PY2023 Annual Summary Report on Evaluation, Measurement & Verification Findings

Prepared for:

Arkansas Public Service Commission

Prepared by:

The Independent Evaluation Monitor

Dr. Katherine Johnson, President

Johnson Consulting Group

1033 Lindfield Drive, Frederick, MD 21702

Email: kjohnson@johnsonconsults.com

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Glossary

Below is a partial listing of some key terms and acronyms used in this report as an effort to aid the reader.

Acronym	Definition
ADM	ADM Associates
AOG	Arkansas Oklahoma Gas Corporation
AOH	Annual Operating Hours
APSC	Arkansas Public Service Commission
ADRC	Avoided and Deferred Equipment Replacement Costs/ Deferred Replacement Costs
AR	Arkansas
B/C	Benefit/Cost
B/C ratio	Benefit/Cost Ratio
BHE	Black Hills Energy Arkansas
BPI	Building Performance Institute
BSP	Business/Solutions Industrial Program
C&I	Commercial and Industrial
CAC	Central Air Conditioner
CF	Coincidence Factor
CEEP	Commercial Energy Efficiency Program
CEI	Continuous Energy Improvement
CIP	Conservation Improvement Program
SUA	Summit Utilities Arkansas
CPS	Consumer Products Solutions
CWA	Consistent Weatherization Approach
DHW	Domestic Hot Water
DI	Direct Install
DLC	Design Lights Consortium
DOE	Department of Energy
DSM	Demand Side Management
EAL	Entergy Arkansas, LLC
EE	Energy Efficiency
EEA	Energy Efficiency Arkansas
EEP	Energy Efficiency Program
EF	Energy Factor
EFLH	Equivalent Full Load Hour
EM&V	Evaluation, Measurement, and Verification
FVR	Field Verification Rate
Empire	Empire District Electric Company
EMS	Environmental Management System

EUL	Equipment Useful Life
HIM	High Impact Measures
HEEP	Home Energy Efficiency Program
HER	Home Performance with ENERGY STAR Energy Reports
HES	Home Energy Savings
HPwES	Home Performance with ENERGY STAR
HOU	Hours Of Use
HUD	Housing and Urban Development
HVAC	Heating, Ventilation, and Air Conditioning
IEM	Independent Evaluation Monitor
IOUs	Investor-Owned Utilities
IPMVP	International Performance Measurement and Verification Protocol
IQW	Income Qualified Weatherization
ISR	In-Service Rate
kW	Kilowatt
kWh	Kilowatt-hour
LED	Light Emitting Diode
LIPP	Low-Income Pilot Program
LIHEAP	Low-Income Home Energy Assistance Program
LMSOP	Load Management Standard Offer Program
MW	Megawatt
MWh	Megawatt-hour
NEBs	Non-Energy Benefits
NPV	Net Present Value
NTG	Net-to-Gross
NTGR	Net-to-Gross Ratio
OG&E	Oklahoma Gas & Electric
Primary Savings	Primary Savings refers to electricity savings by electric utilities and natural gas savings by gas utilities
PY	Program Year
PWC	Parties Working Collaboratively
QA	Quality Assurance
QC	Quality Control
QPL	Qualified Product List
RCT	Randomized Control Trial
REIP	Residential Energy Efficiency Program
RLA	Residential Lighting & Appliance Program
RR	Realization Rate
RSOL	Residential Solutions Program

RSOP	Residential Standard Offer Program
SAGE	Schools and Government Energy Efficiency
SBDI	Small Business Direct Install
SBEE	Small Business Energy Efficiency
SEM	Strategic Energy Management
SWEPCO	American Electric Power- Southwestern Electric Power Company
TRC	Total Resource Cost Test
TRM	Technical Reference Manual
UEF	Uniform Energy Factor
VFD	Variable Frequency Drives

Referencing Style: This report uses the Harvard Referencing Style[1] which is a method of citation that lists the author and date in the text. It is used for researchers to summarize findings from secondary sources, such as the individual Evaluation, Measurement & Verification (EM&V) reports cited in this annual report. This referencing style also used to validate findings from other sources without infringing upon any intellectual property laws.[2]

[1] https://www.imperial.ac.uk/media/imperial-college/administration-and-support-services/library/public/IMPP10649-Harvard-Guide-230822-WEB.pdf

[2] http://www.citethisforme.com/uk/referencing-generator/harvard

Executive Summary

The Independent Evaluation Monitor (IEM) has prepared the PY2023 Annual Summary Report of Evaluation, Measurement & Verification (EM&V) Activities on behalf of the Arkansas Public Service Commission (APSC) and the Parties Working Collaboratively (PWC) as directed in Docket No. 10-100-R.

The 2023 Annual Summary Report summarizes the key findings and recommendations from six separate EM&V Reports prepared for the following energy organizations:

- Arkansas Oklahoma Gas Corporation (AOG) (A division of Summit Utilities);
- Black Hills Energy Arkansas (BHE);
- Entergy Arkansas, LLC (EAL);
- Oklahoma Gas & Electric Company (OG&E);
- Summit Utilities Arkansas (SUA); and
- American Electric Power – Southwestern Electric Power Company (SWEPCO).

Empire Electric filed for an extension to submit their PY2023 on August 1, 2023. Therefore, this annual report does not include any information regarding Empire Electric for PY2023. The IEM will provide a summary memo regarding Empire's PY2023 EM&V Report by August 31, 2024. Moreover, the IEM will continue to reach out proactively to assist Empire in fulfilling its EM&V reporting requirements.

While this report summarizes the PY2023 EM&V Reports, it is intended to supplement and evaluate the individual reports. Each EM&V report provides essential feedback and meaningful insights that the program administrators and implementers should address to improve program operations going forward.

Since the IEM's fundamental role is advisory, this report provides a technical review. As part of this review, the IEM determined whether the PY2023 evaluations incorporated the appropriate methodologies and approaches to provide credible estimates of program savings and followed the proper protocols for process evaluations. In addition, where applicable, the IEM identified how the EM&V contractors could improve, adapt and refine future evaluation activities while operating within the new constraints and challenges of a dynamic energy market.

The key findings and recommendations from the process and impact evaluations are summarized next. Finally, the effectiveness of these evaluation activities is discussed in Section 4: Evaluating the Evaluators.

Key Findings and Recommendations from EM&V Contractors

Impact Evaluation Findings

Arkansas' energy efficiency programs offered by the six[3] IOUs continue to achieve their goals with significant success. The net evaluated electricity savings achieved in PY2023 exceeded the electric utilities' combined goals by two percent. The net evaluated gas savings achieved in PY2023 fell just short of the planned savings by approximately one percent (see Table E-1).

Two of the three electric utilities exceeded their savings goals for PY2023. OG&E and SWEPCO exceeded their individual electric savings goals by 21 percent and 12 percent, respectively. EAL fell just shy of its goal with a deficit of less than one percent (EAL BY2023 EM&V Report, pp. 34-36; OG&E PY2023 EM&V Report, p. 23; SWEPCO PY2023 EM&V Report, p. 24).

Table E - 1: Summary of Total PY2023 Gas and Electricity Primary Savings

Utility	Planned Therm Savings	Net Evaluated Therm Savings	Planned kWh Savings	Net Evaluated kWh Savings	Percent of Planned Savings Achieved
AOG	461,620	528,592			114.5%
BHE	1,510,377	1,543,029			102.2%
SUA	3,934,708	3,745,068			95.2%
EAL			285,148,000	283,027,659	99.3%
OG&E			25,301,215	30,700,870	121.3%
SWEPCO			34,505,559	38,666,749	112.1%
Total Gas	**5,906,705**	**5,816,689**			**98.5%**
Total Electric			**344,954,774**	**352,395,278**	**102.2%**

Sources: PY2023 EM&V Reports and Evaluator-provided summary workbooks.

The C&I sector continues to be the largest contributing sector for both gas and electric savings. Agricultural and cross-cutting electricity savings accounted for over one quarter of evaluated savings for the electric utilities. Gas savings from cross-cutting programs contributed to only one percent of overall gas savings. The residential sector accounted for 24 percent of electricity savings and 39 percent of gas savings.

[3] Empire Electric, a seventh Arkansas IOU, filed an extension to submitting their PY2023 EM&V Report.

Non-Energy Benefits

NEBs continue to provide substantial benefits to programs. For example, including the electric utilities' natural gas NEBs of 1,492,940 therms increased the overall gas savings by 26 percent. The gas utilities' electric NEBs of 3,864,278 kWh represented an additional one percent of electricity savings in addition to that saved by the electric utilities (See Table E-2).

Table E - 2: PY2023 Total NEBs Annual Savings by Utility

Utility	NEB Secondary Fuel Savings		Water (gallons)	Avoided/Deferred Replacement Costs ($)
	kWh or therms	Propane (gallons)		
AOG	710,685 kWh	0	122,437	$173,642
BHE	1,486,149 kWh	0	1,225,047	$221,649
SUA	1,667,444 kWh	0	4,717,560	$1,165,564
EAL	952,482 therms	107,003	6,767,760	$13,800,416
OG&E	35,436 therms	432	2,199,570	$1,222,771
SWEPCO	505,022 therms	0	2,316,379	$4,601,157
Total	**3,864,278 kWh**	**107,435**	**17,348,753**	**$21,185,199**
	1,492,940 therms			

Sources: PY2023 EM&V Reports and Evaluator-provided summary workbooks

Review of Program Database Tracking

The PY2023 databases were adequate for evaluators to conduct their verification activities. Evaluators reported that most data were available for reproducing savings from program offerings (AOG PY2023 EM&V Report, p. 3-12; BHE PY2023 EM&V Report, p. 3-11; EAL BY2023 EM&V Report, pp. 207, 212-213, 229-230, 261-262, 283-284; OG&E PY2023 EM&V Report, pp. 59-60; SUA PY2023 EM&V Report, p. 3-12; SWEPCO PY2023 EM&V Report, p. 54). Data quality issues were noted by evaluators around heating system type, measure classification and efficiency levels (EAL BY2023 EM&V Report, pp. 264-265, 309; OG&E PY2023 EM&V Report, pp. 153, 193; SWEPCO PY2023 EM&V Report, pp. 34, 124, 206).

TRM 9.1 changes were incorporated into tracking databases, yet key fields were not always populated. PY2023 evaluations used TRM 9.1, which was a comprehensive update across many measures. Evaluators found that tracking databases were updated to reflect these changes (AOG PY2023 EM&V Report, p. 3-12; BHE PY2023 EM&V Report, p. 3-11; EAL BY2023 EM&V Report, pp. 207, 212, 229-230, 261-262, 282-283; OG&E PY2023 EM&V Report, p. 59; SUA PY2023 EM&V Report, p. 3-12; SWEPCO PY2023 EM&V Report, p. 54).

Quality Assurance/Quality Control (QA/QC)

All utilities have incorporated QA/QC activities in utility program operations. Evaluation teams confirmed utility QA/QC practices by program. ADM does this as part of reporting on the APSC Comprehensive Goals, Factor 7 (AOG PY2023 EM&V Report, p. 3-12; BHE PY2023 EM&V Report, p. 3-11; OG&E PY2023

EM&V Report, p. 60; SUA PY2023 EM&V Report, p. 3-11; SWEPCO PY2023 EM&V Report, p. 61). Tetra Tech reports on QA/QC practices by program in a dedicated section (EAL BY2023 EM&V Report, pp. 117, 138, 159, 180, 202, 245, 273, 305, 315).

Evaluators continue their engagement with program delivery stakeholders. Evaluators continued to engage with implementation contractors on M&V plans for custom projects throughout the program year to help reduce post-savings assessment risks (AOG PY2023 EM&V Report, pp. 5-8-5-10; BHE PY2023 EM&V Report, pp. 5-10-5-11; EAL BY2023 EM&V Report, pp. 215, 309; OG&E PY2023 EM&V Report, pp. 63, 65; SUA PY2023 EM&V Plan, pp. 7-8-7-10; SWEPCO PY2023 EM&V Report, p. 54).

Review of TRM Savings Estimates

Evaluators reported on their findings regarding the application and usage of the Arkansas TRM Version 9.1, Volume 2. PY2023 EM&V Reports provided evaluators with the opportunity to provide guidance around the application of default parameters, in-service rates, baseline assumptions and refining approaches on how to estimate better algorithm parameters for midstream/kit/giveaway programs (BHE PY2023 EM&V Report, p. 4-25; EAL BY2023 EM&V Report, p. 82; OG&E PY2023 EM&V Report, p. 85; SWEPCO PY2023 EM&V Report, p. 165).

OG&E identified program-specific values to apply in TRM algorithms where relevant to help refine the derivation of ex-ante programs. ADM noted several suggestions on how to apply appropriate default values or weighted estimates where relevant based on program-specific findings (OG&E PY2023 EM&V Report, pp. 87, 111, 194).

Net-to-Gross (NTG) Estimates

The overall savings-weighted average NTG estimates remained high in PY2023 and increased from PY2022 for both electric and gas savings. The PY2023 portfolio NTG values in Table E-3 were at least one percentage point higher for all utilities except one. The portfolio NTG value for SUA decreased slightly from PY2022 (95.6% in PY2023 compared to 96.3% in PY2022) but still remained very high.

Table E - 3: Summary of Portfolio NTG Values

Utility	Portfolio NTG
AOG	95.1%
BHE	96.2%
SUA	95.6%
Gas Savings Weighted Average	95.7%
EAL	99.2%
OG&E	92.3%
SWEPCO	94.8%
Electric Savings Weighted Average	98.1%

Source: Analysis of PY2023 EM&V Reports

Spillover

The evaluators continued to find minimal instances of spillover in PY2023. The evaluators conducted some level of survey-based spillover research for all the utilities. In most cases, no instances of spillover were found. The SWEPCO evaluators found a limited spillover of 4.6% in the HPwES program (SWEPCO PY2023 EM&V Report, p. 167). When primary research was not conducted, evaluators relied on literature reviews or past research.

Custom Projects

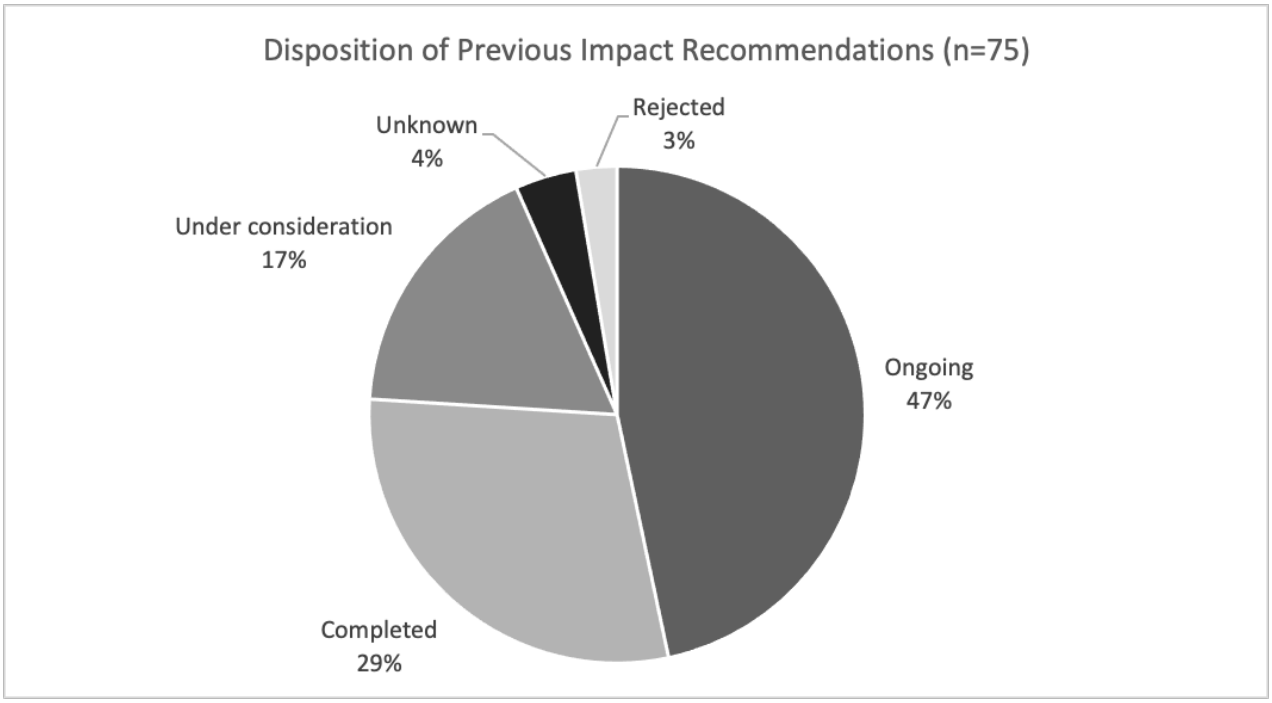
Custom projects' total contribution to statewide gas utility portfolios slightly decreased in PY2023. Statewide custom projects accounted for 35 percent of ex-ante gas (therms) savings in PY2023, ten points less than in PY2022 (45 percent) (AOG PY2023 EM&V Report, Table 1-3, p. 1-3; BHE PY2023 EM&V Report, Table 1-3, p. 1-4; SUA PY2023 EM&V Report, Table 1-2, p. 1-4).

Custom projects' contribution to portfolio savings in electric programs was either similar or less than that in PY2022. Custom project savings in PY2023 were the same as in PY2022 at 13 percent of EAL's portfolio (EAL BY2023 EM&V Report, p. 223). The contribution towards portfolio electric savings from custom projects dropped from 38 percent to 21 percent for OG&E (OG&E PY2023 EM&V Report, p. 158). For SWEPCO, based on two tables from the PY2023 EM&V Report, custom projects appear to have dropped in contribution to the electric savings portfolio from PY2022 to approximately 10 percent (SWEPCO PY2023 EM&V Report, p. 100, 105).

Custom behavioral programs continue to be a viable pathway for reaching savings goals. SWEPCO has seen a significant increase in savings from Strategic Energy Management (SEM) projects, making up 34 percent of the total savings of the C&I program (CIEEP) in PY2023. PY2024 evaluation plans will reflect evaluation methods that will focus on the verification of these savings (SWEPCO PY2023 EM&V Report, pp. 84, 96). For EAL and OG&E, Continuous Energy Improvement (CEI) has similarly seen an uptick in participation and savings. EAL captured 41 percent savings for the C&I program from CEI projects, an increase from 33% in PY2022 (EAL BY2023 EM&V Report, pp. 71, 223). Similarly, OG&E saw 22 percent of the savings for the C&I program from CEI projects, an increase from 19 percent in PY2022 (OG&E PY2023 EM&V Report, p. 159).

Status of Previous Impact Recommendations

The evaluators reported roughly half (47 percent) of the previous impact recommendations as "ongoing" by the utilities in PY2023. Another 29 percent are noted as "completed," 17 percent as "under consideration," and three percent as rejected. 'Unknown' (disposition) is a category added by the IEM to designate the percentage of recommendations made in PY2022 that did not have a status update in the PY2023 EM&V reports.



Sources: Analysis of PY2023 EM&V Reports

Figure E - 1: Disposition of Previous Impact Recommendations

Table E-4 summarizes the status of all previous recommendations by utility.

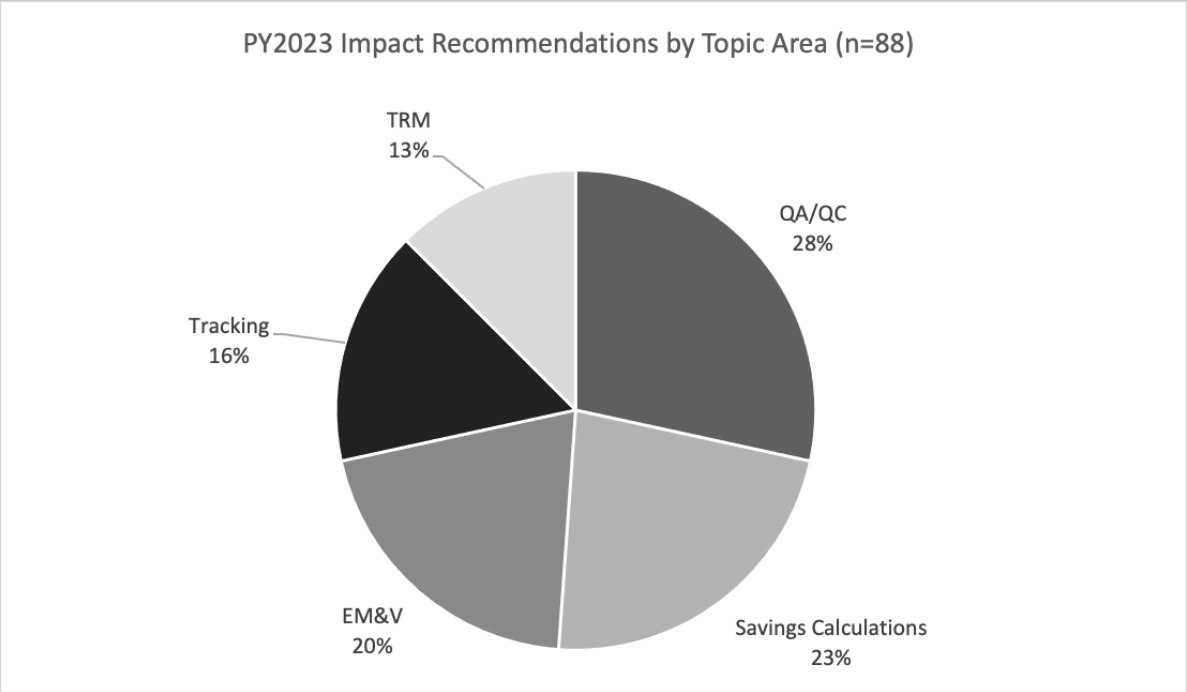
Table E - 4: Disposition of Previous Impact Evaluation (PY2022) Recommendations by Utility

	Gas Utilities			Electric Utilities			
Utility	**AOG**	**BHE**	**SUA**	**EAL**	**OG&E**	**SWEPCO**	**Total**
Completed	1	3	3	12	1	2	**22**
Ongoing	1	3	1	27	3		**35**
Rejected				1	1		**2**
Under Consideration		1		11	1		**13**
Unknown			2	1			**3**
Total for Each Utility	**2**	**7**	**6**	**52**	**6**	**2**	**75**

Sources: Analysis of PY2023 EM&V Reports, IEM PY2022 EM&V Report

PY2023 Impact Recommendations

The evaluators reported 88 recommendations for PY2023, spanning most topic areas evenly. The recommendations covered different impact topic areas, as seen in Figure E-2. Most recommendations focused on QA/QC (28 percent) areas of improvement, followed by recommendations around savings calculations (23 percent) and EM&V (20 percent). Database Tracking and TRM followed at sixteen percent and thirteen percent, respectively.



Source: Analysis of PY2023 EM&V Reports

Figure E - 2: PY2023 Impact Recommendations

Table E-5 summarizes the distribution of the PY2023 recommendations. The evaluators identified 88 unique recommendations for PY2023, with 43 percent (n=38) being new recommendations. Several of the recommendations were duplicated across programs using similar delivery mechanisms.

Table E - 5: Distribution of PY2023 Impact Recommendations by Topic and Utility

Utility	EM&V	QA/QC	Savings Calculations	Tracking	TRM	Total
AOG				2		**2**
BHE			3	1		**4**
SUA		3	1	3		**7**
EAL	16	18	8	5	7	**54**
OG&E	2	1	7	3	3	**16**
SWEPCO		3	1		1	**5**
Total	**18**	**25**	**20**	**14**	**11**	**88**

Source: Analysis of PY2023 EM&V Reports

Process Evaluation Findings

The evaluators completed process evaluations per the requirements identified in TRM 9.1 Volume 1, Protocol C. The key findings from these activities are summarized next.

Program Performance

Several programs met or exceeded their savings and performance goals (AOG PY2023 EM&V Report, p. 7-7; BHE PY2023 EM&V Report, pp. 3-10, 4-40, 5-23, 6-18; EAL BY2023 EM&V Report, pp. 33, 88; OG&E PY2023 EM&V Report, p. 57; SUA PY2023 EM&V Report, p. 1-10; SWEPCO PY2023 EM&V Report, p. 53).

Of particular note, EAL achieved 20 percent of its portfolio savings through its successful hard-to-reach programs, which target public institutions, small businesses, agriculture, multifamily, manufactured homes and low-income segments (EAL BY2023 EM&V Report, pp. 36, 39, 84).

Custom programs accounted for the most savings from commercial projects (AOG PY2023 EM&V Report, p. 5-5). For example, SUA's custom C&I program continues to operate smoothly and accounts for most commercial savings. The program met its savings goal while also remaining highly cost-effective (SUA PY2023 EM&V Report, pp. 7-12, 7-21).

Of note, BHE's SEM program continued to gain traction in the commercial market and accounted for 21 percent of overall savings for its CISP Custom Pathway (BHE PY2023 EM&V Report, p. 5-23).

However, a few programs failed to meet their planned goals (AOG PY2023 EM&V Report, p. 5-19). EAL met the APSC targets but fell just short of its filed goal (99%) due to the transition from lighting and rising prices. The utility met just 55 percent of its demand goals due to shortfalls in demand response reductions. Furthermore, none of EAL's downstream commercial programs met the planned goals (EAL BY2023 EM&V Report, pp. 33-34).

Most notably, SUA's Home Energy Report (HER) program experienced significant attrition in PY2023, with attrition rates rising to 55 percent for Wave 1 (SUA PY2023 EM&V Report, pp. 1-10, 9-1, 9-24).

Awareness

Most participants learned about energy efficiency programs via word-of-mouth or from bill inserts (AOG PY2023 EM&V Report, p. 7-14; BHE PY2023 EM&V Report, pp. 4-26, 6-11; EAL BY2023 EM&V Report, p. 131; OG&E PY2023 EM&V Report, pp. 105, 141, 184-185; SUA PY2023 EM&V Report, p. 12-12; SWEPCO PY2023 EM&V Report, pp. 35, 37, 141, 179, 193, 207).

Mass marketing and targeted marketing to specific segments continued to raise customer awareness. In particular, the use of social media and emails has increased. Email blasts raised customer awareness (EAL BY2023 EM&V Report, p. 81; SWEPCO PY2023 EM&V Report, pp. 43-44).

Respondents also learned about programs from utility websites or participating trade allies (AOG PY2023 EM&V Report, p. 4-8; BHE PY2023 EM&V Report, pp. 2-7, 4-9, 4-14; OG&E PY2023 EM&V Report, pp. 105, 178, 182, 184; SUA PY2023 EM&V Report, pp. 4-7-4-8; SWEPCO PY2023 EM&V Report, pp. 37, 178, 193, 200).

Awareness levels of programs differed by customer group. For example, Large C&I Channel participants were generally aware of other OG&E energy efficiency offerings (OG&E PY2023 EM&V Report pp. 177-

178). While SBDI Channel participants are usually *unaware* of other OG&E energy efficiency offerings (OG&E PY2023 EM&V Report, pp. 184-185).

Marketing

The utilities continue to promote their energy efficiency programs across multiple channels (AOG PY2023 EM&V Report, pp. 5-7, 6-7, 6-8, 6-11, 7-9; BHE PY2023 EM&V Report, p. 4-8; EAL BY2023 EM&V Report, pp. 130-131, 174; OG&E PY2023 EM&V Report, p. 140; SUA PY2023 EM&V Report, p. 11-7; SWEPCO PY2023 EM&V Report, pp. 38, 136-137).

Trade allies promote equipment rebate programs directly to customers on behalf of the sponsoring utility (AOG PY2023 EM&V Report, pp. 6-7-6-8; BHE PY2023 EM&V Report, pp. 4-8, 4-22-4-23; OG&E PY2023 EM&V Report, p. 140; SUA PY2023 EM&V Report, p. 11-7; SWEPCO PY2023 EM&V Report, p. 138).

Marketing and outreach activities align with best practices, including a strong "call to action" (SWEPCO PY2023 EM&V Report, pp. 38, 137-138). Some marketing materials focus on the benefits of energy efficiency, while others focus on seasonal messages emphasizing tune-ups (SWEPCO PY2023 EM&V Report, p. 137).

Reasons for Program Participation

Saving money on energy bills was the primary driver of program participation across all six IOUs (AOG PY2023 EM&V Report, pp. 6-11-6-12, 7-14-7-15; BHE PY2023 EM&V Report, pp. 4-9-4-10, 4-27-4-28; EAL BY2023 EM&V Report, pp. 102-103, 173-174; OG&E PY2023 EM&V Report, pp. 106, 142, 179-180, 182, 188-189; SUA PY2023 EM&V Report, pp. 4-7-4-8; SWEPCO PY2023 EM&V Report, pp. 181, 183-184).

Measure Installations

Most energy audit participants installed most of the recommended measures (AOG PY2023 EM&V Report, pp. 6-13, 6-15; BHE PY2023 EM&V Report, p. 4-28; EAL BY2023 EM&V Report, pp. 132-133, 153, 176; SWEPCO PY2023 EM&V Report, p. 204).

Program Barriers

Increasing energy costs and persistent inflationary pressures adversely affected project costs (EAL BY2023 EM&V Report, p. 33).

Barriers to Installing Recommended Measures

The evaluators identified the following barriers:

- Upfront cost or long payback periods (EAL BY2023 EM&V Report, pp. 132, 153, 176; OG&E PY2023 EM&V Report, pp. 181-183, 187, 193; SWEPCO PY2023 EM&V Report, p. 204)
- Lack of time (EAL BY2023 EM&V Report, pp. 106, 153, 176)
- Did not know how to install the measure (EAL BY2023 EM&V Report, p. 153)
- Unsure of the energy savings (EAL BY2023 EM&V Report, p. 176)
- Did not like the recommended measure (EAL BY2023 EM&V Report, p. 176)

Satisfaction

Overall program satisfaction remained high for most programs offered by the six Arkansas IOUs (AOG PY2023 EM&V Report, pp. 7-17-7-18; BHE PY2023 EM&V Report, pp. 1-9, 4-12, 4-28, 4-29, 4-30, 6-15, 6-18; EAL BY2023 EM&V Report, pp. 108-109, 135-136, 140, 156-157, 177-178; OG&E PY2023 EM&V Report, pp. 27-28, 107, 108, 145-146, 153, 180-181, 186, 193; SUA PY2023 EM&V Report, pp. 4-10-4-11, 12-15; SWEPCO PY2023 EM&V Report, pp. 34, 36-37, 123, 187-188, 195, 197, 203, 210).

Large C&I program participants also reported high satisfaction levels with the program offerings, the participation process and their overall utility (EAL BY2023 EM&V Report, p. 108; OG&E PY2023 EM&V Report, pp. 180, 183; SWEPCO PY2023 EM&V Report, p. 126).

Dissatisfaction

A minority of program participants expressed dissatisfaction with specific program elements, such as the quality or quantity of equipment installed through the program (AOG PY2023 EM&V Report, pp. 6-16, 7-17; BHE PY2023 EM&V Report, p. 4-12; EAL BY2023 EM&V Report, pp. 177-178; OG&E PY2023 EM&V Report, pp. 107-108; SUA PY2023 EM&V Report p. 12-14) and smaller than expected energy savings (EAL BY2023 EM&V Report, p. 136; OG&E PY2023 EM&V Report, p. 108).

Program Operations

***Application Process*:** The application process was fairly easy for most program participants, whether they completed it on their own or with the help of a contractor (AOG, PY2023 EM&V Report, pp. 1-7, 6-18; BHE PY2023 EM&V Report, pp. 6-13, 6-14; OG&E PY2023 EM&V Report, pp. 179, 184-185).

Waiting Times: Wait times for the energy efficiency programs were one to two weeks, with some programs providing audits within the same week (EAL BY2023 EM&V Report, pp. 104, 105, 152, 175).

Changes in Program Operations

The evaluators identified several changes in program operations in 2023, which often led to improved program performance (AOG PY2023 EM&V Report, p. 5-5; EAL BY2023 EM&V Report, p. 39; OG&E PY2023 EM&V Report, p. 140; SUA PY2023 EM&V Report, p. 4-6)

Planned Program Changes

SUA plans on implementing several program design changes next year (SUA PY2023 EM&V Report, pp. 1-10, 6-4, 8-8, 10-2)

AOG is considering offering a behavioral program to coordinate with OG&E's existing program as a way to capture gas savings (AOG PY2023 EM&V Report, pp. 3-5-3-6).

Recommend Program to Others

Most program participants were either likely to recommend these energy programs to others or already have promoted the program to friends or neighbors (AOG P2023 EM&V Report, pp. 4-11, 6-16, 7-17; BHE PY2023 EM&V Report, pp. 4-12, 4-29; EAL BY2023 EM&V Report, p. 157, OG&E PY2023 EM&V Report, p. 180; SWEPCO PY2023 EM&V Report, pp. 37, 188-189).

Areas for Program Improvement

A minority of program participants offered suggestions on ways in which specific energy programs could be improved going forward, including expanding the list of eligible equipment and providing more flexible incentive structures (AOG PY2023 EM&V Report, p. 6-24; EAL BY2023 EM&V Report, pp. 155, 176; OG&E PY2023 EM&V Report, pp. 146, 187; SWEPCO PY2023 EM&V Report, p. 126)

Trade Ally Performance

The program implementers changed the payment structure based on performance for the AOG-OG&E weatherization program as a way to maximize customer savings (AOG PY2023 EM&V Report, pp. 6-6, 7-8).

The AOG-OG&E weatherization program also changed the lead process by focusing on specific geographic locations rather than providing monthly leads every month. However, this process does create fluctuations in trade ally workload (AOG PY2023 EM&V Report, p. 6-6; OG&E PY2023 EM&V Report, p. 140)

Trade Ally Recruiting

Several evaluators provided information concerning trade ally management, addressing areas such as vetting new trade allies and managing trade ally performance. This process provided valuable input for program improvements. They also included situations that identified trade ally/contractor issues that could be addressed promptly (EAL BY2023 EM&V Report, p. 205; SUA PY2023 EM&V Report, p. 11-9; SWEPCO PY2023 EM&V Report, pp. 139, 140, 200).

Marketing

Trade allies rely on a variety of marketing approaches to recruit program participants (AOG PY2023 EM&V Report, pp. 4-11, 6-6; EAL BY2023 EM&V Report, p. 82; OG&E PY2023 EM&V Report, p. 53; SUA PY2023 EM&V Report, pp. 4-3, 4-6, 11-7, 11-12; SWEPCO PY2023 EM&V Report, p. 37). These approaches include relying on word-of-mouth referrals, working with retailers, and promoting the programs on their websites (SUA PY2023 EM&V Report, p. 4-13).

The CWA programs, which include CWA and Low-Income Pilot Programs (LIPP), completed 17,455 audits, leading to 71,084 submitted projects. Based on the measure counts provided in the individual utility evaluation reports, the CWA programs installed measures in "energy inefficient" homes in PY2023. Table E-6 summarizes the cumulative results of these programs.

Table E - 6: Summary of Findings from the CWA and LIPP Results from PY2017-PY2023

Summary of CWA Program Metrics	PY2017	PY2018	PY2019	PY2020	PY2021	PY2022	PY2023	Cumulatively PY2017-PY2023
Total Audits Completed	14,586	14,947	15,702	15,877	10,945	10,638	17,455	100,150
Total Submitted Projects	25,947	27,722	62,777	16,242	17,692	21,688	71,084	243,152
Average Conversion Rate	96%	98%	98.53%	95.65%	94.74%	97.72%	95.76%	96.63%
Average Measures installed per project	3	3.57	3.61	4.36	4.09	4.45	3.19	3.75
Average utility cost per participant	$1,039.80	$1,277.53	$955.39	$1,240.27	$827.94	$1,109.38	$1,221.79	$1,096.01

Sources: PY2017-PY2023 EM&V Reports

Low-Income Pilot Program

The Low-Income Pilot (LIPP) is an extension of the Consistent Weatherization Approach (CWA) targeted to customers who meet the income eligibility requirements of the Low-Income Home Energy Assistance Program (LIHEAP). Participants received in-home energy assessments and the same suite of measures offered in the CWA along with health and safety improvements (AOG PY2023 EM&V Report, p. 7-1; BHE PY2023 EM&V Report, p. 6-2; OG&E PY2023 EM&V Report, p. 123).

