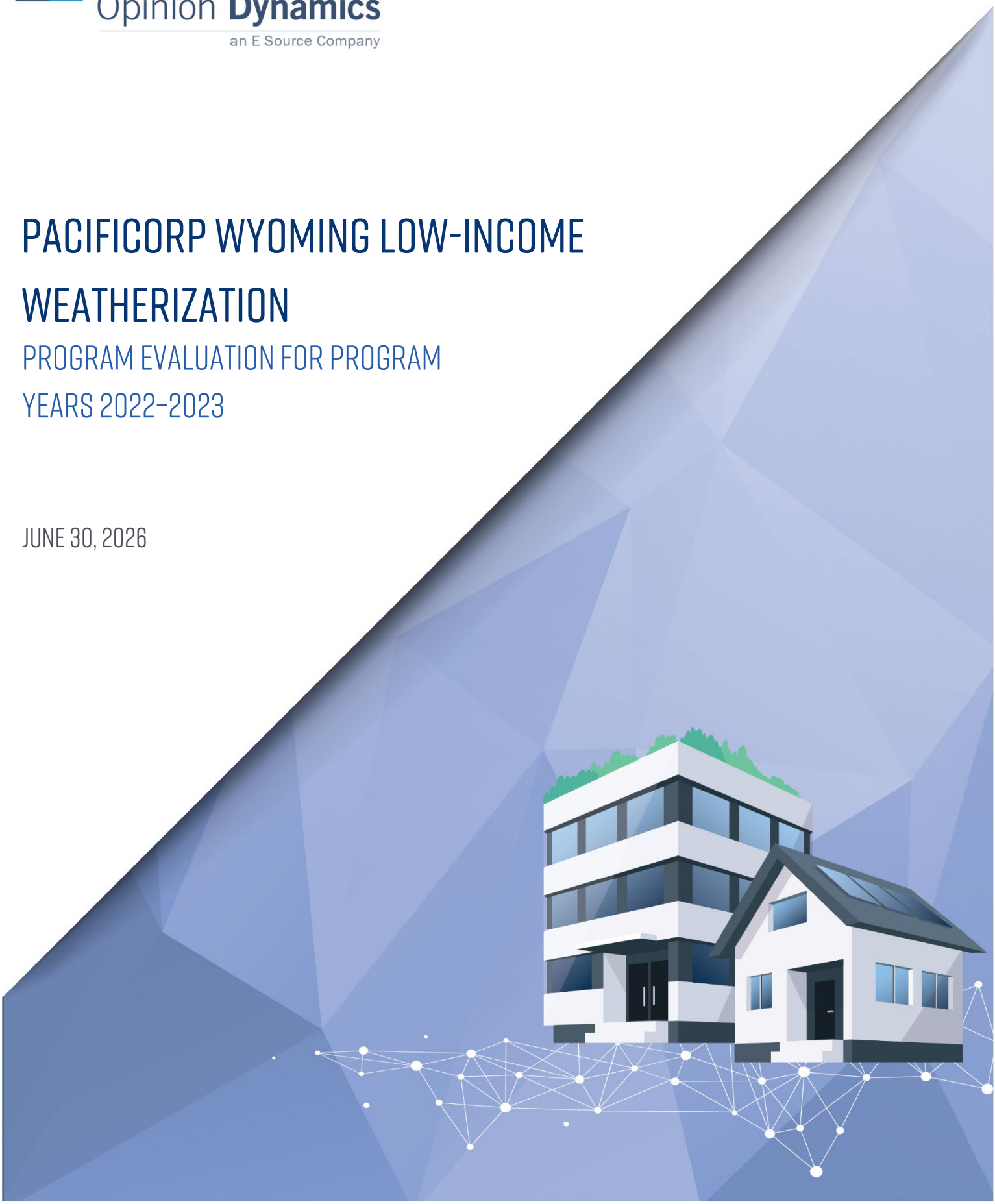
Opinion Dynamics
an E Source Company

PACIFICORP WYOMING LOW-INCOME WEATHERIZATION

PROGRAM EVALUATION FOR PROGRAM YEARS 2022–2023

JUNE 30, 2026



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I. EXECUTIVE SUMMARY

This report presents findings from the process and impact evaluation of Rocky Mountain Power's Low-Income Weatherization Program (referred to as the "Program" throughout this report) in operation in the state of Wyoming during the 2022 and 2023 program years. Opinion Dynamics, an E Source company, performed the evaluation on behalf of Rocky Mountain Power.

Two Wyoming-based nonprofit agencies known for serving low-income communities implement the Program:

- Council of Community Services (CCS)
- Wyoming Weatherization Services (WWS)

These agencies receive funding from Rocky Mountain Power to target low-income customers with building weatherization services.[1] CCS and WWS also receive weatherization funding through federal and state government sources. These funds are transferred to the agencies through a subcontract with the Wyoming Department of Family Services (WFS).

The agencies focus on existing single-family (including manufactured) homes and multifamily properties. Multifamily properties qualify for the program if at least 66% of tenant units are occupied by low-income customers of Rocky Mountain Power.[2] Through the Program, participants receive energy efficiency measures at no cost to them. Agency staff begin by conducting an energy audit on participant homes to assess the condition of the home and identify what energy-saving measures are needed. The Program offers a variety of energy efficiency measures such as insulation, weatherstripping, air sealing, and replacement refrigerators. Measures are typically directly installed by agency staff, although the homeowner may self-install some smaller measures, such as LED light bulbs.

The core objectives for this evaluation were to (1) document and measure effects of the Program, and (2) identify areas of potential improvement. For the process evaluation, we conducted a program materials review, interviewed agency staff, and analyzed participant responses to a telephone survey. To quantify energy savings, we conducted an engineering analysis. This report also includes the results from the Program's cost-effectiveness tests conducted by a third-party consultant, Apex Analytics.

I.I PROCESS RESULTS

The process evaluation examined Program operations from multiple perspectives. Rocky Mountain Power, CCS, and WWS have worked together for several years to deliver the Program. Over this time, CCS and WWS have developed expertise in implementing the Program despite the complex funding environment surrounding low-income weatherization services. The agencies combine funds from Rocky Mountain Power with those from government organizations to reach more low-income customers, demonstrating a best

[1] Weatherization refers to the process of making a building more energy efficient.

[2] "Low income" qualifications are based on 200% of federal poverty guidelines or 60% of the state median income, whichever is greater.

practice in low-income energy efficiency program delivery.[3] It is common for utilities to work with nonprofit agencies to promote their energy efficiency programs to low-income customers since these organizations generally have well-established relationships with eligible communities already.

CCS maintains a waitlist of customers who are eligible and approved to receive weatherization services, using a point system to determine where customers are positioned on the list. Households including young, disabled, and elderly residents receive more points than other households, as well as those with particularly high energy usage. According to CCS, participant homes are typically served within two months from the time of their energy audit; however, surveyed participants reportedly waited between three and 12 months.

Energy education is provided to Program participants upon completion of their audit and during the final home inspection. It is also considered a best practice of energy efficiency programs designed to serve low-income customers.[4] One of the two survey respondents recalled learning ways to save energy from agency staff. This respondent had not yet taken the recommended actions but indicated they intend to do so.

The Program is meeting participant needs satisfactorily. All surveyed participants provided high satisfaction ratings for their experience with the Program (n=2), and both reported they would recommend the Program to others.

