

Utah Low Income Weatherization Program Evaluation, Measurement & Verification Report 2016-2017

*Prepared for
Rocky Mountain Power*

August 2020

Prepared by:



ADM Associates, Inc.
3239 Ramos Circle
Sacramento, CA 95827

Table of Contents

1. Executive Summary.....	1
2. Introduction and Purpose of Study.....	8
3. Description of Program.....	9
4. Impact Evaluation.....	11
5. Process Evaluation.....	29
6. Cost Effectiveness Evaluation.....	40
7. Conclusions and Recommendations.....	43
8. Appendix: Participant Survey.....	45

List of Tables

Table 1-1:	Low Income Weatherization Program Claimed and Evaluated Energy Savings for 2016-2017	1
Table 1-2:	Low Income Weatherization Program Claimed and Evaluated Energy Savings for 2016 and 2017.....	2
Table 1-3:	Low Income Weatherization Program Cost Effectiveness Results PY2016-2017.....	4
Table 1-4:	Low Income Weatherization Program Level Cost Effectiveness Results PY2016.....	5
Table 1-5:	Low Income Weatherization Program Level Cost-Effectiveness Results PY2017.....	5
Table 3-1:	Rocky Mountain Power’s Low Income Weatherization Program in Utah Number of Participants by Implementation Agency 2016-2017	10
Table 4-1:	Low Income Weatherization Program Claimed and Evaluated Energy Savings for 2016-2017.....	11
Table 4-2:	Low Income Weatherization Program Claimed and Evaluated Energy Savings for 2016 and 2017.....	12
Table 4-3:	2016-2017 Low Income Weatherization Program Participant Survey Sample Size.....	14
Table 4-4:	2016-2017 Low Income Weatherization Program Impact Evaluation Methodology by Measure.....	15
Table 4-5:	2016-2017 Utah LIW Program Claimed Gross Energy Savings for Lighting.....	16
Table 4-6:	Inputs for Energy Savings Calculations: CFL Measures.....	18
Table 4-7:	Inputs for Energy Savings Calculations: LED Measures.....	19
Table 4-8:	2016-2017 Low Income Weatherization Program Claimed and Evaluated Gross Energy Savings for Lighting.....	21
Table 4-9:	2016-2017 Utah LIW Program Claimed Gross Energy Savings for HVAC.....	21
Table 4-10:	Inputs for Energy Savings Calculations: Furnace Fan Measure	23

Table 4-11:	2016-2017 Utah LIW Program Claimed and Evaluated Gross Energy Savings for HVAC.....	25
Table 4-12:	2016-2017 Utah LIW Program Claimed Gross Energy Savings for Appliances	25
Table 4-13:	2016-2017 Low Income Weatherization Program Claimed and Evaluated Gross Energy Savings for Appliances.....	26
Table 4-14:	2016-2017 Utah LIW Program Claimed Gross Energy Savings for Building Shell Measures	26
Table 4-15:	2016 Low Income Weatherization Program Claimed and Evaluated Gross Energy Savings for Building Shell	28
Table 5-1:	How did participants learn about the program?	33
Table 5-2:	Why did respondents decide to participate in the program?	34
Table 5-3:	What measures did survey respondents receive?	34
Table 6-1:	Low Income Weatherization Program Inputs	40
Table 6-2:	Low Income Weatherization Annual Program Costs.....	40
Table 6-3:	Low Income Weatherization Program – Savings by Program Year	40
Table 6-4:	Benefit/Cost Ratios by Program Year	41
Table 6-5:	Low Income Weatherization Program Level Results – PY2016-2017.....	41
Table 6-6:	Low Income Weatherization Program Level Cost-Effectiveness Results – PY2016	42
Table 6-7:	Low Income Weatherization Program Level Cost-Effectiveness Results – PY2017	42

List of Figures

Figure 1-1:	Low Income Weatherization Program Claimed and Evaluated Energy Savings for 2016-2017	2
Figure 1-2:	Low Income Weatherization Program Flow of Funds	3
Figure 3-1:	Low Income Weatherization Program Funding Flow	9

Figure 4-1: Low Income Weatherization Program Claimed and Evaluated Energy Savings for 2016-2017	11
Figure 5-1: Satisfaction with Energy Savings Measures	35
Figure 5-2: Usefulness of Energy Savings Tips and Information	37
Figure 5-3: Overall Program Satisfaction	38

1. Executive Summary

This report provides the results of ADM's impact and process evaluations of the Rocky Mountain Power Low Income Weatherization (LIW) program in Utah during 2016 and 2017.