Table E - 7: Comparison of LIPP Metrics from PY2021 to PY2023

Metric	LIPP 2021	LIPP 2022	LIPP 2023	% Change
Total Audits Completed	5,729	1,123	2,421	53.61%
Number of Measures Installed (including estimates)	16,285	17,744	11,580	-53.24%
Total Submitted Projects	3,140	2,507	2,423	-3.47%
Average Conversion Rate	55%	96%	90.25%	-6.37%
Average Measures installed per project	3.4	4.50	3.20	-40.85%
Average Utility - Cost per project	$970.82	$1,234.49	$1,394	11.42%
Percent of Contractors promoting program	100%	100%	99.25%	-0.76%

Sources: PY2023 EM&V Reports

Act 1102 Program Performance

Act 1102 of the 2017 Arkansas Regular Session, concerning Ark. Code Ann. § 23-2-304(a) (11) and Ark. Code Ann. § 23-3-405(a)(1)(B) and the authority of the Commission over energy efficiency programs and measures provided by investor-owned utilities (IOUs), states that the PSC is "permitted to order, require, promote, or engage in energy conservation programs and measures for the benefit of utility customers" that fall into one or both of two eligibility segments:

1. Utility customers who are 65 years of age or older, or
2. Utility customers who meet the income eligibility qualifications for the Low-Income Home Energy Assistance Program (LIHEAP) administered by the Department of Human Services

Act 1102 Program Eligibility

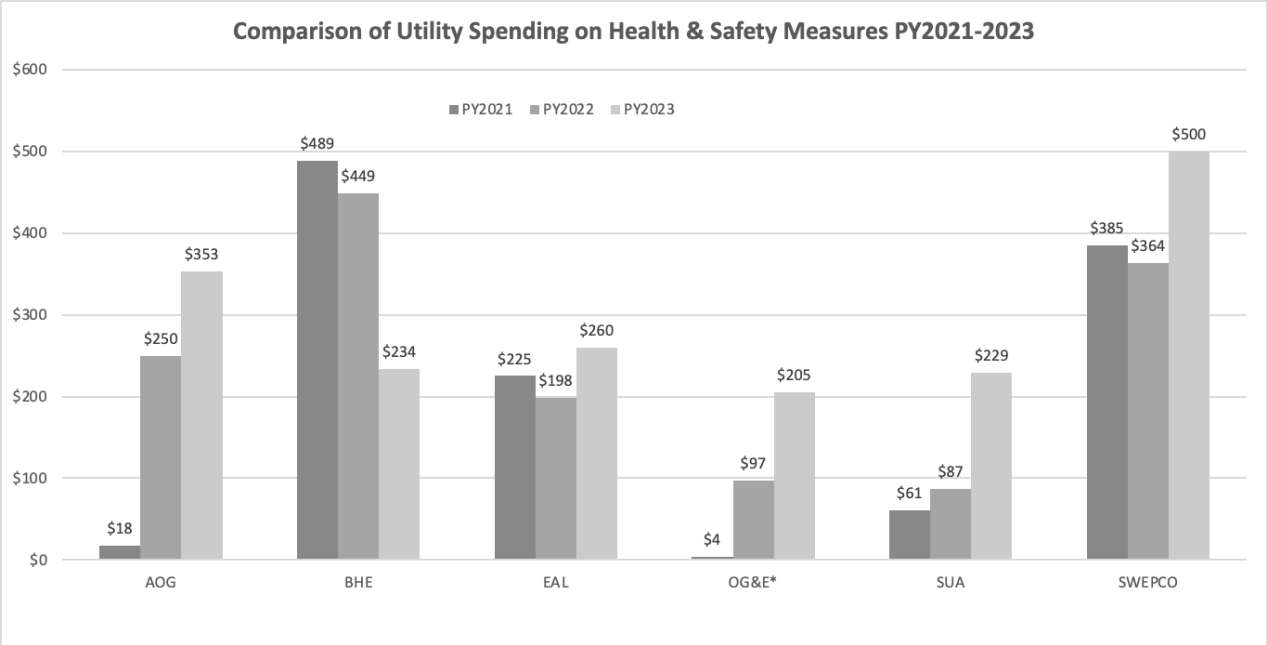
The evaluators provided cross-tabulations of the number of CWA and/or LIPP program participants based on program eligibility requirements (See Table E-8)

Table E - 8: Act 1102 Eligibility Metrics Summary

Utility	% Age-Eligible	% Income Eligible	Both	Source
AOG- LIWP	89%	46%	35%	AOG PY2023 EM&V Report, p. 7-4
BHE- LIPP	76%	74%	57%	BHE PY2023 EM&V Report, p. 6-5
EAL- Low-Income Solutions	35.7%	53.7%	NA	EAL BY2023 EM&V Report, p. 366
EAL-Home Energy Solutions	33.8%	70.8%	NA	EAL BY2023 EM&V Report, p. 367
EAL- Energy Solutions for Manufactured Homes	36.4%	46.4%	NA	EAL BY2023 EM&V Report, p. 368
EAL-Energy Solutions for Multifamily Homes	30.8%	50.0%	NA	EAL BY2023 EM&V Report, p. 369
OG&E- CWA	68%	63%	32%	OG&E PY2023 EM&V Report, p. 126
SUA- LISP	77%	42%	11%	SUA PY2023 EM&V Report, p. 12-8
SWEPCO- IAQ	47%	67%	100%	SWEPCO PY2023 EM&V Report, p. 173
SWEPCO- HPwES	29%	66%	66%	

Health and Safety (H&S) Measures

Act 1102 specifies required spending on health and safety improvement in LIPP homes, and several programs have increased their spending on H&S measures in PY2023 (AOG PY2023 EM&V Report, pp. 6-4, 6-6, 7-11, 7-12; EAL BY2023 EM&V Report, p. 363; OG&E PY2023 EM&V Report, pp. 27, 140, 151; SUA PY2023 EM&V Report, pp. 12-9, 12-16, 12-18).



Source: AOG PY2023 EM&V Report, pp. 1-8, 6-4, 7-11; BHE PY2023 EM&V Report, p. 6-4; EAL BY2023 EM&V Report, p. 363; OG&E PY2023 EM&V Report, p. 27; SUA PY2022 EM&V Report, p. 12-18; SWEPCO PY2023 EM&V Report, p. 143

Figure E - 3: Comparison of Utility Spending on Health & Safety Measures

Energy Burden Analysis

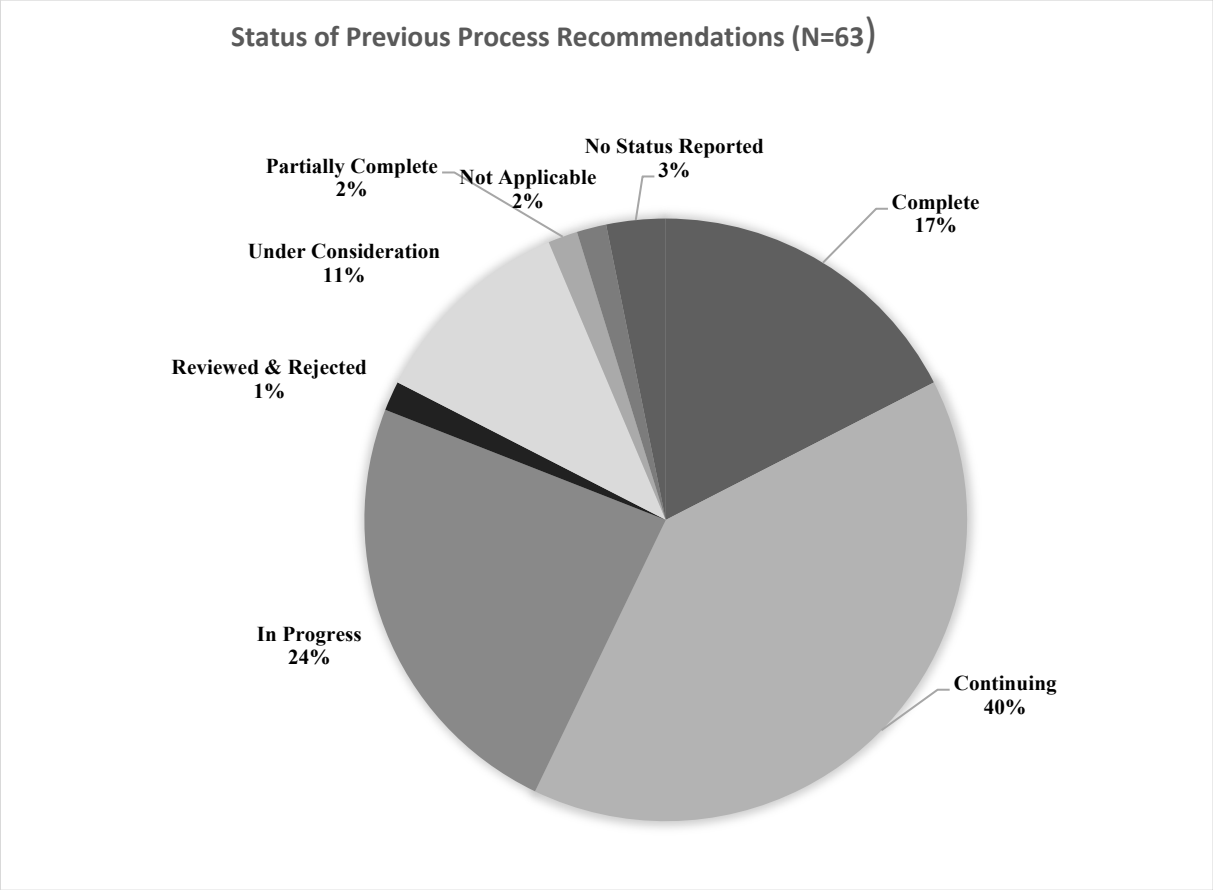
As part of the PY2022 EM&V research, Tetra Tech conducted portfolio-level EM&V research to support EAL in program planning. This success led to the question: *Could another metric also help identify and serve customers that can most benefit from energy efficiency improvements?*

EAL is leading the development and tracking of **an electric-burden metric** for each of its low-income customers. Using Department of Housing and Urban Development (HUD) data overlaid on geographic information system mapping of its territory and analyzing billing data for each household in a HUD low-income qualified census tract, an average annual electric burden is being developed to inform program outreach efforts and monitor program outcomes (EAL BY2023 EM&V Report, p. 80).

Process Evaluation Recommendations

Status of Previous Process Recommendations

Per the reporting requirements in *Protocol C*, the evaluators provided an update on the implementation status of the previous recommendations.



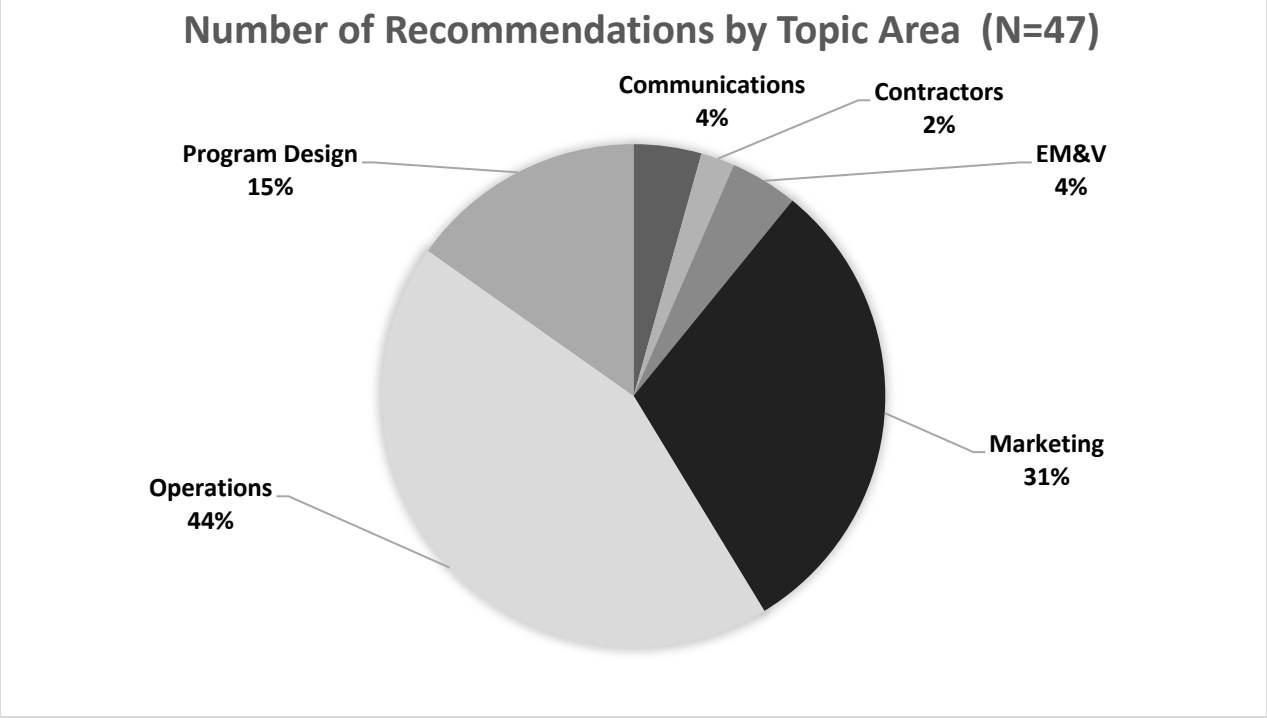
Source: PY2023EM&V Reports

Figure E - 4: Status of Previous Process Recommendations

Table E - 9: Disposition of Previous Process Recommendations by Utility

	Gas Utilities			Electric Utilities			
Utility	**AOG**	**BHE**	**SUA**	**EAL**	**OG&E**	**SWEPCO**	**Total**
Complete	2		1	6		2	11
Continuing				19		6	25
In Progress		1	2	6	2	6	15
Reviewed & Rejected			1				1
Under Consideration	2		2		1	2	7
Partially Complete				1			1
Not Applicable			1				1
No Status Reported				2			2
Total for each Utility	4	1	7	34	3	**16**	**63**
Total for All Recommendations							

Source: PY2023 EM&V Reports



Source: PY2023 EM&V Reports

Figure E - 5: Distribution of Process Evaluation Recommendations by Topic Area

Table E-10 summarizes the distribution of process recommendations by utility.

Table E - 10: Distribution of PY2023 Process Recommendations by Utility

	Comm-unications	Con-tractors	EM&V	Marketing	Operations	Program Design	Total
Utility							
AOG				1		1	2
BHE				1			1
EAL	1	4	2	8	16	1	32
OG&E				1	1	1	3
SUA						2	2
SWEPCO	1	1		3	2		7
Total	2	5	2	14	20	5	47

Source: PY 2023 EM& Reports

Comparison to the Comprehensive Checklist

Each EM&V contractor reported on the progress made by each energy efficiency program portfolio compared to the seven comprehensiveness factors identified by the APSC. Using the following legend, energy organizations have either fully met, partially met or failed to meet the criteria associated with each factor set forth in the Comprehensive Checklist.

Fully Met Criteria = ●	Utilities or third–party administrators are fully meeting the criteria established by the Commission Checklist.
Partially Met Criteria = ◑	Utilities or third-party administrators are partially meeting the criteria established by the Commission Checklist.
Did Not Meet Criteria = ○	Utilities or third–party administrators did not meet the criteria established by the Commission Checklist.
Not Applicable = ■	Identifies those cases where the Commission Checklist cannot be assessed.

Table E-11 summarizes these findings from the comprehensive checklist as reported in the individual EM&V report.

Table E - 11: Summary of Comprehensiveness Checklist Factor Results

Utility	Factor 1: Education/ Training/ Outreach	Factor 2: Provide Adequate Resources	Factor 3: Address Major End Uses	Factor 4: Comprehensively Address Customer Needs to Avoid Cream-Skimming	Factor 5: Target All Customer Sectors	Factor 6: Are Cost-Effective	Factor 7: Have Appropriate EM&V Procedures in Place
AOG	●	●	●	●	●	●	●
BHE	●	●	◑	●	◑	●	●
SUA	●	●	◑	◑	◑	●	●
EAI	●	●	●	●	●	●	●
OG&E	●	●	●	●	●	●	●
SWEPCO	●	●	●	●	●	●	●
Fully Met = ● Partially Met = ◑ Did Not Meet = ○ Not Applicable = ■							

Source: Analysis of PY2023 EM&V Reports

Assessment of the EM&V Reporting

The IEM "evaluated the evaluator" and assessed how well the work conformed to EM&V Protocols and TRM 9.1.

Table E–12 summarizes the IEM's overall assessment of the evaluations conducted by the evaluation firms across the Arkansas energy efficiency portfolio. Section 4 provides a more detailed explanation of these findings and the IEM's specific concerns regarding the PY2023 EM&V activities.

Table E - 12: Summary of the IEM's Assessment of PY 2023 EM&V Evaluation Activities

Evaluator	Energy Organization/Utility	Impact Evaluation	Process Evaluation
ADM	AOG	●	●
ADM	BHE	●	●
ADM	SUA	●	●
Tetra Tech	EAL	●	●
ADM	OG&E	●	●
ADM	SWEPCO	●	●
Fully Met = ● Partially Met = ◑ Did Not Meet = ○ Not Applicable = ■			

IEM Recommended Next Steps and EM&V Priorities

The PWC members remain active and engaged in all activities directed by the Commission. The PWC looks for ways to work cooperatively to cross-deliver, promote joint programs, and implement the recommended improvements into new program designs. These evaluation reports reinforce the importance and value that annual EM&V activities offer to utilities, program implementers and stakeholders. Ultimately, these findings benefit Arkansas ratepayers by ensuring that the energy efficiency programs are well-designed, implemented, and effective.

The six utilities are delivering programs targeting multiple customer groups. Of special note, all utilities have increased the breadth and depth of the services they offer through the low-income pilot programs.

The two evaluation teams, ADM Associates and Tetra Tech completed six portfolio evaluations for the regulated IOUs in Arkansas. Overall, these evaluations met the requirements defined in the EM&V Protocols in TRM Volume 1. The process evaluations included updated reporting of critical metrics for the CWA and LIPP, which were instrumental in addressing the age and income requirements defined in Act 1102.

This year, the presentation and format of the PY2023 evaluation reports were satisfactory. Most reports were written and provided accurate descriptions of EM&V tasks.

Status of IEM Previous Recommendations

- ***Ongoing: The IEM respectfully requests the Commission to reiterate that the intent of the CWA should be to focus on targeting "energy inefficient homes" through a comprehensive approach to program delivery rather than concentrating on single-measure savings.***
- ***Ongoing: The IEM will continue working with the PWC to update the TRM to reflect ongoing changes in the energy efficiency market.***
- ***Ongoing: The IEM will continue high-level reviews to ensure reasonable and realistic results and data are provided in the report.***
- ***Ongoing: IEM will encourage the evaluators to use the evaluation plans as the benchmark for evaluation activities.***
- ***Ongoing: The IEM will require all evaluation materials, including clarifications of the EM&V findings, to be provided within two weeks of the EM&V Annual Report filings.***
- ***Continuing: The IEM will assist Empire Electric in developing and reviewing its EM&V plan for PY2023 programs.*** The IEM will also encourage Empire Electric to seek ways to collaborate with other Arkansas utilities to create and deliver cost-effective and appropriate energy efficiency programs that serve Empire Electric's customers.
- ***Continuing: The IEM will reconvene the Act 1102 Working Group to discuss ways to standardize the reporting of critical program metrics for the CWA and LIPPs***.

New Recommendations

- ***The IEM respectfully requests the Commission to reiterate the importance of annual EM&V reporting to Empire Electric.***
- ***Empire Electric should continue to engage in the PWC activities and elicit help and support from the PWC members.***
- ***To address the lack of behavioral programs offered in some utility portfolios, the IEM encourages utilities to continue developing Strategic Energy Management (SEM) programs across territories.***

- ***The IEM will solicit feedback from the Act 1102 Working Group regarding EAL's Energy Burden Analysis Memorandum.***

Section 1: Summary of Impact Evaluation Findings and Recommendations

1.1 Introduction

The Independent Evaluation Monitor (IEM) has prepared this *Annual Summary Report of Evaluation, Measurement & Verification (EM&V) Activities* on behalf of the Arkansas Public Service Commission (APSC) in support of Docket 10–100–R and the Parties Working Collaboratively (PWC).

The 2023 *Annual Summary Report* summarizes the key findings and recommendations from the six separate EM&V Reports covering Program Year 2023 (PY2023) prepared for the following energy organizations:

- Arkansas Oklahoma Gas Corporation (AOG) (A division of Summit Utilities)
- Black Hills Energy Arkansas (BHE)
- Summit Utilities Arkansas (SUA)[4]
- Entergy Arkansas, LLC (EAL)
- Oklahoma Gas & Electric Company (OG&E)
- American Electric Power– Southwestern Electric Power Company (SWEPCO)

Empire Electric received an extension to file their EM&V Report for PY2023 on August 1, 2024. As a result, this annual report does not include any information regarding Empire Electric for PY2023. A separate memo from the IEM will follow upon the submittal of the report.

This report is organized into the following sections to help guide the reader through this summary of the key results:

- Section 1: Summary of Impact Evaluation Findings and Recommendations
- Section 2: Summary of Process Evaluation Findings and Recommendations
- Section 3: Comparison to Comprehensive Checklist
- Section 4: Evaluating the Evaluators
- Section 5: IEM Recommendations and EM&V Priorities

The portfolio evaluations addressed impact and process evaluation activities separately, so these activities are summarized in separate sections. While this report provides a summary of the PY2023 EM&V Reports, it is not intended to replace the value of the individual reports. Indeed, each EM&V report provides valuable feedback and findings that should be addressed by the program administrators and implementers to improve program operations in the future.

The page numbers cited in this report are consistent with the Harvard Referencing System and are intended to identify the appropriate sections in the individual EM&V reports.

Terminology Used in This Report

This report uses the terms *reported* savings and *evaluated* savings to refer informally to *ex-ante* and *ex-post* savings, respectively. The term *primary* savings refers to electricity savings by electric utilities and natural gas savings by gas utilities.

[4] In 2021, CenterPoint Energy was acquired by Summit Utilities, and is now known as Summit Utilities Arkansas (SUA).

Non-Energy Benefits (NEBs) refer to non-primary savings or benefits. For gas utilities, NEBs include electricity, water, propane, and avoided/deferred replacement costs. For electric utilities, NEBs include natural gas, water, propane, and avoided/deferred replacement costs.

Reported and evaluated savings are compared in this report to each utility's *goals*, or the planned energy savings set by the utility for the program year. Unless otherwise noted, the savings goals shown in this report are those reported in each utility's PY2023 EM&V report and evaluator-provided summary reporting workbooks.

Furthermore, the savings are represented as primary savings, excluding NEBs. When savings terms are used without the preceding modifier *gross* or *net*, *ex-ante* savings are assumed to be gross savings and *ex-pos*t savings are assumed to be net savings.

1.2 Overview of Impact Evaluation

The IEM reviews and summarizes the PY2023 EM&V activities and provides recommendations on ways to improve future EM&V reporting. For PY2023, we determined if each portfolio evaluation used the appropriate methodologies and if those approaches led to credible and reliable savings estimates.

Impact evaluations measure the change in energy usage and demand (e.g., kWh, kW, therms, water gallons, propane gallons, deferred equipment costs) attributable to a program. They rely on various approaches to calculate energy savings, such as statistical comparisons, engineering estimation and modeling, metering, billing analysis, and applying the TRM. Program tracking databases are an important element that enables evaluation approaches.

The key findings and recommendations from these impact evaluations conducted for the Arkansas energy efficiency portfolio are summarized next. Section 4: Evaluating the Evaluators discusses the reliability and effectiveness of these impact evaluation activities.

Specifically, the evaluators completed the following impact evaluation activities to determine the net and gross savings:

- Verify Program Savings Estimates
  - For prescriptive measures, verify the correct use of the Arkansas TRM values
  - For custom measures, calculate savings according to accepted protocols (such as International Performance Measure Verification Protocol (IPMVP)
- Review Program Databases
- Conduct Desk Reviews and On–Site Verification as appropriate
- Estimate the Net to Gross (NTG) impacts
- Determine quantifiable Non-Energy Benefits (NEBs)

This section begins with a summary of the IOU level and utility level energy savings, followed by a review of the key findings and recommendations from each impact evaluation activity.

1.3 Review of Utility Level Energy Savings

One important purpose of EM&V is to determine the progress the portfolio is making toward reaching the specified energy savings goals and objectives. The Arkansas portfolio of programs has a long history of providing cost-effective savings above the statewide goal level, and performance in PY2023 continues that trend.

This section combines all the evaluator-reported savings from regulated utilities[5], providing a statewide look at DSM program performance for the IOUs. The savings are also presented from measure- and sector-level perspectives.

Statewide Portfolio Level Savings

Four of the six utilities exceeded their goals for PY2023. EAL fell short of its goal by one percent, and SUA fell short of its goal by five percent. Overall, the three electric utilities netted 344,955 MWh of savings, reaching 102 percent of the combined electric savings goal. The three gas utilities netted over 5.8 million therms, falling short of the combined gas savings goal of approximately one percent.

NEBs contributed to the statewide gas and electric savings goals, improving the electric and gas savings as a percentage of goal beyond the figures noted above. The improvement in gas utilities was substantial, increasing the contribution to the statewide gas savings by 26 percent. Electric NEBs contributed slightly more than one percent to the electric IOU's combined MWh goal. Table 1 summarizes the goals and savings, including primary savings and NEBs, as reported in the utilities' PY2023 Evaluation Reports and Evaluator-provided summary workbooks. Unless otherwise noted, the remaining figures in this section show results for primary fuel only and do not account for NEBs.

Table 1: Summary of PY2023 Gas and Electricity Savings

Utility	Goal Therm Savings	Net Evaluated Primary Therm Savings	Net Evaluated Therm Savings including NEBs	Goal MWh Savings	Net Evaluated Primary MWh Savings	Net Evaluated MWh Savings including NEBs	Percent of Savings Goal Achieved (Primary)	Percent of Savings Goal Achieved Including NEBs
AOG	461,620	528,592	528,592			711	114.5%	
BHE	1,510,377	1,543,029	1,543,029			1,486	102.2%	
SUA	3,934,708	3,745,068	3,745,068			1,667	95.2%	
EAL			952,482	285,148	283,028	283,028	99.3%	
OG&E			35,436	25,301	30,701	30,701	121.3%	
SWEPCO			505,022	34,506	38,667	38,667	112.1%	

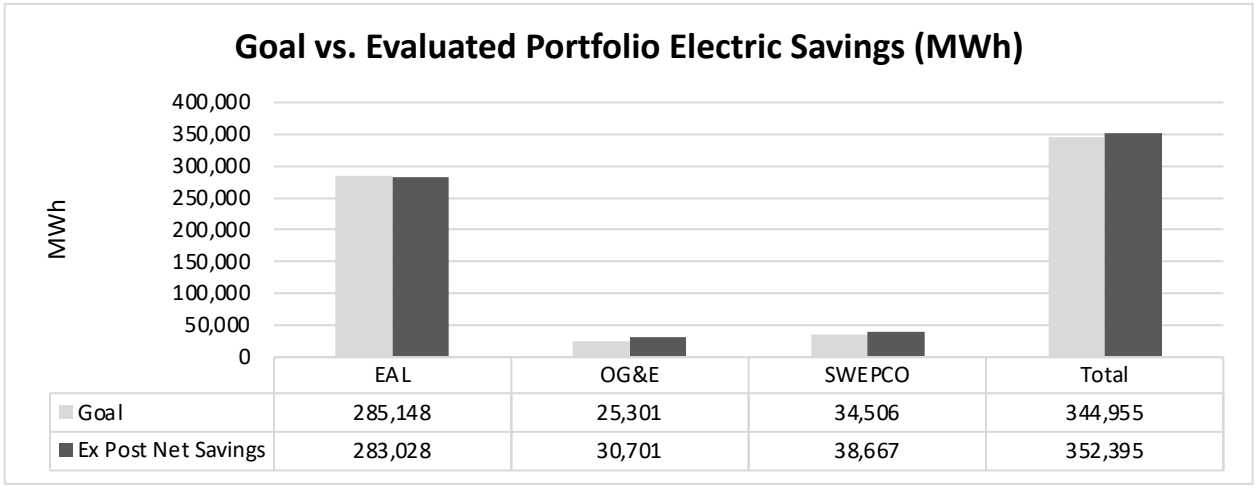
[5] Unless otherwise cited, values in this section are taken from or result from calculations based on data provided by evaluators in PY2023 evaluation summary workbooks requested by and supplied to the IEM.

Total Natural Gas	**5,906,705**	**5,816,689**	**7,309,629**				**98.5%**	**123.8%**
Total Electric				**344,955**	**352,395**	**356,260**	**102.2%**	**103.3%**

Sources: PY2023 EM&V Reports and Evaluator-provided summary workbooks

Electric Portfolio Energy Savings

The electric utilities exceeded their combined goal of 344,955 MWh savings for PY2023. As Figure 1 shows, OG&E and SWEPCO exceeded their individual goals, while EAL fell just shy of its goal (EAL BY2023 EM&V Report, pp. 34-36; OG&E PY2023 EM&V Report, p. 23; SWEPCO PY2023 EM&V Report, p. 24).



Sources: PY2023 EM&V Reports and Evaluator-provided summary workbooks – Electric Utilities

Figure 1: Goal vs. Evaluated Portfolio Electric Savings (MWh)

OG&E exceeded its demand savings goal by 13 percent. The EAL achieved 55 percent of its demand goal, while SWEPCO reached 94 percent of its goal (See Table 2) (EAL BY2023 EM&V Report, pp. 34-36; OG&E PY2023 EM&V Report, p. 23; SWEPCO PY2023 EM&V Report, p. 24).

Table 2: Summary of PY2023 Electric Demand Reduction

Utility	Goal Demand Reduction, MW	Net Evaluated Demand Reduction, MW	Percent Reduction Achieved
EAL	162.40	88.62	54.6%
OG&E	5.02	5.70	113.4%
SWEPCO	16.15	15.13	93.7%
Total	**183.58**	**109.45**	**59.6%**

Sources: PY2023 EM&V Reports and Evaluator-provided summary workbooks – Electric Utilities

Table 3 compares load factors as calculated from planned electric energy and demand savings and net evaluated energy and demand savings. The Savings Load Factor is calculated using the following formula:

$$Savings\ Load\ Factor = \frac{kWh\ savings}{kW\ savings * 8{,}760\ hours}$$

Table 3: Plan vs. Evaluated Savings Load Factors

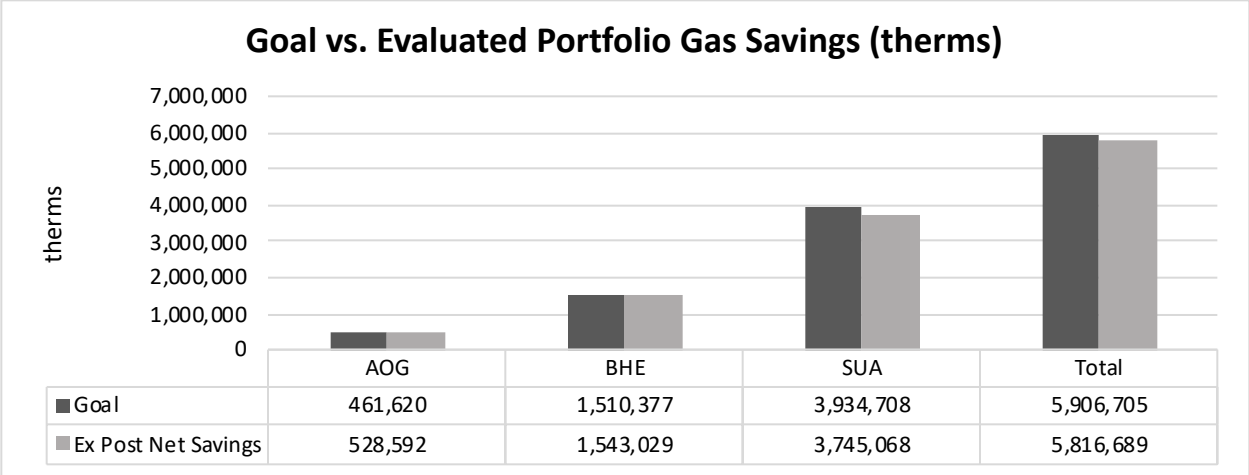
Utility	Goal MW Reduction	Goal MWh Savings	Expected Load Factor of Goal Savings	Net Evaluated MW Reduction	Net Evaluated MWh Savings	Load Factor of Evaluated Savings
EAL	162.40	285,148	20.0%	88.62	283,028	36.5%
OG&E	5.02	25,301	57.5%	5.70	30,701	61.5%
SWEPCO	16.15	34,506	24.4%	15.13	38,667	29.2%
Total	**183.58**	**344,955**	**21.5%**	**109.45**	**352,395**	**36.8%**

Sources: PY2023 EM&V Reports and Evaluator-provided summary workbooks – Electric Utilities

The three electric utilities had anticipated load factors based on planned kWh and kW savings, ranging from 29 to 62 percent. Load management programs were part of EAL's and SWEPCO's portfolios. The demand-only goals for those programs contribute to lower load factors (EAL BY2023 EM&V Report, pp. 34-36; OG&E PY2023 EM&V Report, p. 23; SWEPCO PY2023 EM&V Report, p. 24). The load factors calculated from evaluated demand and energy savings correspond relatively closely to the expected load factors based on MW and MWh goals.

Gas Portfolio Energy Savings

Two of the three gas utilities exceeded their savings goals. AOG exceeded its goal by nearly 15 percent, while BHE exceeded its goal by two percent. SUA fell short of attaining 95 percent of its savings goal. Combined, the gas utilities achieved 99 percent of goal savings (AOG PY2023 EM&V Report, p. 1-3; BHE PY2023 EM&V Report, p. 1-4; SUA PY2023 EM&V Report, p. 1-4) (see Figure 2).



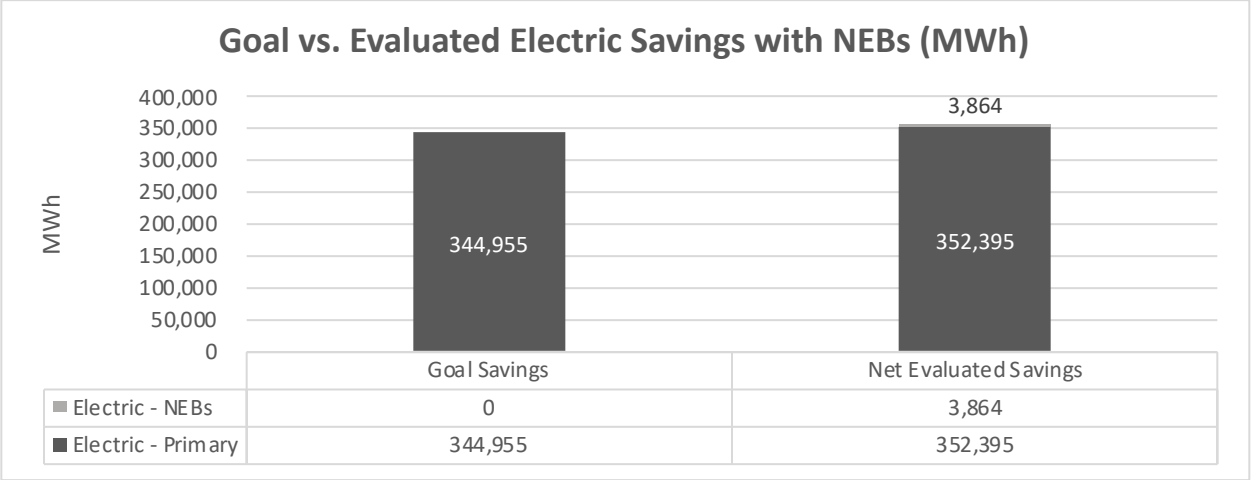
Sources: PY2023 EM&V Reports and Evaluator-provided summary workbooks – Gas Utilities

Figure 2: Goal vs. Evaluated Portfolio Gas Savings (therms)

NEBs Contribution to Savings

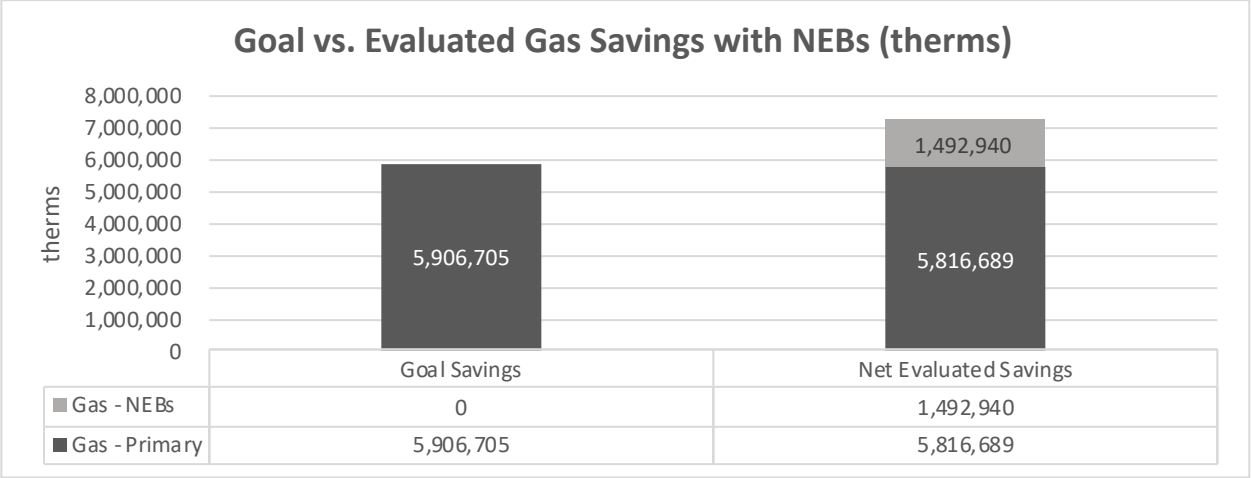
Summed together and inclusive of NEBs, the electricity savings in Arkansas exceeded the electric utilities' statewide energy savings goal by three percent, and the gas savings exceeded the gas utilities' statewide energy savings goal by 24 percent (AOG PY2023 EM&V Report, p. 1-3; BHE PY2023 EM&V Report, p. 1-4; EAL BY2023 EM&V Report, pp. 34-36; OG&E PY2023 EM&V Report, p. 23; SUA PY2023 EM&V Report, p. 1-4; SWEPCO PY2023 EM&V Report, p. 24; Evaluator-provided summary workbooks).

Figures 3 and 4 show the IOU statewide goal and net evaluated savings, including NEBs for electricity and gas savings, respectively.