1.2 IMPACT RESULTS

An engineering analysis was conducted to estimate ex-post energy savings from the Program. Table 1 presents the ex-post net savings for each program year and in total. Overall, the Program achieved 32% of its ex-ante gross savings for the full evaluation period (2022–2023). Ex-ante savings were based on previously evaluated participant-level energy savings from the 2014 and 2015 program years. The difference in ex-ante and ex-post savings are due to a decrease in the average number of measures installed per household, a decrease in the number of high-impact measures (i.e., measures that yield higher energy savings) installed overall, and differences in the mix of measures offered during the evaluation period compared to those included in the ex-ante savings values.

Table 1. Ex-Ante Gross and Ex-Post Net Energy Savings (kWh)

Program Year	Participation	Ex-Ante Gross Energy Savings (kWh)	Ex-Post Net Energy Savings (kWh)	Realization Rate
2022	10	29,970	11,881	40%
2023	4	11,909	1,519	13%
Total	**14**	**41,879**	**13,400**	**32%**

Note: For this low-income program, the net-to-gross ratio is assumed to equal 1, and therefore, gross savings are equal to net savings.

[3] Drehobl, Ariel and Castro-Alvarez, Fernando, "Low-Income Energy Efficiency Programs: A Baseline Assessment of Programs Serving the 51 Largest Cities," ACEEE, November 2017.

[4] Kushler, Martin, York, Dan and Witte, Patti, "Meeting Essential Needs: The Results of a National Search for Exemplary Utility-Funded Low-Income Energy Efficiency Programs," ACEEE Report Number U053, September 2005.

The average annual ex-post net energy savings per participant was 957 kWh during the 2022–2023 evaluation period. The majority of Program energy savings are attributable to LED lighting (40%), wall and floor insulation (24%), and refrigerator replacements (22%).

We describe the impact evaluation in more detail in the sections below and document all ex-post algorithms and assumptions in Appendix B.

1.3 COST-EFFECTIVENESS RESULTS

Apex Analytics estimated the cost-effectiveness of Rocky Mountain Power's evaluated savings without non-energy benefits (NEB) for the Program operating in Wyoming. The Program does not pass any of the cost-effectiveness tests (Table 2).

Table 2. 2022–2023 Program Benefit/Cost Ratios (Without NEBs)

Program Year	PTRC	TRC	UCT	RIM	PCT[a]
2022–2023	0.54	0.49	0.48	0.24	n/a

[a] Low-income programs have no customer costs and therefore a cost benefit ratio cannot be calculated for this test.

1.4 CONCLUSIONS AND RECOMMENDATIONS

Based on the evaluation results, our team offers the following recommendations:

- **Conclusion:** Rocky Mountain Power is adhering to best practices by delivering the Program through trusted, community-based agencies with established relationships in low-income communities. These agencies are well positioned to braid utility, state, and federal funding to maximize the Program's reach and are delivering a high-quality participant experience, as reflected in participant feedback. All participants we spoke with affirmed this, reporting they would recommend the Program to others.
- **Conclusion:** The Program achieved 13,400 kWh in ex-post net energy savings during the 2022 and 2023 program years, resulting in a realization rate of 32% for the evaluation period, which was largely driven by applying an outdated per participant savings assumption instead of applying a savings assumption per measure installed.
  - **Recommendation:** Rocky Mountain Power should apply the evaluated measure-level deemed savings values when calculating ex-ante savings for the next Program cycle and continue to apply the most recent evaluated assumptions when calculating future Program savings. Per-participant estimations often result in less accurate forecasting because the measure mix installed each program year differs based on the agency's leveraged funding sources and the homes that participate.

2. INTRODUCTION

Rocky Mountain Power's Low-Income Weatherization Program (referred to as the "Program" throughout this report) provides energy efficiency measures to income-eligible residential participants through a partnership with two local weatherization agencies:

- Council of Community Services (CCS)
- Wyoming Weatherization Services (WWS)

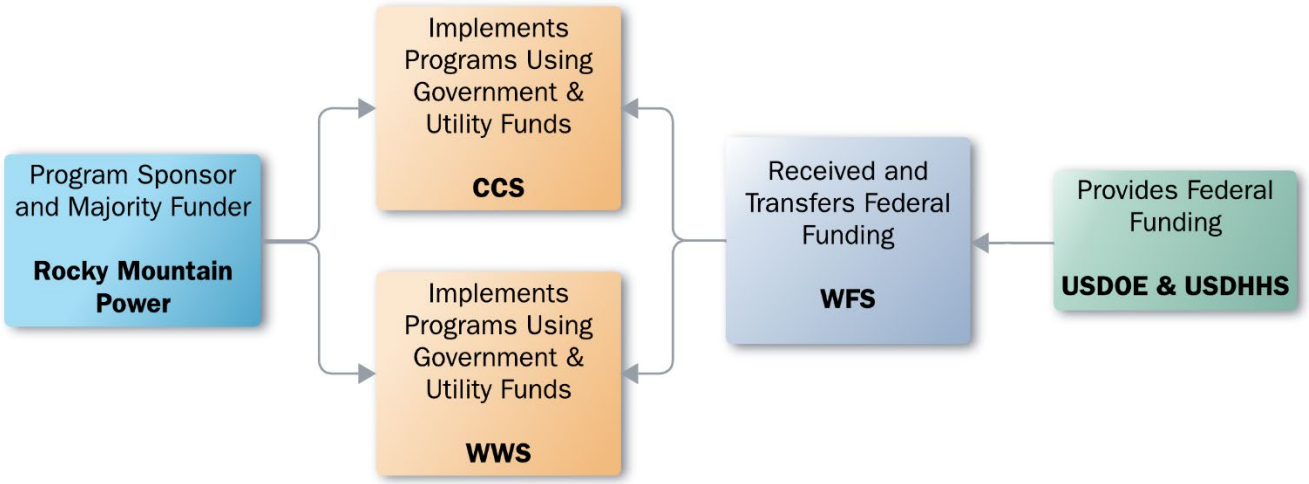
Partnering with agencies that historically serve Wyoming's low-income communities provides Rocky Mountain Power with streamlined access to the customers targeted by this program.

Rocky Mountain Power provides the agencies with 50% of the cost of eligible weatherization measures installed. Importantly, agency reimbursements are calculated after property owner contributions are deducted. Rocky Mountain Power also reimburses the agencies for administrative costs based on 10% of Rocky Mountain Power's installed measure costs. To cover any remaining costs required to provide weatherization services to low-income customers, the implementing agencies leverage federal government funding from the United States Department of Energy (DOE) and the United States Department of Health and Human Services (DHHS). The Wyoming Department of Family Services (WFS) administers the federal funding to the agencies.

Leveraging utility, state, and federal funding sources allows the agencies to provide comprehensive weatherization services to more low-income households than they may have otherwise. Other exemplary utility-funded low-income energy efficiency programs also leverage state and federal funding sources and implement programs through social service agencies.

Figure 1 displays Rocky Mountain Power's Wyoming Program funding sources and roles of oversight.