The program provides energy-efficiency weatherization services at no cost to income-eligible Rocky Mountain Power customers living in single family homes, manufactured homes or multi-unit residential housing. The measures installed through the program include energy-efficient refrigerators, building shell measures, HVAC equipment and lighting measures.

1.1 Impact Evaluation Results

Table 1-1 presents the claimed gross savings, evaluated gross savings, and realization rates for each measure through the program in 2016 and 2017.

Table 1-1: Low Income Weatherization Program Claimed and Evaluated Energy Savings for 2016-2017

Year	Measure Category	Measure Type	Quantity	Claimed Gross Savings (kWh)	Evaluated Gross Savings (kWh/yr.)	Realization Rate
2016-2017	Appliances	Refrigerator Replacement	105	92,295	92,295	100.0%
	Building Shell	Utah Weatherization	4	5,416	5,310	98.0%
	HVAC	Furnace Fan	248	129,704	98,771	76.2%
		Duct Sealing and Insulation	1	2,324	2,324	100.0%
	Lighting	Florescent Lighting	4,485	116,778	97,203	83.2%
		LED Bulbs	3,702	97,843	66,297	67.8%
2016-2017 TOTAL			8,545	444,360	362,200	81.5%

Figure 1-1 presents the impact evaluation results, including the quantity, claimed gross savings, evaluated gross savings, and realization rates for each measure type across both combined program years, 2016 and 2017. Table 1-2 presents the same information for each individual year, 2016 and 2017.

Figure 1-1: Low Income Weatherization Program Claimed and Evaluated Energy Savings for 2016-2017

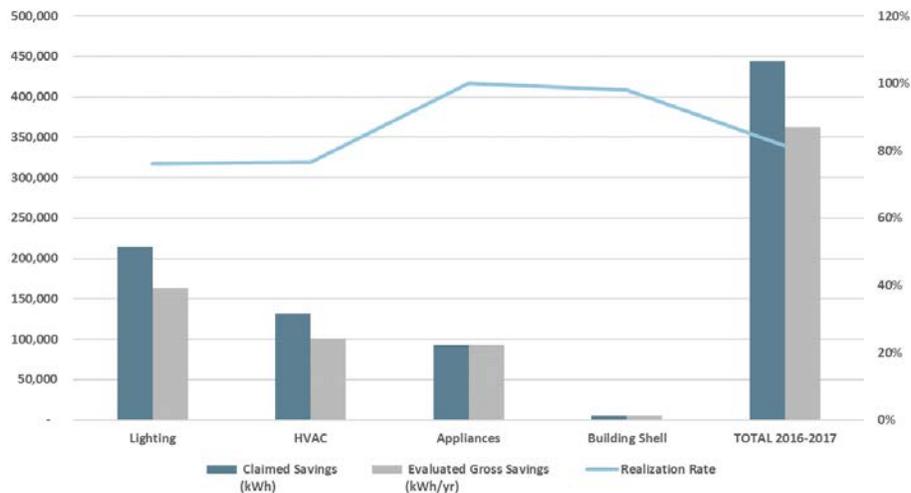


Table 1-2: Low Income Weatherization Program Claimed and Evaluated Energy Savings for 2016 and 2017