Sources: PY2023 EM&V Reports and Evaluator-provided summary workbooks

Figure 3: Goal vs. Evaluated Electric Savings with NEBs (MWh)



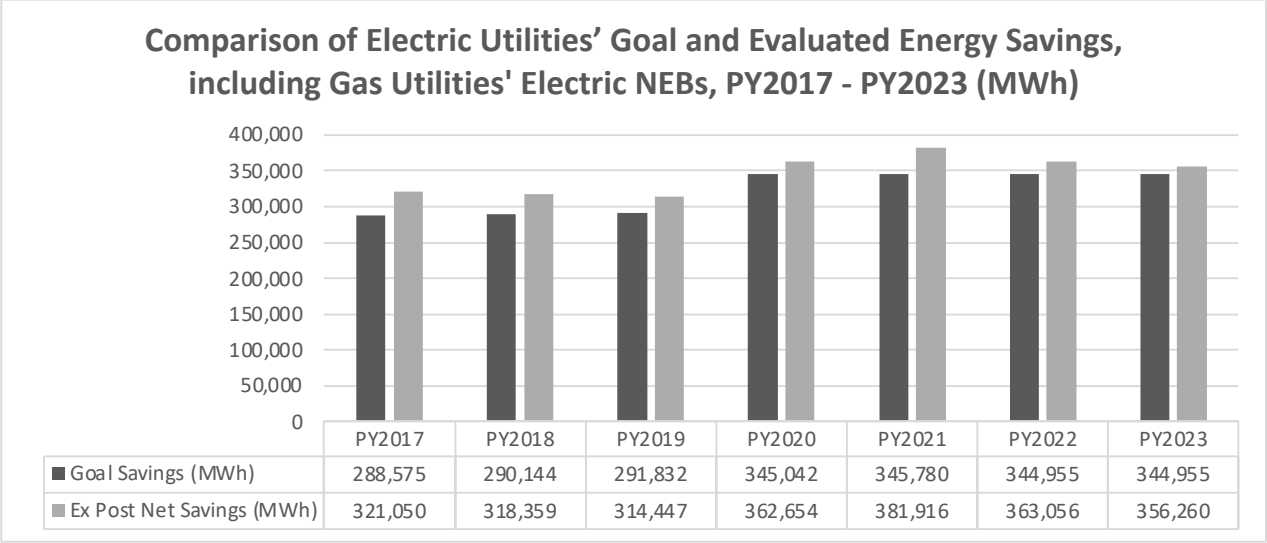
Sources: PY2023 EM&V Reports and Evaluator-provided summary workbooks

Figure 4: Goal vs. Evaluated Gas Savings with NEBs (therms)

Historical Statewide Portfolio Performance

When considering the impacts of NEBs, electric and gas savings have exceeded the utilities' combined savings goals for at least the past seven years. The electric savings goal has been exceeded by as little as three percent (PY2023) and as much as 11 percent (PY2021) in the past seven years. The gas savings goal has been exceeded by between 17 to 42 percent in the past seven years (AOG PY2023 EM&V Report, p. 1-3; BHE PY2023 EM&V Report, p. 1-4; EAL BY2023 EM&V Report, pp. 34-36; OG&E PY2023 EM&V Report, p. 23; SUA PY2023 EM&V Report, p. 1-4; SWEPCO PY2023 EM&V Report, p. 24; Evaluator-provided summary workbooks and reports from PY2017 through PY2023).

Figure 5 compares the PY2017 – PY2023 combined energy savings goals and achievements for the electric utilities. The net evaluated savings in these figures include NEBs and primary savings.

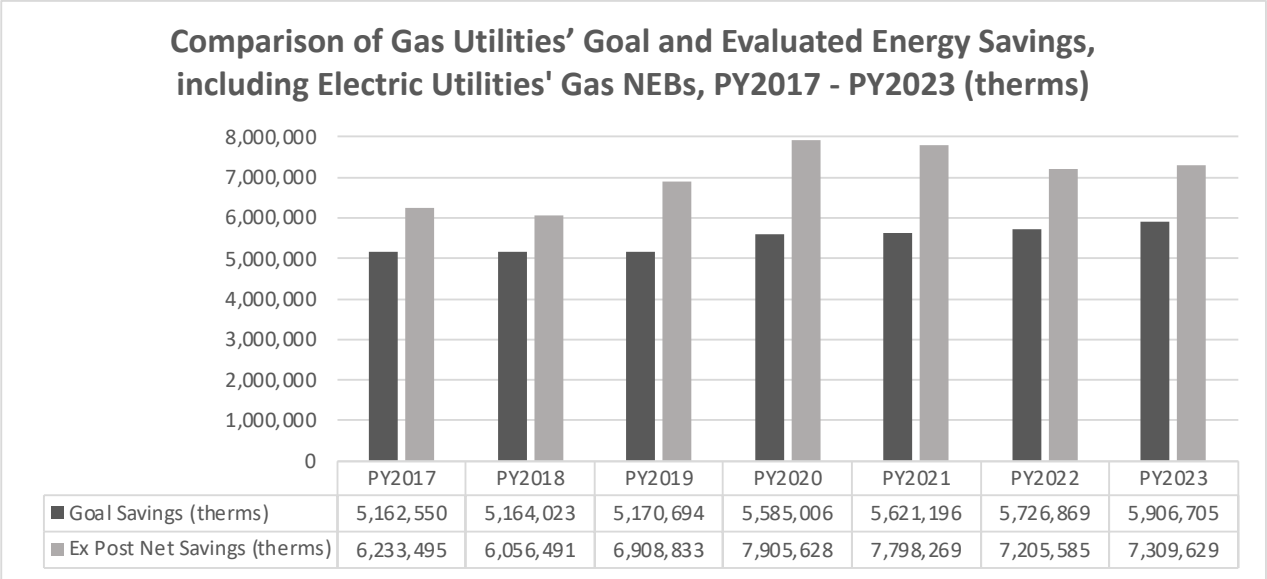


	PY2017	PY2018	PY2019	PY2020	PY2021	PY2022	PY2023
Goal Savings (MWh)	288,575	290,144	291,832	345,042	345,780	344,955	344,955
Ex Post Net Savings (MWh)	321,050	318,359	314,447	362,654	381,916	363,056	356,260

Sources: PY2017-PY2023 EM&V Reports and Evaluator-provided summary workbooks

Figure 5: Comparison of Electric Utilities' Goal and Evaluated Energy Savings, including Gas Utilities' Electric NEBs, PY2017 - PY2023 (MWh)

Figure 6 compares the combined energy savings goals and achievements for the gas utilities from PY2017 to PY2023. The net evaluated savings in these figures include NEBs and primary savings.



	PY2017	PY2018	PY2019	PY2020	PY2021	PY2022	PY2023
Goal Savings (therms)	5,162,550	5,164,023	5,170,694	5,585,006	5,621,196	5,726,869	5,906,705
Ex Post Net Savings (therms)	6,233,495	6,056,491	6,908,833	7,905,628	7,798,269	7,205,585	7,309,629

Sources: PY2017-PY2023 EM&V Reports and Evaluator-provided summary workbooks

Figure 6: Comparison of Gas Utilities' Goal and Evaluated Energy Savings, including Electric Utilities' Gas NEBs, PY2017 - PY2023 (therms)

Sector Level Savings

To assess the sectors in which savings and expenditures occur, the IEM categorized programs into C&I, small business, residential, agricultural, and cross-cutting categories. C&I targets non-residential customers only, while residential programs include single-family and multifamily residences. Programs in the agricultural category focus exclusively on that sector, while cross-cutting refers to programs available to customers across different sectors. Note that EAL is the only utility with programs targeting the agricultural sector. Table 4 shows the classification of each program within each utility.

Table 4: Utility Programs by Class

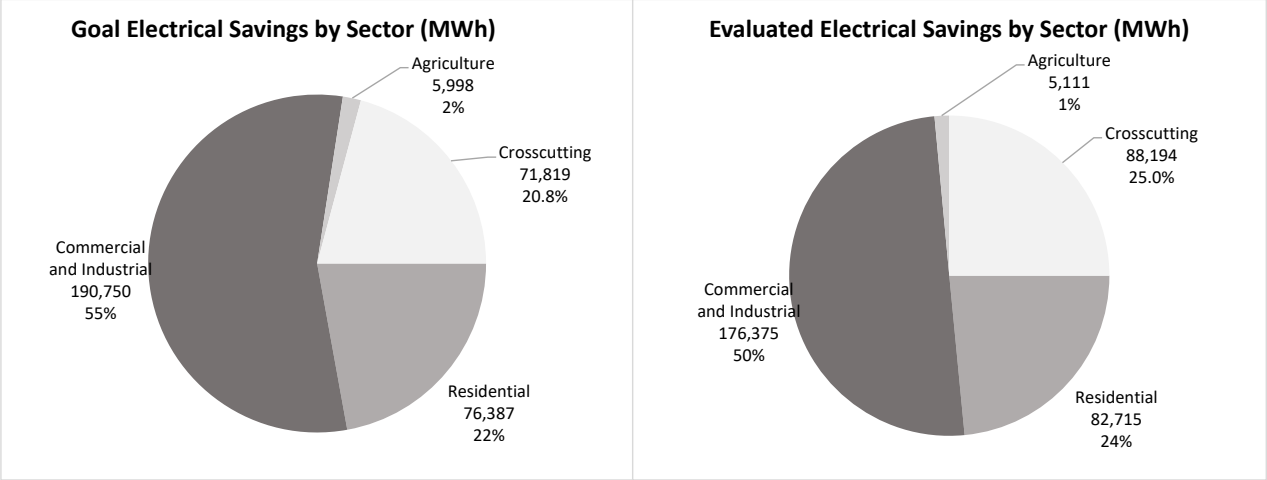
Utility	Residential	C&I	Cross-cutting
AOG	• AOG Weatherization • Low-Income Pilot	• C&I Solutions	• Energy Efficiency Arkansas • Equipment Rebate
BHE	• Residential Solutions • Low-Income Pilot	• C&I Solutions	• Energy Efficiency Arkansas
SUA	• Home Energy Reports • Low-Flow Showerhead & Faucet Aerator • Saving Homes Weatherization • Low-Income Savings Homes Weatherization	• Commercial Boiler • Natural Gas Commercial and Industrial Solutions • Commercial Food Service	• Energy Efficiency Arkansas • Natural Gas Equipment
EAL	• Home Energy Solutions • Multifamily Homes • Manufactured Homes • Low-Income Solutions • Residential Direct Load Control	• Large C&I Solutions • Small Business Solutions • Public Institutions Solutions	**Cross-cutting** • Smart Direct Load Control • Energy Efficiency Arkansas • Point of Purchase Solutions **Agricultural** • Agricultural Energy Solutions • Agricultural Irrigation Load Control
OG&E	**Home Energy Efficiency Program** • LivingWise School Outreach • HVAC Replacement and Tune-Up • Consumer Products Solutions • Residential Solutions • Consistent Weatherization Approach	**Commercial Energy Efficiency Program** • C&I Solutions • Small Business Solutions • School & Governmental Entities (SAGE) • Midstream • Continuous Energy Improvement (CEI) • Retro-Commissioning (RCx)	• Energy Efficiency Arkansas
SWEPCO	**Home Solutions Program** • Home Performance with ENERGY STAR • Income Qualified Weatherization • Residential Energy Improvement Pathway • Efficient Products Pathway	**Business/Industrial Solutions Program** • C&I Energy Efficiency Pathway • Small Business Pathway • Load Management Standard Offer Pathway	• Energy Efficiency Arkansas

Figures 7 and 8 illustrate the savings breakdown by sector for all electric utilities combined and all gas utilities combined, respectively.

The C&I sector remains the largest contributing sector for both gas and electric savings. The sector contributed roughly half of the savings for both electricity and gas in the state, not including the additional savings from commercial or industrial projects in the cross-cutting programs.

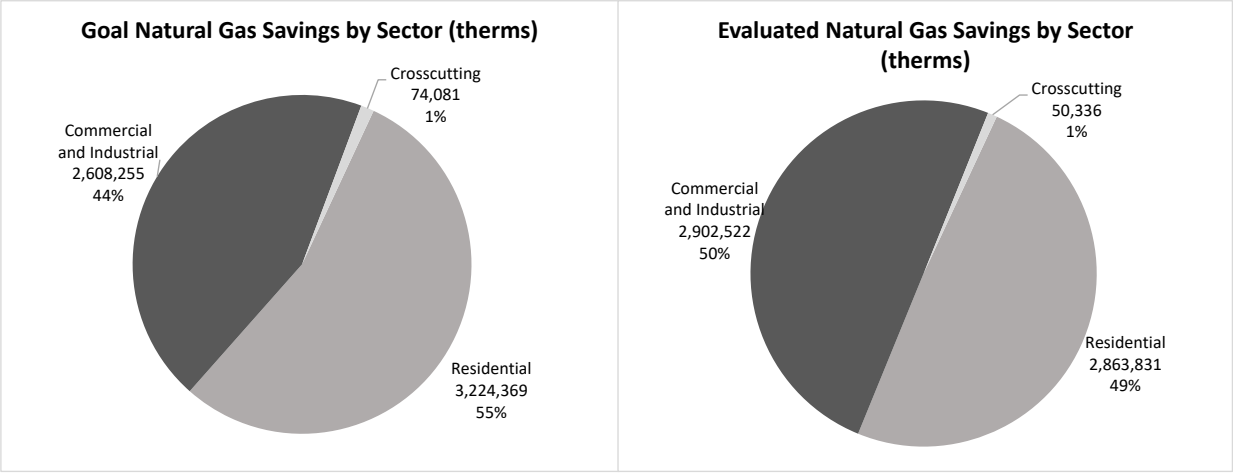
Agricultural and cross-cutting electricity savings accounted for approximately 26 percent of evaluated savings for the electric utilities. Gas savings from cross-cutting programs contributed to about one percent of overall gas savings in PY2023. This value is lower than PY2022's seven percent because SUA reported their Equipment Rebates program for each sector in PY2023 instead of as a combined cross-cutting program as in prior years.

The residential sector accounted for 24 percent of electricity savings and 49 percent of gas savings.



Sources: PY2023 EM&V Reports and Evaluator-provided summary workbook

Figure 7: Goal and Evaluated Electric Savings by Sector (MWh)

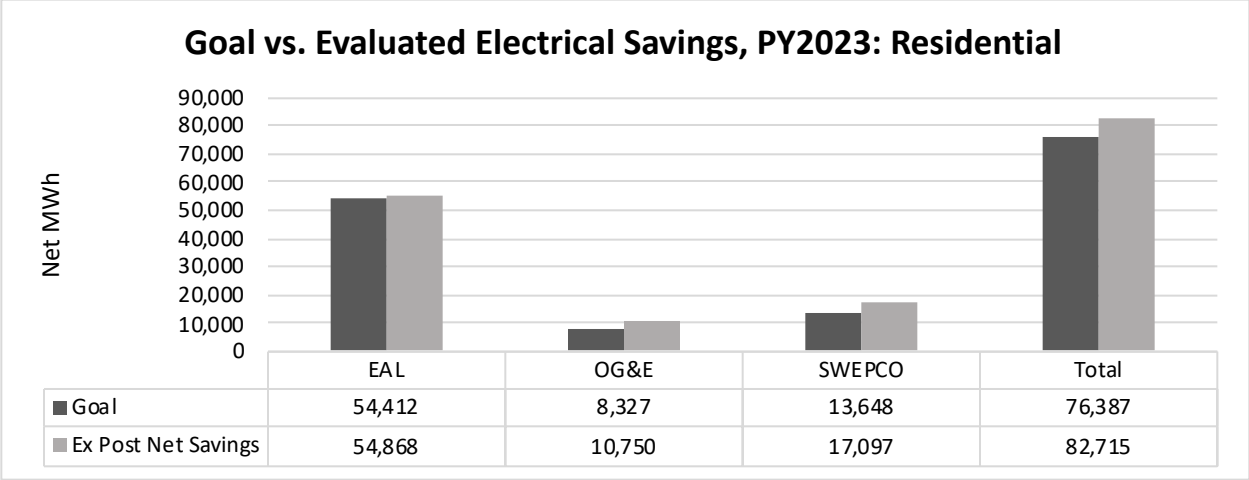


Sources: PY2023 EM&V Reports and Evaluator-provided summary workbooks

Figure 8: Goal and Evaluated Natural Gas Savings by Sector (therms)

Electric Utility Savings by Sector

All three electric utilities exceeded their residential sector savings goals as Figure 9 illustrates. (EAL BY2023 EM&V Report, pp. 34-36; OG&E PY2023 EM&V Report, p. 23; SWEPCO PY2023 EM&V Report, p. 24).

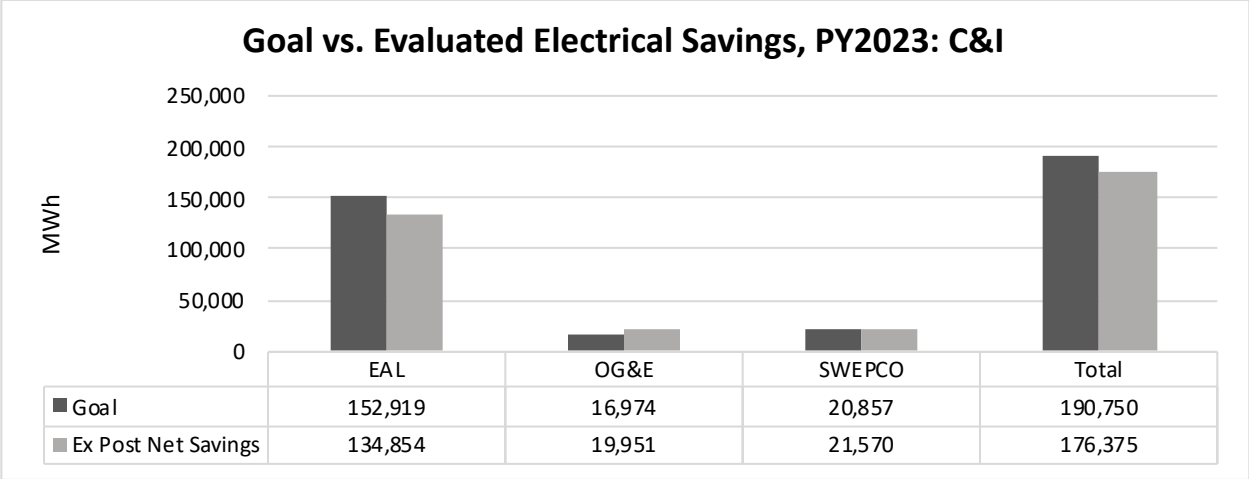


	EAL	OG&E	SWEPCO	Total
Goal	54,412	8,327	13,648	76,387
Ex Post Net Savings	54,868	10,750	17,097	82,715

Sources: PY2023 EM&V Reports and Evaluator-provided summary workbooks

Figure 9: Goal vs. Evaluated Electrical Savings, PY2023: Residential (MWh)

Two of the three utilities exceeded their goals in the C&I-directed programs. EAL fell short of its goal for the sector. Figure 10 shows the PY2023 goals and results for the C&I sector. (EAL BY2023 EM&V Report, pp. 34-36; OG&E PY2023 EM&V Report, p. 23; SWEPCO PY2023 EM&V Report, p. 24).

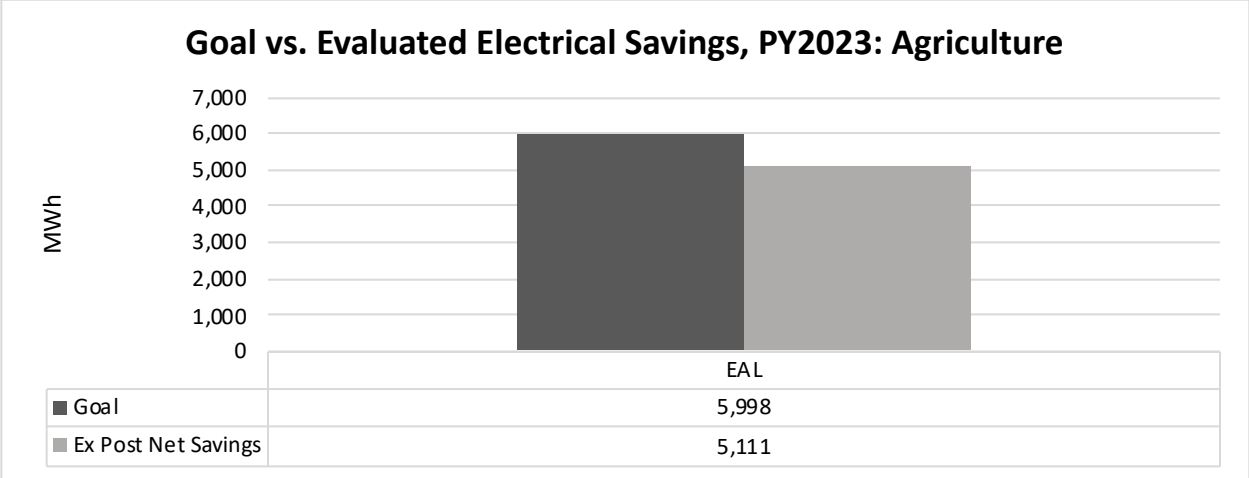


	EAL	OG&E	SWEPCO	Total
Goal	152,919	16,974	20,857	190,750
Ex Post Net Savings	134,854	19,951	21,570	176,375

Sources: PY2023 EM&V Reports and Evaluator-provided summary workbooks – Electric Utilities

Figure 10: Goal vs. Evaluated Electrical Savings, PY2023: C&I (MWh)

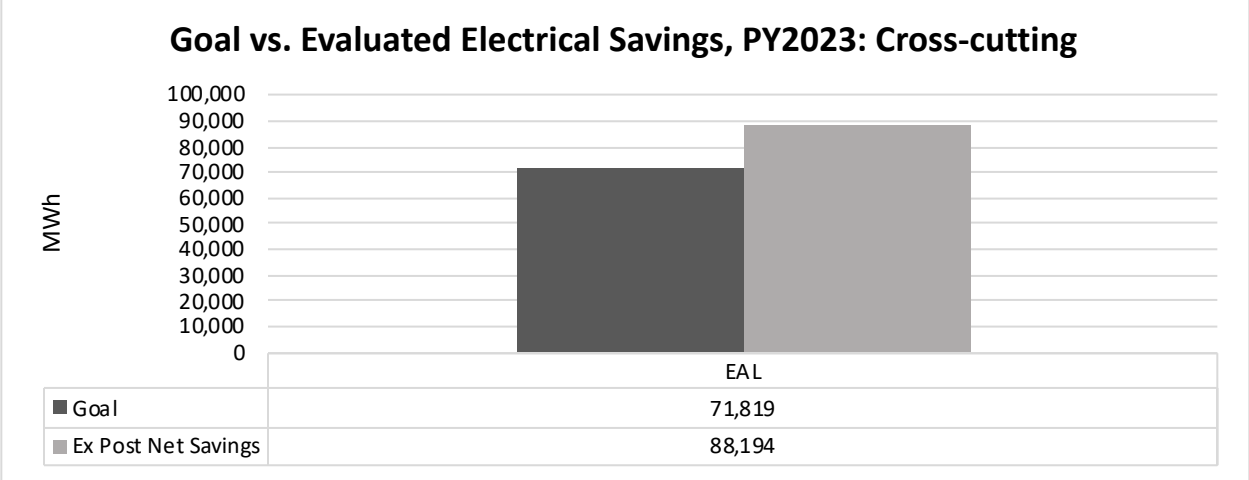
EAL's agricultural programs attained 85 percent of the associated savings goal as Figure 11 shows (EAL BY2023 EM&V Report, pp. 34-36).



Sources: PY2023 EM&V Reports and Evaluator-provided summary workbooks – Electric Utilities

Figure 11: Goal vs. Evaluated Electrical Savings, PY2023: Agricultural (MWh)

EAL significantly exceeded its goals for cross-cutting offerings which include its Point of Purchase Solutions Program and the Smart Direct Load Control Program. Figure 12 presents the savings compared to the goal associated with those programs (EAL BY2023 EM&V Report, pp. 34-36).

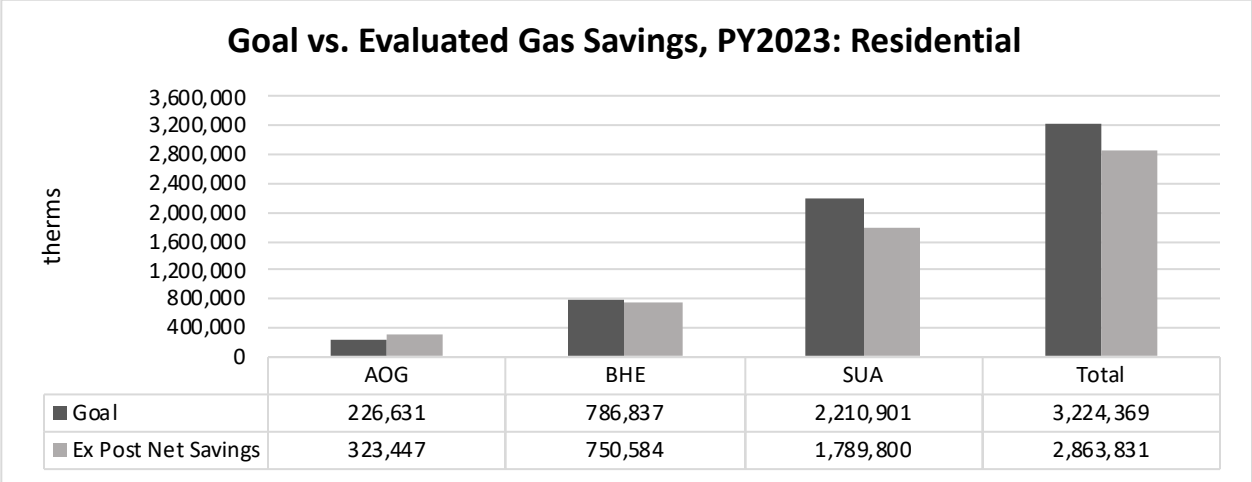


Sources: PY2023 EM&V Reports and Evaluator-provided summary workbooks – Electric Utilities

Figure 12: Goal vs. Evaluated Electrical Savings, PY2023: Cross-cutting (MWh)

Gas Utility Savings by Sector

The residential program portfolios of BHE and SUA fell short of their savings goals, while AOG's residential programs exceeded goals. Figure 13 summarizes the PY2023 goals and results for the gas residential programs (AOG PY2023 EM&V Report, p. 1-3; BHE PY2023 EM&V Report, p. 1-4; SUA PY2023 EM&V Report, p. 1-4).

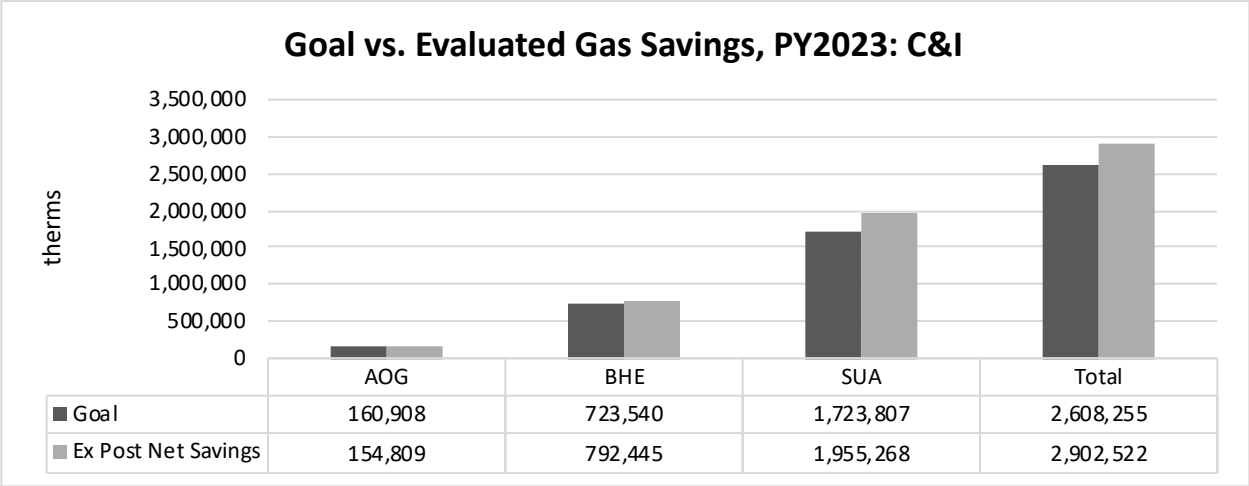


	AOG	BHE	SUA	Total
Goal	226,631	786,837	2,210,901	3,224,369
Ex Post Net Savings	323,447	750,584	1,789,800	2,863,831

Sources: PY2023 EM&V Reports and Evaluator-provided summary workbooks – Gas Utilities

Figure 13: Goal vs. Evaluated Gas Savings, PY2023: Residential (therms)

BHE and SUA exceeded their goals in the C&I sector, as shown in Figure 14. AOG fell short in the sector, attaining 96 percent of the sector goal (AOG PY2023 EM&V Report, p. 1-3; BHE PY2023 EM&V Report, p. 1-4; SUA PY2023 EM&V Report, p. 1-4).

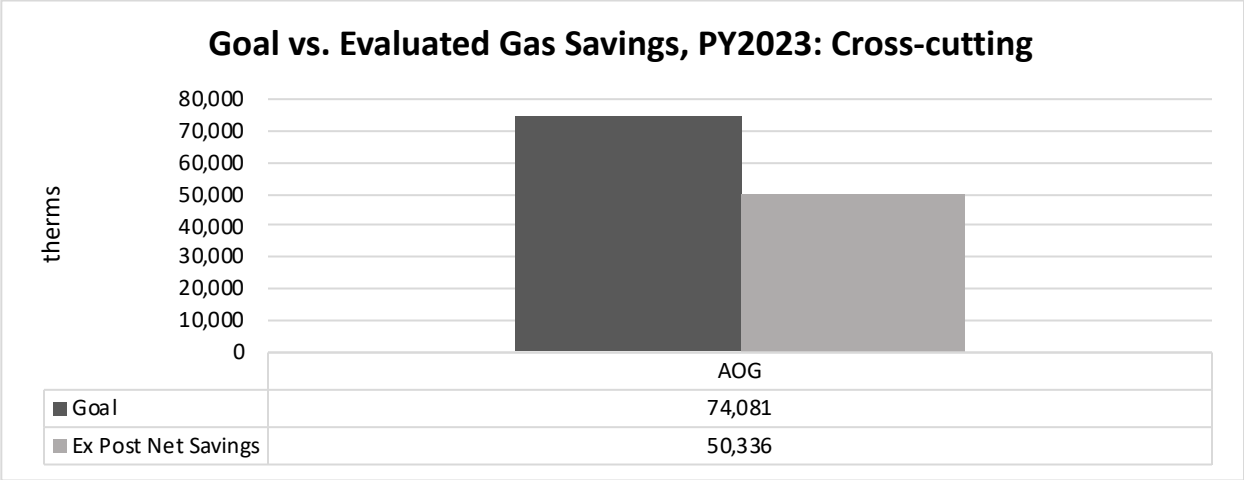


	AOG	BHE	SUA	Total
Goal	160,908	723,540	1,723,807	2,608,255
Ex Post Net Savings	154,809	792,445	1,955,268	2,902,522

Sources: PY2023 EM&V Reports and Evaluator-provided summary workbooks – Gas Utilities

Figure 14: Goal vs. Evaluated Gas Savings, PY2023: C&I (therms)

One gas utility, AOG, offered a cross-cutting program in PY2023 – an equipment rebates program. That program fell short of its goal, achieving 68 percent of the goal. Figure 15 shows results versus the goal for the program (AOG PY2023 EM&V Report, p. 1-3).



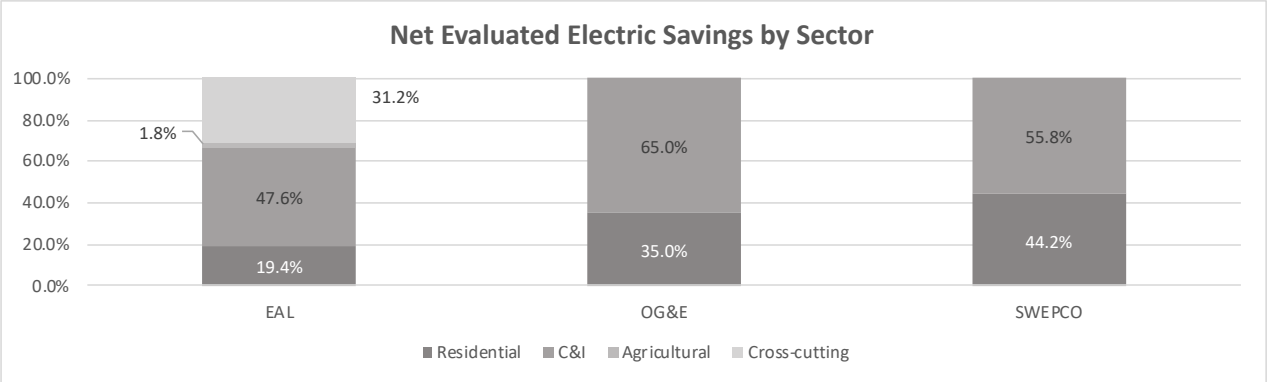
Sources: PY2023 EM&V Reports and Evaluator-provided summary workbooks – Gas Utilities

Figure 15: Goal vs. Evaluated Gas Savings, PY2023: Cross-cutting (therms)

Sector Mix Within Portfolios

Comparing the portfolio mixes across the utilities helps to understand and assess the program sectors served for each utility.

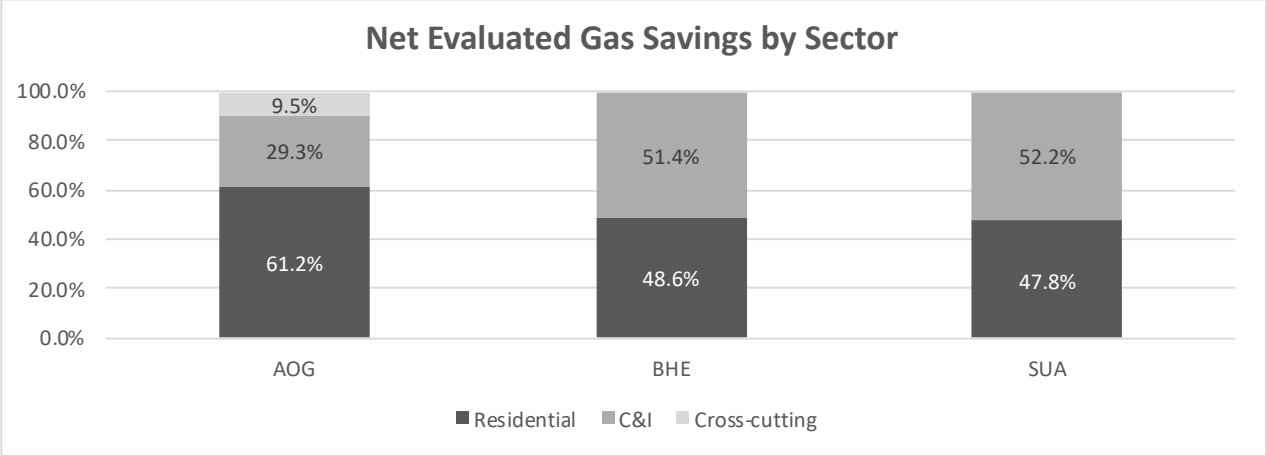
The sector contribution to savings among electric utilities is varied. Excluding the contribution by agricultural and cross-cutting programs, EAL and OG&E exhibit a similar split between residential and C&I savings, roughly one-third to two-thirds, respectively. SWEPCO's residential and C&I split was closer to an even split, with about five percent more contribution by savings in the C&I sector. These breakdowns are shown in Figure 16 (EAL BY2023 EM&V Report, pp. 34-36; OG&E PY2023 EM&V Report, p. 23; SWEPCO PY2023 EM&V Report, p. 24).



Sources: PY2023 EM&V Reports and Evaluator-provided summary workbooks – Electric Utilities

Figure 16: Net Evaluated Electric Savings by Sector

Figure 17 shows that the gas utilities have varied savings breakdown across sectors. AOG's residential savings makes up over two-thirds of the savings when only considering residential and C&I sector savings (excluding cross-cutting for comparison purposes). BHE and SUA's savings are nearly 50/50 across the two sectors. (AOG PY2023 EM&V Report, p. 1-3; BHE PY2023 EM&V Report, p. 1-4; SUA PY2023 EM&V Report, p. 1-4).



Sources: PY2023 EM&V Reports and Evaluator-provided summary workbooks – Gas Utilities

Figure 17: Net Evaluated Gas Savings by Sector

1.4 Non-Energy Benefits

The Commission issued Order No. 30 on December 10, 2015, which provides further direction and guidance regarding including Non-Energy Benefits (NEBs) in the savings reporting. The Commission ordered those three categories of NEBs to be consistently and transparently accounted for in the programs. Per the order, NEBs are used in applications of the Total Resource Cost (TRC) test as applied to measures, programs, and portfolios. The three categories are:

- Benefits of electricity, natural gas, and liquid propane energy savings (i.e., other fuels)
- Benefits of public water and wastewater savings
- Benefits of avoided and deferred equipment replacement costs (ADRCs)

This was the seventh year that NEBs were accounted for and included in the TRC tests. Each evaluation quantified the three categories of NEBs (AOG PY2023 EM&V Report, pp. 3-12, 3-13; BHE PY2023 EM&V Report, pp. 3-12, 3-13; EAL BY2023 EM&V Report, p. 395; OG&E PY2023 EM&V Report, pp. 47, 50; SUA PY2023 EM&V Report, p. 3-11; SWEPCO PY2023 EM&V Report, pp. 33, 274, 278-280).

This section summarizes the NEB findings from the PY2023 program evaluations. Table 5 shows the total savings resulting from NEBs for each utility program.

Table 5: PY2023 Total NEBs Savings by Utility

Utility	NEB Secondary Fuel Savings		Water savings (gallons)	ADRC
	kWh or therms	Propane savings (gallons)		
AOG	710,685 kWh	0	122,437	$173,642
BHE	1,486,149 kWh	0	1,225,047	$221,649
SUA	1,667,443 kWh	0	4,717,560	$1,165,563
EAL	952,482 therms	107,003	6,767,760	$13,800,416
OG&E	35,436 therms	432	2,199,570	$1,222,771
SWEPCO	505,022 therms	0	2,316,379	$4,601,157
Total	**3,864,278 kWh**	**107,435**	**17,348,753**	**$21,185,199**
	1,492,940 therms			

Sources: PY2023 EM&V Reports and Evaluator-provided summary workbooks

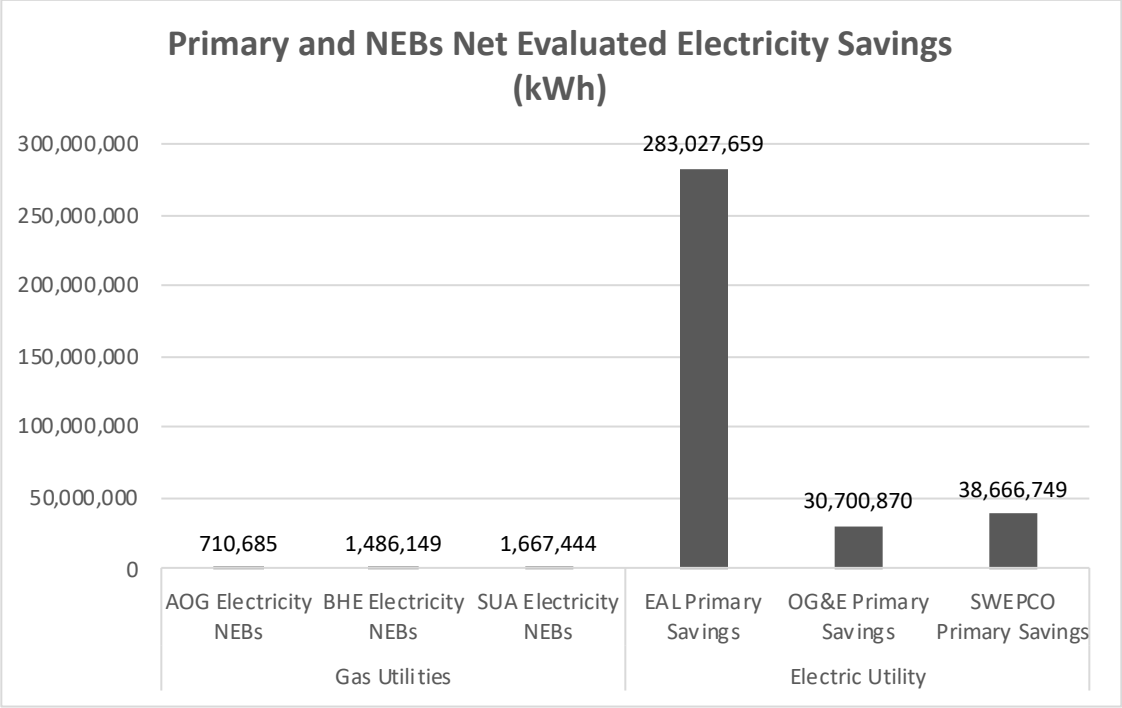
The gas savings claimed as NEBs by the electric utilities accounted for 26 percent more gas savings than what was claimed by the gas utilities. In comparison, the electric savings claimed as NEBs by the gas utilities are approximately one percent of the electricity savings attributed to the electric utilities. Table 6 summarizes these findings.