Figure 1. Funding and Oversight for Rocky Mountain Power's Low-Income Weatherization Program



2.1 PROGRAM IMPLEMENTATION

Program implementation involves agency staff carrying out the following steps, which are detailed in the 2023 Wyoming Annual Demand-Side Management Report:[5]

- Income verification based on WFS guidelines to ensure participants qualify for program participation[6]
- Energy audit using a DOE-approved tool to determine eligible measures that are cost-effective to install
- Installation of measures that have a Savings-to-Investment Ratio (SIR) of 1.0 or greater based on the DOE energy audit tool
- Post-inspection of all projects
- Billing notification to Rocky Mountain Power within 60 days of job completion, which must be accompanied by a homeowner agreement invoice form with installed measures and associated cost for each completed home

The Program is available to low-income residential customers in existing single-family (including manufactured) and multifamily homes in all Rocky Mountain Power service territory in Wyoming. Duplexes and fourplexes are eligible if low-income tenants occupy one-half of the property. Larger multifamily properties are eligible if low-income qualifying tenants occupy at least 66% of the units. "Low income" qualifications follow Federal guidelines, and Program eligibility is based on 200% of federal poverty guidelines or 60% of State Median Income (SMI), whichever is greater.[7]

Agencies directly install measures for participants based on heating fuel type and need. Measures vary by household and are classified as either "major" or "supplemental." Major measures include floor, ceiling, and wall insulation, and window replacement, while supplemental measures include, but are not limited to, LED light bulbs, water heater pipe insulation, weatherstripping, replacement refrigerators, and low-flow showerheads. Major measures and a portion of supplemental measures are only available where an electric heating system heats at least 51% of the home.

2.2 EVALUATION OBJECTIVES

Program evaluation objectives are listed in Table 3, along with the evaluation activity used to address each objective.

Table 3. Evaluation Objectives by Evaluation Activities

Objective	Process Evaluation	Impact Evaluation
Document and measure effects of the Program	✓	✓

[5] https://www.pacificorp.com/content/dam/pcorp/documents/en/pacificorp/environment/dsm/wyoming/WY_Energy_Efficiency_and_Peak_Reduction_Report_2023.pdf

[6] Wyoming Department of Family Services, Accessed February 23, 2026, http://dfsweb.wyo.gov.

[7] Note that the maximum eligibility for Low-Income Home Energy Assistance Program (LIHEAP) funding is 60% SMI.

Objective	Process Evaluation	Impact Evaluation
Verify measure installation and savings		✓
Review program operations	✓	
Document all other funding used by agencies to provide no-charge services to participants	✓	
Provide data to support Program cost-effectiveness assessments		✓
Identify areas of potential improvement	✓	✓
Document compliance with regulatory requirements	✓	

3. DATA SOURCES AND METHODOLOGY

In this section, we review the data sources and methodologies used to conduct the process and impact evaluation activities.

3.1 PROGRAM TRACKING DATA

We requested and received program tracking data for program years 2022 and 2023 to support both impact and process evaluations. These data are tracked at the measure level; therefore, program participants who received more than one measure are listed multiple times.

We received the following key variables in the program tracking data:

- Customer name, address, and phone number
- Project ID
- Bill account number (customer identifier)
- Implementation agency
- Cost recovery date
- Project creation date
- Project last update date
- Measure category, type, sub-type, and name
- Participant level kWh/year savings
- Direct install costs
- Measure costs

For the Wyoming evaluation, we used the program tracking data to identify Program participants and the measures installed to develop the participant telephone survey sample. Program tracking data were also used to support the engineering analysis.

3.2 PROCESS EVALUATION

For the process evaluation, we interviewed agency staff and surveyed Program participants.

3.2.1 AGENCY INTERVIEWS

We conducted one interview with a CCS representative. The agency interview helped inform our review of Program operations, compliance with regulatory requirements, as well as major accomplishments and challenges related to Program implementation.

3.2.2 PARTICIPANT SURVEY

We fielded a telephone survey with customers who participated in the Program between 2022 and 2023. We used information gathered through the participant telephone survey to verify Program participation and inform process-related findings.

We had valid phone numbers for all 14 Program participants. A total of two participants completed the survey, yielding a response rate of 14% and a cooperation rate of 40% (Table 4).[8]

Table 4. Wyoming Participant Telephone Survey

Population Frame	Unique Telephone Numbers	Final Survey Responses	Survey Response Rate	Survey Cooperation Rate
14	14	2	14%	40%

Up to three attempts were made to reach each Program participant. Final dispositions for survey outreach are listed in Table 5.

Table 5. Participant Survey Disposition

Survey Disposition	Sample
Complete	**2**
Answering machine	7
Refusal	3
Callback	2
Total	**14**

Note: Callback disposition identifies records that requested a callback but could not be reached during follow-up attempts.

3.3 IMPACT EVALUATION

We performed an engineering review of per-measure deemed savings and developed revised assumptions for the ex-post analysis. As part of the engineering review, we updated the per-measure savings assumptions used in the previous evaluation with updated resources. We estimated program-level savings by multiplying the per-measure savings by the measure quantity provided in the Program tracking database. Refer to Appendix B for detailed ex-post equations, assumptions, and sources.

We did not achieve a sufficient number of survey responses to calculate an LED in-service rate (ISR) for the current evaluation period.[9] Due to the limited number of survey responses, we averaged and applied ISRs

[8] Response rate is calculated using American Association for Public Opinion Research (AAPOR) Response Rate 3. The cooperation rate depicts the proportion of eligible respondents who completed the survey out of those who were contacted.

[9] In-service rates represent the rate at which measures that were originally installed remain installed at the time of the survey (i.e., have not been since removed).

from previous evaluation periods for lighting measures (87%) and assumed an ISR of 100% for all non-lighting measures. LED ISRs over time for Program operations in Wyoming are displayed in Table 6 for context.

Table 6. Wyoming LED Installation Rates Over Time

Evaluation Period	Program Participant Count	Number of Survey Completes	ISR Based on Survey Responses
2014–2015	40	8	73%
2018–2019	40	8	100%
2020–2021	17	3	N/A[a]
2022—2023	14	2	N/A[a]
Average ISR Applied for 2022–2023	-	-	**87%**

[a] Too few survey responses to calculate an LED ISR.

3.4 COST-EFFECTIVENESS

Inputs for cost-effectiveness testing were calculated through the engineering analysis. We provided these inputs to Apex Analytics, which conducted the final modeling and provided outputs for this report.

4. RESULTS

This section details the results from the process and impact evaluations and cost-effectiveness testing conducted for the 2022 and 2023 program years.

4.1 PROCESS EVALUATION

In the following sections, we present findings from the agency interviews and Program participant survey.

4.1.1 AGENCY PERSPECTIVE

We interviewed the Weatherization Administrative Assistant from CCS in December 2025. We spoke with CCS to gain a deeper understanding of the Program's operations, how funds from multiple sources are used to service customers, and any key areas of improvement that could be made to the Program. We present CCS's perspective on the topics we addressed during the interview in Table 7.

