Make sure that each student completes a Student Survey form and thank-you note. Return the Student Survey forms, thank-you notes, the Teacher Survey form (located on the reverse side of this letter) and a letter from you in the postage-paid envelope provided.

Questions? Call 1-888-GET-WISE or visit www.getwise.org.

DON'T LET TIME RUN OUT



Simply return 80% of your completed surveys by February 1, 2022, and you'll receive a **\$50.00** Mini Grant for your classroom!

And don't forget to give a wristband reward to your students when they return their completed surveys to you!



Offer open only to teachers participating in the program. Certain restrictions may apply. Good while supplies last. Offer ends February 1, 2022. 80% return rate of completed participant survey forms required for eligibility. For more information call 1-888-GET-WISE or contact us online at www.getwise.org.

PARENTS



CONGRATULATIONS!

Your child's class has been selected to participate in the exciting LivingWise Program. The program is designed to teach your child the value of water and energy and help you save money on your utility bills. This program is being provided by **Oklahoma Gas & Electric** at NO COST to you, your child's school, or the school district.

The average U.S. household pays at least \$2,200 per year in utility bills and can reduce these costs with just a few simple changes. Your child will be given a kit which includes FREE high quality energy and water saving products that utilize the latest efficiency technology. This kit is valued at over \$50 and will provide you with the ability to make these changes.

To participate, please do the following:

- Have your child talk to you about the ways they would like to save energy and water and complete the Pledge Form located on the next page.
- Install all of the kit items. You and your child can do most of the activities in less than 15 minutes. If you need additional help installing the kit items, visit www.getwise.org to view installation videos or call 1-888-GET-WISE.
- Work with your child to answer all of the survey questions in the Take-Home Workbook.

The LivingWise Program will be an easy and fun experience for your entire family. Not only will it allow your child the chance to be a leader in your home and community, but also your family will immediately benefit from lower utility bills. Thank you for your participation.

LET'S GET STARTED!



QUESTIONS? • 1-888-GET-WISE • www.getwise.org

**\$\$\$
AHORROS**

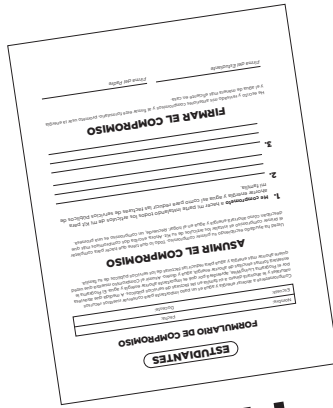
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INSTALACIÓN



+

FIRMA



¡COMENCEMOS!

El Programa LivingWise será una experiencia sencilla y divertida para toda su familia. No sólo le permitirá a su hijo la posibilidad de ser un líder en su hogar y en su comunidad, sino que también su familia se beneficiará inmediatamente por las facturas más bajas de los servicios públicos. Gracias por su participación.

- Haga que su hijo hable con usted sobre las formas en las que le gustaría ahorrar agua y energía y complete el Formulario de Compromiso ubicado en la próxima página.
- Instale todos los artículos del kit. Usted y su hijo pueden hacer la mayoría de las actividades en menos de 15 minutos. Si necesita ayuda adicional con la instalación de los artículos del kit, visite www.getwise.org para ver videos de instalación o llame al 1-888-GET-WISE.
- Trabaje con su hijo para responder todas las preguntas de la encuesta en el Libro de Trabajo para llevar a casa.

Para participar, por favor haga lo siguiente:

La vivienda promedio estadounidense paga por la mínima \$2,200 por año en facturas de servicios públicos y puede reducir estos costos simplemente con algunos cambios sencillos. A su hijo se le dará un kit LivingWise que incluye productos GRATUITOS de alta calidad para el ahorro de agua y energía que utilizan la tecnología de ahorro más moderna. Este kit tiene un valor de más de \$50 y le dará a usted la habilidad de implementar estos cambios.

La clase de su hijo ha sido seleccionada para participar en el fascinante Programa LivingWise. El programa está diseñado para enseñarle a su hijo el valor del agua y de la energía y para ayudarle a usted a ahorrar dinero en sus facturas de servicios públicos. Este programa lo provee **Oklahoma Gas & Electric** SIN COSTO para usted, la escuela de su hijo ni el distrito escolar.

¡FELICITACIONES!