Table 6: Electric and Gas Savings including NEBs

Resource	Net Evaluated Primary Savings	NEB Secondary Fuel Savings	% Additional savings due to NEBs
Gas (therms)	5,816,689	1,492,940	25.7%
Electric (kWh)	352,395,278	3,864,278	1.1%

Sources: PY2023 EM&V Reports and Evaluator-provided summary workbooks.

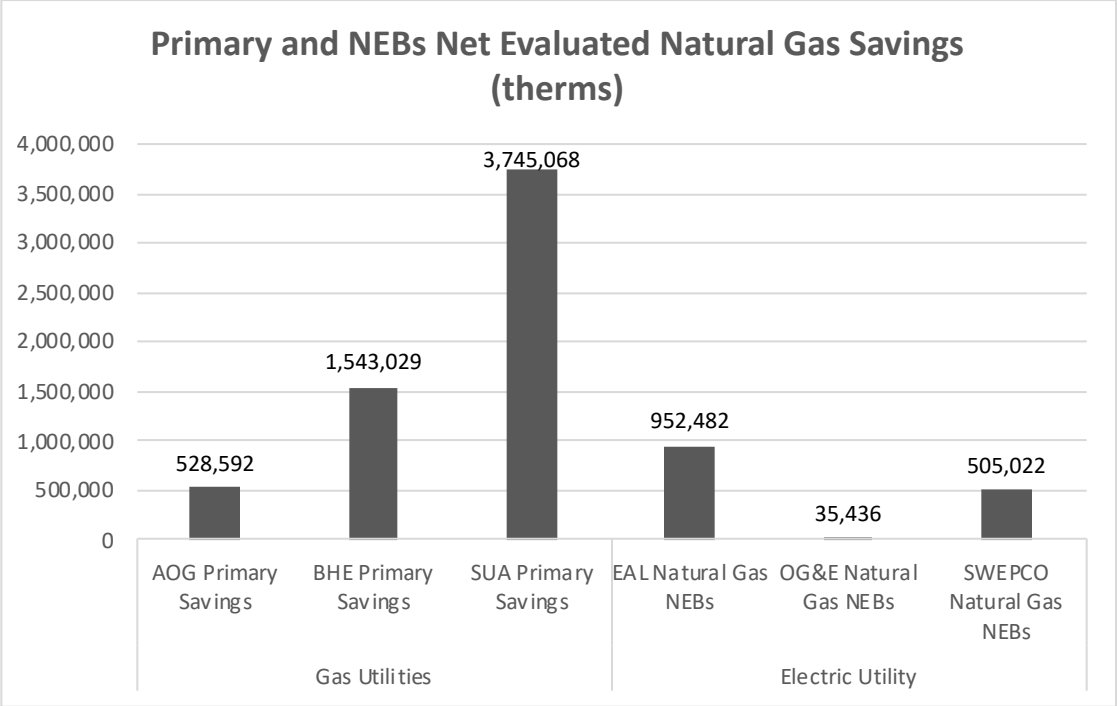
Figure 18 shows the gas utilities' electricity NEBs and the electric utilities' primary electricity savings. The figure shows that the gas utilities' combined electricity savings equate to, for example, 13 percent of OG&E's net evaluated savings. (AOG PY2023 EM&V Report, p. 1-3; BHE PY2023 EM&V Report, p. 1-4; EAL BY2023 EM&V Report, pp. 34-36; OG&E PY2023 EM&V Report, p. 23; SUA PY2023 EM&V Report, p. 1-4; SWEPCO PY2023 EM&V Report, p. 24; Evaluator-provided summary workbooks and reports from PY2017 through PY2023).



Sources: PY2023 EM&V Reports and Evaluator-provided summary workbooks

Figure 18: Primary and NEBs Net Evaluated Electricity Savings (kWh)

Figure 19 summarizes the primary and NEBs for evaluated natural gas savings. The figure shows that the electric utility EAL had PY2023 natural gas NEBs savings that exceeded the total portfolio natural gas savings by AOG (AOG PY2023 EM&V Report, pp. 1-5-1-6; BHE PY2023 EM&V Report, p. 1-6; EAL BY2023 EM&V Report, p. 394; OG&E PY2023 EM&V Report, pp. 97-99, 133-135, 170-172; SUA PY2023 EM&V Report, pp. 1-7-1-8; SWEPCO PY2023 EM&V Report, p. 33).



Sources: PY2023 EM&V Reports and Evaluator-provided summary workbooks

Figure 19: Primary and NEBs Net Evaluated Natural Gas Savings (therms)

NEBs significantly increased each utility's overall benefits. Accounting for NEBs comes at a low cost (only tracking and evaluation tasks are required) and identifies additional savings from existing programs. It also significantly improves program economic performance as measured by TRC.

Table 7 shows the dollar amount of the NEBs' lifetime benefits as a percentage of total TRC benefits. As this table illustrates, NEBs contribute to each utility's savings and their portfolio's cost-effectiveness. For the utilities reporting dollar amounts of NEBs benefits, NEBs increased overall cost-effectiveness ranging from 11 percent (AOG) of total lifetime TRC benefits to 17 percent (SWEPCO). NEBs represented over 14 percent of the TRC benefits across those utilities reporting these details[6].

Table 7: NEBs Lifetime Benefits as Percentage of TRC Lifetime Benefits

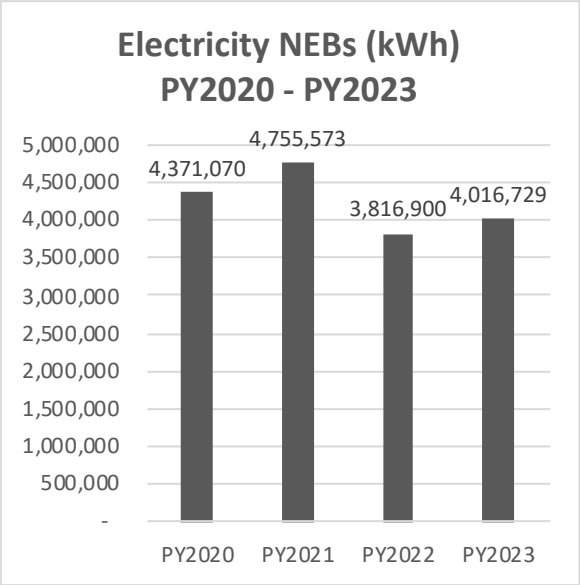
Utility	TRC Benefits	Total NPV NEBs $ Benefits	NEBs % of TRC Benefits	TRC
AOG	$5,262,302	$560,707	10.66%	2.03
BHE	$8,624,130	$1,079,976	12.52%	1.76
SUA[7]				1.67
EAL[7]		$22,099,383		
OG&E	$19,959,427	$2,220,000	11.12%	2.21
SWEPCO	$31,727,804	$5,387,212	16.98%	2.40
Total (excl. SUA and EAL)	**$65,573,663**	**$9,247,896**	**14.10%**	

Sources: PY2023 EM&V Reports and Evaluator-provided summary workbooks

Total PY2023 electricity NEBs savings from gas utility programs and natural gas NEBs savings from electrical utilities remained relatively close to PY2022 figures. PY2023 propane NEBs, water and wastewater NEBs, and avoided/deferred replacement cost NEBs all exhibited a marked decrease from PY2022 figures. Figures 20-24 compare each category of NEBs from PY2020 through PY2023 (AOG PY2023 EM&V Report, p. 1-6; BHE PY2023 EM&V Report, pp. 1-5-1-6; EAL BY2023 EM&V Report, p. 394; OG&E PY2023 EM&V Report, pp. 97-99, 133-135, 170-172; SUA PY2023 EM&V Report, p. 1-7; SWEPCO PY2023 EM&V Report, p. 33).

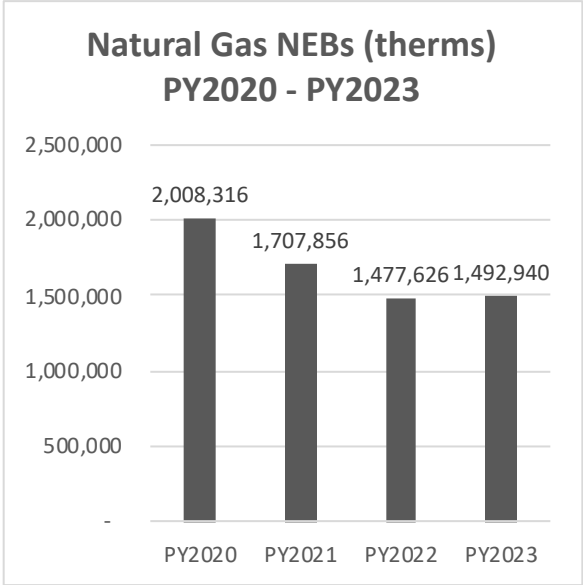
[6] Several utilities did not directly report the information in the table but provided information that allows for calculation or estimation of that information. For example, OG&E's report provided a TRC and TRC net benefit amount (benefits minus costs), but did not explicitly provide total TRC benefits. EAL and SUA did not report sufficient information to calculate the relevant values.

[7] The SUA and EAL EM&V Reports lacked adequate reporting on cost effectiveness and the contribution by NEBs to cost effectiveness benefits to provide findings for those two utilities in the table. The total row excludes both utilities.



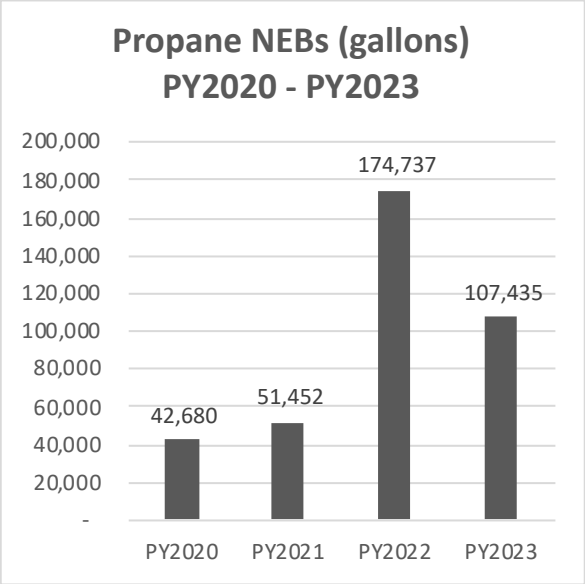
Sources: PY2020 – PY2023 EM&V Reports and Evaluator-provided summary workbooks

Figure 20: Electricity NEBs (kWh) PY2020 – PY2023



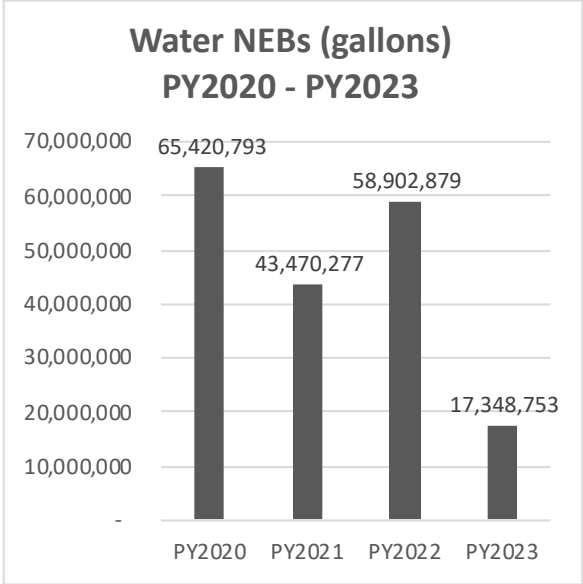
Sources: PY2020 – PY2023 EM&V Reports and Evaluator-provided summary workbooks

Figure 21: Natural Gas NEBs (therms) PY2020 – PY2023



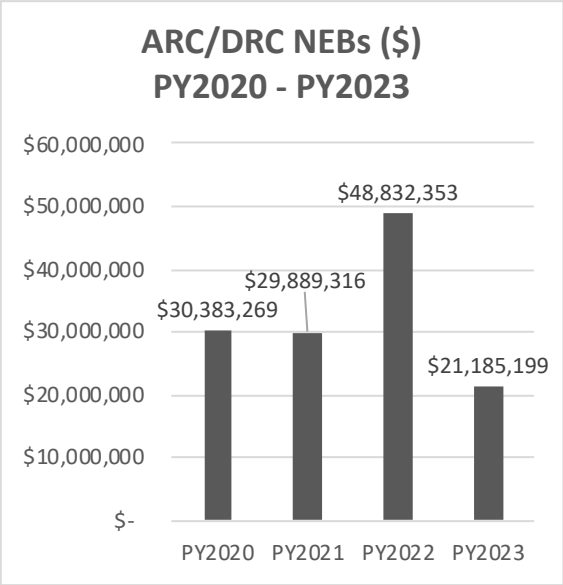
Sources: PY2020 – PY2023 EM&V Reports and Evaluator-provided summary workbooks

Figure 22: Propane NEBs (gallons) PY2020 – PY2023



Sources: PY2020 – PY2023 EM&V Reports and Evaluator-provided summary workbooks

Figure 23: Water NEBs (gallons) PY2020 – PY2023



Sources: PY2020 – PY2023 EM&V Reports and Evaluator-provided summary workbooks

Figure 24: ARC/DRC NEBs ($) PY2020 – PY2023

1.5 Review of Key Impact Findings

The evaluation contractors conducted various impact evaluation activities as identified in their PY2023 EM&V Plans. These activities aim to determine the overall gross and net savings achieved from each utility program. This section summarizes the findings from specific impact evaluation activities:

- Review of Program Database Tracking;
- Quality Assurance/Quality Control (QA/QC);
- Review of TRM Savings Estimates;
- Determine Savings from M&V/Custom Projects and
- Net-to-Gross (NTG) Verification.

Review of Program Database Tracking

The PY2023 databases were adequate for evaluators to conduct their verification activities. Evaluators reported that most data were available for reproducing savings from program offerings (AOG PY2023 EM&V Report, p. 3-12; BHE PY2023 EM&V Report, p. 3-11; EAL BY2023 EM&V Report, pp. 207, 212-213, 229-230, 261-262, 283-284; OG&E PY2023 EM&V Report, pp. 59-60; SUA PY2023 EM&V Report, p. 3-12; SWEPCO PY2023 EM&V Report, p. 54). Data quality issues were noted by evaluators around heating system type, measure classification and efficiency levels (EAL BY2023 EM&V Report, pp. 264-265, 309; OG&E PY2023 EM&V Report, pp. 153, 193; SWEPCO PY2023 EM&V Report, pp. 34, 124, 206).

TRM 9.1 changes were incorporated into tracking databases, yet key fields were not always populated. PY2023 evaluations used TRM 9.1, which was a comprehensive update across many measures. Evaluators found that tracking databases were updated to reflect these changes (AOG PY2023 EM&V Report, p. 3-12; BHE PY2023 EM&V Report, p. 3-11; EAL BY2023 EM&V Report, pp. 207, 212, 229-230, 261-262, 282-283; OG&E PY2023 EM&V Report, p. 59; SUA PY2023 EM&V Report, p. 3-12; SWEPCO PY2023 EM&V Report, p. 54).

While databases may have included all columns necessary for collecting project data, evaluators found several situations where the database fields were not populated (BHE PY2023 EM&V Report, pp. 5-7-5-8; EAL BY2023 EM&V Report, pp. 110, 117, 153; OG&E PY2023 EM&V Report, pp. 103-104, 147-149, 191-192; SUA PY2023 EM&V Report, pp. 4-5-4-6, 5-6-5-7, 6-2-6-3; SWEPCO PY2023 EM&V Report, pp. 123-126, 205-207). Evaluators continued to emphasize the need to collect either phone and/or email addresses from participants due to the difficulty in outreach (AOG PY2023 EM&V Report, pp. 5-11-5-12, 6-8-6-9, 7-10, 7-22; EAL BY2023 EM&V Report, pp. 212-213; SUA PY2023 EM&V Report, pp. 4-5-4-6, 4-22).

Quality Assurance/Quality Control (QA/QC)

All utilities have incorporated QA/QC activities in utility program operations. Evaluation teams confirmed utility QA/QC practices by program. ADM does this as part of reporting on the APSC Comprehensive Goals, Factor 7 (AOG PY2023 EM&V Report, p. 3-12; BHE PY2023 EM&V Report, p. 3-11; OG&E PY2023 EM&V Report, p. 60; SUA PY2023 EM&V Report, p. 3-11; SWEPCO PY2023 EM&V Report, p. 61). Tetra Tech reports on QA/QC practices by program in a dedicated section (EAL BY2023 EM&V Report, pp. 117, 138, 159, 180, 202, 245, 273, 305, 315).

Evaluators continued their engagement with program delivery stakeholders. Evaluators continued to engage with implementation contractors on M&V plans for custom projects throughout the program year to help reduce post-savings assessment risks (AOG PY2023 EM&V Report, pp. 5-8-5-10; BHE PY2023 EM&V Report, pp. 5-10-5-11; EAL BY2023 EM&V Report, pp. 215, 309; OG&E PY2023 EM&V Report, pp. 63, 65; SUA PY2023 EM&V Plan, pp. 7-8-7-10; SWEPCO PY2023 EM&V Report, p. 54).

Adherence to evaluator recommendations can increase program performance. Evaluators provided strategies such as flagging thresholds or conditional formatting that can help identify projects for further QA/QC efforts (EAL BY2023 EM&V Report, p. 65; OG&E PY2023 EM&V Report, p. 154; SUA PY2023 EM&V Report, pp. 8-5-8-6). In some cases, evaluators noted a best practice of automating savings calculations within a database instead of manual entry (EAL BY2023 EM&V Report, p. 232). ADM noted in PY2021 that new trade allies' projects should be reviewed to note any missed/or ignored opportunities for installing health and safety measures. In PY2023, participants receiving any health and safety measures increased from five percent in PY2021 to 41 percent in PY2023 (OG&E PY2023 EM&V Report, p. 52).

Review of TRM Savings Estimates

Evaluators reported on their findings regarding the application and usage of the Arkansas TRM Version 9.1, Volume 2. The list below summarizes each observation noted in the EM&V Reports by TRM measure name.

- 2.1.6 Central Air Conditioner Replacement & 2.1.8 Heat Pump Replacement
  - Apply SEER-SEER2, EER-EER2, and HSPF-HSPF2 conversion factors when estimating the efficiency of legacy equipment (OG&E PY2023 EM&V Report, p. 85).
- 2.1.11 Duct Sealing
  - Duct sealing projects where cooling efficiency is unobtainable, the default SEER should be applied (11.5) as noted in TRM (EAL BY2023 EM&V Report, p. 165).
- 2.1.12 Smart Thermostats
  - For point-of-sale program, default values for heating system weights were identified from the evaluation at 1,484 sq-ft for housing size and savings of 592 kWh, 0 kW, and 49 therms (OG&E PY2023 EM&V Report, p. 85, 110).
  - For the unknown heating system, the evaluator developed values based on saturation percentages from the PY2023 CWA: a. Gas: 60%, b. Electric Resistance: 24%, c. Heat Pump: 16% (OG&E PY2023 EM&V Report, p. 194).
- 2.1.13 Ventilation Fans
  - Update deemed savings by product category to reflect observed actual efficiencies: 10-89 CFM: 4.88 CFM/W 90-200 CFM: 6.52 CFM/W (OG&E PY2023 EM&V Report, p. 87).
  - Develop a separate savings estimate for ENERGY STAR Most Efficient systems, using 10 CFM/W (OG&E PY2023 EM&V Report, p. 87).
- 2.3.1 Water Heater Replacement
  - The residential water heater setpoint of 120 degrees was used for savings instead of the TRM parameter of 124 degrees (BHE PY2023 EM&V Report, p. 4-37).
  - Align water heater savings calculations such that baseline and volume derive from the same size category (BHE PY2023 EM&V Report, p. 4-37).
- 2.4.4 Dehumidifiers

  - Update parameters to align with TRM 9.2 for PY2024 for dehumidifiers. Apply deemed savings based on the three size categories specified in the TRM, which align with updated ENERGY STAR guidelines (OG&E PY2023 EM&V Report, pp. 85, 111).
- 2.5.1 Lighting Efficiency
  - Review the baseline and retrofit wattages against the AR TRM and ENERGY STAR QPL (EAL BY2023 EM&V Report, p. 184).
  - Follow the guidance in Appendix F of the TRM to determine exterior lighting power density in the calculation method for new construction exterior lighting (EAL BY2023 EM&V Report, p. 310).
  - For retail programs, apply the commercial lighting savings for 6.7% of installed lamps (OG&E PY2023 EM&V Report, p. 85).
  - Do not apply the commercial lighting savings of 6.7% to lamps that are part of the 'Food Bank" giveaway (SWEPCO PY2023 EM&V Report, p. 165).
- 2.6.1 Advanced Power Strips
  - For Tier 1 products, evaluators identified an ISR of 67% as part of the low-income giveaway program (EAL BY2023 EM&V Report, pp. 194-195).

Non-TRM prescriptive algorithms were identified by the evaluation teams. Specific measures used in prescriptive programs in Arkansas had calculations that deviated from the AR TRM. The source of these savings can be (1) based on work papers from the implementation contractor provided to the evaluator, (2) referencing TRMs in other jurisdictions or (3) deviations from an existing AR TRM measure. These measures are listed next.

- Residential AC/HP Tune-Ups (CoolSaver): CLEAResult white paper.
- Commercial Wi-Fi Thermostats: CLEAResult white paper.
- Commercial Overhead Door Weatherstripping: CLEAResult methodology from Commercial Door Air Infiltration.
- Packaged Terminal AC Sealing: applies CLEAResult methodology from Commercial Door Air Infiltration.
- DrySmart Controls.
- High Speed Door applies AR TRM for High Speed Doors for Cold Storage with an implementer paper for when high speed door separates conditioned spaces and not conditioned/ambient spaces.
- Water Dispenser (Cooler): applies New Orleans TRM 6.0.
- Energy Recovery Ventilator (ERV).

Determine Savings from M&V/Custom Projects

Per the guidance and direction from the Arkansas TRM, it was more appropriate for some programs to rely on custom savings calculations using Measurement & Verification (M&V) protocols rather than relying on the TRM values or algorithms. In some cases, *custom* measures use a combination of site-specific parameters and methodologies outlined in Arkansas TRM V9.1. Specific programs that included custom M&V elements are:

- ***Commercial & Industrial Solutions Program (CISP):*** a program that provides custom, prescriptive, and direct install measures for larger commercial and industrial customers. The custom portion of this program includes technical assistance in identifying and implementing energy-saving measures. Incentives vary based on project scope and verified energy savings of each measure installed. In Arkansas, this program was offered by AOG (AOG PY2023 EM&V Report, pp. 5-1-5-2), Black Hills Energy (BHE PY2023 EM&V Report, pp. 5-1-5-2), and Summit Utilities (SUA PY2023 EM&V Report, pp. 7-1-7-2).
- ***Large Commercial and Industrial Solutions:*** a program that offers eligible nonresidential customers incentives for prescriptive and custom measures and is available for all commercial new construction customers. The custom component of this program includes technical assistance with identifying and implementing energy-saving measures, program referrals, and incentives. EAL offers This program (EAL BY2023 Evaluation Report, pp. 204-205).
- ***Public Institutions Solutions:*** a program that provides custom, prescriptive, and direct install measures to public buildings targeting government, government-owned institutions, and public-private education entities. The custom portion of this program assists in identifying, assessing, and implementing energy-saving measures and operational practices. All custom measures require measurement and verification (M&V), with incentive levels varying based on installed measures. This program was offered by EAL (EAL BY2022 Evaluation Report, pp. 11-1-11-2).
- ***Agricultural Energy Solutions:*** a custom program that provides audits and incentives for energy efficiency improvements for farmers and agricultural customers and education for agricultural equipment suppliers. EAL offers This program (EAL BY2023 Evaluation Report, pp. 12-1-12-2).
- ***Commercial Energy Efficiency Program (CEEP):*** a portfolio-style approach designed to provide access to technical expertise and incentives for all commercial and industrial customers. Six program channels are offered based on market segments/delivery approach. Custom projects are available through three of the six channels: Large C&I Solutions, Small Business Solutions, and Schools and Governmental Entities (SAGE). This program is offered by OG&E (OGE PY2023 Portfolio EM&V Report, pp. 7-1-7-2).
- ***Business/Industrial Solutions Program (BSP):*** This program promotes energy efficiency through three pathways: Commercial and Industrial Energy Efficiency Pathway (CIEEP), Small Business Pathway (SBP), and Load Management Standard Offer Pathway (LMSOP). Custom projects are offered through the CIEEP and SBP pathways for SWEPCO (SWEPCO PY2023 EM&V Report, pp. 4-1-4-2) offers this program.

Custom projects continued to contribute significantly to gas utility portfolios. Statewide custom projects accounted for 35 percent of *ex-ante* gas (therms) savings, which is less than the savings contribution from PY2022 (45 percent) (AOG PY2023 EM&V Report, Table 1-3, p. 1-3; BHE PY2023 EM&V Report, Table 1-3, p. 1-4; SUA PY2023 EM&V Report, Table 1-2, p. 1-4). Custom projects continue to account for a majority of the savings for the C&I Solutions programs offered by gas utilities: 67 percent for AOG (AOG PY2023 EM&V Report, Table 5-12, p. 5-19), 81 percent for BHE (BHE PY2023 EM&V Report, Table 5-13, p. 5-22), and 78 percent for SUA (SUA PY2023 EM&V Report, Table 7-10, p. 7-20). In PY2022, this proportion of savings from custom measures in the gas utilities' Commercial & Industrial Solutions program was significantly higher for AOG (77 percent) and roughly the same for BHE (80 percent) and SUA (79 percent) (AOG PY2023 EM&V Report, p. 1-3; BHE PY2023 EM&V Report, p. 5-22; SUA PY2023 EM&V Report, p. 7-20).

Custom projects' contribution to portfolio savings in electric programs were either similar or less than that in PY2022. Custom project savings in PY2023 were the same as in PY2022 at 13 percent of EAL's portfolio (EAL BY2023 EM&V Report, p. 223). The contribution towards portfolio electric savings from custom projects dropped from 38 percent to 21 percent for OG&E (OG&E PY2023 EM&V Report, p. 158). For SWEPCO, based on two tables from the PY2023 EM&V Report, custom projects' contribution to the portfolio savings was approximately 10 percent. This is lower than that reported in PY2022 (28%), but that was due to the inclusion of a custom Strategic Energy Management (SEM) program in PY 2022 (SWEPCO PY2023 EM&V Report, pp. 100, 105).

Despite the varied contributions to savings from custom projects, most of the utilities reached or nearly reached their electric savings goals in PY2023. EAL's Public Institutions Solutions and the Agricultural Energy Solutions programs fell below their savings goals in PY2023, reaching respectively 68% and 85% of the savings goal (EAL BY2023 EM&V Report, Table 155, p. 278, Table 173, p. 309). However, the largest contributor to electric savings is EAL's Large C&I Program, which achieved 95 percent of the savings goal in PY2023, an increase from PY2022, which was at 88 percent of the savings goal (EAL BY2023 EM&V Report, Table 119, p. 207).

Despite the shortfall from custom projects in the C&I pathways, OG&E's CEEP achieved 118 percent of its savings goal (OGE PY2023 EM&V Report, Table 2-3, p. 23), and SWEPCO's BSP achieved 110 percent of its savings goal (SWEPCO PY2023 EM&V Report, Table 4-14, p. 99).

Custom gas projects continue to address a variety of applications. Gas utility custom measures included retro-commissioning, waste heat recovery, boiler retrofits, boiler controls, boiler replacements, steam trap repairs, steam trap replacements, steam leak repairs, insulation, smart thermostats, process ovens, burner tune-ups, burner replacements, and process improvement measures (AOG PY2023 EM&V Report, Table 5-10, p. 5-15; BHE PY2023 EM&V Report, Table 5-2, p. 5-4; SUA PY2023 EM&V Report, Table 7-2, p. 7-3). Steam trap replacement, boiler control and condensate return projects were the largest drivers of savings for custom gas projects, representing 38 percent of the total savings from custom gas projects in PY2023 (AOG PY2023 EM&V Report, p. 5-15; BHE PY2023 EM&V Report p. 5-4; SUA PY2023 EM&V Report, p. 7-3).

Custom non-lighting electric projects have continued to create an opportunity for savings. Electric utility custom projects included compressed air dryer projects, compressed air leak repairs, HVAC controls, process chillers, auto door closers, injection molding machine replacements, refrigeration, smart thermostats and variable frequency drives (EAL BY2023 EM&V Report, pp. 224-225; OG&E PY2023 EM&V Report, pp. 26, 161; SWEPCO PY2023 EM&V Report, p. 103).

EAL and OG&E's Continuous Energy Improvement (CEI) behavioral program has seen an increase in savings compared to PY2022. EAL captured 41 percent savings for the C&I program from CEI projects, an increase from 33 percent in PY2022 (EAL BY2023 EM&V Report, pp. 66, 71, 223). Similarly, OG&E saw a total of 22 percent of the savings for the C&I program from CEI projects, an increase from 19 percent in PY2022 (OG&E PY2023 EM&V Report, p. 159).

SWEPCO's Strategic Energy Management (SEM) is a pathway to reaching savings goals. New Construction projects have been a growing area of interest for SWEPCO, bringing with it an increased option of expanding Strategic Energy Management (SEM) offerings (SWEPCO PY2023 EM&V Report, p. 91). In PY2023, SEM made up 34 percent of the total savings of the C&I program (CIEEP), which will start being evaluated in PY2024 (SWEPCO PY2023 EM&V Report, p. 96).

Net-to-Gross (NTG) Verification

The IEM team reviewed the methods and findings for the PY2023 NTG ratios in detail, which are presented in this section. Note that the IEM standardized the program or program component (i.e., channel) offerings across the utilities to limit the number, length and complexity of the following tables and allow a comparison of the NTG results (see Table 8 and Table 9). *Section 4* presents a discussion of the strengths and limitations of the NTG research for each utility.

Table 8: Summary of NTG Values for Gas Utilities

Program: Component	AOG NTG	BHE NTG	SUA NTG
Equipment Rebates (AOG, SUA), Residential Solutions (BHE)	72.8%	95.2%	83.0%
Low-Flow Showerhead and Faucet Aerator CIP			62.7%
Commercial Boiler CIP			80.3%
C&I Solutions	96.5%	97.0%	99.9%
Commercial Equipment Rebates			79.0%
Commercial Food Service CIP			77.2%
Home Energy Reports*			100.0%
Savings Home Program			90.0%
Consistent Weatherization Approach	97.9%		
Low-Income Pilot (AOG, BHE), Low-Income Saving Homes (SUA)	100.0%	100.0%	100.0%
Total	**95.1%**	**96.2%**	**95.6%**
*The Residential Solutions Reward relied on a price response model and thus did not calculate a NTG ratio.			

The program-specific NTG values for electric utilities were similar to past evaluations.

Table 9: Summary of NTG Values for the Electric Utilities

Program: Channel	EAL NTG	OG&E NTG	SWEPCO NTG
Point of Purchase Solutions (EAL); EPP (SWEPCO); HEEP: CPS (OG&E)	91.8%	94.7%	91.9%
Home Energy Solutions (EAL); HEEP: Residential Solutions (OG&E); REIP (SWEPCO)	99.9%	98.4%	97.5%
Multifamily Homes	100.0%		
Manufactured Homes	100.0%		
HVAC Replacement & Tune-up (OG&E)		89.1%	
Res. Direct Load Control**	100.0%		
C&I Midstream Lighting			
Large C&I Solutions (EAL); CIEEP (SWEPCO); CEEP Large C&I (OG&E)	105.2%	83.1%	89.4%
Small Business (EAL), SBP (SWEPCO)	100.0%	100.0%	100.0%
HPwES			99.0%
Consistent Weatherization Approach (CWA)			
School-Based Energy Education; HEEP School Kits (OG&E)			
SAGE		100.0%	
LMSOP			100.0%
Public Institutions Solutions	99.4%		
Agricultural Energy Solutions	99.0%		
Smart Direct Load Control	100.3%		
Low-Income Solutions (EAL): IQW (SWEPCO)	100.0%		100.0%
Total	**99.2%**	**92.3%**	**94.8%**

NTG Methods

Evaluators used various methods across electric and gas utility PY2023 evaluations to develop program-level NTGRs. While the evaluations used primary research for many programs, most electric and gas programs relied on a combination of either previous research or literature reviews.

The evaluation plans documented a staggered approach to conducting primary NTGR research during the three-year evaluation cycle. The IEM team confirmed that the evaluators followed the evaluation plans and were able to conduct primary research for those programs designated to receive the research in PY2023. A minority of programs NTGR relied on billing/statistical analysis or deemed values. Tables 10 through Table 12 summarize the NTG methods for each utility.

Table 10: Summary of NTG Methods for Gas Utilities

	Survey Research in PY2023			Use of Prior Year Findings	Billing Analysis/ Statistical Modeling	Lit Review	Deemed Values
Program	**Participant Customer Surveys**	**Non-part Surveys**	**Trade Ally Surveys**				
AOG							
Equipment Rebates	✓			✓			
C&I Solutions	✓			✓			
Consistent Weatherization Approach	✓						
Low-Income Pilot						✓	
BHE							
Residential Solutions	✓			✓			
C&I Solutions	✓			✓			
Low-Income Pilot						✓	
SUA							
Residential Equipment Rebates	✓			✓			
Commercial Equipment Rebates				✓			
C&I Boiler				✓			
C&I Solutions	✓			✓			
Comm Food Service CIP				✓			
HER					✓		
Low-Flow CIP				✓			
Saving Homes Program				✓			
Low-Income Saving Homes				✓			

All the NTG research followed the three-year plans previously reviewed by the IEM, effectively leveraging resources across the utilities.

Table 11: Summary of NTG Methods for Electric Utilities

Program	Survey Research in PY2023			Use of Prior Year Findings*	Billing Analysis/ Statistical Modeling	Literature Review	Deemed Values
	Participant Customer Surveys	Non-part Surveys	Trade Ally Surveys				
EAL							
Point of Purchase Solutions				✓			
HES	✓			✓			
Multifamily Homes				✓			
Mfg. Homes				✓			
Residential Low-Income Solutions				✓			
Large C&I Solutions				✓			
Small Business				✓			
Public Institutions				✓			
Agricultural Energy Solutions				✓			
Residential Equipment Rebates Direct Load Control							✓
Smart Direct Load Control Pilot				✓			
Agricultural Irrigation Load Control							✓
SWEPCO							
C&I EEP	✓			✓			
SBP				✓			
LMSOP							✓
REIP	✓			✓		✓	
HPwES	✓						
IQW Pathway Pilot							✓
EPP				✓	✓	✓	✓
*EAL's Res DLC, and Ag. ILC Programs and SWEPCO LMSOP Program evaluation did not include net-to-gross research due to the nature of the program.							

Table 12 summarizes the NTG methods used for OG&E's program portfolio. This utility's portfolio requires a different set of NTG approaches than the other electric utilities.

Table 12: Summary of NTG Methods for OG&E

Program and Channel	Survey Research in PY2023			Use of Prior Year Findings	Billing Analysis/ Statistical Modeling	Literature Review	Deemed Values
	Participant Customer Surveys	Non-part Surveys	Trade Ally Surveys				
OG&E							
HEEP – RSOL	✓			✓		✓	
HEEP – Kits						✓	✓
HEEP – HVAC				✓			
HEEP – CPS		✓			✓	✓	✓
CWA	✓	✓					
CWA – Low-Income							✓
Large CEEP – C&I Solutions	✓						
CEEP – SAGE				✓			
CEEP – SBS	✓						
CEEP – Midstream Lighting				✓*			
Residential Direct Load Control CEEP – CEI							✓
CEEP – RCx				ü			
* Based on downstream participants.							