Table 7. Agency Feedback

Topic	Feedback
Balance of Funding	CCS uses Rocky Mountain Power funds to supplement funding from government sources (e.g., DOE, HHS) to help increase the number of homes it can weatherize each year.
Waitlist Process	CCS weatherizes between 50 to 150 homes each year, one quarter of which are typically Rocky Mountain Power customers. CCS receives Program applications directly from LIHEAP and immediately place customers on a waitlist once their application is received. A customer's position on the waitlist for services is based on a priority point system, where points are awarded based on whether the customer or their dependents are elderly or disabled, whether small children are living in the home, or if the household's energy usage is particularly high. Customers with the most points appear at the top of the waitlist and are prioritized when scheduling the initial energy audit. Participants' homes are screened to ensure they can be weatherized based on their building characteristics. When participants reach the top of the list, CCS contacts participants to schedule the energy audit Weatherization services are typically provided within two to eight weeks following the audit. Although the sample size was small (n=2), participants' wait times varied. One respondent reported waiting only three months to receive Program services, while the other participant recalled waiting up to 12 months.
Current Waitlist	At the time of the interview, CCS had 670 applicants on its waitlist. Customer waitlist priority scores are determined by their most recent LIHEAP application. If the customer moves while still on the waitlist, their position will not change; they will undergo the same screening process as participants added to the waitlist through their LIHEAP applications.

Topic	Feedback
Challenges and Barriers	Delays in funding were described as CCS's most significant challenge, an issue that has persisted for the Program over time. Another challenge mentioned by CCS was that participants often perceive the Program as a scam when they receive their call because they do not realize their name has been referred through their LIHEAP application. Additionally, CCS noted an increase in administrative burden over the past few years, resulting from process and system modifications they have been required to make to align with new DOE guidelines. Staff mentioned that the guidelines for weatherization jobs and documentation systems have expanded, which has increased the amount of work required to weatherize each home.

4.1.2 PARTICIPANT PERSPECTIVE

We used this survey to collect data about participant household characteristics and Program experience. According to demographic data, both surveyed participants resided in single-family homes. One participant indicated that they owned their home, while the other recently sold the home where Program services were completed. We summarize participant feedback in Table 8.

Table 8. Surveyed Program Participant Feedback

Topic Area	Participant Feedback
Program Awareness	Respondents heard about the Program from the Rocky Mountain Power website (one respondent) and another energy assistance program (one respondent). Despite one respondent reporting that they heard about the Program through the utility website, neither respondent identified Rocky Mountain Power as a funding source for the Program. Both respondents were unaware of the source of Program funding. One respondent received weatherization services within three months of submitting their application, while the second respondent reported waiting between six to 12 months.
Energy Education	The Program does not offer energy education formally; however, one of the two respondents recalled Program staff informing them of ways to save energy in their homes. The respondent who recalled receiving energy education noted that they had not yet acted on the recommendations but intend to do so in the future. Despite not having taken any actions, this respondent rated the Program education as extremely helpful. Both respondents said that the Program staff informed them of ways to improve the H&S in their homes. Neither respondent recalled the Program staff checking their home for additional repairs outside the scope of Program measures during the home visit.
LED Verification and Satisfaction	One of the two respondents received LEDs through the Program. This respondent recalled receiving the LEDs and how many bulbs were initially installed. This individual also reported greater satisfaction with the lighting in their home after the installation of the new LEDs. At the time the survey was completed, this respondent could not recall how many LEDs remained installed and indicated they had not purchased any additional lighting for their home since participating in the Program.

Topic Area	Participant Feedback
Program Delivery Satisfaction	Since receiving weatherization services, one of the surveyed participants reported a noticeable decrease in their electric bill, while the other had not observed a change. Both respondents reported they would recommend the Program to family and friends. Respondents were asked to rate the Program on a scale of 0 to 10, where 0 was "extremely dissatisfied" and 10 was "extremely satisfied." Both respondents reported being highly satisfied with their experience, giving ratings of 9 and 10. The two surveyed participants said agency staff were respectful and courteous while working in their homes. However, one participant reported that their home was damaged during the process. This participant explained that their bathroom skylight began leaking after the work was completed and that this issue had not existed beforehand. Verbatim quotes from respondents about why they are satisfied with the program are provided below: "Because I was satisfied." "The guys who came in were professional, courteous, and did a great job."

4.2 IMPACT EVALUATION

A total of 14 customers participated in the Program between 2022 and 2023. Table 9 summarizes the number of customers who received each measure, from the most common (LED light bulbs) to the least common (low-flow showerhead, weatherstripping, ceiling, wall, and floor insulation, and ground cover). Other common measures include water heater pipe insulation and refrigerator replacements.

Table 9. Wyoming Participation Counts and Measures for Program Years 2022–2023

Measures	2022	2023	Total	Percent
Total # of Homes Treated	**10**	**4**	**14**	**100%**
LED Light Bulbs	8	4	12	86%
Water Heater Pipe Insulation	4	1	5	36%
Refrigerator Replacement	5	0	5	36%
Window Replacement	2	0	2	14%
Low-Flow Showerhead	1	0	1	7%
Wall Insulation	1	0	1	7%
Weatherstripping	1[a]	0	1	7%
Floor Insulation	1	0	1	7%
Ceiling Insulation	1	0	1	7%
Ground Cover Vapor Barrier	1	0	1	7%

[a] The Program tracking data accounts for door and window weatherstripping separately for the same participant. To avoid double-counting, it is represented as one measure.

4.2.1 PROGRAM SAVINGS

Table 10 presents the annual ex-ante and ex-post net energy savings for the Program. The Program achieved 13,400 kWh in energy savings between 2022 and 2023 program years, resulting in a realization rate of 32% for the evaluation period. Ex-ante savings were based on previously evaluated participant-level energy savings from the 2014 and 2015 program years. Primary drivers behind the difference in ex-ante and ex-post savings include a decrease in the average number of measures installed per household in 2022-2023, a decrease in the number of high-impact measures installed overall, such as insulation, and differences in the mix of measures offered during the evaluation period compared to those included in the ex-ante savings from 2014-2015.

Table 10. Ex-Ante Gross and Ex-Post Net Energy Savings (kWh)

Program Year	Participation	Ex-Ante Gross Energy Savings (kWh)	Ex-Post Net Energy Savings (kWh)	Realization Rate
2022	10	29,970	11,881	40%
2023	4	11,909	1,519	13%
Total	**14**	**41,879**	**13,400**	**32%**

Note: For this low-income program, the net-to-gross ratio is assumed to be equal to 1, and therefore, gross savings are equal to net savings.

For 2022–2023, we assumed an ISR of 100% for all non-lighting measures and applied an average ISR (87%) for lighting, as described in the Data Sources and Methodology section. Measure-specific deemed savings are described in more detail in Appendix B. Ex-post gross and ex-post net savings are equal because it is assumed that low-income customers would not have the disposable income to make weatherization upgrades without the program, negating free-ridership. This is a common assumption across low-income program evaluations nationwide.

On average, 2022-2023 customers saved 957 kWh per year after installing the Program measures. The ex-post per-participant savings are much lower than ex-ante savings expectations (2,997 kWh per participant). Table 11 compares the ex-post savings by measure type with the proportion of savings attributable to each measure. The majority of ex-post savings (62%) result from LED light bulbs and refrigerator replacements.