PADRES



STUDENTS

PLEDGE FORM

Name:	Date:
School:	Teacher:

Pledging to save energy and water is an important step in conserving our natural resources and will save your family money on utility bills. As you go through the Program, you will learn why it is important to conserve energy and water. The Program will teach you simple ways to save energy, water, and money. Taking the Pledge shows that you want to be more energy and water efficient to reduce your family's utility bills.

TAKE THE PLEDGE

We have helped you out by writing your first pledge. All you have to do to complete the first pledge is install the items from your kit. Now, write two more pledges describing how you will be more energy and water efficient at home. Remember, a pledge is a *promise*.

- 1.** I pledge to do my part by installing all of the items in my kit to save energy and water as well as reduce my family's utility bills.
- 2.** _____

- 3.** _____

SIGN THE PLEDGE

I have written and reviewed my pledges above and by signing this form, I promise to use energy and water more efficiently at home.

Student Signature

Parent Signature

These kits are made possible by:



Firma del Padre

Firma del Estudiante

He escrito y revisado mis anteriores compromisos y al firmar este formulario, prometo usar la energía y el agua de manera más eficiente en casa.

FIRMAR EL COMPROMISO

- 1.** Me comprometo a hacer mi parte instalando todos los artículos de mi kit para ahorrar energía y agua así como para reducir las facturas de servicios públicos de mi familia.
- 2.** _____

- 3.** _____

Le hemos ayudado a escribir su primer compromiso. Todo lo que tiene que hacer para completar el primer compromiso es instalar los artículos de su kit. Ahora, escriba dos compromisos más que describan cómo ahorrará energía y agua en el hogar. Recuerde, un compromiso es una promesa.

ASUMIR EL COMPROMISO

Comprometirse a ahorrar energía y agua es un paso importante para conservar nuestros recursos naturales y le ahorrará dinero a su familia en las facturas de servicios públicos. A medida que avanza por el Programa, aprenderá por qué es importante ahorrar energía y agua. El Programa le enseñará formas sencillas de ahorrar energía, agua y dinero. Asumir el Compromiso muestra que usted quiere ahorrar más energía y agua para reducir las facturas de los servicios públicos de su familia.

Nombre:	Fecha:
Escuela:	Docente:

FORMULARIO DE COMPROMISO

ESTUDIANTES



OG+E[®]

We Energize Life



CERTIFICATE OF ACHIEVEMENT

Awarded to

**for making a difference in your community
by successfully completing the LivingWise[®] Program.**

Diane Sumner

Diane Sumner, Ed.D., Director of Education



LIVINGWISE[®]
PROGRAM

ARKANSAS ACADEMIC STANDARDS*

GRADE 6

LANGUAGE ARTS

READING IN SCIENCE AND TECHNICAL SUBJECTS

RST.6-8.1	Cite specific textual evidence to support analysis of science and technical texts.
RST.6-8.2	Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.
RST.6-8.3	Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
RST.6-8.4	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to Grades 6–8 texts and topics.
RST.6-8.5	Analyze the structure an author uses to organize a text, including how the major sections contribute to the whole and to an understanding of the topic.
RST.6-8.6	Analyze the author’s purpose in providing an explanation, describing a procedure, or discussing an experiment in a text.
RST.6-8.7	Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).
RST.6-8.8	Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.
RST.6-8.9	Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.
RST.6-8.10	By the end of grade 8, read and comprehend science/technical texts in the grades 6-8 text complexity band independently and proficiently.

READING: INFORMATIONAL TEXT

RI.6.1	Cite textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.
RI.6.2	Examine a grade-appropriate informational text. Provide an objective summary. Determine a central idea and how it is conveyed through particular details.
RI.6.3	Analyze in detail how a key individual, event, or idea is introduced, illustrated, and elaborated in a text.
RI.6.4	Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings.
RI.6.5	Analyze how a particular sentence, paragraph, chapter, or section fits into the overall structure of a text and contributes to the development of the ideas.
RI.6.6	Determine an author’s point of view, perspective, and/or purpose in a text and explain how it is conveyed in the text.
RI.6.7	Integrate information presented in different media or formats (e.g., visually, quantitatively) as well as in words to develop a coherent understanding of a topic or issue.
RI.6.8	Trace and evaluate the argument and specific claims in a text, distinguishing claims that are supported by reasons and evidence from claims that are not.
RI.6.10	By the end of the year, read and comprehend literary nonfiction in the Grades 6-8 text complexity band proficiently, with scaffolding as needed at the high end of the range.