Spillover

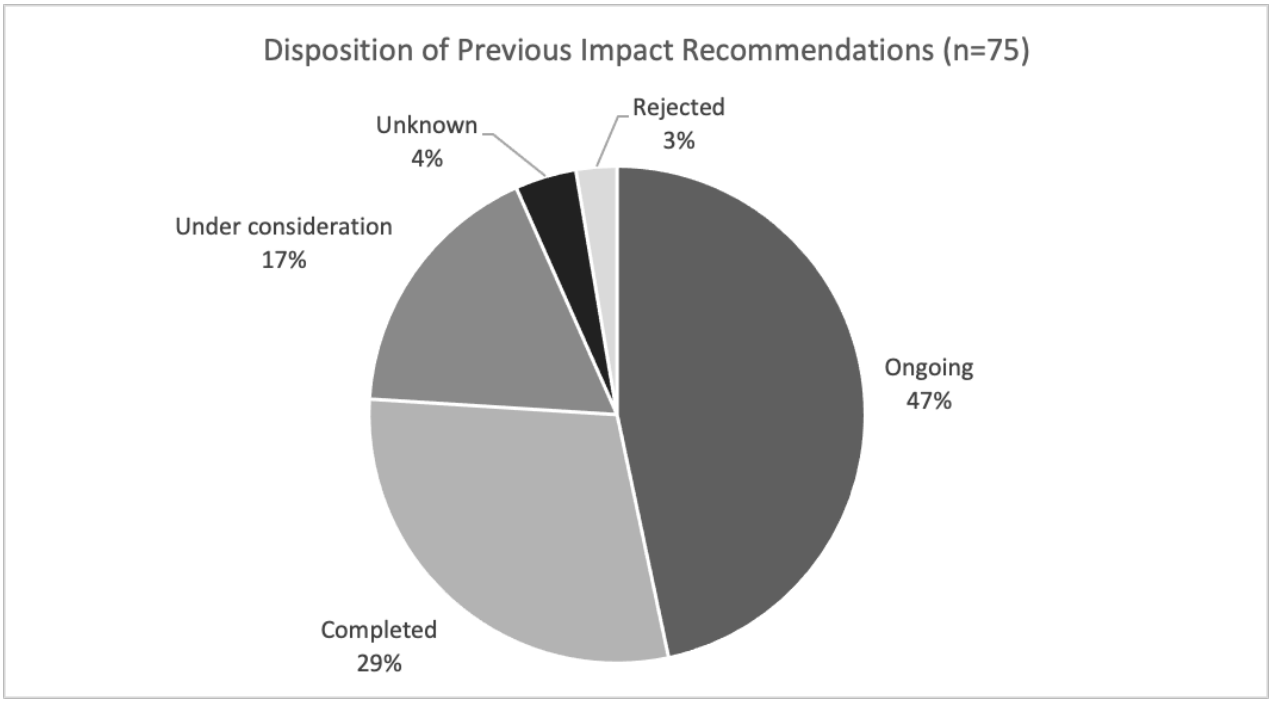
The evaluators continued to find minimal instances of spillover in PY2023. The evaluators conducted some level of survey-based spillover research for all utilities. These included spillover surveys for the Residential Solutions programs for BHE (BHE PY2023 EM&V Report, pp. 4-32-4-33); the HES program for EAL (EAL BY2023 EM&V Report, p. 114); OG&E's CEEP program (OG&E PY2023 EM&V Report, p. 190); the HPwES and CIEEP programs for SWEPCO (SWEPCO PY2023 EM&V Report, pp. 115, 166-167), and the C&I Solutions programs for AOG and SUA (AOG PY2023 EM&V Report, p. 5-13; SUA PY2023 EM&V Report, pp. 7-14-7-15).

In most cases, no instances of spillover were found. However, the SWEPCO evaluators found a limited spillover of 4.6 percent in the HPwES program (SWEPCO PY2023 EM&V Report, p. 167). When primary research was not conducted, evaluators relied on literature reviews or past research.

1.6 Impact Recommendations

Status of Previous Impact Recommendations

Six out of the seven utilities filed evaluation reports for PY2023. Each report provided a status update on recommendations made in previous program years. Given the fact that PY2023 is a bridge year, most of the evaluation reports provided a review of past recommendations and their status during the three-year program period starting in PY2020. As Figure 25 shows, evaluators reported the status of roughly half (47 percent) of the previous impact recommendations as 'ongoing' by the utilities in PY2023. Another 29 percent were 'completed', and 17 percent were 'under consideration.' Less than 5 percent of the statuses were identified as 'unknown' or 'rejected.'



Sources: PY2023 EM&V Reports

Figure 25: Disposition of Previous Impact Recommendations

Table 13 summarizes the recommendation status by utility. Of note, many of the 'ongoing' recommendations made by EAL's evaluator focused on continuing practices that have been working well for programs with no specific resolution needed. 'Unknown' was applied by the IEM to designate recommendations that were tracked in PY2022, but their disposition was not mentioned in the evaluation reports. This number was significantly reduced from last year due to the detailed updates provided by the evaluators in all of the reports on recommendation status updates from previous program years (AOG PY2023 EM&V Report, p. 1-9; BHE PY2023 EM&V Report, p. 1-9; EAL BY2023 EM&V Report, p. 39; OG&E PY2023 EM&V Report, pp. 28-29; SUA PY2023 EM&V Report, p. 1-12; SWEPCO PY2023 EM&V Report, pp. 39-43).

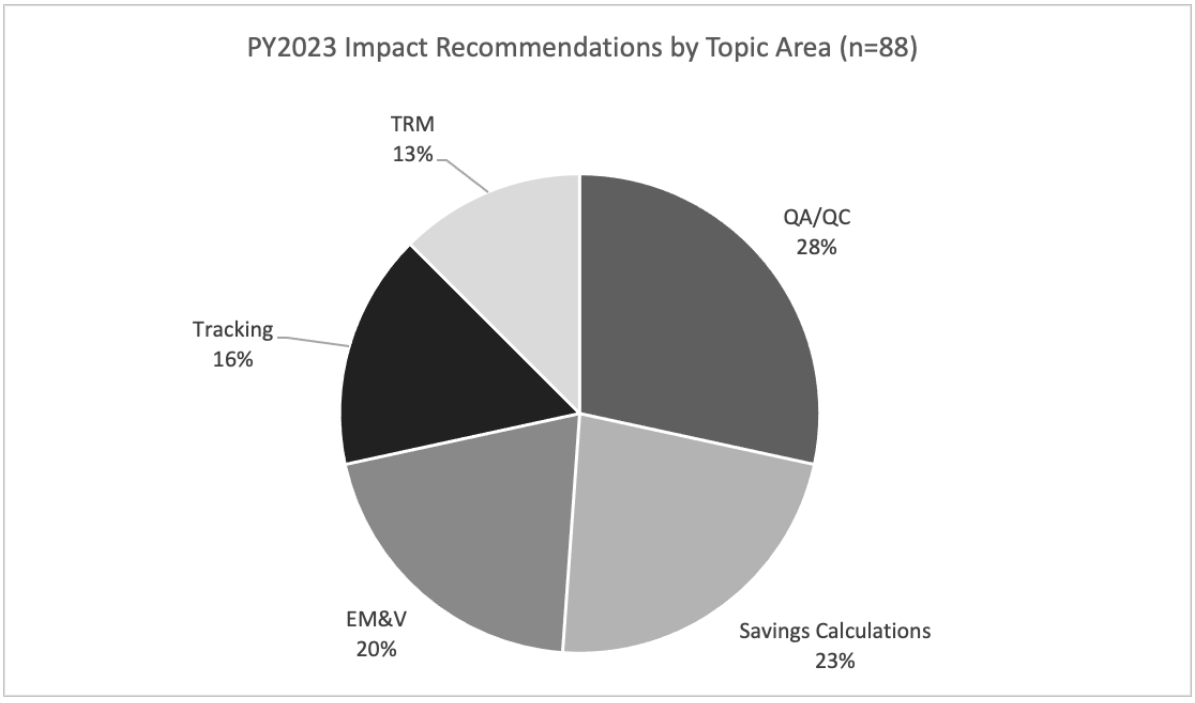
Table 13: Disposition of Previous Impact Recommendations by Energy Organization

	Gas Utilities			Electric Utilities			
Utility	**AOG**	**BHE**	**SUA**	**EAL**	**OG&E**	**SWEPCO**	**Total**
Completed	1	3	3	12	1	2	**22**
Ongoing	1	3	1	27	3		**35**
Rejected				1	1		**2**
Under Consideration		1		11	1		**13**
Unknown			2	1			**3**
Total for Each Utility	**2**	**7**	**6**	**52**	**6**	**2**	**75**

Source: Analysis of PY2023 EM&V Reports

PY2023 Impact Evaluation Recommendations

Figure 26 summarizes the distribution of the impact recommendations by topic area for PY2023. The IEM identifies recommendations as those summarized at the end of a program section or noted in the body of the text, which in some cases only sometimes made it to the summary section. Recommendations from previous program years with a status of "ongoing", "under consideration" or "unknown" are also included in the total count for PY2023. Based on this criterion, the evaluators identified 88 total unique recommendations for PY2023, with 43 percent of the recommendations (38) noted as new recommendations.



Source: Analysis of PY2023 EM&V Reports

Figure 26: PY2023 Impact Recommendations (n=88)

Most of the recommendations in PY2023 focused on improvements in QA/QC efforts, representing 29 percent of the total recommendations. This was followed by recommendations related to savings calculations at 23 percent and EM&V at 21 percent. Database tracking recommendations continued from last year with only six new recommendations, whereas several new TRM recommendations in the PY2023 EM&V reports comprised 12 percent of the total recommendations. Table 14 shows the distribution of recommendations by topic area and utility reports.

Table 14: Summary of PY2023 Impact Recommendations by Topic and Energy Organization

Utility	EM&V	QA/QC	Savings Calculations	Tracking	TRM	Total
AOG				2		**2**
BHE			3	1		**4**
SUA		3	1	3		**7**
EAL	16	18	8	5	7	**54**
OG&E	2	1	7	3	3	**16**
SWEPCO		3	1		1	**5**
Total	**18**	**25**	**20**	**14**	**11**	**88**

Source: Analysis of PY2023 EM&V Reports

The following sections list the recommendations by topic area as noted in the PY2023 EM&V reports.

EM&V

The evaluation teams identified 18 recommendations related to EM&V efforts. There were 15 recommendations continuing from previous years and three new recommendations. The new recommendations are noted below.

- Continue discussions with the EM&V team and IEM regarding the use of weather data in CEI and custom programs (EAL BY2023 EM&V Report, p. 221)
- Tetra Tech suggests the IEM discuss the use and sources of weather data to develop a common approach among the implementers and evaluators in Arkansas (EAL BY2023 EM&V Report, p. 49)
- Increase the review of statistical results on regression coefficients for programs (EAL BY2023 EM&V Report, p. 221)

Fourteen of the following recommendations were repeated from previous years.

- Clearly define program requirements to determine if retrofit or new construction methodology should be used. If unclear on which method should be used, consult the EM&V team to discuss and reach an agreement (EAL BY2023 EM&V Report, p. 310);
- Consider increasing documentation for custom projects to verify new building types, annual operating hours (AOH), and lighting end-use (EAL BY2023 EM&V Report, p. 310);
- Develop a library of AHRI actual heating and cooling capacities for system replacement savings calculations for HVAC Replacement & Tune Ups (OG&E PY2022 EM&V Report, pp. 70, 82);

- Enforce greater consistency in tracking data across program channels. Since PY2021, how efficient measures were reported in the tracking data changed for SBS but none of the other channels. (OG&E PY2023 EM&V Report, pp. 191-192);
- Follow the BPI standards for minimum ventilation rate when performing blower door tests (EAL BY2023 EM&V Report, p. 121);
- Follow the guidance set forth in the memo: EAL Tune-ups Methodology Recommendations for Residential Programs (EAL BY2023 EM&V Report, p. 93);
- HVAC System Efficiencies were available, but defaults were used for duct sealing. Use a consistent standard for documentation (EAL BY2023 EM&V Report, p. 93);
- Include a data dictionary between the two databases used for Tune-up, which is outside of the ArchEE database (EAL BY2023 EM&V Report, p. 232);
- Rated or calculated capacity for both heating and cooling should be tracked and used for tune-up savings calculations. The model number or AHRI certificate should be used to find the rated capacity (EAL BY2023 EM&V Report, pp. 120-121);
- Require contractors to submit all the documentation required to replicate savings such as condenser nameplate, advanced power strip location, heating seasonal performance factor (HSPF), light bulbs installed and removed (EAL BY2023 EM&V Report, p. 121);
- Select building types based on the closest description match from the available building types. The EM&V team recommends more careful QA/QC to ensure that the operations within the buildings fit the building type selected (EAL BY2023 EM&V Report, pp. 250-251);
- Streamline the evaluation process by providing a MISO savings report with 15-minute-level data (EAL BY2023 EM&V Report, p. 352);
- Continue to seek the EM&V team's review throughout the program year for large custom projects in the Large C&I program (EAL BY2023 EM&V Report, p. 207) and Agricultural Energy Solutions program (EAL BY2023 EM&V Report, p. 208); and
- Work with the EM&V team to revise the CEI, continuous energy improvement (custom program) M&V plan to address peak demand concerns (EAL BY2023 EM&V Report, p. 208).

Quality Assurance/Quality Control (QA/QC)

The evaluators noted 25 unique recommendations related to QA/QC, of which nearly half (12) are new recommendations. The new recommendations are noted below.

- Collect photo documentation on-site when able for the Agricultural Energy Solutions program (EAL BY2023 EM&V Report, p. 309);
- Columns are available but not filled in the database tracking spreadsheet for parameters such as EFLH, efficiency details, and interactive effects (SWEPCO PY2023 EM&V Report, p. 34);
- Conduct an audit of AHRI certificates for furnaces in the program (SUA PY2023 EM&V Report, p. 5-9);
- During the implementation of the contractor's QA/QC process, adjustments noted were not made in the final tracking database (EAL BY2023 EM&V Report, p. 117).
- Enhance review of general service lamp baseline wattages to ensure AR TRM compliance and the federal EISA standards (EAL BY2023 EM&V Report, pp. 208, 221);
- Ensure all ceiling insulation and smart thermostat variables are being captured correctly (EAL BY2023 EM&V Report, pp. 40, 91);

- Square footage and home age are not reported in tracking for multifamily furnaces (SUA PY2023 EM&V Report, p. 5-6);
- Increase QA/QC of formulas for custom projects; EM&V team adjusted multiple projects due to transcription errors, data ranges, and incorrect formula averages (EAL BY2023 EM&V Report, pp. 221, 257);
- Increase QA/QC on baseline lighting fixture types and quantities as well as identified heating and cooling system types (EAL BY2023 EM&V Report, p. 221, 257);
- Measure inputs are not provided for all projects, such as water heater replacement UEF, draw pattern and installation location (SWEPCO PY2023 EM&V Report, p. 206);
- Correct heating system data quality issues by using a pre-set dropdown menu of heating system types and developing an automated data flagging mechanism when a count of unique heating system entries is > 1 for a given "contract account ID" field value (OG&E PY2023 EM&V Report, p. 154); and
- Tracking data measure details can be improved; the Measure description contains conflicting information from other columns (SWEPCO PY2023 EM&V Report, pp. 34, 124).

The twelve recommendations that continue from previous years are noted below. The PY2023 EM&V reports updated these with a status of 'ongoing' or 'under consideration.'

- Improve QA/QC checks to ensure projects are correctly imported from invoices to the tracking system, especially problematic with the Commercial Midstream Lighting program (EAL BY2023 EM&V Report, pp. 184, 192);
- Automating the commercial wi-fi thermostat measures deemed savings will allow for more effective QA/QC as opposed to a manual entry (EAL BY2023 EM&V Report, p. 232);
- Increase QA/QC on certified/non-certified lights for lighting retrofit projects (EAL BY2023 EM&V Report, p. 279);
- Perform QA/QC on the pre- and post-inspection forms to ensure the most up-to-date inspection data is captured in tracking data (EAL BY2023 EM&V Report, p. 306);
- Manufacturer specification sheets should be included for any lighting project. There are similar lighting types that vary by color temperature and other features, so the cut-sheet would help answer those questions (EAL BY2023 EM&V Report, pp. 228, 272, 303);
- Provide work orders and/or post-inspection reports on all projects; project data should include other key parameters such as building type and heating and cooling space types (EAL BY2023 EM&V Report, pp. 247, 272, 306);
- Increase the internal quality assurance/quality control (QA/QC) process on the duct sealing measure for all heating types to ensure all cooling and heating variables are captured correctly (EAL BY2023 EM&V Report, pp. 64, 139, 163);
- Implementation contractor (CLEAResult) should conduct cursory reviews of the tracking system data periodically and before finalizing at the end of the program year (EAL BY2023 EM&V Report, p. 203);
- Collect documentation that clearly verifies the installation location of the smart strip or use average APPS consistently in the program (EAL BY2023 EM&V Report, pp. 100, 140, 163);
- Ensure photographic documentation provided is clear and legible and include nameplate photos of lighting model numbers and HVAC units, when possible (EAL BY2023 EM&V Report, pp. 247, 272, 306); and

- Increase QA/QC of data recorded from direct-install project and entered into ArchEE for savings to improve consistency (EAL BY2023 EM&V Report, pp. 280).

The status of the following recommendation from PY2022 was not mentioned in the PY2023 EM&V report.

- Set conditional formatting in the equipment specifications workbook with parameter boundaries that will flag unit of measurement errors (SUA PY2022 EM&V Report, p. 8-5).

Savings Calculations

The evaluators identified 20 unique recommendations related to improving the derivation of impact savings, of which nine recommendations were new to PY2023. Two previously reported recommendations were not provided with status updates in the PY2023 EM&V reports and were classified by the IEM as 'unknown.'

The nine new recommendeations noted in the PY2023 EM&V reports can be seen below.

- For residential lighting, review the baseline and retrofit wattages reported in the tracking data against the AR TRM lighting baselines. Efficient wattages should also be checked against the ENERGY STAR QPL (EAL BY2023 EM&V Report, pp. 44, 184, 193).
- The current table for Smart Thermostats does not include savings for an unknown heating system type. The evaluators developed values for OG&E in PY2023 based on heating types observed in the PY2023 CWA: Gas: 60%, b. Electric Resistance: 24%, c. Heat Pump: 16% (OG&E PY2023 EM&V Report, pp. 110-111, 194);
- Smart thermostats for point-of-sale programs applied assumed square footage for households based on evaluation findings. Deemed savings were 592 kWh and 49 therms (kw is 0) (OG&E PY2023 EM&V Report, p. 111);
- Central AC/HP Replacement savings should apply SEER-SEER2, EER-EER2, and HSPF-HSPF2 conversion factors when estimating efficiency of legacy equipment (OG&E PY2023 EM&V Report, p. 112);
- Update parameters to align with TRM 9.2 for PY2024 for dehumidifiers. Apply deemed savings based on the three size categories specified in the TRM, which align with updated ENERGY STAR guidelines (OG&E PY2023 EM&V Report, p. 110);
- Update deemed savings for Ventilation Fans by product category to reflect observed actual efficiencies: 10-89 CFM: 4.88 CFM/W and 90-200 CFM: 6.52 CFM/W (OG&E PY2023 EM&V Report, pp. 86-87);
- Develop a separate savings estimate for Ventilation Fans that qualify for Energy Star Most Efficient systems, using 10 CFM/W (OG&E PY2023 EM&V Report, p. 87);
- Update the kilowatt savings calculation to correct the identified calculation error for the POPS weatherization measure. Implementer mistake noted in mid-year; being corrected (EAL BY2023 EM&V Report p. 192); and
- LED lamps distributed through food bank giveaways should not use the retail assumption of 6.7% distribution to commercial facilities (SWEPCO PY2023 EM&V Report, p. 165).

Nine recommendations from previous years were noted as ongoing or under consideration in PY2023.

- Model the effect of weather on demand using a lagged time variable (EAL BY2023 EM&V Report, p. 317);
- Duct sealing projects where cooling efficiency is unobtainable use 11.5 SEER as noted in TRM (EAL BY2023 EM&V Report, pp. 165, 185);

- Explore the effects of limiting the baseline to periods with similar weather for the Residential Direct Load Control program (EAL BY2023 EM&V Report, p. 318);
- Water heater setpoint was not updated to 124 degrees and was using 120 degrees (BHE PY2023 EM&V Report, p. 4-25);
- Incorporate non-residential impacts into retail lighting (OG&E PY2023 EM&V Report, p. 85);
- Follow the guidance in Appendix F of TRM V8.1 Table F4, to determine exterior lighting power density in the calculation methodology for new construction exterior lighting (EAL BY2023 EM&V Report, p. 310);
- Projects that save water can have significantly more rapid payback periods than just based solely on their gas savings. CLEAResult should factor water savings into audit report calculations when the opportunity presents itself (e.g., steam leak repair, condensate return, etc.) (BHE PY2023 EM&V Report, p. 5-8);
- Update energy savings methodology for commercial thermostats in the Smart Direct Load Control program (EAL BY2023 EM&V Report, p. 338); and
- Align water heater savings calculations such that baseline and volume derive consistently from the same size category (BHE PY2022 EM&V Report, p. 4-37).

The status for the following recommendations from PY2022 were not provided in the PY2023 EM&V reports.

- Homes with multiple HVAC systems should use the more conservative option when calculating savings. A weighted option could be considered if documentation collected and tracking data fields were added to ArchEE (EAL BY2022 EM&V Report, p. 93); and
- Projects that save water can have significantly more rapid payback periods than just based solely on their gas savings. CLEAResult should factor this into audit report calculations when the opportunity presents itself (steam leak repair, condensate return, etc.) (SUA PY2022 EM&V Report, p. 7-21).

Tracking Databases

The evaluators noted 14 recommendations related to tracking databases of which half were repeated from previous years and half were noted as new recommendations from PY2023. The new recommendations are noted below.

- Develop another designation for bulbs that are qualified via other methods and not “NA”, which is typically used for exit signs (EAL BY2023 EM&V Report, pp. 264-265);
- Consider tracking opt-outs by event or event-hour for the Agricultural Load Control program (EAL BY2023 EM&V Report, pp. 338, 351);
- Contact names are not provided for commercial projects (SUA PY2023 EM&V Report, pp. 5-6, 6-2); collect at least one form of contact information (email or phone) (SUA PY2023 EM&V Report, p. 4-5, 4-22) and including the addition of email addresses in future program tracking (AOG PY2023 EM&V Report, pp. 1-8, 7-22);
- Examine duct sealing tracking data calculations to ensure that peak coincidence is not applied twice (OG&E PY2023 EM&V Report, p. 112); and
- Include fields for home square footage and heating system type of direct customer programs for smart thermostats (OG&E PY2023 EM&V Report, pp. 110-111).

The seven recommendations from previous years noted as 'ongoing' or 'under consideration' in PY2023 are noted next.

- Rack Ovens did not have calculations automated in the tracking system due to a lack of participation from past years (SUA PY2023 EM&V Report, p. 8-8);
- The evaluator recommends the addition of email addresses in future program tracking data (AOG PY2023 EM&V Report, p. 7-22);
- Establish a policy to enter square footage as a physical actual and complete division of square footage by thermostat total (BHE PY2023 EM&V Report, p. 4-31);
- Use additional data descriptions for lighting fixture certification to distinguish between fixtures not required for certification and those that followed an alternative compliance path. The EM&V team suggests reserving "N/A" for fixtures that do not require certification and using "Other" for fixtures that go through an alternative compliance path. (EAL BY2023 EM&V Report, pp. 209, 231, 264, 265);
- Improve facility designations for prescriptive lighting; many projects note "Retail: Other," which is not a TRM facility type (OG&E PY2023 EM&V Report, p. 193);
- Consider estimating kilowatt-hour savings for the Residential DLC program in the tracking database (EAL BY2023 EM&V Report, p. 318); and
- Define additional measure descriptions to ArchEE to clarify measure type as the program expands with new offerings beyond lighting (EAL BY2023 EM&V Report, p. 309).

The status for the following recommendation from PY2022 was not provided in the PY2023 EM&V reports.

- Establish a policy to enter square footage as the physical actual and complete division of square footage by thermostat total (BHE PY2022 EM&V Report, p. 4-31).

TRM Version 10.0

Eleven recommendations were made in the PY2023 EM&V Reports related to updates to the next AR TRM. These are noted below.

- 2.1.10 Window AC Replacement: Room Adjustment Factor (RAF) should be updated in the TRM to only apply to kWh savings, not kW (OG&E PY2023 EM&V Report, p. 194);
- 2.2.12 Smart Thermostats: Develop a weighted mix of heating system types for an unknown heating system configuration (OG&E PY2023 EM&V Report, p. 194);
- 2.6.1 Advanced Power strips: Tetra Tech suggests adding multiple ISRs to the residential Tier 1 APS measure algorithm, considering various delivery methods like direct installation, time-of-sale, kits, etc. One example of this is the Illinois TRM, which includes six ISR values for this measure (EAL BY2023 EM&V Report, p. 48); and
- 3.6.3 Lighting Efficiency
  - Add agricultural building types of factors (review Wisconsin and Illinois TRM) (EAL BY2023 EM&V Report, pp. 48-49)
  - Consider adding midstream factors such as in-service rates (currently Illinois TRM being used) (EAL BY2023 EM&V Report, pp. 48-49)
  - Review EUL for HID, which is currently at 16 years, longer than the common EUL fixture of 15 years (OG&E PY2023 EM&V Report, p. 190).

The following new measures were suggested for inclusion:

- Ductless Mini-Splits: Consider including this technology in the AR TRM with approaches identified for manufactured homes and similar housing types that show substantial savings opportunities (EAL BY2023 EM&V Report, p. 142);
- Variable Frequency Drives are not included for commercial fans and pumps, which would be helpful to include for ease of implementer burden for small projects (EAL BY2023 EM&V Report, p. 49); and
- Induction Cooktops to facilitate savings from new construction projects (SWEPCO PY2023 EM&V Report, p. 40).

The following TRM suggestions were made in previous evaluation reports and remain to be adopted.

- 2.1.11 Duct Sealing: Default SEER/HSPF values do not consider the standard from 2015-2023. Consider updating the default values for SEER and HSPF to better align with all equipment operating in the field (EAL PY2022 EM&V Report, p. 20); and
- Commercial Wi-Fi Thermostats should be included based on CLEAResult savings methodology (EAL PY2021 EM&V Report, Technical Appendix A-1).

Section 2: Summary of Process Evaluation Findings

2.1 Overview of Process Evaluations

This section summarizes the findings from the six process evaluations conducted to assess PY2023 program activities. All evaluations met the requirements specified in Protocol C of Volume 1, TRM Version 9.1.

2.2 Key Process Findings

Program Performance

Several programs met or exceeded their savings and performance goals (AOG PY2023 EM&V Report, p. 7-7; BHE PY2023 EM&V Report, pp. 3-10, 4-40, 5-23, 6-18; EAL BY2023 EM&V Report, pp. 33, 88; OG&E PY2023 EM&V Report, p. 57; SUA PY2023 EM&V Report, p. 1-10; SWEPCO PY2023 EM&V Report, p. 53).

Top-performing programs included EAL's Energy Solutions for Multifamily Homes and Agricultural Energy Solutions Programs and AOG's C&I Solutions (AOG PY2023 EM&V Report, pp. 1-7; EAL BY2023 EM&V Report, p. 34).

Of particular note, EAL achieved 20 percent of its portfolio savings through its successful hard-to-reach programs, which target public institutions, small businesses, agriculture, multifamily, manufactured homes and low-income segments (EAL BY2023 EM&V Report, pp. 36, 39, 84).

Several programs operated effectively in 2023, with minimal changes or adjustments needed (SUA PY2023 EM&V Report, pp. 6-1, 8-2, 10-4, 12-6).

Participants in energy assessment programs achieved significantly higher savings than install-only homes for BHE (BHE PY2023 EM&V Report, p. 4-17).

Multiple programs are reaching LIHEAP Eligible and Low-Income Customers (SWEPCO PY2023 EM&V Report, p. 39).

Custom programs accounted for the most savings from commercial projects (AOG PY2023 EM&V Report, p. 5-5). For example, SUA's custom C&I program continues to operate smoothly and accounts for most commercial savings. The program met its savings goal while remaining highly cost-effective (SUA PY2023 EM&V Report, pp. 7-12, 7-21).

Of note, BHE's SEM program continued to gain traction in the commercial market and accounted for 21 percent of overall savings for its CISP Custom Pathway (BHE PY2023 EM&V Report, p. 5-23).

Although SUA's Commercial Food Service Program did not reach its planned savings goal, its overall performance increased dramatically in 2023 (SUA PY2023 EM&V Report, pp. 1-6, 8-8).

However, a few programs failed to meet their planned goals (AOG PY2023 EM&V Report, p. 5-19). EAL met the APSC targets but fell just short of its filed goal (99%) due to the transition from lighting and rising prices on energy efficiency measures. The utility met just 55 percent of its demand goals due to shortfalls in demand response reductions. Furthermore, none of EAL's downstream commercial programs met the planned goals (EAL BY2023 EM&V Report, pp. 33-34).

AOG's Equipment Rebate Pathway program met just 68 percent of its PY2023 net savings goal, dropping from 71 percent in PY2022. (AOG PY2023 EM&V Report, pp. 1-7, 4-27). Furthermore, AOG's C&I Solutions Program fell short of meeting its goals due to lower-than-expected savings from a multi-year custom project and an error in calculating savings for a boiler project (AOG PY2023 EM&V Report, pp. 1-7, 5-20).

SUA's Low Flow Showerhead & Faucet Aerator Program continues to face declining participation rates in 2023, a trend that began in 2018 (SUA PY2023 EM&V Report, pp. 1-11, 10-2, 10-7) Other SUA programs also face declining participation rates, which increased the customer acquisition cost for the program (SUA PY2023 EM&V Report, pp. 1-9, 1-10, 6-8, 8-8).

Most notably, SUA's Home Energy Report (HER) program experienced significant attrition in PY2023, with attrition rates rising to 55 percent for Wave 1 (SUA PY2023 EM&V Report, pp. 1-10, 9-1, 9-24).

Awareness

Most participants learned about energy efficiency programs via word-of-mouth or from bill inserts (AOG PY2023 EM&V Report, p. 7-14; BHE PY2023 EM&V Report, pp. 4-26, 6-11; EAL BY2023 EM&V Report, p. 131; OG&E PY2023 EM&V Report, pp. 105, 141, 184-185; SUA PY2023 EM&V Report, p. 12-12; SWEPCO PY2023 EM&V Report, pp. 35, 37, 141, 179, 193, 207).

Mass marketing and targeted marketing to specific segments continued to raise customer awareness. In particular, the use of social media and emails has increased. Email blasts raised customer awareness (EAL BY2023 EM&V Report, p. 81; SWEPCO PY2023 EM&V Report, pp. 43-44).

Participants also mentioned learning about programs through co-branding with other utility partners or from other program offerings (OG&E PY2023 EM&V Report, pp. 141-142; SWEPCO PY2023 EM&V Report, pp. 121, 179-180).

Respondents also learned about programs from utility websites or participating trade allies (AOG PY2023 EM&V Report, p. 4-8; BHE PY2023 EM&V Report, pp. 2-7, 4-9, 4-14; OG&E PY2023 EM&V Report, pp. 105, 178, 182, 184; SUA PY2023 EM&V Report, pp. 4-7-4-8; SWEPCO PY2023 EM&V Report, pp. 37, 178, 193, 200).

Participants typically work with contractors they are familiar with, though some indicate being approached or cold-called about the SBDI Channel (OG&E PY2023 EM&V Report, pp. 184-185).

Awareness levels of programs differed by customer group. For example, Large C&I Channel participants were generally aware of other OG&E energy efficiency offerings (OG&E PY2023 EM&V Report pp. 177-178). At the same time, SBDI Channel participants are generally *unaware* of other OG&E energy efficiency offerings (OG&E PY2023 EM&V Report, pp. 184-185).

Marketing

The utilities continue to promote their energy efficiency programs across multiple channels (AOG PY2023 EM&V Report, pp. 5-7, 6-7, 6-8, 6-11, 7-9; BHE PY2023 EM&V Report, p. 4-8; EAL BY2023 EM&V Report, pp. 130-131, 174; OG&E PY2023 EM&V Report, p. 140; SUA PY2023 EM&V Report, p. 11-7; SWEPCO PY2023 EM&V Report, pp. 38, 136-137).

However, word-of-mouth remains one of the most successful outreach strategies (AOG PY2023 EM&V Report, pp. 5-5, 6-11, 7-14; BHE PY2023 EM&V Report, pp. 4-8, 4-23, 6-3; EAL BY2023 EM&V Report, pp. 103, 130, 151-152, 174).

Trade allies promote equipment rebate programs directly to customers on behalf of the sponsoring utility (AOG PY2023 EM&V Report, pp. 6-7-6-8; BHE PY2023 EM&V Report, pp. 4-8, 4-22-4-23; OG&E PY2023 EM&V Report, p. 140; SUA PY2023 EM&V Report, p. 11-7; SWEPCO PY2023 EM&V Report, p. 138).

Several utilities co-market their programs with similar programs or co-delivery programs such as the Consistent Weatherization Approach (CWA). For example, SUA markets the LISHP with the SHP, referring eligible customers to the appropriate program (SUA PY2023 EM&V Report, p. 12-7). The AOGWP is jointly implemented with AOG and OG&E, with both utilities using CLEAResult to provide third-party implementation support (AOG PY2023 EM&V Report, p. 3-10; OG&E PY2023 EM&V Report, p. 57).

The utilities promote their programs across multiple marketing channels, which include targeting hard-to-reach segments such as multifamily and manufactured housing (AOG PY2023 EM&V Report, pp. 3-9-3-10; EAL BY2023 EM&V Report, p. 81; SUA PY2023 EM&V Report, pp. 3-9-3-10).

The program implementer also conducts retail outreach to support product and incentive programs (SWEPCO PY2023 EM&V Report, pp. 147-148).

A few programs focus on direct engagement rather than mass-market strategies due to low budgets, high awareness, and limited eligibility (AOG PY2023 EM&V Report, pp. 6-8, 6-13).

Marketing and outreach activities align with best practices, including a strong "call to action" (SWEPCO PY2023 EM&V Report, pp. 38, 137-138). Some marketing materials focus on the benefits of energy efficiency, while others focus on seasonal messages emphasizing tune-ups (SWEPCO PY2023 EM&V Report, p. 137).

EAL's evaluator conducted a website review to ensure it contains all necessary program information for customers and trade allies (EAL BY2023 EM&V Report, pp. 243, 271).

Reasons for Program Participation

Saving money on energy bills was the primary driver of program participation across all six IOUs (AOG PY2023 EM&V Report, pp. 6-11-6-12, 7-14-7-15; BHE PY2023 EM&V Report, pp. 4-9-4-10, 4-27-4-28; EAL BY2023 EM&V Report, pp. 102-103, 173-174; OG&E PY2023 EM&V Report, pp. 106, 142, 179-180, 182, 188-189; SUA PY2023 EM&V Report, pp. 4-7-4-8; SWEPCO PY2023 EM&V Report, pp. 181, 183-184).

Program participants were also interested in improving their home's overall comfort or reducing energy usage (AOG PY2023 EM&V Report, pp. 6-12, 7-14-7-15; BHE PY2023 EM&V Report, pp. 4-9-4-10; EAL BY2023 EM&V Report, pp. 173-174; OG&E PY2023 EM&V Report, pp. 106, 142-143; SUA PY2023 EM&V Report, pp. 4-7-4-8; SWEPCO PY2023 EM&V Report, pp. 182-183, 194-195).

Other less frequent motivating factors include understanding or improving equipment performance and replacing old or broken equipment (OG&E PY2023 EM&V Report, p. 143; SWEPCO PY2023 EM&V Report, pp. 193-194, 202).

Participating in these programs led to multiple benefits, including better equipment operations, increased knowledge about energy savings benefits, and improved home comfort (EAL BY2023 EM&V Report, p. 132; SWEPCO PY2023 EM&V Report, pp. 37, 175, 186-187, 197). Of note, SWEPCO program participants indicated that the availability of incentives was a primary motivating factor for purchasing energy-efficient equipment (SWEPCO PY2023 EM&V Report, p. 201).

Measure Installations

Most energy audit participants installed most of the recommended measures (AOG PY2023 EM&V Report, pp. 6-13, 6-15; BHE PY2023 EM&V Report, p. 4-28; EAL BY2023 EM&V Report, pp. 132-133, 153, 176; SWEPCO PY2023 EM&V Report, p. 204).

However, only a few respondents replaced fully broken equipment (BHE PY2023 EM&V Report, p. 4-10).

Some respondents have installed additional energy-efficient equipment because of their experience with the program. These additional installations included ENERGY STAR appliances, low-flow showerheads, low-flow faucet aerators, water heater insulation, and other equipment (BHE PY2023 EM&V Report, p. 4-11).

Program Barriers

Increasing energy costs and persistent inflationary pressures adversely affect project costs (EAL BY2023 EM&V Report, p. 33).

Several participants reported that the contractors failed to install equipment properly or at all, and a few had to rely on additional help to resolve these issues (EAL BY2023 EM&V Report, pp. 135-136, 157) as described in the following comment:

> *"The first time they came after they left, my heat went out. They came back and changed the fuse, and everything was good for about two months, then it went out completely..." (EAL BY2023 EM&V Report, p. 157)*

Barriers to Installing Recommended Measures

The evaluators identified the following barriers that prevented program participants from installing all recommended measures during energy audits:

- Upfront cost or long payback periods (EAL BY2023 EM&V Report, pp. 132, 153, 176; OG&E PY2023 EM&V Report, pp. 181-183, 187, 193; SWEPCO PY2023 EM&V Report, p. 204);
- Lack of time (EAL BY2023 EM&V Report, pp. 106, 153, 176);
- Did not know how to install the measure (EAL BY2023 EM&V Report, p. 153);
- Unsure of the energy savings (EAL BY2023 EM&V Report, p. 176); and
- Did not like the recommended measure (EAL BY2023 EM&V Report, p. 176).

Satisfaction

Overall program satisfaction remains high for most programs offered by the six Arkansas IOUs (AOG PY2023 EM&V Report, pp. 7-17-7-18; BHE PY2023 EM&V Report, pp. 1-9, 4-12, 4-28, 4-29, 4-30, 6-15, 6-18; EAL BY2023 EM&V Report, pp. 108-109, 135-136, 140, 156-157, 177-178; OG&E PY2023 EM&V Report, pp. 27-28, 107, 108, 145-146, 153, 180-181, 186, 193; SUA PY2023 EM&V Report, pp. 4-10-4-11, 12-15; SWEPCO PY2023 EM&V Report, pp. 34, 36-37, 123, 187-188, 195, 197, 203, 210).

> *"What I found useful was the knowledge provided to me and my residents to save energy and to save money. The staff was wonderful, their customer service was phenomenal, and they worked fast."* (EAL BY2023 EM&V Report, p. 133)

Most program participants were pleased with the enrollment process (BHE PY2023 EM&V Report, pp. 1-9, 6-18; EAL BY2023 EM&V Report, pp. 140, 156; OG&E PY2023 EM&V Report, p. 193; SUA PY2023 EM&V Report p. 4-14; SWEPCO PY2023 EM&V Report, pp. 36-37, 123, 184-186, 203-204).