Table 11. Ex-Post Net Savings by Measure

Measure	Quantity		Unit of Measure	Ex-Post Per Unit Net Savings	Ex-Post Net Savings		Percent of Total Ex-Post Savings
	2022	2023			2022	2023	
LED Light Bulbs	119	37	Bulbs	33.95	4,040	1,256	40%
Refrigerator Replacement	5	0	Refrigerators	581.78	2,909	0	22%
Wall Insulation	1	0	Participants	1,693.19	1,693	0	13%
Floor Insulation	1	0	Participants	1,531.94	1,532	0	11%
Water Heater Pipe Insulation	4	1	Per six feet of insulation	262.96	1,052	263	10%
Ceiling Insulation	1	0	Participants	294.81	295	0	2%
Window Replacement	2	0	Windows	87.97	176	0	1%
Weatherstripping	1	0	Participants	107.84	108	0	0.8%
Low-Flow Showerhead	1	0	Showerheads	76.80	77	0	0.6%
Ground Cover Vapor Barrier	1	0	Participants	0.00	0	0	0%
Total	**136**	**38**			**11,881**	**1,519**	**100%**

Note: Percentage of total savings may not sum to 100% due to rounding.

4.3 COST-EFFECTIVENESS

Apex Analytics estimated the cost-effectiveness of Rocky Mountain Power's 2022–2023 Wyoming Program without NEBs. The Program does not pass any of the cost-effectiveness tests. Notably, the Wyoming Program did not pass the UCT largely because it is implemented primarily through local agencies that control project identification, readiness, and installation activities. As a result, agency participation levels directly affect program cost-effectiveness; lower project volumes increase per-unit costs and reduce total energy savings, while higher participation improves performance by spreading fixed costs across more projects and increasing realized savings.

The following assumptions were utilized in the analysis:

- Realization Rates: Rocky Mountain Power provided updated realization rates due to changes between the original predicted and evaluated energy savings in PY2022–PY2023.
- Modeling Inputs: Measure savings, costs, and NEBs; measure lives, incentive levels, Program delivery, and portfolio costs based on estimates provided by Rocky Mountain Power.

Table 13 presents the cost-effectiveness results, without NEBs at the program level for 2022-2023.

Table 12. 2022–2023 Program Cost-Effectiveness Results (Without NEBs)

Cost-Effectiveness Test	Levelized $/kWh	NPV[a] Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.10	$10,673	$5,744	($4,929)	0.54
Total Resource Cost Test (TRC) No Adder	$0.10	$10,673	$5,231	($5,442)	0.49
Utility Cost Test (UCT)	$0.10	$10,673	$5,138	($5,535)	0.48
Participant Cost Test (PCT)		$0	$17,763	$17,763	Pass[b]
Ratepayer Impact Measure Test (RIM)		$21,696	$5,138	($16,558)	0.24
Lifecycle Revenue Impacts ($/kWh)					$0.00

[a] Net Present Value (NPV).

[b] Low-income programs have no customer costs and therefore a cost benefit ratio cannot be calculated for this test.

Table 13 presents the cost-effectiveness results, without NEBs at the program level for 2022.

Table 13. 2022 Program Cost-Effectiveness Results (Without NEBs)

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.10	$8,933	$5,063	($3,870)	0.57
Total Resource Cost Test (TRC) No Adder	$0.10	$8,933	$4,612	($4,321)	0.52
Utility Cost Test (UCT)	$0.10	$8,933	$4,519	($4,414)	0.51
Participant Cost Test (PCT)		$0	$16,383	$16,383	Pass[a]
Ratepayer Impact Measure Test (RIM)		$18,663	$4,519	($14,144)	0.24
Lifecycle Revenue Impacts ($/kWh)					$0.00

[a] Low-income programs have no customer costs and therefore a cost benefit ratio cannot be calculated for this test.

Table 14 presents the cost-effectiveness results, without NEBs at the program level for 2023.

Table 14. 2023 Program Cost-Effectiveness Results (Without NEBs)

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.14	$1,654	$681	($973)	0.41
Total Resource Cost Test (TRC) No Adder	$0.14	$1,740	$619	($1,121)	0.36
Utility Cost Test (UCT)	$0.15	$1,740	$619	($1,121)	0.36
Participant Cost Test (PCT)		$0	$1,380	$1,380	Pass[a]
Ratepayer Impact Measure Test (RIM)		$3,033	$619	($2,414)	0.20
Lifecycle Revenue Impacts ($/kWh)					$0.00

[a] Low-income programs have no customer costs and therefore a cost benefit ratio cannot be calculated for this test.

APPENDIX A. ACRONYM GLOSSARY

Table 15. Acronym Glossary

Acronyms	Definition
CCS	Council of Community Services
DOE	United States Department of Energy
H&S	Health and Safety
kWh	Kilowatt-hour
LED	Light Emitting Diode Light Bulb
LIHEAP	Low-Income Home Energy Assistance Program
LIW	Low-Income Weatherization
NEB	Non-Energy Benefit
PCT	Participant Cost Test
PTRC	PacifiCorp Total Resource Cost Test
RIM	Ratepayer Impact Measure Test
TRC	Total Resource Cost
TRM	Technical Reference Manual
UCT	Utility Cost Test
DHHS	United States Department of Health and Human Services
WFS	Wyoming Department of Family Services
WWS	Wyoming Weatherization Services

APPENDIX B. IMPACT ANALYSIS DETAILS

C.I LED LIGHT BULBS

Table 16 documents the inputs and methodology for estimating LED savings.

Table 16. Algorithms and Inputs for LED Light Bulbs

Algorithms Used		
kWh Savings	= ((Baseline Watts – LED Watts) / 1,000) × (1 - Leakage) × Hours × WHFe × ISR	
Source of Algorithm: Illinois TRM V13.0 Section 5.5.8		
Parameter	**Value**	**Source/Notes**
Baseline Watts	43.0	IL TRM V13.0 halogen equivalent wattage for a standard 9W LED.
LED Watts	9.0	LED wattage distributed within the Program.
Percentage of bulbs outside utility jurisdiction (Leakage)	0%	Measures are directly installed and, therefore, 100% remain in utility jurisdiction.
Annual hours of use (Hours)	1,089	IL TRM V13.0. Average Annual Average of Use for Residential LEDs. This aligns with program guidelines, which state that lights must be on for at least two hours a day to qualify.
Energy waste heat factor (WHFe)	1.06	IL TRM V13.0 for single-family housing type (participants predominantly live in single-family or mobile homes).
In-service rate (ISR)	87%	Average from Wyoming Participant Survey results (2014-2015, 2018-2019).

Table 17 provides the deemed savings for LED light bulbs using the assumptions from Table 16.

Table 17. LED Deemed Savings

Metric	Deemed Savings per Measure
Annual kWh per LED	33.95

C.2 REFRIGERATOR REPLACEMENT

Table 18 documents the inputs and methodology for estimating refrigerator replacement savings.