*State Academic Standards derived from multiple, independent sources exhibit the most current information available to date.

ARKANSAS ACADEMIC STANDARDS*

GRADE 6

LANGUAGE ARTS

WRITING

W.6.1	Write arguments to support claims with clear reasons and relevant evidence.
W.6.2	Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.
W.6.3	Write narratives to develop real or imagined experiences or events using effective technique, relevant descriptive details, and well-structured event sequences.
W.6.4	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
W.6.9	Draw evidence from literary and/or informational texts to support analysis, reflection, and research.
W.6.10	Write routinely over extended time frames and shorter time frames for research, reflection, and revision and shorter time frames for a range of discipline-specific tasks, purposes, and audiences.

SPEAKING AND LISTENING

SL.6.1	Engage effectively in a range of collaborative discussions one-on-one, in groups, and teacher-led with diverse partners on grade 6 topics, texts, and issues, building on others' ideas and expressing their own clearly.
SL.6.4	Present claims and findings, sequencing ideas logically and using pertinent descriptions, facts, and details to accentuate main ideas or themes; use appropriate eye contact, adequate volume, and clear pronunciation.

LANGUAGE

L.6.4	Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on Grade 6 reading and content, choosing flexibly from a range of effective strategies.
L.6.6	Acquire and use accurately grade-appropriate general academic and domain-specific words and phrases; gather vocabulary knowledge when considering a word or phrase important to comprehension or expression.

WRITING IN SCIENCE AND TECHNICAL SUBJECTS

WHST.6-8.1	Write arguments focused on discipline-specific content.
WHST.6-8.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.
WHST.6-8.4	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
WHST.6-8.9	Draw evidence from informational texts to support analysis, reflection, and research.
WHST.6-8.10	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.

*State Academic Standards derived from multiple, independent sources exhibit the most current information available to date.

ARKANSAS ACADEMIC STANDARDS*

GRADE 6

MATHEMATICS

RATIOS AND PROPORTIONAL RELATIONSHIPS

6.RP.A.1	Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.
6.RP.A.2	Understand the concept of a unit rate a/b associated with a ratio $a:b$ with $b \neq 0$, and use rate language in the context of a ratio relationship.
6.RP.A.3	Use ratio and rate reasoning to solve real-world and mathematical problems (e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations).

THE NUMBER SYSTEM

6.NS.B.2	Use computational fluency to divide multi-digit numbers using a standard algorithm.
6.NS.B.3	Use computational fluency to add, subtract, multiply, and divide multi-digit decimals using a standard algorithm for each operation.
6.NS.C.5	Understand that positive and negative numbers are used together to describe quantities having opposite directions or values, explaining the meaning of 0 (e.g., temperature above/below zero).

EXPRESSIONS AND EQUATIONS

6.EE.A.1	Write and evaluate numerical expressions involving whole-number exponents.
6.EE.A.2	Write, read, and evaluate expressions in which letters stand for numbers.
6.EE.B.6	Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number or any number in a specified set.

GEOMETRY

6.G.A.2	Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas $V = lwh$ and $V = bh$ to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems.
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STATISTICS AND PROBABILITY

6.SP.A.1	Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers.
6.SP.B.4	Display numerical data in plots on a number line, including dot plots, histograms, and box plots.
6.SP.B.5	Summarize numerical data sets in relation to their context, such as by: reporting the number of observations and describing the nature of the attribute under investigation, including how it was measured and its units of measurement.

*State Academic Standards derived from multiple, independent sources exhibit the most current information available to date.

ARKANSAS ACADEMIC STANDARDS*

GRADE 6

SCIENCE

PHYSICAL SCIENCES

6-PS3-3.	Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer.
6-PS3-4.	Plan an investigation to determine the relationships among the energy transferred, the type of matter, the mass, and the change in the average kinetic energy of the particles as measured by the temperature of the sample.
6-PS3-5.	Construct, use, and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object.

EARTH AND SPACE SCIENCES

6-ESS2-4.	Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity.
6-ESS3-3.	Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.
6-ESS3-4.	Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.

ENGINEERING DESIGN

6-ETS1-1.	Define the criteria and constraints of a design problem, accounting for scientific principles and impacts on people and the natural environment that may limit possible solutions.
6-ETS1-2.	Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
6-ETS1-3.	Analyze data to determine similarities and differences to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.
6-ETS1-4.	Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.

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