Customers were also satisfied with the energy savings they achieved due to participating in these utility programs (AOG PY2023 EM&V Report, pp. 6-16-6-17, 7-18; BHE PY2023 EM&V Report, pp. 4-28-4-30, 6-15; EAL BY2023 EM&V Report, p. 140; SUA PY2023 EM&V Report, p. 12-15; SWEPCO PY2023 EM&V Report, pp. 38, 197-198, 210).

Program participants noted that their participation increased their overall satisfaction with their utility provider as well (AOG PY2023 EM&V Report, pp. 6-16, 7-17, 7-18; BHE PY2023 EM&V Report, pp. 4-29, 4-30, 6-15; OG&E PY2023 EM&V Report, pp. 28, 145, 186; SUA PY2023 EM&V Report, pp. 4-10, 12-15; SWEPCO PY2023 EM&V Report, pp. 39, 184-185, 198).

Several evaluators emphasized the high satisfaction ratings that the energy audit programs received from participants and were pleased with the information the program provided through the audits (EAL BY2023 EM&V Report, p. 107; SUA PY2023 EM&V Report pp. 12-14, 12-15; SWEPCO PY2023 EM&V Report, pp. 123, 184-185).

> *"The attentiveness of the program managers has really impressed me. They do not feel like they are going through the motions or dragging their feet. They have been really great about helping the whole way through the improvements."*
>
> *"[SWEPCO Program Lead] is great to work with. The school district loves the incentive checks." (SWEPCO PY2023 EM&V Report, p. 123)*

Respondents who received an assessment were generally satisfied with all aspects of the assessment (SWEPCO PY2023 EM&V Report, pp. 184, 204).

Several respondents indicated that the energy audit increased their overall knowledge and awareness about ways to save energy (EAL BY2023 EM&V Report, pp. 153, 154).

Large C&I program participants also reported high satisfaction levels with the program offerings, the participation process and their overall utility (EAL BY2023 EM&V Report, p. 108; OG&E PY2023 EM&V Report, pp. 180, 183; SWEPCO PY2023 EM&V Report, p. 126).

Dissatisfaction

A minority of program participants expressed dissatisfaction with specific program elements, such as:

- *The quality or quantity of equipment installed through the program* (AOG PY2023 EM&V Report, pp. 6-16, 7-17; BHE PY2023 EM&V Report, p. 4-12; EAL BY2023 EM&V Report, pp. 177-178; OG&E PY2023 EM&V Report, pp. 107-108; SUA PY2023 EM&V Report p. 12-14);
- *Poor quality of the contractors' work, such as leaving behind a mess or poor communication about the project* (AOG PY2023 EM&V Report, pp. 4-11, 6-16, 7-17; BHE PY2023 EM&V Report, pp. 4-29, 6-15; EAL BY2023 EM&V Report, pp. 108, 135, 136, 140, 156, 170; OG&E PY2023 EM&V Report, p. 108; SUA PY2023 EM&V Report p. 11-13; SWEPCO PY2023 EM&V Report, pp. 34, 37, 123, 195-196);
- *Not receiving a written report or incentives as promised* (AOG PY2023 EM&V Report, p. 7-17; EAL BY2023 EM&V Report, pp. 108, 109, 156, 177, 1; OG&E PY2023 EM&V Report, p. 107; SWEPCO PY2023 EM&V Report, p. 34);
- *The application or enrollment process, including a long waiting time for the energy audit* (EAL BY2023 EM&V Report, p. 135; SUA PY2023 EM&V Report pp. 4-10, 4-14; SWEPCO PY2023 EM&V Report, p. 38); and
- *Smaller than expected energy savings* (EAL BY2023 EM&V Report, p. 136; OG&E PY2023 EM&V Report, p. 108).

Staff attribute changes in program satisfaction rates over the years to the increasing cost of gas. They explain that customers are disappointed by the minimal changes in their bill despite program participation; however, program incentives have not been able to keep up with rising gas costs (AOG PY2023 EM&V Report, p. 6-7).

Program Operations

***Application Process*:** The application process was fairly easy for most program participants, whether they completed it on their own or with the help of a contractor (AOG, PY2023 EM&V Report, pp. 1-7, 6-18; BHE PY2023 EM&V Report, pp. 6-13, 6-14; OG&E PY2023 EM&V Report, pp. 179, 184-185).

For example, AOG enrolls participants through its online portal, customer call center, and outreach by program trade allies. The online registration portal is straightforward and captures the information needed for program qualification (year built) and whether the customer is served by an electric investor-owned utility or by a muni/co-op. The fields use drop-down menus wherever possible to ensure ease of use (AOG PY2023 EM&V Report, p. 7-8).

Waiting Times: Wait times for the energy efficiency programs were one to two weeks, with some programs providing audits within the same week (EAL BY2023 EM&V Report, pp. 104, 105, 152, 175).

As a result of the program evaluations, the utility and implementer implemented changes to resolve identified issues quickly, which is a best practice in program management (SWEPCO PY2023 EM&V Report, p. 44).

Changes in Program Operations

The evaluators identified changes in program operations that occurred in 2023, which often led to improved program performance. These changes included the following:

- Hiring a rebate processor to handle the equipment rebate program applications, with the intent to accelerate rebate processing times (AOG PY2023 EM&V Report, p. 5-5);

- Redesign the application form to better differentiate early retirement from replace on burn-out applications (AOG PY2023 EM&V Report, p. 5-5);
- Increase outreach and expand delivery to low-income households through downstream residential and upstream point-of-purchase programs (EAL BY2023 EM&V Report, p. 39);
- Focus on cost-effective measures such as duct sealing and consistent and frequent marketing and promotional campaigns for the CWA program (OG&E PY2023 EM&V Report, p. 140); and
- Expand the measure mix to include stand-alone smart thermostats (SUA PY2023 EM&V Report, p. 4-6).

Program Changes

Respondents recommended the program expand measure offerings to include furnace filters (n=1) and increase the health and safety measure budget to allow for more measures (SUA PY2023 EM&V Report, p. 11-12).

Planned Program Changes

SUA is planning on making several program design changes in PY2024, including:

- Increase the minimum efficiency boiler standards from 84% to 88% to reflect new DOE standards (SUA PY2023 EM&V Report, p. 6-4);
- Raise incentives for the Commercial Food Service Program (SUA PY2023 EM&V Report, pp. 1-10, 8-8); and
- Redesign the Low Flow Program and continue to add new measures like smart thermostats, which were added in 2023 (SUA PY2023 EM&V Report, p. 10-2).

AOG is considering offering a behavioral program to coordinate with OG&E's existing program to capture gas savings (AOG PY2023 EM&V Report, pp. 3-5-3-6).

Recommend Program to Others

Most program participants were either likely to recommend these energy programs to others or already have promoted the program to friends or neighbors (AOG P2023 EM&V Report, pp. 4-11, 6-16, 7-17; BHE PY2023 EM&V Report, pp. 4-12, 4-29; EAL BY2023 EM&V Report, p. 157, OG&E PY2023 EM&V Report, p. 180; SWEPCO PY2023 EM&V Report, pp. 37, 188-189).

Areas for Program Improvement

A minority of program participants suggested how specific energy programs could be improved going forward. These suggestions include:

- *Expand the list of eligible measures such as including more insulation measures, duct sealing, and smart thermostats* (EAL BY2023 EM&V Report, pp. 155, 176; OG&E PY2023 EM&V Report, p. 146);
- *Increase advertising/awareness levels among targeted audiences, including building owners and city officials* (OG&E PY2023 EM&V Report, pp. 181, 186);
- *Simplify the enrollment process* (OG&E PY2023 EM&V Report, pp. 186, 187; SWEPCO PY2023 EM&V Report, pp. 35, 202);
- *Provide more information about the recommended energy efficiency upgrades* (EAL BY2023 EM&V Report, pp. 108, 109, 134, 155; SWEPCO PY2023 EM&V Report, pp. 35, 157);

- *Provide higher or more flexible incentives* (AOG PY2023 EM&V Report, p. 6-24; OG&E PY2023 EM&V Report, p. 187; SWEPCO PY2023 EM&V Report, p. 126);
- *Provide more engineering support or technical support to customers* (SUA PY2023 EM&V Report, p. 12-15; SWEPCO PY2023 EM&V Report, p. 126); and
- *Improve the overall quality of the contractors affiliated with the program* (SWEPCO PY2023 EM&V Report, p. 126).

Despite the program implementers' efforts, SWEPCO could not recruit Spanish-speaking contractors to provide program services. In the meantime, the program has encouraged its existing contractors to try to hire Spanish-speaking contractors (SWEPCO PY2023 EM&V Report, p. 35).

Trade Ally Performance

The program implementers changed the payment structure based on performance for the AOG-OG&E weatherization program to maximize customer savings (AOG PY2023 EM&V Report, pp. 6-6, 7-8).

The AOG-OG&E weatherization program also changed the lead process by focusing on specific geographic locations rather than providing monthly leads every month. However, this process does create fluctuations in trade ally workload (AOG PY2023 EM&V Report, p. 6-6; OG&E PY2023 EM&V Report, p. 140).

During on-site verifications, the EM&V team observed customers' satisfaction with contractor communication with customers and going the extra mile to increase the energy efficiency, health and safety, and comfort of their home (EAL BY2023 EM&V Report, p. 163)

Trade Ally Recruiting

Several evaluators provided information concerning trade ally management, addressing areas such as vetting new trade allies and managing trade ally performance. This process provided valuable input for program improvements. They also included situations that identified trade ally/contractor issues that could be addressed promptly (EAL BY2023 EM&V Report, p. 205; SUA PY2023 EM&V Report, p. 11-9; SWEPCO PY2023 EM&V Report, pp. 139, 140, 200).

Marketing

Trade allies rely on a variety of marketing approaches to recruit program participants (AOG PY2023 EM&V Report, pp. 4-11, 6-6; EAL BY2023 EM&V Report, p. 82; OG&E PY2023 EM&V Report, p. 53; SUA PY2023 EM&V Report, pp. 4-3, 4-6, 11-7, 11-12; SWEPCO PY2023 EM&V Report, p. 37). These approaches include relying on word-of-mouth referrals, working with retailers, and promoting the programs on their websites (SUA PY2023 EM&V Report, p. 4-13)

Several trade allies do not use utility marketing information and lead generation, preferring to use their marketing materials (AOG PY2023 EM &V Report, p. 6-18; OG&E PY2023 EM&V Report, pp. 147, 187-188; SUA PY2023 EM&V Report, p. 11-13; SWEPCO PY2023 EM&V Report, p. 190).

Some trade allies generate their program leads, while other programs send leads directly to the participating contractors (AOG PY2023 EM&V Report, pp. 5-4, 6-6; BHE PY2023 EM&V Report, p. 4-23; SUA PY2023 EM&V Report, pp. 4-13, 11-12).

2.3 Consistent Weatherization Approach (CWA)

The Arkansas PSC established the Consistent Weatherization Approach (CWA) in Order No.7 in Docket No.13-002. This Order identified critical programmatic features that this Consistent Weatherization Approach must include. These features were further developed and refined into a recommended framework –the Core Program– for implementation by the IOUs. Critical components of the Core Program are:

- Direct installation of low-cost energy-saving measures;
- Installation of a set of weatherization measures, including insulation and air sealing; and
- Management of the contractors that deliver the home assessments and installations.

Key Findings

The CWA programs, including CWA and Low-Income Pilot Programs (LIPP), 17,455 completed audits, leading to 71,084 submitted projects. Based on the measure counts provided in the individual utility evaluation reports, the CWA programs installed measures in energy "inefficient" homes in PY2023. Table 15 summarizes the cumulative results of these programs.

Table 15: Summary of Findings from the CWA and LIPP Results from PY2017-PY2023

Summary of CWA Program Metrics	PY2017	PY2018	PY2019	PY2020	PY2021	PY2022	PY2023	Cumulatively PY2017-PY2023
Total Audits Completed	14,586	14,947	15,702	15,877	10,945	10,638	17,455	100,150
Total Submitted Projects	25,947	27,722	62,777	16,242	17,692	21,688	71,084	243,152
Average Conversion Rate	96%	98%	98.53%	95.65%	94.74%	97.72%	95.76%	96.63%
Average Measures installed per project	3	3.57	3.61	4.36	4.09	4.45	3.19	3.75
Average utility cost per participant	$1,039.80	$1,277.53	$955.39	$1,240.27	$827.94	$1,109.38	$1,221.79	$1,096.01

Sources: PY2017-PY2023 EM&V Reports

The Consistent Weatherization Approach is AOG's most successful program offering (AOG PY2023 EM&V Report, p. 6-6). The CWA, administered by CLEAResult under contract to AOG and OG&E, provides energy audits and whole-house retrofit services to AOG and OG&E residential customers. The program uses gas and electric utility funds to provide customers with in-home audits and energy-efficient measures at no additional cost (AOG PY2023 EM&V Report, p. 6-1; OG&E PY2023 EM&V Report, p. 121).

The AOG OG&E Program's success is due to incorporating the lessons learned from previous program years, including an increased focus on cost-effective measures such as duct sealing and consistent and frequent marketing and promotional campaigns (OG&E PY2023 EM&V Report, p. 140).

The other utilities deliver their version of the CWA, often as part of their overall residential portfolio. For example, EAL's Low-Income Solutions program serves as the CWA delivery mechanism and includes all cost-effective measures following the CWA protocols (EAL BY2023 EM&V Report, p. 161).

SWEPCO developed its Income Qualified Weatherization Pathway Pilot (IQW) for residential households, which is the delivery mechanism for the statewide weatherization collaborative program (SWEPCO PY2023 EM&V Report, p. 143).

Insulation measures account for most of the energy savings from these programs, including duct sealing, air sealing and ceiling insulation (AOG PY2023 EM&V Report, pp. 6-2; SUA PY2023 EM&V Report, p. 11-10). The program implementers focused on installing multiple measures to maximize energy savings (SUA PY2023 EM&V Report, p. 11-11).

Of note, overall, AOG's program decreased the average number of installed measures per home (2.45 to 2.41) but increased spending per home from $685 to $1,070 and savings per home from $330 to $365 (AOG PY2023 EM&V Report, p. 6-4). However, AOG ran out of funding to install measures in 38 homes; these homes will be revisited in PY2024 (AOG PY2023 EM&V Report, p. 7-22).

Table 16 summarizes the CWA metrics for these program offerings across the six Arkansas IOUs.

Table 16: Summary of CWA Metrics Across the Arkansas IOUs for PY2023

Utility	Program Name	CWA Implementation	Total Audits Completed	Number of Measures Installed Unique Jobs	Total Submitted Projects	Conversion Rate	Average Measures installed per Project	Average Utility Cost per Project	Percent of Contractors promoting program	Source
AOG	AOG Weatherization Program	The CWA is implemented directly by CLEAResult under contract with AOG. The program uses a closed network of pre-approved trade allies. The program coordinates heavily with OG&E.	873	2,991	813	100%	2.41	$1,070.00	100%	AOG PY2023 EM&V Report, pp. 1-8, 7-11
AOG	LIPP	The LIWP is implemented directly by CLEAResult under contract with AOG with the use of a closed network of pre-approved trade allies.	65	51	30	46%	1.62	$1,451.00	100%	AOG PY2023 EM&V Report, pp. 1,-8, 7-4
BHE	Residential Home Energy Solutions LIPP	The CWA Residential Solutions Program is implemented using itself a third-party contractor with a network of pre-approved trade allies that market the new program.	38	111	40	100%	2.78	$1,403.47	100%	BHE PY2023 EM&V Report, p. 6-4
EAL	Home Energy Solutions	EAL uses local home energy consultants who help single family residential customers analyze their energy use and identify opportunities to improve the energy efficiency of their homes.	7,437	30,704	7,437	100%	4.00	$1,150.00	100%	EAL BY2023 EM&V Report, pp. 358-359
EAL	Energy Solutions for Manufactured Homes	The Energy Solutions for Manufactured Homes program provides cost-effective energy	625	2,627	625	100%	4.00	$1,095.00	100%	EAL BY2023 EM&V

Utility	Program Name	CWA Implementation	Total Audits Completed	Number of Measures Installed Unique Jobs	Total Submitted Projects	Conversion Rate	Average Measures installed per Project	Average Utility Cost per Project	Percent of Contractors promoting program	Source
		efficiency measures to manufactured home communities throughout EAL's service territory.								Report, p. 360
EAL	Energy Solutions for Multifamily Homes	The Energy Solutions for Multifamily Homes program provides cost-effective energy efficiency measures for multifamily residences with at least five units.	2,673	13,470	2,673	100%	5.00	$614.00	100%	EAL BY2023 EM&V Report, p. 361
EAL	Low-Income Solutions	The Low-Income Solutions program helps low-income households become more comfortable, safe, and energy-efficient through home weatherization and health and safety upgrades at no cost to customers.	1,654	9,657	1,654	100%	5.84	$1,324.00	100%	EAL BY 2023 Report, pp. 362-363
OG&E	CWA	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.	887	2,342	976	100%	2.40	$1,256.00	100%	OG&E PY2023 EM&V Report, p. 124
OG&E	Low-Income Pilot Program	In PY2020, the low-income pilot was added to the program.	467	1180	498	98%	2.37	$1,215.00	98%	OG&E PY2023 EM&V Report, p. 124

Utility	Program Name	CWA Implementation	Total Audits Completed	Number of Measures Installed Unique Jobs	Total Submitted Projects	Conversion Rate	Average Measures installed per Project	Average Utility Cost per Project	Percent of Contractors promoting program	Source
SUA	Low-income Home Savings Program	LISHP is an extension of the Consistent Weatherization Approach (CWA) targeted to customers who meet the income eligibility requirements of the Low-Income Home Energy Assistance Program (LIHEAP).	118	239	115	98%	2.08	$2,750.20	98%	SUA PY2022 EM&V Report, p. 12-7
SUA	Saving Homes Weatherization Program	The CWA is implemented using a third-party contractor (CLEAResult) with a network of pre-approved trade allies that market the program.	955	2,110	1,071	97.50%	1.97	$988.00	100%	SUA PY2023 EM&V Report, p. 11-6
SWEPCO	HPwES	The program targets energy-inefficient homes by requiring that participating residences must have been occupied for the last twelve months and is at least 10 years old.	1,584	4,413	1,678	105.90%	2.63	$1,113.17	100%	SWEPCO PY2023 EM&V Report, p. 174
SWEPCO	Income-Qualified Weatherization Pathway	The IQW is an additional delivery mechanism for the statewide weatherization collaborative measures.	79	341	82	100%	4.36	$1,460.77	100%	SWEPCO PY2023 EM&V Report, p. 177
Totals			**17,455**	**71,084**	**18,018**	**95.76%**	**3.19**	**$1,221,79**	**100%**	

Low-Income Pilot Program

The Low-Income Pilot (LIPP) was launched in PY2020 to comply with Act 1102 and includes health and safety measures. LIPP is an extension of the Consistent Weatherization Approach (CWA) targeted to customers who meet the income eligibility requirements of the Low-Income Home Energy Assistance Program (LIHEAP). Participants received in-home energy assessments and the same suite of measures offered in the CWA along with health and safety improvements (AOG PY2023 EM&V Report, p. 7-1; BHE PY2023 EM&V Report, p. 6-2; OG&E PY2023 EM&V Report, p. 123). The Low-Income Program offerings include energy assessments, direct installation of low-cost measures and pre-qualification for building envelope improvements. Direct install measures include:

- Faucet aerators
- Low flow showerheads

Weatherization measures include:

- Air infiltration
- Duct sealing
- Ceiling insulation

Insulation accounted for most energy savings for the LIPP program (AOG PY2023 EM&V Report, p. 7-1).

SUA staff said they struggle to spend the full $500 on participating homes and are working with trade allies to understand the program components better. Since the low-income program has a small budget, CLEAResult staff encourage trade allies ***not to classify homes as low-income*** (even if they qualify) unless the homes need health and safety measure upgrades; this system allows the program to maximize the number of low-income customers it can assist (SUA PY2023 EM&V Report, p. 12-6).

The trade ally payment structure changed with the transition to CLEAResult. The program has evolved from paid incentives based on the type of measure installed to a per-therm performance approach in PY2021 (AOG PY2023 EM&V Report, p. 7-7).

Program performance across the collaborating utilities is uneven as the trade allies focus on specific AOG and OG&E's service territory before moving to SUA (OG&E PY2023 EM&V Report, p. 140).

Table 17: Comparison of LIPP Metrics from PY2021 to PY2023

Metric	LIPP 2021	LIPP 2022	LIPP 2023	% Change
Total Audits Completed	5,729	1,123	2,421	53.61%
Number of Measures Installed (including estimates)	16,285	17,744	11,580	-53.24%
Total Submitted Projects	3,140	2,507	2,423	-3.47%
Average Conversion Rate	55%	96%	90.25%	-6.37%
Average Measures installed per project	3.4	4.50	3.20	-40.85%
Average Utility - Cost per project	$970.82	$1,234.49	$1,394	11.42%
Percent of Contractors promoting program	100%	100%	99.25%	-0.76%

Sources: PY2023 EM&V Reports

EAL's elimination of residential lighting products was the reason for the 37 percent decrease in the number of measures installed in PY2023 compared to BY2023. Specifically, 62,591 *lighting* measure units were installed in PY2022 compared to 28,283 in BY2023 (EAL BY2023 EM&V Report, p. 356).

2.3 Act 1102 and the Consistent Weatherization Approach

Act 1102 of the 2017 Arkansas Regular Session, concerning Ark. Code Ann. § 23-2-304(a) (11) and Ark. Code Ann. § 23-3-405(a)(1)(B) and the authority of the Commission over energy efficiency programs and measures provided by investor-owned utilities (IOUs), states that the PSC is "permitted to order, require, promote, or engage in energy conservation programs and measures for the benefit of utility customers" that fall into one or both of two key segments:

3. Utility customers who are 65 years of age or older, or
4. Utility customers who meet the income eligibility qualifications for the Low-Income Home Energy Assistance Program (LIHEAP) administered by the Department of Human Services

Act 1102 Program Eligibility

The evaluators provided cross-tabulations of the number of CWA and/or LIPP program participants based on program eligibility requirements. Table 18 summarizes these findings.

Table 18: Act 1102 Eligibility Metrics Summary

Utility	% Age-Eligible	% Income Eligible	Both	Source
AOG- LIWP	89%	46%	35%	AOG PY2023 EM&V Report, p. 7-4
BHE- LIPP	76%	74%	57%	BHE PY2023 EM&V Report, p. 6-5
EAL- Low-Income Solutions	35.7%	53.7%	NA	EAL BY2023 EM&V Report, p. 366
EAL- Home Energy Solutions	33.8%	70.8%	NA	EAL BY2023 EM&V Report, p. 367
EAL- Energy Solutions for Manufactured Homes	36.4%	46.4%	NA	EAL BY2023 EM&V Report, p. 368
EAL- Energy Solutions for Multifamily Homes	30.8%	50.0%	NA	EAL BY2023 EM&V Report, p. 369
OG&E- CWA	68%	63%	32%	OG&E PY2023 EM&V Report, p. 126
SUA- LISP	77%	42%	11%	SUA PY2023 EM&V Report, p. 12-8
SWEPCO- IWQ	47%	67%	100%	SWEPCO PY2023 EM&V Report, p. 173
SWEPCO- HPwES	29%	66%	66%	

Health and Safety (H&S) Measures

Act 1102 specifies required spending on health and safety improvement in LIPP homes, and several programs have increased their spending on H&S measures in PY2023 (AOG PY2023 EM&V Report, pp. 6-4, 6-6, 7-11, 7-12; EAL BY2023 EM&V Report, p. 363; OG&E PY2023 EM&V Report, pp. 27, 140, 151; SUA PY2023 EM&V Report, pp. 12-9, 12-16, 12-18).

EAL's evaluator noted that H&S measures have become more diverse in PY2023 and were often undertaken by the contractor to address urgent home needs. Examples include drywalling, taping, and painting an exposed ceiling, installing three gable vents to ensure proper attic ventilation, and ensuring a bathroom exhaust fan that goes to the attic is connected to the outside (EAL BY2023 EM&V Report, p. 163).

Most H&S projects for SWEPCO's program included building envelope improvements, duct sealing and LED lighting (SWEPCO PY2023 EM&V Report, p. 177). Other commonly installed H&S measures focused on improving existing ventilation through fans and adding smoke detectors, CO detectors, and combo systems (OG&E PY2023 EM&V Report, p. 152).

Some H&S were not consistently defined in the program databases (OG&E PY2023 EM&V Report, p. 151). While the SWEPCO database used "Other" to track a variety of H&S measures, including plumber fixing flue pipe/shut off relief valve, plumber replacing water shutoffs, electrician services, capping ceramic heaters, and fixing gas leaks (SWEPCO PY2023 EM&V Report, p. 177). Moreover, OG&E's program database did not provide sufficient data to classify H&S measures for 23 percent of the total H&S spending (OG&E PY2023 EM&V Report, p. 152).

SUA staff identified some ongoing challenges with its low-income program, primarily on how to spend the full $500 allocated to each home for health and safety measures. Staff are working towards better educating their trade allies to understand the types of eligible homes and measures covered by the low-income program and teaching them how to assist those customers best. Because the low-income program has a small budget, CLEAResult staff encourage trade allies not to classify homes as low-income (even if they qualify) unless the homes need health and safety measure upgrades; this system allows the program to maximize the number of low-income customers it can assist (SUA PY2023 EM&V Report, p. 12-6).

Another barrier may be that the H&S spending caps are too low at $500 and should be closer to $2,500 to meet customer needs fully (SUA PY2023 EM&V Report, p. 11-13).

Table 19 summarizes the types of H&S measures installed in each utility's low-income pilot program.

Table 19: Types of H&S Measures Installed Through the LIPPs

	Gas Utilities			Electric Utilities		
	AOG	**BHE**	**SUA**	**EAL**	**OG&E**	**SWEPCO**
Air Purifier	X	X	X			X
Air Cycler		X				
Batteries	X		X	X		
CO_2 Detector	X	X	X	X	X	X
Dryer Vent (Cleaning/Repair)	X		X	X		
Drywall Repair	X		X	X		
Exhaust Fan	X	X	X	X	X	
Electrical Repairs		X		X		X
Re-flue Water Heater				X		X
Smoke Detector	X	X	X		X	X
Gas leak repair			X			X
Combustion Testing	X		X		X	
IAQ						X
Mechanical Ventilation		X		X		X
Moisture Control	X		X		X	X
Night lights			X			
Other		X		X		X
Source	AOG PY2023 EM&V Report, p. 7-1	BHE PY2023 EM&V Report, p. 6-6	SUA PY2023 EM&V Report, p. 12-9	EAL BY2023 EM&V Report, p. 363	OG&E PY2022 EM&V Report, p. 154	SWEPCO PY2023 EM&V Report, p. 177

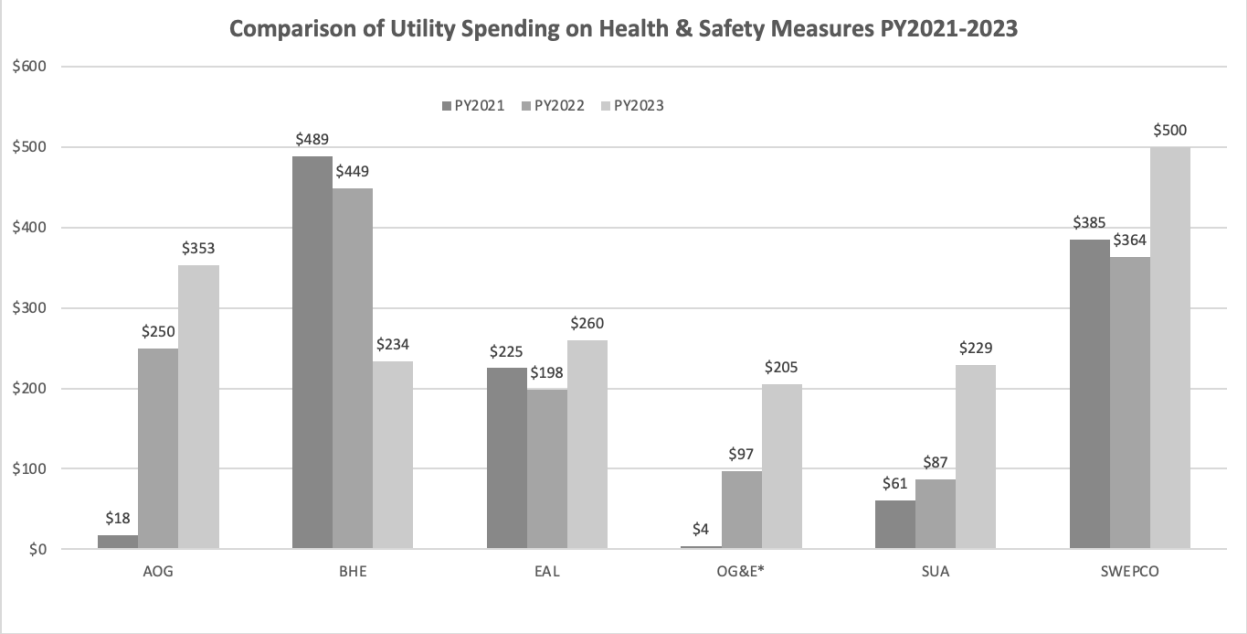
Table 20 provides a comparison of H&S spending and illustrates the dramatic decrease in H&S spending for BHE.

Table 20: Year-Over-Year Comparison of H&S Spending by Utility

Utility	PY2022	PY2023	% Change for PY2022 to PY2023
AOG	$250.00	$353.00	29.18%
BHE	$449.00	$234.00	-91.88%
SUA	$87.07	$260.00	66.5%
EAL	$197.99	$205.00	3.4%
OG&E*	$97.00	$229.00	57.6%
SWEPCO	$363.68	$500.00	27.26%

*OG&E includes LIPP H&S spending only

Sources: 2022 EM&V Reports, AOG PY2023 EM&V Report, pp. 1-8, 6-4, 7-11; BHE PY2023 EM&V Report, p. 6-4; EAL BY2023 EM&V Report, p. 363; OG&E PY2023 EM&V Report, p. 27; SUA PY2022 EM&V Report, p. 12-18; SWEPCO PY2023 EM&V Report, p. 143



Source: AOG PY2023 EM&V Report, pp. 1-8, 6-4, 7-11; BHE PY2023 EM&V Report, p. 6-4; EAL BY2023 EM&V Report, p. 363; OG&E PY2023 EM&V Report, p. 27; SUA PY2022 EM&V Report, p. 12-18; SWEPCO PY2023 EM&V Report, p. 143

Figure 26: Comparison of Utility Spending on Health & Safety Measures PY2021-PY2023

Energy Burden Analysis

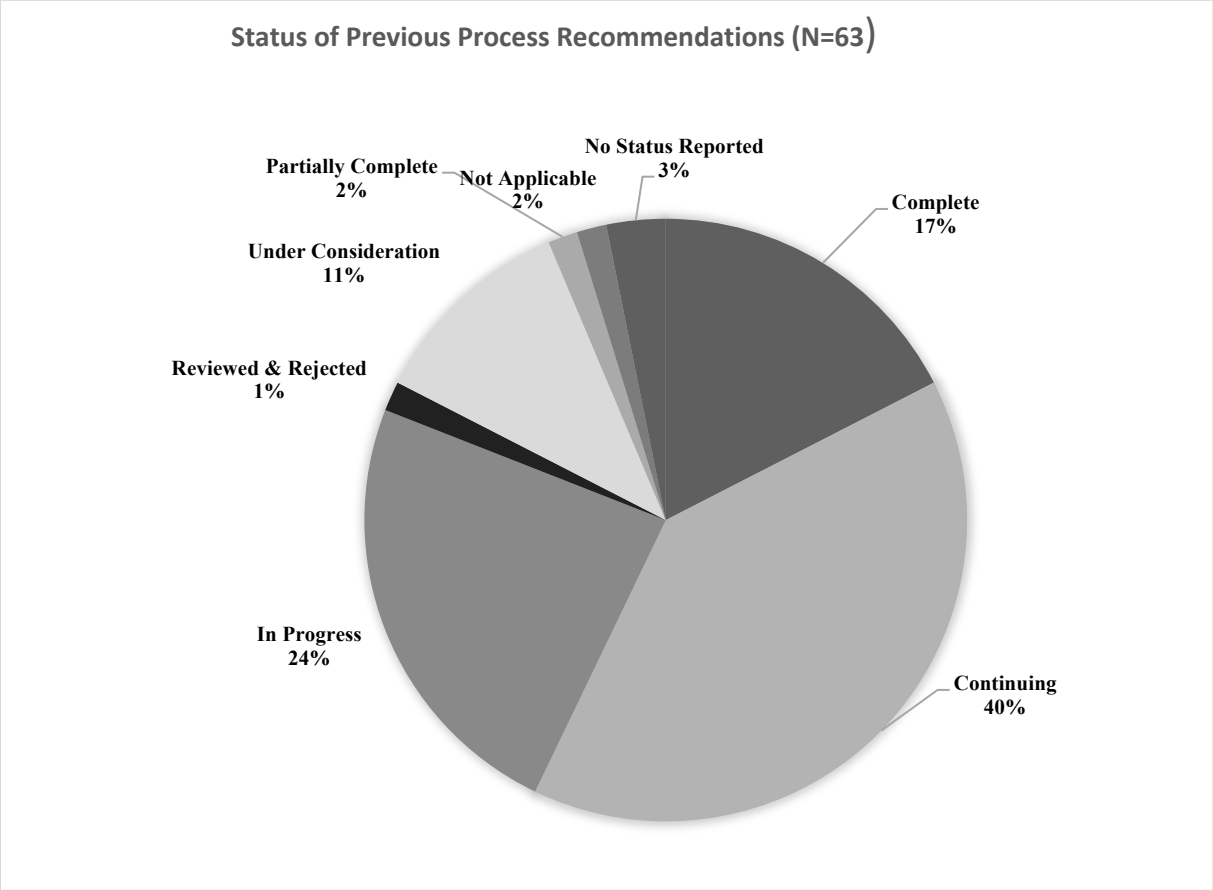
As part of the PY2022 EM&V research, Tetra Tech conducted portfolio-level EM&V research to support EAL in program planning. This research included a market trends study characterizing the market conditions in which the energy efficiency programs operate and measure trend analysis, which was also updated through BY2023, as presented above. In addition, BY2023 presented another opportunity for forward-looking portfolio-level research to inform and support future program success. Through relationship-building in hard-to-reach communities, including partnerships with neighborhood stores and nonprofit organizations, focused outreach efforts for multifamily and manufactured homes, and including *health and safety* measures as part of its low-income offerings, EAL has effectively served vulnerable populations throughout its territory as defined by income, age and comprehensiveness metrics (see the Act 1102 information in Section 16). This success led to the question: *Could another metric also help identify and serve customers that can most benefit from energy efficiency improvements?*

Given the importance of energy burden in understanding energy affordability and serving one of the five states with the highest energy burden nationally, as calculated by the Department of Energy, EAL is leading the development and tracking of **an electric-burden metric** for each of its low-income customers. Using Department of Housing and Urban Development (HUD) data overlaid on geographic information system mapping of its territory and analyzing billing data for each household in a HUD low-income qualified census tract, an average annual electric burden is being developed to inform program outreach efforts and monitor program outcomes. As this metric is in progress during BY2023 reporting, future reporting will discuss the methodology used to develop EAL's customer electric burden metric and how program design and delivery strategies are being informed by this new metric in its 2024-2026 program cycle (EAL BY2023 EM&V Report, p. 80).

2.4 Process Evaluation Recommendations

Status of Previous Process Recommendations

Per Protocol C's reporting requirements, the evaluators provided an update on the implementation status of the previous recommendations.



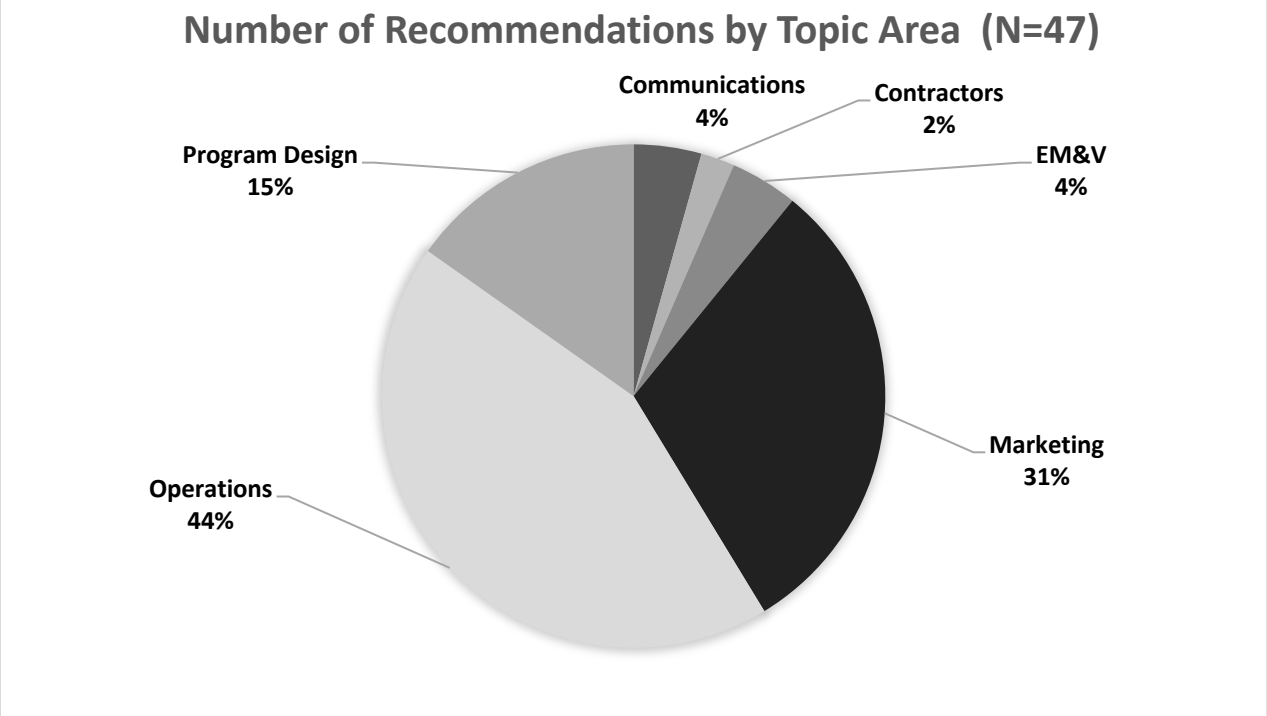
Source: PY2023EM&V Reports

Figure 27: Status of Previous Process Recommendations

Table 21: Disposition of Previous Process Recommendations by Utility

	Gas Utilities			Electric Utilities			
Utility	**AOG**	**BHE**	**SUA**	**EAL**	**OG&E**	**SWEPCO**	**Total**
Complete	2		1	6		2	11
Continuing				19		6	25
In Progress		1	2	6	2	6	15
Reviewed & Rejected			1				1
Under Consideration	2		2		1	2	7
Partially Complete				1			1
Not Applicable			1				1
No Status Reported				2			2
Total for each Utility	4	1	7	34	3	**16**	**63**
Total for All Recommendations							

Source: PY2023 EM&V Reports



Source: PY2023 EM&V Reports

Figure 28: Distribution of Process Evaluation Recommendations by Topic Area

Table 22 summarizes the distribution of process recommendations by utility.