Table 18. Algorithms and Inputs for Refrigerator Replacement

Algorithms Used		
$kWh_{existing}$	= [83.32 + (Age × 3.68) + (Pre-1990 × 485.04) + (Size × 27.15) + (%Side-by-side × 406.78) + (Primary × 161.86) + (CDD/365.25 × unconditioned × 15.37) + (HDD/365.25 × unconditioned × -11.07)] × Part Use Factor	
$kWh_{ENERGYSTAR}$	= 0.90 × kWh_{code}	
kWh savings	= ($kWh_{existing}$ – $kWh_{ENERGYSTAR}$) × ISR	
Source of Algorithm(s): Illinois TRM V13.0 Section 5.1.8, Federal Code, ENERGY STAR		
Parameter	**Value**	**Source/Notes**
Age of Existing Refrigerator (Age)	15.00	IL TRM V13.0.
Percentage refrigerators manufactured pre1990 (Pre1990)	0%	Based on Age assumption, assuming 2022 is year of replacement.
Capacity of Existing Refrigerator (Size)	22.62	Weighted capacity of refrigerators from 2020 RECS for Mountain North Division.
Percentage of Refrigerators Side by Side (SidebySide)	31%	Percentage of side-by-side refrigerators from 2020 RECS for Mountain North Division.
Percentage of Refrigerators Primary Unit (Primary)	100%	All refrigerators replace primary units.
Cooling Degree Day (CDD)	541	ASHRAE Fundamentals 2021 for Wyoming.
Heating Degree Day (HDD)	7,417	
Percentage of Refrigerators Operating in Unconditioned Space (Unconditioned)	0%	Assumed 100% of refrigerators operate in conditioned space, as Program targets the replacement of primary units.
Part-time use adjustment factor (part use factor)	1.00	Replaced refrigerator is the primary refrigerator and operates continuously.
Energy consumption of code-compliant refrigerators (kWh_{code})	507.81	Federal standard for refrigerators manufactured after 2014 based on weighted capacity from 2020 RECS data for Mountain North Division.
In-Service Rate (ISR)	100%	Assumed 100% of refrigerators remain installed, as it is not likely to be removed by the participant.

Table 19 provides the deemed savings for refrigerator replacements using the assumptions from Table 18.

Table 19. Refrigerator Replacement Deemed Savings

Metric	Deemed Savings Per Measure
Annual kWh per refrigerator	581.78

C.3 WALL INSULATION

Table 20 documents the inputs and methodology for estimating wall insulation savings.

Table 20. Algorithms and Inputs for Wall Insulation

Algorithms Used		
kWh Savings (cooling)	= (((1/Rexisting – 1/Rwall) × Area × (1 – Framing Factor) × 24 × CDD × DUA) / (1,000 × ηCool)) × ADJcool × %Cool × ISR	
kWh Savings (heating)	= (((1/Rexisting – 1/Rwall) × Area × (1 – Framing Factor) × 24 × HDD) / (ηHeat × 3,412)) × ADJHeat × %ElecHeat × ISR	
kWh Savings	= Cooling kWh Savings + Heating kWh Savings	
Source of Algorithm: Illinois TRM V13.0 Section 5.6.4		
Parameter	**Value**	**Source/Notes**
Existing Insulation R-value (Rexisting)	5.0	IL TRM V13.0. Minimum of R-5 for uninsulated assemblies. "LIW TRL" sheet in program database indicates that the baseline description is no insulation for this measure.
R-value after installing wall insulation (Rwall)	20.0	"LIW TRL" sheet in Program database specifies an efficiency requirement "Up to R-26". In absence of a statewide energy code, the IECC energy code for Wyoming's climate zone (Zone 6), requires R-20 or R-13 cavity insulation + R-10 insulated sheathing. Assume R-20 as a conservative estimate.
Area of Installed Insulation (Area)	1,380	Calculated wall area by multiplying wall height (assuming 8-foot ceilings × number of stories) by wall length (√conditioned floor area × 4 walls), where number of stories (1.40) and conditioned floor area (1,690 square feet) from RECS 2020 data for Idaho (Mountain North) Reduced by 25% as a conservative estimate provided limited program-specific data.
Framing Factor	25%	IL TRM V13.0.
Cooling Degree Day (CDD)	541	ASHRAE Fundamentals 2021 for Wyoming.
Heating Degree Day (HDD)	7,417	
Discretionary Use Adjustment (DUA)	0.75	Discretionary use adjustment for cooling. Common to most TRMs. Accounts for fact that all cooling systems will not operate 100% of time requiring cooling.
Cooling Efficiency (nCool)	12.64 SEER	Weighted average by equipment type and age from IL TRM V11.0 and 2020 RECS data for Mountain North Division.
Heating Efficiency (nHeat)	1.56 COP	
Cooling savings adjustment (ADJcool)	75%	IL TRM V13.0. Adjustment for cooling savings to account for inaccuracies in prescriptive engineering algorithms.
Heating savings adjustment (ADJheat)	63%	IL TRM V13.0. Adjustment for heating savings to account for inaccuracies in prescriptive engineering algorithms.
Percent of homes with central cooling (%Cool)	60%	RECS Survey 2020 for Mountain North Division.
Percent of Homes with electric heating (%ElecHeat)	50%	Wyoming County Assessor public records. Address lookup for participants who received major measures (N=2) with electric heating (n=1).
In-service rate (ISR)	100%	From the Low-Income Weatherization Program Summary in the Wyoming Demand Side Management Report (issued July 2023). Post-Installation Inspections completed to verify installation of measures.

Table 21 provides the deemed savings for wall insulation using the assumptions from Table 20.

Table 21. Wall Insulation Deemed Savings

Metric	Deemed Savings per Measure
Annual kWh per home	1,693.19

C.4 FLOOR INSULATION

Table 22 documents the inputs and methodology for estimating floor insulation savings.

Table 22. Algorithms and Inputs for Floor Insulation

Algorithms Used		
kWh Savings (cooling)	= ((((1/Rexisting - 1/(Rfloor)) × Area × (1 – Framing Factor)) × 24 × CDD × DUA) / (1,000 × ηCool)) × ADJcool × %Cool × ISR	
kWh Savings (heating)	= (((1/Rexisting - 1/(Rfloor)) × Area × (1 – Framing Factor) × 24 × HDD) / (3,412 × ηHeat)) × ADJheat × %ElecHeat × ISR	
kWh Savings	= Cooling kWh Savings + Heating kWh Savings	
Source of Algorithm: Illinois TRM V13.0 Section 5.6.3		
Parameter	**Value**	**Source/Notes**
Existing Insulation R-value (Rexisting)	3.53	IL TRM V13.0, assuming 3/4" plywood subfloor and carpet with pad. "LIW TRL" does not specify a program-specific baseline description for this measure.
R-value after installing Floor insulation (Rfloor)	22.53	"LIW TRL" sheet in program database specifies an efficiency requirement "Up to R-30". In absence of a statewide energy code, the IECC energy code for Wyoming's climate zone (zone 6), requires R-30 or insulation sufficient to fill the framing cavity, R-19 minimum. Assume R-19 as a conservative estimate.
Area of installed insulation (Area)	1,208	Calculated foundation footprint square footage by dividing total conditioned floor area (1,690 sf) by the number of stories (1.40) from RECS 2020 data for Wyoming (Mountain North).
Framing factor	12%	IL TRM V13.0.
Cooling Degree Day (CDD)	277	Five-year average cooling degree days with base temperature 75°F and heating degree days with base temperature 50°F from degreedays.net for Wyoming.
Heating Degree Day (HDD)	4,115	
Discretionary Use Adjustment (DUA)	0.75	Discretionary Use Adjustment for cooling. Common to most TRMs, Accounts for the fact that all cooling systems will not operate 100% of the time, requiring cooling.
Cooling Efficiency (nCool)	12.64 SEER	Weighted average by equipment type and age from the IL TRM V11.0 and 2020 RECS data for Mountain North Division.
Heating Efficiency (nHeat)	1.56 COP	
Cooling Savings Adjustment (ADJcool)	75%	IL TRM V13.0. Adjustment for cooling savings to account for inaccuracies in prescriptive engineering algorithms.
Heating Savings Adjustment (ADJheat)	63%	IL TRM V13.0. Adjustment for heating savings to account for inaccuracies in prescriptive engineering algorithms.
Percent of Homes with Central Cooling %Cool)	60%	RECS Survey 2020 for Mountain North Division.
Percent of Homes with Electric Heating (%ElecHeat)	50%	Wyoming County Assessor public records. Address lookup for participants who received major measures (N=2) and have electric heating (n=1).
In-Service Rate (ISR)	100%	Assumed 100% of installed floor insulation remains installed, as it is a major measure and not likely to be removed by the participant.

Table 23 provides the deemed savings for floor insulation using the assumptions from Table 22.

Table 23. Floor Insulation Deemed Savings

Metric	Deemed Saving Per Measure
Annual kWh per home	1,531.94

C.5 WATER HEATER PIPE INSULATION

Table 24 documents the inputs and methodology for estimating water heater pipe insulation savings.

Table 24. Algorithms and Inputs for Water Heater Pipe Insulation

Algorithms Used		
kWh Savings	= (((1/Rexist – 1/Rnew) × Cinside × L × ΔT × 8,766)/ ηDHW / 3412) × %ElecWH × ISR	
Source of Algorithm: Illinois TRM V13.0 Section 5.4.1.		
Parameter	**Value**	**Source/Notes**
R-value of uninsulated water heater pipe (Rexist)	0.42	IL TRM V13.0. Average values for 1/2" and 3/4" diameter for both copper and PEX types.
R-value of added water heater pipe insulation (Radded)	2.00	Calculated. Radded = Insulation thickness (inches) / Conductivity at 100°F. Assumed ½" insulation thickness base on standard pipe insulation thickness. Conductivity of 0.25 based on 100°F fluid temperature with an outer radius <1.0 inches from ASHRAE Fundamentals Chapter 23 (Table 2).
Total R-value of water heater pipe insulation (Rnew)	2.42	Calculated. Rnew = Radded +Rexist
Inside circumference of the pipe (Cinside)	0.16	IL TRM V13.0. Average values for 1/2" and 3/4" diameter for both copper and PEX types.
Effective linear feet of pipe length (L)	5.17	Calculated using equation from IL TRM V13.0. L = Lhorizontal + αLvertical, Assume 6 feet of insulation. Per IL TRM V13.0, assume 3 feet for vertical and remaining length for horizontal. IL TRM V13.0 average value for 1/2-inch and 3/4-inch diameter for both copper and PEX type α = 0.72.
Supplied water and outside air temperature differential (ΔT)	60°F	IL TRM V13.0. Assumes 125°F water leaving the hot water tank and an average temperature of the basement of 65°F.
Annual hours per year	8,766	Conversion.
Recovery efficiency of water heater (nDHW)	0.98	Typical recovery efficiency for electric resistance heaters (IL TRM, IN TRM, ARK TRM).
BTU to kWh Conversion	3,412	Standard conversion.
Percent of homes with electric water heating (%ElecWH)	100%	Program targets homes with electric hot water heaters.
In-Service Rate (ISR)	100%	From the Low-Income Weatherization Program Summary in the Wyoming Demand Side Management Report (issued July 2023). Post-Installation Inspections completed to verify installation of measures.

Table 25 provides the deemed savings for water heater pipe insulation using the assumptions from Table 24.

Table 25. Water Heater Pipe Insulation Deemed Savings

Metric	Deemed Savings Per Measure
Annual kWh per 6 feet	262.96

C.6 CEILING INSULATION

Table 26 documents the inputs and methodology for estimating ceiling insulation savings.

Table 26. Algorithms and Inputs for Ceiling Insulation

Algorithms Used		
kWh Savings (cooling)	= ((((1/Rexisting - 1/Rattic) × Area × (1 - Framing Factor)) × 24 × CDD × DUA) / (1,000 × ηCool)) × ADJcool × %Cool × ISR	
kWh Savings (heating)	= ((((1/Rexisting - 1/Rattic) × Area × (1 – Framing Factor)) × 24 × HDD) / (ηHeat × 3,412)) × ADJheat × %ElecHeat × ISR	
kWh Savings	= Cooling kWh Savings + Heating kWh Savings	
Source of Algorithm: Illinois TRM V13.0 Section 5.6.5		
Parameter	**Value**	**Source/Notes**
Existing Insulation R-value (Rexisting)	20.0	"LIW TRL" sheet in Program database indicates the baseline description is "less than R-30 in place." We assume some ceilings will already have some insulation in place and, therefore, assume an existing R-value of R-20 for the average.
R-value after installing attic insulation (Rattic)	38.0	"LIW TRL" sheet in Program database specifies an efficiency requirement "Up to R-48." In absence of a statewide energy code, the IECC energy code for Wyoming's climate zone (Zone 6), requires R-48. Assume R-38 as a conservative estimate.
Area of Installed Insulation (Area)	1,208	Calculated attic footprint square footage by dividing total conditioned floor area (1,690 square feet) by the number of stories (1.40) from RECS 2020 data for Wyoming (Mountain North).
Framing factor	7%	IL TRM V13.0.
Cooling Degree Day (CDD)	541	ASHRAE Fundamentals 2021 for Wyoming.
Heating Degree Day (HDD)	7,417	
Discretionary Use Adjustment (DUA)	0.75	Discretionary use adjustment for cooling. Common to most TRMs. Accounts for the fact that all cooling systems will not operate 100% of the time, requiring cooling.
Cooling Efficiency (nCool)	12.64 SEER	Weighted average by equipment type and age from the IL TRM V11.0 and 2020 RECS data for Mountain North Division.
Heating Efficiency (nHeat)	1.56 COP	
Cooling savings adjustment (ADJcool)	114%	IL TRM V13.0. Adjustment for cooling savings to account for inaccuracies in prescriptive engineering algorithms.
Heating savings adjustment (ADJheat)	63%	IL TRM V13.0. Adjustment for heating savings to account for inaccuracies in prescriptive engineering algorithms.
Percent of homes with central cooling (%Cool)	60%	RECS Survey 2020 for Mountain North Division.
Percent of homes with electric heating (%ElecHeat)	50%	Wyoming County Assessor public records. Address lookup for participants who received major measures (N=2) with electric heating (n=1).
In-service rate (ISR)	100%	Assumed 100% of the ceiling insulation remains installed, as it is a major measure and not likely to be removed by the participant.

Table 27 provides the deemed savings for ceiling insulation using the assumptions from Table 26.

Table 27. Ceiling Insulation Deemed Savings

Metric	Deemed Savings per Measure
Annual kWh per home	294.81

C.7. WINDOWS

Table 28 documents the inputs and methodology for estimating window savings.