Table 22: Distribution of PY2023 Process Recommendations by Utility

	Comm-unications	Con-tractors	EM&V	Marketing	Operations	Program Design	Total
Utility							
AOG				1		1	2
BHE				1			1
EAL	1	4	2	8	16	1	32
OG&E				1	1	1	3
SUA						2	2
SWEPCO	1	1		3	2		7
Total	2	5	2	14	20	5	47

Source: PY 2023 EM& Reports

Process Evaluations Recommendations

The evaluators provided a total of 47 recommendations to improve program operations across six topic areas. These findings are summarized next.

Communications

Two recommendations focused on ways to improve communications with program participants:

- Enhance communication and provide customers with contact information to reach customer service with program-related issues (EAL BY2023 EM&V Report, p. 142); and
- Review communication processes for program participants (SWEPCO PY2023 EM&V Report, pp. 38, 211).

Contractors

Five recommendations focused on ways to improve contractor relationships and help them promote the benefits of program participation to customers:

- Two evaluators recommended ways to improve relationships with contractors, primarily focusing on training contractors to improve customer communications (EAL BY2023 EM&V Report, pp. 43, 120, 164); and
- Another recommendation wanted the utility to focus on the benefits of both the incentive and energy efficiency equipment (SWEPCO PY2023 EM&V Report, pp. 38, 210).

EM&V Activities

Two recommendations offered suggestions on ways to improve the savings estimates for residential and C&I programs:

- Continue early engagement reviews to gain consensus across the EM&V team, EAL, and the implementer, particularly for *custom* and *CEI* projects over a larger savings threshold. Discuss whether review savings thresholds should be adjusted for the next program cycle (EAL BY2023 EM&V Report, p. 208); and
- Work with the EM&V team to improve estimates of residential program participants (EAL BY2023 EM&V Report, p. 185).

Marketing

The 14 marketing recommendations included improving program visibility, proactively addressing customer questions, and sharing program information across multiple channels. These recommendations are summarized next:

- Scan CLEAResult tracking updates for new contractors to target outreach and education (AOG PY2023 EM&V Report, p. 4-27);
- Develop case studies for program marketing (BHE PY 2023 EM&V Report, p. 4-41);
- Landlords expressed a high interest in receiving more information on energy efficiency; therefore, they continue to share information directly with landlords and customers. Email and direct mailing were reported as preferred information sources (EAL BY2023 EM&V Report, p. 41);
- Provide a home assessment leave-behind document and review it with customers to ensure they understand what is included in the program offerings, provide information on other programs and provide contact information for customer follow-up questions (EAL BY2023 EM&V Report, pp. 42, 43);
- Manufactured homes participants would appreciate a specific customer service contact so they can reach out with questions regarding the equipment installed, additional incentives available, and energy bill questions (EAL BY2023 EM&V Report, p. 42);
- Discuss potential opportunities to focus additional outreach efforts and program offerings to non-profit organizations serving hard-to-reach segments in EAL's territory (EAL BY2023 EM&V Report, pp. 46, 280);
- Continue to share information directly with customers about the Manufactured Homes, Low-Income Solutions and Multifamily Homes programs via direct mailing and email when possible (EAL BY2023 EM&V Report, pp. 120, 141, 164);
- Emphasize messaging in support of the Low-Income channel in streaming service marketing (OG&E PY2023 EM&V Report, p. 154);
- Leverage the success of spreading word-of-mouth program awareness to enhance program marketing targeting the Hispanic market (SWEPCO PY2023 EM&V Report, pp. 35, 207); and
- Enhance the marketing messages to highlight the simplicity of engaging with SWEPCO's program pathways, like HPwES (SWEPCO PY2023 EM&V Report, pp. 38, 211).

Improving Program Operations

The evaluators provided 20 recommendations on how to improve program operations, which included additional contractor training, identifying new ways to verify program eligibility, especially for low-income programs, and exploring ways to reduce market barriers in programs targeting small business and agricultural customers, as summarized next.

- Consider developing a list of recommended contractors for improvements identified in the home assessment (EAL BY2023 EM&V Report, p. 40);
- Ensure contractors are appropriately trained, correct any problems that occur during program services, and allow sufficient time in scheduling to service each home. (EAL BY2023 EM&V Report, p. 41);
- Develop tactics for improving contractor performance during installations and managing customers' experience with the program (SWEPCO PY2023 EM&V Report, pp. 37, 209);
- Work with the EM&V team, IEM, and Parties Working Collaboratively (PWC) to identify streamlined methods to verify program eligibility (EAL BY2023 EM&V Report, pp. 43, 165);
- Reorganize information presented on the POPS residential website and program manual to enhance clarity (EAL BY2023 EM&V Report, pp. 44, 184);
- Investigate opportunities to increase energy efficiency program participation among small businesses in light of barriers that were encountered during BY2023 (EAL BY2023 EM&V Report, pp. 45, 47, 251);
- Continue to monitor barriers to wider agricultural participation, including inflationary pressures and high interest rates (EAL BY2023 EM&V Report, pp. 47, 337);
- Continue to monitor and utilize opportunities to move participants from *radio technology* to *smart thermostats* in the following program cycle (EAL BY2023 EM&V Report, pp. 47, 317)
- Provide a written audit report and discuss recommendations with customers to ensure that customers understand what is included in the audit (EAL BY2023 EM&V Report, pp. 92, 120, 141, 165; OG&E PY2023 EM&V Report, p. 110); and
- Review program processes to identify opportunities for potentially improving the consistency of communications around assessments (SWEPCO PY2023 EM&V Report, pp. 36, 208).

Program Design

Five recommendations identified ways to improve or enhance current program offerings.

- Develop a Strategic Energy Management offering (AOG PY 2023 EM&V Report, p. 5-20);
- Continue to assess the role of this program in EAL's overall demand response opportunities, as it provides a unique participation path (EAL BY2023 EM&V Report, pp. 48, 352);
- Explore on-bill financing as a project option (OG&E PY2023 EM&V Report, p. 193);
- Discontinue wave 5 (SUA PY2023 EM&V Report, p. 9-24); and
- Assess whether Act 1102 homes can reasonably obtain Inflation Reduction Act (IRA) funding (SUA PY2023 EM&V Report, p. 12-18).

Section 3: Comparison to the Comprehensive Checklist

Each EM&V contractor also reported on the progress each energy efficiency program portfolio has made compared to the seven comprehensiveness factors identified by the APSC. Table 23 summarizes these findings from the comprehensive checklist reported in the individual EM&V reports. Using the following legend, energy organizations have been evaluated as either fully met, partially met, or failed to meet the criteria associated with each factor as set forth in the Commission's Comprehensive Checklist.

Fully Met Criteria = ●	Utilities or third–party administrators are fully meeting the criteria established by the Commission Checklist.
Partially Met Criteria = ◑	Utilities or third-party administrators are partially meeting the criteria established by the Commission Checklist.
Did Not Meet Criteria = ○	Utilities or third–party administrators did not meet the criteria established by the Commission Checklist.
Not Applicable = ■	Identifies those cases where the Commission Checklist cannot be assessed.

Table 23: Summary of the Comprehensiveness Checklist Factor Results

Utility	Factor 1: Education/ Training/ Outreach	Factor 2: Provide Adequate Resources	Factor 3: Address Major End Uses	Factor 4: Comprehensively Address Customer Needs to Avoid Cream-Skimming	Factor 5: Target All Customer Sectors	Factor 6: Are Cost-Effective	Factor 7: Have Appropriate EM&V Procedures in Place
AOG	●	●	●	●	●	●	●
BHE	●	●	◑	●	◑	●	●
SUA	●	●	◑	◑	◑	◑	●
EAL	●	●	●	●	●	●	●
OG&E	●	●	●	●	●	●	●
SWEPCO	●	●	●	●	●	●	●
Fully Met = ● Partially Met = ◑ Did Not Meet = ○ Not Applicable = ■							

Factor One: Adequate Education, Training and Marketing

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

All of the electric and gas utilities use a variety of channels to provide educational materials designed to reach their programs' target markets (AOG PY2023 EM&V Report, pp. 3-3-3-4; BHE PY2023 EM&V Report, pp. 3-2-3-3; EAL BY2023 EM&V Report, pp. 80-81; OG&E PY2023 EM&V Report, pp. 51-53; SUA PY2023 EM&V Report, pp. 3-3-3-4; SWEPCO PY2023 EM&V Report, pp. 43-45).

- These educational materials include brochures, case studies, and presentations to trade and industry groups (AOG PY2023 EM&V Report, p. 3-3; BHE PY2023 EM&V Report, p. 3-2; OG&E PY2023 EM&V Report, p. 51; SUA PY2023 EM&V Report, p. 3-3);
- Of note, all program branding and all marketing materials carry the *Entergy Solutions* logo (EAL BY2023 EM&V Report, p. 80);
- LMSOP stood out because SWEPCO identified and directly targeted potential customers (SWEPCO PY2023 EM&V Report, p. 45); and
- BHE programs for the non-residential sector use past participant case studies in their marketing (BHEA PY2023 EM&V Report, p. 3-4).

The electric utilities rely on trade allies to market programs throughout their electric service territories (EAL BY2023 EM&V Report, p. 81; OG&E PY2023 EM&V Report, pp. 52-53; SWEPCO PY2023 EM&V Report, pp. 45-46).

On a related note, increased trade ally involvement in the C&I Solutions Program increased its promotion (AOG PY2023 EM&V Report, p. 3-4).

The gas utilities also conduct a variety of outreach and education to potential program partners, including contractors, retailers, home builders and local governments (AOG PY2023 EM&V Report, p. 3-3; BHEA PY2023 EM&V Report, p. 3-2; SUA PY2023 EM&V Report, p. 3-4).

The gas utilities have marketing materials that address specific barriers associated with the targeted segments or technologies (AOG PY2023 EM&V Report, pp. 3-4; BHEA PY2023 EM&V Report, pp. 3-4; SUA PY2023 EM&V Report, pp. 3-5). For example, SUA initiated sector-specific marketing, including fact sheets for restaurants and food processing plants (SUA PY2023 EM&V Report, p. 3-5).

Marketing materials typically make attempts at cross-promotion of programs (BHE PY2023 EM&V Report, p. 3-8; SUA PY2023 EM&V Report, p. 3-9).

None of the gas utilities require trade allies to register for rebate or C&I programs; however, contractors must register to participate in the CWA and Low-Income Pilot Program (AOG PY2023 EM&V Report, p. 3-3; BHEA PY2023 EM&V Report, p. 3-3; SUA PY2023 EM&V Report, p. 3-4).

- This approach allows licensed dealers and contractors to participate in the equipment rebate programs without affecting the programs' quality assurance (AOG PY2023 EM&V Report, p. 3-3; BHEA PY2023 EM&V Report, p. 3-3; SUA PY2023 EM&V Report, p. 3-4); and
- There was marked improvement in H&S measure implementation in PY2023, increasing from $18 per home in PY2021 to $353 per home for the LIPP for both AOG and SUA (AOG PY2023 EM&V Report, p. 3-4; SUA PY2023 EM&V Report, p. 3-4).

Since the Low-Income program is a pilot, the gas utilities did not develop specific marketing materials for it (AOG PY2023 EM&V Report, p. 3-4; BHE PY2023 EM&V Report, p. 3-4; SUA PY2023 EM&V Report, p. 3-5). However, the AOG's LIPP continues to be over-subscribed, exceeding its savings goal, even without specific marketing materials (AOG PY2023 EM&V Report, p. 3-4).

The electric utilities consistently approached training in a comprehensive manner (OG&E PY2023 EM&V Report, p. 52; SWEPCO PY2023 EM&V Report, p. 44). For example, SWEPCO held multiple program trainings for trade allies and program partners. While the training met the contractor training requirements, a future enhancement could include C&I technical training, such as seminars on efficiency measures and technologies (SWEPCO PY2023 EM&V Report, p. 44).

Factor Two: Adequate 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.

In most cases, the program budgets for the gas and electric utilities were sufficient to support program activities (AOG PY2023 EM&V Report, pp. 3-4-3-5; BHE PY2023 EM&V Report, p. 3-4; EAL BY2023 EM&V Report, p. 82; OG&E PY2023 EM&V Report, p. 53; SUA PY2023 EM&V Report, p. 3-6; SWEPCO PY2023 EM&V Report, pp. 46-47).

- OG&E's energy resource acquisition cost at a portfolio level aligns with averages for utilities nationwide, with programs running for several years.[8] Program and implementation staff reported that, overall, they had sufficient budget to cover program implementation in PY2023 (OG&E PY2023 EM&V Report, pp. 53-54);
- SWEPCO's resource acquisition cost at a portfolio level is below average for utilities across the country with programs that have been run for several years. The LMSOP program had a higher acquisition cost than any other program, which is expected of load management and demand response programs. The PY2023 budget indicated a budget of $11,667,200 and a net energy savings (kWh) goal of 34,505,559 kWh, which accounts for $0.34 per kWh (SWEPCO PY2023 EM&V Report, p. 46); and
- EAL staff were concerned about the continued increase in costs in PY2022, which persisted in BY2023. Pre-negotiated contracts helped maintain expenses, but there are concerns about future program years. EAL achieved its energy savings goals at a portfolio level but fell short of demand reduction targets while spending 84 percent of the planned budget, as some programs fell short of participation goals (EAL BY2023 EM&V Report, p. 82).

For most gas utilities, the actual cost per therm, aggregated across all programs, is significantly lower than planned:

[8] 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

- AOG's portfolio had an acquisition cost of $4.44 per therm, which increased from $3.99 in PY2022 but was still 39% lower than the program plan value of $6.28 (AOG PY2023 EM&V Report, p. 3-5). AOG Weatherization and the Low-Income Pilot Program significantly outperformed relative to their planned acquisition cost (AOG PY2023 EM&V Report, p. 3-5).
- BHE's portfolio had an acquisition cost of $2.80 per net therm, lower than the program plan value of $3.15. At the individual program level, the LIPP significantly outperformed relative to its planned acquisition cost, which is 86% of the program plan value (BHE PY2023 EM&V Report, p. 3-5).
- SUA's portfolio overall had acquisition costs that were 15% lower than the program plan, mainly due to Home Energy Reports and C&I Solutions Programs (SUA PY2023 EM&V Report, pp. 3-6-3-7).

Several other programs had lower-than-planned acquisition costs, such as AOG's Equipment Rebate Program and SUA's C&I Solutions Program (AOG PY2023 EM&V Report, pp. 3-5-3-6; BHE PY2023 EM&V Report, p. 3-5; SUA PY2023 EM&V Report, p. 3-7).

Several SUA programs had marked improvement in acquisition costs; for example, the Gas Equipment, Commercial Food Service, and Saving Homes Programs all had lower acquisition costs than in PY2022 (SUA PY2023 EM&V Report, p. 3-7).

Budget flexibility is important for EAL to make allowable adjustments to deliver annual cost-effective energy efficiency that meets savings goals. Arkansas utilities had additional budgetary flexibility in BY2023, giving the opportunity for reallocation. In BY2023, EAL revised the approved budget within the APSC's guidelines for budget flexibility, moving budgeted dollars from underachieving programs to programs seeing higher energy-saving projects and market acceptance. This budget flexibility was critical to meeting EAL's portfolio savings goals in BY2023 (EAL BY2023 EM&V Report, p. 82).

Factor Three: Reasonably Addresses All Major End-Uses

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

With the exception of behavioral programs, most utilities offer programs that target major end uses (AOG PY2023 EM&V Report, pp. 3-6-3-7; EAL BY2023 EM&V Report, p. 83; OG&E2023 EM&V Report, p. 55; SWEPCO PY2023 EM&V Report, p. 49).

- Traditional behavioral programs have inherent challenges, including small service territories and number of customers; these may not make them cost-effective for some utilities (AOG PY2023 EM&V Report, pp. 3-6-3-7; SWEPCO PY2033 EM&V Report, p. 49);
- BHE canceled its Home Energy Reports program to allow for developing the Home Energy Savings weatherization program. This leads to a tradeoff of filling the residential building envelope but leaving a gap in behavioral savings. Given the program budget allotment, the evaluators concluded that BHE was correct in prioritizing weatherization over behavioral savings (BHE PY2023 EM&V Report, p. 3-6); and
- SWEPCO's CIEEP SEM program has been an effective behavioral program for commercial customers (SWEPCO PY2023 EM&V Report, p. 49).

Most gas utility programs are designed around a specific technology or end-use that addresses all major end-uses (AOG PY2023 EM&V Report, p. 3-6; BHE PY2023 EM&V Report, p. 3-6; SUA PY2023 EM&V Report, p. 3-7). Of note, the gas utilities do not address home appliances, as there is limited equipment and low-energy savings per unit (AOG PY2023 EM&V Report, p. 3-7; BHE PY2023 EM&V Report, p. 3-6).

The gas utilities encourage multiple-measure installations through their residential and C&I programs (AOG PY2023 EM&V Report, p. 3-6; BHE PY2023 EM&V Report, p. 3-6; SUA PY2023 EM&V Report, p. 3-7). Notably, the SUA portfolio has no specific requirements for installing multiple measures, but customers can participate to the extent of their choice (SUA PY2023 EM&V Report, pp. 3-7-3-8).

The *Measure Trends Analysis* revealed that EAL's overall program portfolio has become more diverse and comprehensive due to changes in the lighting market. This has led to increased incentives for other end-uses such as refrigeration, ductless heat pumps and variable-frequency drives (EAL BY2023 EM&V Report, p. 83).

Factor Four: Addresses the Needs of Customers Comprehensively

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.

Although customers are not specifically required to install multiple measures, the electric and gas utilities encourage these installations when they benefit the customer (AOG PY2023 EM&V Report, pp. 3-8; BHE PY2023 EM&V Report, pp. 3-7; OG&E PY2023 EM&V Report, p. 56; SUA PY2023 EM&V Report, pp. 3-7; SWEPCO PY2023 EM&V Report, p. 50).

EAL continues to try to identify and serve customers comprehensively, which has led to increased installations of more envelope and AC tune-up measures in the residential sector. The implementation contractor for the Large C&I program works closely with customers to comprehensively address facility needs (EAL BY2023 EM&V Report, p. 84).

Two utilities offer tiered incentives to trade allies for their prescriptive program offerings (BHE PY2023 EM&V Report, p. 3-8; SUA PY2023 EM&V Report, p. 3-8). SUA continues to offer tiered incentives for premium efficiency measures across all their rebate programs (SUA PY2023 EM&V Report, pp. 3-8-3-9).

- Both AOG and BHE discounted their tiered incentives for several prescriptive programs to focus on encouraging higher-efficiency measures only (AOG PY2023 EM&V Report, p. 3-9; BHE PY2023 EM&V Report, p. 3-8);
- The OG&E portfolio will introduce incentives for premium efficiency in PY2024 (OG&E PY2023 EM&V Report, p. 56); and

- SWEPCO has identified the challenge in implementing tiered incentives lies in minimizing customer confusion, which may arise from incorrect labeling of appliances in stores or misunderstandings regarding the distinctions between ENERGY STAR-Certified[9] and ENERGY STAR Most Efficient[10] labels. Nonetheless, the HSP within the New Homes segment of REIP features bundled, tiered incentives (SWEPCO PY2023 EM&V Report, p. 50).

Several utilities bundle on-site technical assistance with direct customer education and support in direct install measures (AOG PY2023 EM&V Report, p. 3-9; BHE PY2023 EM&V Report, p. 3-9; OG&E PY2023 EM&V Report, pp. 55-56; SUA PY2023 EM&V Report, p. 3-9; SWEPCO PY2023 EM&V Report, p. 50).

Both OG&E and SWEPCO offer technical support to educate their 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 types of technical assistance vary (AOG PY2023 EM&V Report, p. 3-9; BHE PY2023 EM&V Report, p. 3-9; OG&E PY2023 EM&V Report, pp. 55-56; SUA PY2023 EM&V Report, p. 3-9; SWEPCO PY2023 EM&V Report, p. 50).

Factor Five: Addresses Comprehensive Needs of Targeted Customer Sectors

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

Factor Five has two components: whether the portfolios comprehensively target entire sectors and if the portfolios leverage non-utility programs to improve program effectiveness, reduce customer barriers, or maximize delivery assistance.

The six Arkansas utilities have developed effective cross-utility coordination of programs that benefit rate payers across the state (AOG PY2023 EM&V Report, p. 3-10; BHEA PY2023 EM&V Report, pp. 3-9-3-10; OG&E PY2023 EM&V Report, p. 56; SUA PY2023 EM&V Report, pp. 3-9-3-10; SWEPCO PY2023 EM&V Report, p. 51).

Examples of cross-utility coordination include:

- The AOGWP is jointly implemented with Oklahoma Gas & Electric (OG&E), with both utilities using CLEAResult to provide third-party implementation support. This is a successful example of cross-fuel coordination. The costs are split when a home is an AOG and OG&E customer and paid in full by AOG if they are served by another electric utility (such as a municipal or a rural co-op) (AOG PY2023 EM&V Report, p. 3-10; OG&E PY2023 EM&V Report, p. 57);

[9] More information can be found here: https://www.energystar.gov/partner_resources/utilities_eeps/es_quals

[10] More information can be found here: https://www.energystar.gov/products/most_efficient

- SWEPCO 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 CIEEP (SEM), REIP (MF), IQW, and HPwES pathways were jointly implemented with the gas utilities and were a successful example of cross-fuel coordination (SWEPCO PY2023 EM&V Report, p. 51); and
- ADM provides EM&V to SUA, BHE, and AOG, which allows for the sharing of fixed EM&V costs and a more seamless comparison of program offerings and lessons learned across the natural gas energy efficiency portfolio. This approach has reduced the overall cost of EM&V across all three gas utilities (AOG PY2023 EM&V Report, p. 3-11; BHEA PY2023 EM&V Report, p. 3-10; SUA PY2023 EM&V Report, p. 3-10).

Several utilities developed innovative partnerships and collaborations with community groups, industry partners, professional organizations, manufacturers, distributors, and government agencies (EAL BY2023 EM&V Report, p. 85; OG&E PY2023 EM&V Report, pp. 56-57; SWEPCO PY2023 EM&V Report, p. 51).

Public Sector facilities are targeted with a wide range of programs, including residential programs that reach out to public housing authorities (AOG PY2023 EM&V Report, p. 3-10; BHEA PY2023 EM&V Report, p. 3-9; SUA PY2023 EM&V Report, pp. 3-9-3-10).

Several markets are not specifically targeted by gas utilities, including:

- Agriculture and Industrial customers are not targeted as the equipment used by these facilities generally requires custom calculations (AOG PY2023 EM&V Report, p. 3-10; SUA PY2023 EM&V Report, pp. 3-9-3-10); and
- Multifamily and mobile homes rarely participate in BHE programs as they have a high share of all-electric space heating and water heating equipment (AOG PY2023 EM&V Report, p. 3-10; BHEA PY2023 EM&V Report, pp. 3-9-3-10; SUA PY2023 EM&V Report, p. 3-9).

Factor Six: Enables the Delivery of All Achievable, Cost-Effective Energy Efficiency

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.

Several utility programs met their savings goals (BHE PY2023 EM&V Report, p. 3-10; EAL BY2023 EM&V Report, p. 88; OG&E PY2023 EM&V Report, p. 57; SWEPCO PY2023 EM&V Report, pp. 52-53).

Most gas utility programs passed the TRC with a ratio above 1.0 (AOG PY2023 EM&V Report, p. 3-11; BHE PY2023 EM&V Report, p. 3-10; SUA PY2023 EM&V Report, p. 3-11).

Several programs did not meet their net savings goal, including:

- AOG's Equipment Rebate and C&I Solutions Program (AOG PY2023 EM&V Report, p. 3-11);
- SUA's Residential and Equipment Rebate Programs, Commercial Boiler and Low-Flow Showerhead & Faucet Aerator Program (SUA PY2023 EM&V Report, pp. 3-10-3-11); and
- Only SUA's Low Flow Showerhead & Faucet Aerator Program did not pass the Total Resource Cost (TRC) test with a ratio of .78 (SUA PY2023 EM&V Report, p. 3-11).

All three gas utility programs had NTGR within industry norms (AOG PY2023 EM&V Report, p. 3-11; BHE PY2023 EM&V Report, p. 3-10; SUA PY2023 EM&V Report, p. 3-11).

EAL screens commercial customers during the application phase to ascertain whether the program would be instrumental in helping them move forward with energy efficiency instead of incentivizing the energy efficiency projects they were already going to do. These activities led to targeting low-income segments through partnerships with organizations, which determined an NTG of 100%. The PY2020 Large C&I NTG research also showed higher NTG values for *custom* projects, which have continued to be a substantial percentage of savings under this program, positively affecting the NTG ratio as Large C&I is the single largest contributor to overall portfolio savings in BY2023 (EAL BY2023 EM&V Report, p. 88).

Factor Seven: Evaluation, Measurement, and Verification

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

The three gas utilities' EM&V methodologies incorporated industry best practices and reflected feedback from previous evaluations, as defined in AR TRM 9.1 (AOG PY2023 EM&V Report, p. 3-12; BHE PY2023 EM&V Report p. 3-11; SUA PY2023 EM&V Report, p. 3-11).

Both the gas and electric utilities provided the evaluation teams with full documentation of their QA/QC post-inspection results (AOG PY2023 EM&V Report, p. 3-12; BHE PY2023 EM&V Report pp. 3-11; OGE PY2023 EM&V Report, p. 59; SUA PY2023 EM&V Report, pp. 3-12-3-13).

The utilities also worked closely with program implementers to ensure that all EM&V activities conformed with the Arkansas Protocols (EAL BY2023 EM&V Report, p. 89; OGE PY2023 EM&V Report, p. 59). This collaboration allowed the evaluators to identify the reasons for low realization rates for dehumidifiers and smart thermostats, which were due mostly to the use of a default size offered and a low efficiency value. Savings were adjusted after accounting for differences across units (OGE PY2023 EM&V Report, p. 59).

Section 4: Evaluating the Evaluators

One of the responsibilities of serving as an IEM is ensuring compliance with EM&V rules or protocols approved by the APSC. The IEM recognizes that we are also serving as advisors; therefore, our approach in conducting this summary was to match the skills of each team member to the appropriate program area. This format allows us to provide the in-depth technical guidance and assistance needed to ensure that EM&V activities conform to the Arkansas EM&V Protocols and industry best practices using the following legend.

4.1 Scope and Methodology Used for Assessing EM&V Activities

Fully Met Criteria =	●	The EM&V Contractors met the requirements prescribed by the IEM or provided reports that reflected industry standards and best practices.
Partially Met Criteria =	◑	The EM&V contractors met some but not all of them.
Did Not Meet Criteria =	○	The EM&V reports failed to meet the IEM requirements or industry best practices.
Not Applicable =	■	Identifies those cases where these standards may not be appropriate.

As Table 24 shows, the quality of the EM&V reports significantly improved in PY2023. The NEBs calculations were correct, and the evaluators provided additional information regarding the methodologies and approaches used to estimate savings.

However, the IEM did find several areas for improvement, especially in reporting program impacts. Some evaluation methodologies, especially regarding calculating water savings for steam traps and identifying hours of use (HOU), sometimes conflicted with evaluation best practices. This section provides additional clarifications and recommendations to improve future EM&V activities.

Table 24: Summary of the IEM's Assessment of the 2023 EM&V Evaluation Activities

Evaluator	Energy Organization/Utility	Impact Evaluation	Process Evaluation
ADM	AOG	●	●
ADM	BHE	●	●
ADM	SUA	●	●
Tetra Tech	EAL	●	●
ADM	OG&E	●	●
ADM	SWEPCO	●	●
Fully Met = ● Partially Met = ◑ Did Not Meet = ○ Not Applicable = ■			

4.2 Impact Evaluation Assessment

The IEM reviewed PY2023 portfolio evaluations submitted by the evaluation teams to assess consistency against submitted EM&V plans, previous evaluations, and the application of TRM 9.1. Each portfolio evaluation was reviewed to:

- Quantify energy and demand savings resulting from current programs;
- Understand why certain program effects occurred; and
- Identify ways to improve and refine current and future programs.

Like previous evaluations, the IEM maintained the following impact objectives in PY2023:

- Verify that program tracking data support total claimed savings;
- Review the current database tracking methodology against the recommended formats in *Protocol A: Program Tracking and Database Development*, as defined in the TRM;
- Verify the correct use of the AR TRM values;
- Estimate PY2023 gross energy and demand impacts at the measure and program levels;
- Estimate PY2023 net impacts at a program level; and
- Identify key issues and areas of focus for subsequent evaluations and TRM updates.

Table 25 summarizes the IEM's assessment of the impact evaluation activities and methods by the evaluator and the utility or third–party administrator. The basis for these findings is discussed next.

Table 25: Summary of Assessment of Evaluators' Impact Activities

Utility	AOG	BHE	SUA	EAL	OG&E	SWEPCO
Prescriptive Savings Verification	●	●	●	●	●	●
Custom Measure Verification	●	◑	◑	◑	●	●
Review Program Databases	●	●	●	●	●	●
Verify Correct use TRM Values	●	●	●	●	●	●
Estimate NTG	◑	●	●	●	●	●
NEBS	●	●	◑	●	●	●
Quality of Report- Impact Evaluation	●	●	●	●	●	●

Prescriptive Measure Verification

Arkansas TRM, Volume I Protocol *D: "Level of Effort"* specifies approaches for determining: 1) which measures are best suited for deemed savings estimates; 2) which measures are best served through simplified EM&V activities such as on-site inspections or an engineering review; and 3) which measures require full EM&V activities, as defined by the IPMVP. The overall goal of EM&V sampling for verification activities is to achieve a minimum confidence interval of 90 percent ±10 percent at the program level for evaluated savings estimates.

Evaluators provided the IEM with their PY2023 EM&V plans for review and comment in fall of 2023 including their strategy around developing sampling plans with estimates of site visits and surveys. The IEM identified the following key findings from our review of the evaluators' efforts in conducting on-site verification visits and surveys for prescriptive measures.

Findings from Prescriptive Measure Verification

Evaluators provided their updated EM&V verification efforts around on-site visits, surveys and desk reviews by the program. All of the PY2023 EM&V Reports included updated details around the total number of verification activities conducted to confirm relevant measure details for reproducing savings by the program (AOG PY2023 EM&V Report, p. 3-1; BHE PY2023 EM&V Report, p. 3-1, EAL BY2023 EM&V Report, p. 90, 118, 139, 161, 205, 248, 277, 308; OG&E PY2023 EM&V Report, p. 46; SUA PY2023 EM&V Report, p. 3-1; SWEPCO PY2023 EM&V Report, p. 20). Tetra Tech continues to provide details around deviations from plans in a dedicated section, including reference to an appendix providing the confidence and precision levels reached with the actual sampling results by the program (EAL BY2023 EM&V Report, p. 29).

The level of detail reported from verification activities significantly improved across some evaluation reports. OG&E significantly improved their reporting on field verification findings by adding a column in the realization results table dedicated to explaining deviations from 100 percent (OG&E PY2023 EM&V Report, pp. 79, 84); SWEPCO continues to provide helpful context by including an Appendix at the end of the report dedicated to sharing results from evaluator's site visits including photo verifications (SWEPCO PY2023 EM&V Report, pp. 79, 224, Appendix E).

A few remaining issues are still prevalent in evaluators' reporting discrepancies on significantly high or low realization rates. In general, the source of discrepancies from prescriptive savings verification by evaluators was reported by program (AOG PY2023 EM&V Report, p. 5-14; BHE PY2023 EM&V Report, p. 4-37; EAL BY2023 EM&V Report, pp. 98-100, 126-128, 147-148, 171, 189, 267; SUA PY2023 EM&V Report, p. 4-22, 5-9). The IEM continues to find situations where evaluators should provide a more thoughtful response not only when realization rates are significantly lower but also when they are higher (i.e., 1495 percent in the AOG PY2023 EM&V Report, p. 4-24, Table 4-12).

Evaluation teams applied field verification findings to refine savings for direct install, give-away and kit programs. Where possible, verification results from evaluation activities were used to provide recommendations for future TRM parameters. The IEM values ADM's findings regarding their on-site verification efforts to identify default estimates for 'unknown' heating systems or home square footage for measures in kit programs or direct install efforts (OG&E PY2023 EM&V Report, p. 85, 194).

Recommendations for Prescriptive Measures Verification

- ***Evaluators should continue to provide details on the results from on-site/survey verification efforts.*** Site-specific data can be used to make recommended changes for the next TRM update. This is especially relevant regarding Advanced Power Strips or other direct-install measures.
- ***Evaluators should note any planned deviations around sampling in their evaluation plans.*** The IEM recognizes the value in having a conversation around acceptable methods to apply when sampling strategies cannot be completed. While evaluators all provide the sampling approach used for the current evaluation, insights around the projected versus actual may help in future planning.

Database Tracking

Evaluation teams reviewed the utility program tracking databases about Protocol A: Program Tracking and Database Development, as defined in the AR TRM. This protocol provides guidance on effectively tracking

a variety of critical program attributes. The specific areas in Protocol A that address program impact are listed below.

- ***Participating Customer Information****:* Databases should have up-to-date and accurate participant contact information used to schedule on-site verification and conduct telephone surveys;
- ***Measure Specific Information:*** Databases should contain all relevant fields needed to calculate savings using algorithms and methods defined in the recent TRM; and
- ***Program Tracking Information:*** Total number of measures installed or implemented and status of rebate process, which ensures that the sum of measures in the database meets program reported totals.

Findings from Evaluators' Review of Database Tracking

Evaluation teams have employed various strategies with program delivery teams to ensure that databases effectively track program data. The IEM noted that Tetra Tech has continued its efforts in conducting mid-year reviews to help facilitate changes before the end of the year (EAL BY2023 EM&V Report, p. 30). In general, the evaluators have employed a template approach to report on their findings from the review of databases. The following list identifies the key observations from the IEM from the PY2023 EM&V Reports.

The level of detail provided by evaluators from their database review improved in PY2023 evaluation reports. ADM provided a color-coded table reflecting the results of their review of databases mapping directly with the AR TRM Protocol A with a column added for 'description of issue(s)' (AOG PY2023 EM&V Report, Table(s) 5-11, 6-8, 7-10; BHE PY2023 EM&V Report, Table(s) 4-6, 5-6 and 6-8; SUA PY2023 EM&V Report, Table(s) 4-5, 5-6, 6-2, 7-11, 8-5, 10-5, 11-9). Evaluators also suggested methods to address data quality issues by implementing improvements such as pre-set dropdown menus or automating calculations within databases (BHE PY2023 EM&V Report, p. 4-25; EAL BY2023 EM&V Report, p. 295; OG&E PY2023 EM&V Report, p. 153; SUA PY2023 EM&V Report, p. 8-8).

Evaluators established methods for determining parameters that would be missing in the database tracking fields. Evaluators have consistently provided recommendations around missing data despite dedicated fields being available in tracking databases. The IEM appreciates the efforts made by evaluators in applying strategies for determining the appropriate values to use in place of missing data (AOG PY2023 EM&V Report, p. 6-12; BHE PY2023 EM&V Report, p. 4-32; SWEPCO PY2023 EM&V Report, p. 34).

Recommendations for Review of Database Tracking

Evaluators should continue their diligence in addressing ongoing issues related to database quality. Evaluation teams have successfully tracked issues noted during their review of database tracking. Given the reduction of the 'unknown' status of impact recommendations in this area, the IEM recognizes the efforts made by the evaluators in working with the utilities to resolve persistent issues.

Verify Correct Use of AR TRM 9.1

Evaluation teams referenced AR TRM 9.1, Volume 2, when verifying prescriptive savings calculations. The TRM identifies the algorithms to apply for measures deemed savings using proven analysis of measure performance using field data, accepted engineering calculations, engineered energy efficiency models (simulations) and secondary research. The AR TRM also discusses using best available data (AR TRM 9.1, Volume 2, p. 2).

Findings from Evaluators' Verification of AR TRM 9.1 Use

Impact savings rely on the correct application of the AR TRM. Evaluation teams have been working to check algorithms and how they are interpreted or applied. The IEM found several instances related to TRM interpretation in the PY2022 EM&V reports. In PY2023, many of these issues have been addressed. The following highlights our observations from the evaluator's efforts on AR TRM 9.1 use.

Evaluators appropriately referenced TRM 9.1 sections for their verification activities. PY2023 reports continue to provide TRM sections for the derivation of savings. In situations where there were issues noted during their review, these were highlighted in the report (BHE PY2023 EM&V Report, p. 3-12; EAL BY2023 EM&V Report, p. 48; OG&E PY2023 EM&V Report, p. 126; SWEPCO PY2023 EM&V Report, p. 56).

Some evaluation teams clearly note deviations from TRM 9.1. In some situations, prescriptive algorithms follow TRMs in other jurisdictions or are based on implementer work papers. Many evaluators provided a dedicated section on noting these situations (OG&E PY2023 EM&V Report, p. 42, 190; SWEPCO PY2023 EM&V Report, p. 129). In April 2023, the IEM also provided a memo titled 'Discretionary Guidance on EISA Baselines for Residential LED Lamps' which provided evaluators with direction on baseline wattages for calculating savings for income-eligible customers taking part in efficiency programs through direct install, give-away and retailer programs. Only one of the three electric utilities referenced the IEM guidance in the PY2023 EM&V Report (OG&E's PY2023 EM&V Report, p. 27, 75).

Recommendations for Evaluators' Verification of Correct Use of TRM Values

Evaluators should continue to connect their observations when verifying TRM algorithms to recommendations for improvement. In PY2023 EM&V Reports, evaluators provided useful insights for TRM improvements. In PY2022, TRM updates were only provided in one of the six reports; in PY2023, three out of the six reports provided TRM update suggestions. The IEM values strategic insight by evaluators that connect evaluation findings to informing updates for the TRM (EAL BY2023 EM&V Report, pp. 48, 64, 68; OG&E PY2023 EM&V Report, p. 194).

Custom Projects

The Arkansas TRM 9.1, Volume 1 Protocol D2: M&V Protocols provides guidance on recommended IPMVP protocol options by measure type, including C&I Comprehensive Multi-Measure New Construction, C&I Custom Measures, C&I Natural Gas Boilers and Furnaces, C&I HVAC, C&I Lighting, C&I Motors, and C&I Variable Speed Drives. Based on this guidance, the IEM reviewed the impact evaluation tasks conducted by evaluation teams in accordance with the following methodologies:

- On-site inspections with key parameter (IPMVP Option A) or all parameter (IPMVP Option B) measurements on a census or sample of program participants to verify installation and collect specific operating information;
- Whole facility (IPMVP Option C) where savings are done through energy bill analyses; and
- Whole facility calibrated simulation modeling (IPMVP Option D) for capturing measure dynamics and interaction.

The evaluators completed 77 reviews of custom projects in PY2023. Including non-deemed lighting projects, the PY2023 EM&V reports mentioned 108 electric and 36 gas custom projects. EAL reduced the number of projects evaluated in PY2023 to 31 from 44 in PY2022. The IEM confirmed these custom site visit reports contained sufficient information to determine if an independent M&V had been completed.

Findings from Evaluators' Assessment of Custom Projects

Most PY2023 evaluation reports contained sufficient details regarding the custom project M&V activities. Four of the six utilities with custom projects reported the results from their review of custom projects with a summary of total savings impacts (AOG PY2023 EM&V Report, Table 5-10; BHE PY2023 EM&V Report, Table 5-9; SUA PY2023 EM&V Report, Table 78; EAL BY2023 EM&V Report, Table 132). Two utilities provided summaries at the program level but still need to break out custom results separately (OG&E PY2023 EM&V Report, pp. 160-166; SWEPCO PY2023 EM&V Report, pp. 92-93).

All utilities included site visits of custom projects. For SWEPCO, the evaluators completed one site visit for a custom HVAC project (SWEPCO PY2023 EM&V Report, Section 4.4.4.1.4). OG&E custom projects received three site visits for the C&I Solutions program (OG&E PY2023 EM&V Report, p. 214-219). EAL programs received 14 site visits for custom projects – twelve for the Large C&I Program and two for the Agricultural Energy Solutions Program (EAL BY2023 EM&V Report, Table 126, p. 338). Two site visits were performed for SUA custom projects completed through the C&I Solutions Program (SUA PY2023 EM&V Report, pp. 206 – 209). Two site visits were performed for the BHE CISP Program (BHE PY2023 EM&V Report, Table 31). For the AOG C&I Solutions Program, one site visit was noted for a custom project in the M&V reports as part of a multi-year project (AOG PY2023 EM&V Report, p. 152).

Significant discrepancies were found between savings summaries and M&V reports. The SUA PY2023 EM&V Report includes M&V reports for the sampled C&I Solutions projects in an appendix (SUA PY2023 EM&V Report, Appendix A), and the savings for the sampled projects are included in a summary table in the body of the report (SUA PY2023 EM&V Report, Table 78). For multiple sampled projects the savings values in the Appendix were inconsistent with Table 78, with multiple savings values differing by greater than 100,000 therms. In total, the verified savings in the M&V reports were found to be 43% higher than what is reported in Table 78 of the SUA PY2023 EM&V Report. Similarly, multiple inconsistencies were also found between the summary tables in the BHE report (BHE PY2023 EM&V Report, Table 59) and the M&V reports in the included Appendix (BHE PY2023 EM&V Report, Appendix A). The *ex-post* savings in the M&V reports were 39% higher than in Table 59 of the BHE PY2023 EM&V Report.

Some project paybacks were incorrectly determined. In some instances, the payback period for a project was stated to be longer with the incentive compared to without the incentive, which calls into question the accuracy of the stated payback periods (BHE PY2023 EM&V Report, pp. 145, 149, 168). In another instance, the stated incentive amount was found to be equal to the project's incremental cost (which should lead to a payback of zero). Still, a non-zero value is calculated for the project payback after the incentive (SUA PY2023 EM&V Report, p. 271). The site reports for BHE and SUA included payback data, while the site reports for AOG, SWEPCO, EAL, and OG&E did not.

Recommendations for Evaluators Assessment of Custom Projects

- ***Evaluators should verify project paybacks as reasonable and consistent with program requirements.*** Some projects had very quick paybacks (less than two years) even before any incentives (BHE PY2023 EM&V Report, pp. 145, 149, 160, 168, 172, 174, 177, 183, 187; SUA PY2023 EM&V Report, pp. 213, 223, 245, 253, 255, 271, 295, 309). These can sometimes be justified through program intervention that identifies or quantifies project savings for building operators/owners. Where projects have atypically high or low paybacks, it would help readers understand the program impact if the writeups included a description of the program's influence in their findings.

- ***Evaluators should improve project savings tracking to ensure consistency between summary tables and site reports.*** The IEM team identified multiple significant discrepancies between the savings summary tables in the EM&V reports for SUA and BHE and their respective M&V site reports in the appendices. The total savings from the site reports for custom projects exceeded those presented in the summary tables in the EM&V Reports by substantial amounts, which calls into question their accuracy. The evaluators should take additional steps to track savings between the site reports and the summary tables to ensure consistency in the reported values.

Findings from Evaluators' Site-Specific M&V Reporting

Site-level reports are vital tools for stakeholders to review the complexities of custom projects. Custom projects account for significant portions of programs and portfolios across the state and deserve robust focus and attention.

Evaluators provided custom project details in the EM&V appendices. All of the evaluation reports included site reports in a separate appendix. These reports outline the results from desk reviews and site visits. The IEM team reviewed the site reports to gauge whether sufficient detail was provided on custom projects' methodology, calculations, assumptions, and results. Some evaluators conducted independent analyses to verify the savings estimates, including alternate calculation methodologies and a review of key savings parameters (AOG PY2023 EM&V Report, Appendix A; BHE PY2023 EM&V Report, Appendix A; EAL BY2023 EM&V Report Technical Appendix H; OG&E PY2023 EM&V Report, Appendix B; SUA PY2023 EM&V Report, Appendix A; SWEPCO PY2023 EM&V Report, Appendix D).

In all reports, selected projects represented diverse projects and approach types. This variety allows readers to gain a sense of how various projects were evaluated and the methodologies used (EAL BY2023 EM&V Report Technical Appendix H; OG&E PY2023 EM&V Report, Appendix B; SWEPCO PY2023 EM&V Report, Appendix D, SUA PY2023 EM&V Report, Appendix A, BHE PY2023 EM&V Report, Appendix A, AOG PY2023 EM&V Report, Appendix A.)

Some projects reported savings that represent a substantial portion of site annual usage. Gas projects, in particular, included several instances for which the reported annual savings represent 20% or more of the site's reported annual pre-implementation consumption. Of the ten projects sampled for evaluation from the BHE CISP Program, four of them have reported savings of 20% of annual use or greater, with the highest savings percentage being 35% (determined from values in BHE PY2023 EM&V Report, pp. 138-187). All of these projects were evaluated using IPMVP Option A.

In the SUA PY2023 Report, one project has verified savings that represent over half (54%) of the pre-implementation annual use (SUA PY2023 EM&V Report, pp. 224-236), which was determined with IPMVP Option A. It should be noted that the M&V reports for EAL, SWEPCO, and OG&E do not include metrics of annual consumption. Still, most M&V reports for AOG, BHE, and SUA include annual consumption metrics.

Many site visit reports needed more specific project details. In one instance, the IEM team found that the reported realization rate was inconsistent with the reported savings values (OG&E PY2023 EM&V Report, p. 214). The EAL site reports (EAL BY2023 Evaluation Report Technical Appendix) contained few project-specific details, making it impossible for the IEM team to check the accuracy of the savings calculations. Most EAL site reports do not include any equipment quantities or specifications; they are just general statements about the project and the completed evaluation activities.

The IEM team found that the site reports provided by SWEPCO (SWEPCO PY2023 EM&V Report, Appendix D), OG&E (OG&E PY2023 EM&V Report, Appendix B), AOG (AOG PY2023 EM&V Report, Appendix A), SUA (SUA PY2023 EM&V Report, Appendix A) and BHEA (BHE PY2023 EM&V Report, Appendix A) all include key equations, tables of inputs, and in most cases when appropriate refer to specific TRM versions and sections providing methodologies or deemed values. These site reports provide adequate documentation of the M&V efforts undertaken by the evaluators, making it clear to the IEM team that due diligence was performed. None of the site reports provided by EAL (EAL BY2023 EM&V Report Technical Appendix H) include any equations, references to specific TRM sections, or tables with details of the equipment involved in each project, and largely just make general statements about the evaluation activities that were performed.

- As a point of comparison between the site reports, the EAL report includes several reports for lighting retrofit projects (p. G-89 of the EAL BY2023 Evaluation Report Technical Appendix), which can be compared to the lighting retrofit site reports in the SWEPCO (p. 301 of the SWEPCO PY2023 EM&V Report). The SWEPCO site reports include references to a specific TRM version and section, key equations, and tables specifying critical inputs for the equations and the resulting savings for each retrofit. In contrast, the EAL report does not include any of these details.

- Another point of comparison is reports that include regression analyses; the EAL report includes several custom projects for which weather-normalized regression analyses were performed (p. G-51 of the EAL BY2023 Evaluation Report Technical Appendix). While these site reports generally provide sufficient detail about the regression variables used, no information about the regression statistics or goodness-of-fit metrics is provided. In contrast, the OG&E Report includes a site report that includes all these details (pp. 202-204 of the OG&E PY2023 EM&V Report) and scatter plots showing how the developed regressions correlate to the chosen variables.

Site reports provided by the evaluators (AOG PY2023 EM&V Report, Appendix A; BHE PY2023 EM&V Report, Appendix A; SUA PY2023 EM&V Report, Appendix A; EAL BY2023 EM&V Report Technical Appendix H; OG&E PY2023 EM&V Report, Appendix B; SWEPCO PY2023 EM&V Report, Appendix D) describe how the *ex-post* (sometimes referred to as *verified*) savings analyses were completed, but lacked details about how the *ex-ante* savings were determined, only making brief statements about if/why the *ex-post* savings differ from the *ex-ante* savings.

The reasoning for selecting IMPVP Options was not always clearly stated. For example, SUA had one project where the claimed savings were a significant portion of the building's energy use, but IPMVP Option A was used to determine the project savings. This project should result in noticeable and statistically significant reductions in the customer's billed energy use. From the site report, it is unclear if the evaluators looked at the impact on billed use (SUA PY2023 EM&V Report, pp. 224-236).

Recommendations for Evaluators' on Site-Specific M&V Reporting

- ***Continue focusing on ensuring consistency and quality while reporting in the appendices.*** In reviewing the site reports from custom projects, the IEM noted a need for detailed quality review, including double-checking values and where assumptions were verified. Specific checks should include verifying that total savings are appropriate given the site's total energy use. Additionally,

the IEM team found the equation formatting in several site reports difficult to read, with some equations existing outside of page boundaries or displayed on top of each other.

- ***When appropriate, IPMVP Option C should supplement or be used instead of IPMVP Option A.*** Based on the magnitude of savings relative to pre-case usage for each project, and when appropriate, the IEM team recommends the evaluators use IPMVP Option C to determine the *ex-post* savings or to use IPMVP Option C to support or validate claimed savings determined with IPMVP Option A that represent 20 percent or more of a facility's usage. Additionally, reports should state if evaluators attempted to use alternative pathways to evaluate savings which did not provide satisfactory results.
- ***Evaluators should provide more details about how decisions regarding IPMVP Option C regressions are being made***. The projects for which M&V was completed using IPMVP Option C showed improvements over previous years in the level of detail included regarding the developed regressions and their goodness-of-fit metrics. The SUA PY2023 EM&V Report includes three C&I Solutions Program M&V reports that utilized IPMVP Option C, all of which include information about the regressions developed between gas usage and input variables but lack any regression statistics, such as the Coefficient of Variance of the regressions or the Standard Error or t-statistics of the input variables (SUA PY2023 EM&V Report, pp. 238-242, 280-285, 305-310).

  The OG&E PY2023 EM&V Report included one OG&E CEEP M&V report that utilized a regression and included all pertinent details about the completed regressions (OG&E PY2023 EM&V Report, pp. 212-214). In the EAL BY2023 EM&V Technical Appendix, one custom project was evaluated using IPMVP Option C, but no details were provided about the resulting regression statistics; only general statements are made about the approach taken and the input variables used (EAL BY2023 EM&V Technical Appendices, Appendix G, pp. 191-192).
- ***The implementers should provide their savings analysis to the evaluator and provide this information in site reports.*** Understanding how the implementers conducted the *ex-ante* savings analyses is to identify systemic or reoccurring errors that should be corrected in future program years and/or TRM updates when applicable.

Behavioral Programs Savings Calculations

SUA continued to offer a behavior program and achieved similar savings to previous years. SUA's Home Energy Reports program has been offered for over a decade and accounts for 24% of the portfolio's net therm savings (SUA PY2023 EM&V Report, pp. 1-4). In general, the findings associated with SUA's evaluation align with other residential behavior program evaluations, which save, on average, between one and two percent of annual residential electric or natural gas load.

Given the program's maturity and the corresponding historical IEM recommendations to improve the evaluation of this type of program, there remain only marginal improvements largely to the reporting of these program evaluations. Protocol J of the TRM documents the requirements for reporting behavior programs. Similar to past years, the IEM review found that the SUA residential behavior evaluation reports provided almost all the required details described in Protocol J, except for describing the data processing steps. Including this information would make the evaluations more transparent.

BHE also offered a Home Energy Reports in previous years but canceled this program to allow for the developing the Home Energy Savings weatherization program, which focuses on residential building envelope measures instead of behavioral savings (BHE PY2023 EM&V Report, p. 3-6).

Other utilities offered C&I behavioral programs. SWEPCO offered a behavioral-based program in PY2023. SWEPCO introduced a strategic energy management (SEM) offering as part of CIEEP in PY2021. Evaluators used IPMVP Option C, whole facility modeling, to determine savings. Because the SEM offering comprised 34% of the CIEEP savings, additional detail on the modeling methodology is recommended.

OG&E offers a continuous energy improvement (CEI) channel of CEEP that focuses on low- to no-cost measures for large C&I customers. The report indicates that evaluators conducted utility billing regressions to estimate savings but does not provide any more detail about the methodology or findings except to note that there were "minor corrections made to model to improve model fit." (OG&E PY2023 EMV&V Report, p. 168). More detail is desired because CEI accounts for 22% of PY2023 CEEP savings.

Non-Energy Benefits (NEBs)

Findings for Non-Energy Benefits (NEBs)

Reporting on NEBs continues to improve and become more robust over time. However, several perennial issues persist that can be addressed in future EM&V reports to add significant value to NEBs. The key issues from our NEBs review are detailed next.

Most utilities provided clear documentation of key input assumptions related to NEBs. All utilities provided key assumptions, including secondary fuel avoided costs, water rates, and discount rates, except for SUA's report, which missed data on avoided water and electricity costs. This exclusion continues from prior years. Particularly useful appendices dedicated to NEBs were provided in the AOG, BHE, and OG&E reports, and the EAL report provided a dedicated section on NEBs methodologies and results. Having these details in centralized locations in the reports adds clarity. Table ***26:*** identifies instances where key NEBs assumptions were provided or missing. (AOG PY2023 EM&V Report, pp. 9-1-9-3, 11-1; BHE PY2023 EM&V Report, p. 10-1; EAL BY2023 EM&V Report, pp. 371-372, 375-395, 380, 381; OG&E PY2023 EM&V Report, pp. 225-226; SUA PY2023 EM&V Report, p. 14-2; SWEPCO PY2023 EM&V Report, p. 281).

Methodologies for calculating NEBs were described, but little detail was provided on the actual calculations that were performed. For example, the three gas utilities provided screenshots of the avoided replacement cost calculations in a spreadsheet, but the spreadsheet formulas needed to be visible. In the case of EAL, formulas for calculating NEBs were provided, but no examples were shown. OG&E and SWEPCO reports did not include details on the NEBs calculation methods (AOG PY2023 EM&V Report, pp. 9-1-9-3, 11-1; BHE PY2023 EM&V Report, p. 10-1; EAL BY2023 EM&V Report, pp. 371-372, 375 - 395, 380, 381; OG&E PY2023 EM&V Report, pp. 225-226; SUA PY2023 EM&V Report, p. 14-2; SWEPCO PY2023 EM&V Report, p. 281). Table ***26:*** 6 identifies instances where example equations were provided, partial, or missing.

Table 26: Evaluator Protocol L NEBs Reporting

	Discount rate	Marginal water rate	Secondary Fuel Avoided Cost	Propane cost	Equations
AOG*	Yes	Yes	Yes	N/A	Partial
BHE*	Yes	Yes	Yes	N/A	Partial
SUA**	Yes	No	No	N/A	Partial
EAL	Yes	Yes	Yes	Yes	Yes***
OG&E	Yes	Yes	Yes	Yes	No
SWEPCO	Yes	Yes	Yes	Yes	No

*A/DRC cost calculations shown in Appendix B as screenshots of spreadsheet and no formulas shown.

**Discount rates are provided for specific measures in the Residential and Commercial Equipment Rebates programs only. A/DRC cost calculations shown in Appendix B as screenshots of spreadsheet and no formulas shown. Report notes IEM-provided "Protocol L Avoided & Deferred Replacement Cost_08_31_16.xlsx" workbook as source for equations.

***Calculation methods provided, but lacking examples.

In some cases, where site-specific desk review results or Custom Program site reports were provided, the NEBs results and methods to calculate NEBs were excluded. For instance, in EAL's Technical Appendix to the PY2023 EM&V report, several desk review findings were reported for programs that had water savings and/or propane savings. Still, no indication of those savings was present in any of the desk review reports. The Appendix also showed several projects with interior lighting retrofits, but no desk review report included natural gas heating penalties (EAL BY2023 EM&V Technical Appendix, Appendix H). Another example is an EAL custom commercial project in the Large C&I program, which included installing new refrigerated case doors. This project shows a calculation for therm savings but does not report natural gas NEBs in the savings summary table (EAL BY2023 EM&V Technical Appendix, pp. G-189-G-190). Another example is in BHE's Appendix A: Site Reports section. The site report for a project involving steam leak repairs did not report water savings that should likely be associated with the project, nor did the site report include a method for calculating water savings (BHE PY2023 EM&V Report, pp. 7-5-7-9).

Recommendations for Evaluators' Improvement of NEBs

Based on this review, the IEM suggests that the evaluators improve NEBs estimates and reporting in the following ways:

- ***Include NEBs calculations when providing site-specific reporting***. Evaluators provide valuable insight into site-specific evaluation methods and findings. While those site-specific reports typically include calculation methods and formulas used to establish ex-post primary energy savings, they tend to exclude additional calculation methods and formulas to show how NEBs were calculated and even exclude NEBs results altogether. Evaluators should treat NEBs with the same level of rigor as the calculation of primary savings in site-specific reporting.
- ***Provide clear documentation on all NEBs assumptions, including the following:***
  - Discount rate;
  - Marginal water rate(s) and methods used to calculate;

- Natural gas or electricity secondary fuel avoided cost values and source; At a minimum, providing which utility the avoided secondary fuel costs are based on, including the year of the expenses filed;
- Propane cost and source;
- Example equations used to calculate NEBs, including example calculations;
- Total NPV of NEBs benefits; and
- NEBs contribution (%) to TRC benefits.

Improvements have been made in reporting these items. Still, some notable exceptions are in providing interpretable examples of NEB calculations, cost-effectiveness details required to analyze the contributions of NEBs to the TRC, and ex-post savings for NEBs in desk reviews and site reports.

- ***Provide the NEBs workbook calculations to the IEM for independent review and verification as part of the draft reports.*** This additional degree of oversight and review will minimize any calculation errors.

Estimate Net Impacts (NTG)

The IEM team reviewed the components of the PY2023 evaluation reports related to NTG for clarity, completeness, and adherence to the TRM. The specific components the IEM team reviewed are summarized as follows:

- **NTG methods/activity summary table**: All reports included an NTG methods and activity summary table;
- **Introduction to methods, with the general approach:** All reports, except EAL, included an introduction NTG methods section. Instead, the EAL report included detailed individual program NTG logic. Several of the evaluation reports included detailed NTG methodological details even though the NTG relied on secondary literature reviews or prior research;
- **Clear sampling details for NTG:** Where evaluators conducted primary research, reports included sufficient sampling details, including relative component contribution to savings;
- **Reporting of free ridership and spillover findings:** PY2023 reports detailed the different NTG components findings; and
- **Delineation of Methods vs. Findings:** Most PY2023 reports clearly delineated the NTG methods and findings, but, in some cases, the findings were buried within methodology sections, making them harder to find. Examples include BHE PY2023 EM&V Report, pp. 4-31 to 4-33 and 5-16 to 5-20 and SUA pp. 4-16. In these cases, simply adding subheadings delineating the methodology and results would improve the readability.

Findings on the Reporting of Net Impacts (NTG)

In PY2023, the evaluators continued to utilize past NTG values for most programs. The evaluators maintained the status quo in terms of the reporting on the program net-to-gross methods and findings since most of the program estimation of net-to-gross was conducted in prior evaluation years. Primary research was limited to those programs without recent primary research and custom C&I programs, for which evaluators fielded participant surveys to update free-ridership and spillover assumptions. While many programs used NTG values from research conducted in PY2021 or PY2022, some relied on older research, which may need to be updated next year.

Typos and internal inconsistencies of NTG results need to be clarified. The IEM found the NTG reporting to be robust. However, similar to past years, there were some examples where poor reporting likely led to misreporting of NTG evaluation findings. In some cases, the reports contained inconsistencies within tables and between other tables. For example, the calculated NTG values (i.e., *ex-post* net savings divided by *ex-post* gross savings) in tables 4-12 and 4-13 and 5-12 and 5-13 of the AOG report do not match the NTGRs listed in tables. Additionally, the total NTGR in Table 4-13 (78%) does not match the corresponding NTGR value (76.8%) in Table 1-4 (AOG PY2023 EM&V Report pp. 1-3, 4-24, 5-19).

In other cases, reports contained typographical errors that may lead to confusion. For example, the total NTG kWh value in Table 2-3 of the OG&E report is shown as 93% when it should be 92.3%, and Table 5-1 contains errors for the realization rate and ex-post gross energy savings for the HVAC Replacement & Tune-up program row and a mistake in the LivingWise Schools Outreach *ex-post* gross energy savings rows. (OG&E PY2023 EM&V Report pp. 23, 61).

Recommendations for Evaluators' Improvement of NTG

Based on this review, the IEM suggests that the evaluators improve NTG reporting in the following ways:

- ***Evaluators should review the previous year's IEM recommendations and issues and ensure that the current year's reports address the NTG issues;***
- ***The evaluators should review all NTG values to ensure they are internally consistent with other instances in the report and with the gross and net energy savings; and***
- ***For programs relying on prior years' NTG values, evaluators should review these values and determine if they should be updated based on the guidance in Appendix F in the TRM.***

Overall Quality of Reports

The IEM assessed the reporting of how evaluators provided their findings, including the extent of the overall quality of the reports provided. We also reviewed the use of the IEM-provided template for reporting information such as gross/net savings and NEBs.

Findings Regarding the Overall Quality of Reports

In general, the impact sections for the PY2023 EM&V reports were significantly improved in terms of organization, structure and reporting from PY2022.

- Evaluators effectively used tables to summarize key findings and recommendations;
- Evaluators were more thorough in their status update of previous program year recommendations; and
- Evaluation teams have been consistently completing the IEM-provided reporting templates.

Recommendations for Evaluators' Improvement of Overall Quality of EM&V Impact Findings

- ***Continue to use the IEM-provided reporting template.*** Each year, the IEM provides each evaluator with a portfolio reporting template that serves multiple purposes: It helps in the review of the evaluations, provides a convenient resource for reviewing overall impact findings, and, importantly, provides a quality assurance function for the evaluators, utilities, and the IEM. Evaluators continue to complete these templates accurately. The IEM did not identify any inconsistencies between the reports and the values provided in the reporting templates for PY2023. The evaluators should strive for continued consistency between the values reported in

the reports and the values entered in the reporting template, as prior years' reporting template submissions did include some errors/inconsistencies.

- ***When rolling up savings to the portfolio level, ensure that ex-post net savings are reported at a minimum and that the reported savings type is explicitly identified.*** Most EM&V reports included *ex-post* net savings by program and portfolio in the report's Executive Summary. EAL's EM&V report, in a continuation of recent years' reports, provided *ex-post* gross savings at the program and portfolio level in the main table (Table 2) in the executive summary (EAL BY2023 EM&V Report, p. 38). Figure 2 in that report's executive summary provides ex-*post net savings*, but the figure refers to *ex-post* savings as "actual" savings. It does not explicitly identify whether the savings are gross or net (EAL BY2023 EM&V Report, p. 34).
- The EAL report also reports savings in each program section referring to "actual" savings when presenting *ex-post* net savings without an explicit definition of what is being presented (EAL BY2023 EM&V Report, pp. 91, 119, 140, 162, 183, 207, 250, 278, 309, 317, 337).
- The evaluators should explicitly identify the type of savings being presented and ideally present *ex-post* net savings in tabular form in the executive summary and introduction to the reports.

4.3 Process Evaluation Assessment

A summary and assessment of EM&V Process Evaluation Activities is addressed next.

In PY2023, the process evaluation objectives were to:

- Document the programs' 2023 evolution, processes, and key success factors and challenges;
- Track progress incorporating recommendations from the previous evaluations;
- Identify significant gaps, achievements, and areas where improvements are warranted;
- Provide new recommendations to help streamline program delivery and operations; improve customer satisfaction; enhance participation, energy, and demand savings; and achieve varied program objectives; and
- Report key metrics regarding each utility's CWA program and low-income pilot programs and
- Identify areas for future program improvements.

Process Evaluation Methodology

All process evaluations followed the appropriateness and timing for process evaluations as defined in Protocol C of the TRM 9.1 The process evaluations also incorporated participant surveys, in-depth interviews with program staff, implementers and trade allies, as prescribed in the process evaluation protocols (AOG; BHE PY2023 EM&V Report, pp. 1-3, 2-9-2-10, 3-1;4-5, 5-3, 6-3, 7-2; BHE PY2023 EM&V Report, pp. 2-9, 4-4, 5-5; 6-6-6-7; EAL BY2023 EM&V Report, pp. 30, 52-53, 356; OG&E PY2023 EM&V Report pp. 21, 44-46, 100, 136, 173; SUA PY2023 EM&V Report, pp. 2-9-2-10, 5-4-5-5, 6-4-6-7, 7-5, 8-3, 9-2, 10-3, 11-2, 12-3; SWEPCO PY2023 EM&V Report, pp. 26, 83-84, 90-91).

Many EM&V reports provided comprehensive data collection summaries of their process evaluation activities (AOG PY2023 EM&V Report, p. 4-6; 5-4, 6-5, 7-3; BHE PY2023 EM&V Report, pp. 4-6; 4-21, 5-6, 6-8; EAL BY2023 EM&V Report, pp. 90; EAL BY2023 PY pp. 54-55, 140, 162, 181, 205, 211, 248, 253, 277, 282, 308, 316, 350; OG&E PY2023 EM&V Report pp. 21, 46, 102, 139, 175**;** SUA PY2023 EM&V Report, p. 4-4; 5-5-5-6; 6-4-6-7, 7-6, 8-4, 10-4;11-3; 12-4-12-5; SWEPCO PY2023 EM&V Report, pp. 25, 83).

The following table shows that most of the process evaluations met these criteria. This section provides additional details regarding the evaluators' performance for each metric.

Table 27: Summary of Assessment of Process Evaluators' Activities

	Gas Utilities			Electric Utilities		
Utility	**AOG**	**BHE**	**SUA**	**EAL**	**OG&E**	**SWEPCO**
Evaluator	**ADM**	**ADM**	**ADM**	**Tetra Tech**	**ADM**	**ADM**
Requirement #1-Review Databases/Conduct Staff Interviews	●	●	●	●	●	●
Requirement #2: Provided Progress Report on Previous Recommendations	●	●	◑	◑	●	●
Requirement #3: Assessed Comprehensive Checklist	●	●	●	●	●	●
Requirement #4: Reported CWA/LIPP Metrics	●	●	●	●	●	●
Requirement #5: Identified Areas for Future Exploration	●	●	●	●	●	●
Overall Report Quality- Process Evaluations	●	●	●	●	●	●

Sources: Analysis of the PY2023 EM&V Reports

Requirement 1: Did the evaluators review the databases and conduct staff interviews?

All of the evaluators conducted interviews with program staff to assess the status of current operations as directed in Protocol C (AOG PY2023 EM&V Report, p. 4-6; 5-4, 6-5, 7-3; BHE PY2023 EM&V Report, pp. 4-6; 4-21, 5-6, 6-8; EAL BY2023 EM&V Report, pp. 90; EAL BY2023 PY pp. 54-55, 140, 162, 181, 205, 211, 248, 253, 277, 282, 308, 316, 350; OG&E PY2023 EM&V Report pp. 21, 46, 102, 139, 175; SUA PY2023 EM&V Report, p. 4-4; 5-5-5-6; 6-4-6-7, 7-6, 8-4, 10-4;11-3; 12-4-12-5; SWEPCO PY2023 EM&V Report, pp. 25, 830).

The evaluators provided detailed reviews of the program databases as required in Protocol A; (AOG PY2023 EM&V Report, p. 5-11, 6-8, 7-10; BHE PY2023 EM&V Report, pp. 4-7, 5-6-5-7, 6-9; OG&E PY2023 EM&V Report, pp. 103-104, 147-148, 191-192; SUA PY2023 EM&V Report, pp. 4-5-4-6, 5-6-5-7; 6-1-6-3, 7-11-7-12, 8-5-8-6, 10-5-10-6; 11-3-11-4, 11-9-11-10; SWEPCO PY2023 EM&V Report, pp. 83, 123).

Requirement 2: Did the Evaluators Provide a Progress Report on Previous Recommendations?

Most PY2022 evaluations reported the status of the previous recommendations as directed in TRM 9.1, Volume 1, Protocol C p. 22).

The evaluators should categorize the status of each recommendation using the following rubric:

- **Completed:** which means the recommendation has been fully implemented.
- **Continuing:** which means the recommendation has been fully implemented in the previous year. However, due to the nature of the recommendation, this area will be monitored throughout the next program year.
- **In Progress:** which identifies those recommendations that have been accepted and will be adopted before the next program year.
- **Under Consideration:** which identifies those recommendations that still need to be reviewed by the program staff or implementers and no decision has yet to be made.
- **Reviewed and Rejected***:* which identifies those recommendations that have been considered and subsequently rejected. This could also apply to recommendations that are no longer applicable due to program design or operations changes.

However, two EM&V reports tracking previous recommendations did not align with these categories as two recommendations did not have any updates, one was tagged as "Not applicable," and one was listed as "Partially Complete" (SUA PY 2023 EM&V Report, p. 10-2; EAL BY2023 EM&V Report, pp. 185, 252).

Requirement 3: Did the Evaluators Identify Progress Towards Comprehensive Checklist Factors?

The evaluators provided well-written assessments of the utility's progress regarding the Comprehensive Checklist. Overall, these write-ups improved significantly compared to previous years. SWEPCO's write-up included a detailed summary of marketing and outreach activities, clearly demonstrating SWEPCO's marketing efforts (SWEPCO PY2023 EM&V Report, pp. 43-44).

Several evaluations included examples of why certain program designs may not be cost-effective or appropriate for some utilities, which provided additional context for these findings (AOG PY2023 EM&V Report, pp. 3-6-3-7, 3-10; BHEA PY2023 EM&V Report, pp. 3-9-3-10; SUA PY2023 EM&V Report, p. 3-9-3-10; SWEPCO PY2033 EM&V Report, p. 49; SUA PY2023 EM&V Report, pp. 3-9-3-10).

EAL's report also included a *Measure Trends Analysis,* which included additional details that will be useful in designing future program offerings because of changing market conditions (EAL BY2023 EM&V Report, p. 83).

Requirement 4: Reported Key Metrics for the Consistent Weatherization Approach (CWA) and Low-Income Pilot Programs (LIPP) for Each Utility

The evaluators provided the following information as requested in TRM 9.1, Volume 1, Protocol C (p. 23).

- Listing of each kind of H&S measure installed through the low-income pilot program;
- Average spending per participant on H&S measures;
- Cross tabulations that indicated the actual or estimated number of customers who participated in the Act 1102 program in the following categories:
  - Estimated percentage of participants who are 65 or older; and
  - Estimated percentage of participants who meet LIHEAP income-eligibility requirements.

Overall, these findings conformed to the reporting requirements, and each evaluator offered the detailed metrics as requested.

Requirement 5: Did the Evaluators Identify any Additional Areas for Future Exploration

All evaluators provided recommendations for improving future program design. Of note, EAL referenced an Energy Burden Analysis metric it is developing and will discuss in future PWC meetings (EAL BY2023 EM&V Report, p. 80).

Requirement 6: Overall Quality of the Report

Overall, the evaluation reports were well-written and documented the current status of program operations. The evaluators' summaries of the process evaluations were thorough.

Moreover, the evaluators addressed the concerns identified in the IEM PY2022 EM&V Annual Report by providing the CWA and LIPP metrics in the requested format and proactively contacting the IEM for clarifications (IEM PY2022 EM&V Report, p. 95).

Section 5: IEM Recommended Next Steps and EM&V Priorities

The PWC members remain active and engaged in all of the activities directed by the Commission. The PWC looks for ways to work cooperatively to cross-deliver, promote joint programs, and implement the recommended improvements into new program designs. These reports reinforce the importance and value that annual EM&V activities offer to utilities, program implementers and stakeholders. Ultimately, these findings benefit Arkansas ratepayers by ensuring that the energy efficiency programs are well-designed, implemented, and effective.

The six utilities are delivering programs targeting multiple customer groups. Of special note, all utilities have increased the breadth and depth of the services they offer through the low-income pilot programs. A few utilities still need to increase the budgets allocated for Health & Safety Measures (e.g., OG&E and SUA), but these program operations have improved.

The two evaluation teams, ADM Associates and Tetra Tech completed six portfolio evaluations for the regulated IOUs in Arkansas. Overall, these evaluations met the requirements defined in the EM&V Protocols in TRM Volume 1. The process evaluations included updated reporting of critical metrics for the CWA and LIPP, which were instrumental in addressing the age and income requirements defined in Act 1102.

This year, the presentation and format of the PY2023 evaluation reports were satisfactory. Most reports were clearly written and provided accurate descriptions of EM&V tasks.

Status of IEM Previous Recommendations

- ***Ongoing: The IEM respectfully requests the Commission to reiterate that the CWA should target "energy inefficient homes" through a comprehensive approach to program delivery rather than concentrating on single-measure savings.***
- ***Ongoing: The IEM will continue working with the PWC to update the TRM to reflect ongoing changes in the energy efficiency market.***
- ***Ongoing: The IEM will continue high-level reviews to ensure reasonable and realistic results and data provided in reports.***
- ***Ongoing: IEM will encourage the evaluators to use the evaluation plans as the benchmark for evaluation activities.***
- ***Ongoing: The IEM will require all evaluation materials, including clarifications of the EM&V findings, to be provided within two weeks of the EM&V Annual Report filings.***
- ***Continuing: The IEM will assist Empire Electric in developing and reviewing its EM&V plan for PY2023 programs.*** The IEM will also encourage Empire Electric to seek ways to collaborate with other Arkansas utilities to create and deliver cost-effective and appropriate energy efficiency programs that serve Empire Electric's customers.
- ***Continuing:*** The IEM will reconvene the Act 1102 Working Group to discuss ways to standardize the reporting of critical program metrics for the CWA and LIPPs.

New Recommendations

- ***The IEM respectfully requests the Commission to reiterate the importance of annual EM&V reporting to Empire Electric.*** This is the second year Empire has failed to produce an annual EM&V Report within the required timeline. Empire will submit its EM&V Report for PY2023 in August 2024.

- ***Empire Electric should continue to engage in the PWC activities and elicit help and support from the PWC members.*** As a small utility, it will benefit from the economies of scale that the utility collaboration provides, and the IEM encourages Empire to seek out these opportunities to explore cross-utility partnerships.
- ***To address the lack of behavioral programs offered in some utility portfolios, the IEM encourages utilities to continue developing Strategic Energy Management (SEM) programs across territories.*** This strategy will help the utilities better align with the Commission's Comprehensiveness Checklist Factors while also capturing additional opportunities for gas savings.
- ***The IEM will solicit feedback from the Act 1102 Working Group regarding EAL's Energy Burden Analysis Memorandum.*** The Working Group will also discuss the feasibility of including this metric in future evaluations for the remaining six utilities.

References

ADM Associates 2024, "*Evaluation, Measurement and Verification Report for the 2023 Arkansas Energy Efficiency Portfolio," Submitted to Arkansas Oklahoma Gas (AOG), A Division of Summit Utilities,* April 26.

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_____, 2024 *Southwestern Electric Power Company in Arkansas Program Year 2023 Energy Efficiency and Demand Response Portfolio Evaluation Report*, April 20.

Tetra Tech, 2024, *Entergy Arkansas LLC Arkansas Energy Efficiency Program Portfolio Annual Report, Appendix A,* May 1.