Table 28. Algorithms and Inputs for Windows

Algorithms Used		
Source of Algorithm: Used RESFEN6 (LBNL Software) to model a home with new windows. We estimate savings per window, and then apply to the total number of windows replaced.		
Parameter	**Value**	**Source/Notes**
House Type	1 Story Existing Frame	Input for RESFEN6. House Type that most closely corresponds with the homes that received new windows.
HVAC System	Electric Heat Pump	Input for RESFEN6. Electric Heat Pump is the only Electric Heating option in the RESFEN6 Modeling Software.
Window Area	9 ft^2	Input for RESFEN6. Standard Window Size for Window Savings Modeling.
U-Factor Base	0.88	Input for RESFEN6. RESFEN6 Preset Value for Single Clear, Non-Metal Frame Window.
U-Factor New	0.28	Input for RESFEN6. RESFEN6 Preset Value for Double Low-E, Medium Solar Gain, Non-Metal Thermally Improved Frame Window.
SHGC Base	0.64	Input for RESFEN6. RESFEN6 Preset Value for Single Clear, Non-Metal Frame Window.
SHGC New	0.31	Input for RESFEN6. RESFEN6 Preset Value for Double Low-E, Medium Solar Gain, Non-Metal Thermally Improved Frame Window.
Percent of Homes with Central Cooling (%Cool)	60%	RECS Survey 2020 for Mountain North Division.
Percent of Homes with Electric Heating (%ElecHeat)	100%	Program requires 51% of conditioned floor area be electrically heated.
In-Service Rate (ISR)	100%	Assumed 100% of windows remain installed as it is not likely to be removed by the participant.

Table 29 provides the deemed savings for windows using the assumptions from Table 28.

Table 29. Window Deemed Savings

Metric	Deemed Savings per Measure
Annual kWh per Window	87.97

C.8 WEATHERSTRIPPING

Table 30 documents the inputs and methodology for estimating weatherstripping savings.

Table 30. Algorithms and Inputs for Weatherstripping

Algorithms Used		
kWh Savings (cooling)	= (((CFM50existing - CFM50new)/Nfactor × 60 × 24 × CDD × DUA × 0.018) / (1,000 × ηCool) × LM) × %Cool × ISR	
kWh Savings (heating)	= [(((CFM50existing - CFM50new)/Nfactor) × 60 × 24 × HDD × 0.018) / (ηHeat * 3,412)] × %ElecHeat × ISR	
kWh Savings	= Cooling kWh Savings + Heating kWh Savings	
Source of Algorithm: Illinois TRM V13.0 Section 5.6.1		
Parameter	**Value**	**Source/Notes**
Existing infiltration rate (ACH50existing)	17.40	ENERGY STAR savings analysis assumptions for Wyoming (climate zone 6 as it covers the majority of the state). Assume air sealing for "Windows, Doors, and Walls," but assume half the reduction since this measure is only weatherstripping, and it is not known how much it covers per home. https://www.energystar.gov/ia/home_improvement/home_sealing/Measure_Upgrade_Assumptions.pdf?945a-eddc.
Improved infiltration rate (ACH50new)	17.20	
Existing infiltration rate (CFM50existing)	3,920	Converts ACH50 to CFM50 (=ACH50*Volume/60 minutes), where volume is the total conditioned floor area (1,690 sf) from RECS 2020 data for Wyoming (Mountain North) multiplied by an assumed ceiling height of 8 feet. https://www.energy.wsu.edu/Documents/BFG%20Supplement%20B-Jan2011.pdf.
Improved infiltration rate (CFM50new)	3,875	
Nfactor	15.79	BPI Technical Standards for the Building Analyst Professional. Approximately half of Wyoming is located in Zone 1, and the other half is in Zone 2, so the median N Factor from both zones was applied across 1 and 1.5 stories as the average number of stories per 2020 RECs is 1.40 stories multiplied by the average Height Correction Factor (0.95).
Conversion	1,440	Converts ft^3/min to ft^3/day by multiplying 60 (mins/hour) by 24 (hours/day).
Cooling Degree Day (CDD)	541	ASHRAE Fundamentals 2021 for Wyoming.
Heating Degree Day (HDD)	7,417	
Discretionary Use Adjustment (DUA)	0.75	Discretionary Use Adjustment for cooling. Common to most TRMs. Accounts for the fact that all cooling systems will not operate 100% of the time, requiring cooling.
Heat capacity of air	0.018	Volumetric heat capacity of air.
Cooling Efficiency (nCool)	12.64 SEER	Weighted average by equipment type and age from the IL TRM V11.0 and 2020 RECS data for Mountain North Division.
Heating Efficiency (nHeat)	1.56 COP	
Latent Multiplier (LM)	3.20	IL TRM V13.0 for Chicago, IL, most representative climate to Wyoming.
Percent of homes with central cooling (%Cool)	60%	RECS Survey 2020 for Mountain North Division.
Percent of homes with electric heating (%ElecHeat)	100%	Program requires 51% of conditioned floor area be electrically heated.
In-service rate (ISR)	100%	From the Low-Income Weatherization Program Summary in the Wyoming Demand Side Management Report (issued July 2023). Post-Installation Inspections completed to verify installation of measures.

Table 31 provides the deemed savings for weatherstripping using the assumptions from Table 30.

Table 31. Weatherstripping Deemed Savings

Metric	kWh Savings per Measure
Annual kWh per home	107.84

C.9 LOW-FLOW SHOWERHEADS

Table 32 documents the inputs and methodology for estimating low-flow showerhead savings.

Table 32. Algorithms and Inputs for Low-Flow Showerheads

Algorithms Used		
kWh Savings (cooling)	= (Baseline GPM – Efficient GPM) * (Minutes/Shower) * SPCD * Household * 365.25 /SPH) * (8.33 * (Tmix – Tinlet)) / 3,412 / nDHW) * %ElecWH * ISR	
Source of Algorithm: Illinois TRM V13.0 Section 5.4.5		
Parameter	**Value**	**Source/Notes**
Flow rate of existing showerhead (Baseline GPM)	2.24	IL TRM V13.0.
Flow rate of efficient showerhead (Efficient GPM)	2.00	Based on email exchange with program manager for previous evaluation; shower head wands are rated at 2.0 GPM. This assumption aligns with multiple TRMs.
Shower length in minutes (minutes/shower)	7.80	IL TRM V13.0.
Showers per capita per day (SPCD)	0.60	IL TRM V13.0.
People per household (Household)	2.51	RECS Survey 2020 for Mountain North Division.
Shower fixtures per household (SPH)	1.64	IL TRM V13.0.
Shower water temperature (Tmix)	101.00 °F	IL TRM V13.0.
Inlet water temperature (Tinlet)	51.94 °F	NREL Domestic Hot Water Event Generator for Wyoming.
Specific heat of water	8.33	Standard conversion.
BTU to kWh conversion	3,412	Standard conversion.
Recovery efficiency of water heater (nDHW)	0.98	Typical recovery efficiency for electric resistance heaters (IL TRM, IN TRM, ARK TRM).
Percent of homes with electric water heating (%ElecWH)	100%	Program targets homes with electric hot water heaters.
In-service rate (ISR)	100%	From the Low-Income Weatherization Program Summary in the Wyoming Demand Side Management Report (issued July 2023). Post-Installation Inspections completed to verify installation of measures.

Table 33 provides the deemed savings for low-flow showerheads using the assumptions from Table 32.

Table 33. Low-Flow Showerhead Deemed Savings

Metric	Deemed Savings per Measure
Annual kWh per showerhead	76.80

Opinion **Dynamics**

CONTACT:

Megan Campbell
Senior Vice President
mcampbell@opiniondynamics.com

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