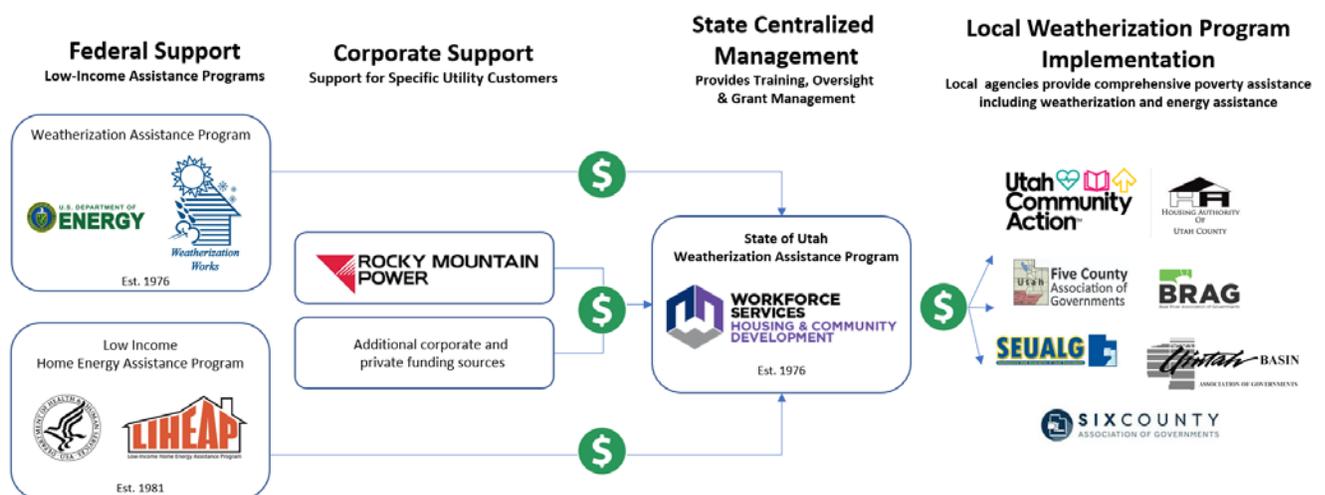
Year	Measure Category	Measure Type	Quantity	Claimed Gross Savings (kWh)	Evaluated Gross Savings (kWh/yr.)	Realization Rate
2016	Appliances	Refrigerator Replacement	41	36,039	36,039	100.0%
	Building Shell	Utah Weatherization	4	5,416	5,310	98.0%
	HVAC	Furnace Fan	116	60,668	46,199	76.2%
		Duct Sealing and Insulation	1	2,324	2,324	100.0%
	Lighting	Florescent Lighting	3,985	103,778	86,367	83.2%
		LED Bulbs	73	1,929	1,307	67.8%
2016 TOTAL			4,220	210,154	177,546	84.5%
Year	Measure Category	Measure Type	Quantity	Claimed Gross Savings (kWh)	Evaluated Gross Savings (kWh/yr.)	Realization Rate
2017	Appliances	Refrigerator Replacement	64	56,256	56,256	100.0%
	Building Shell	Utah Weatherization	-	-	-	-
	HVAC	Furnace Fan	132	69,036	52,572	76.2%
		Duct Sealing and Insulation	-	-	-	-
	Lighting	Florescent Lighting	500	13,000	10,836	83.4%
		LED Bulbs	3,629	95,914	64,989	67.8%
2017 TOTAL			4,325	234,206	184,654	78.8%

1.2 Process Evaluation Results

In Utah, Rocky Mountain Power’s LIW program is managed by the Utah Department of Workforce Services, Housing and Community Development Division (HCD). HCD centrally manages utility and federal weatherization contracts in the state of Utah.

Rocky Mountain Power’s LIW program uses funds from the U.S. Department of Energy (DOE), U.S. Department of Health and Human Services (HHS), Rocky Mountain Power, Dominion Energy, and a variety of other corporate and private funding sources to provide energy saving measures to income-qualified residents; see Figure 1-2.

Figure 1-2: Low Income Weatherization Program Flow of Funds



The department works with seven implementation agencies in the state that provide a variety of wrap-around services to income-qualified residents, including weatherization services. Rocky Mountain Power benefits from partnering with HCD to implement the program in the following ways:

- **HCD’s evidence-based continuous improvement practices** increased the percentage of participants’ homes that met the agency’s goal of reducing energy consumption by 30% per project. HCD provides Utah’s weatherization workforce with year round training at its centralized training facility, creating a stable, well-trained workforce with an average tenure of 7 years.
- **Leveraging multiple funding streams** to maximize the number of measures that can be installed in a single home and therefore maximizes benefits for customers and overall energy savings.
- **Lower program administration costs.** By managing multiple funding streams, HCD distributes overhead costs across funders.

- **Partnerships with agencies** that have long-standing, trusted relationships with a difficult-to-reach customer base.

Most participants who responded to ADM's survey shared positive feedback and support for the program. A small portion of respondents noted minor issues with the program.

1.3 Cost Effectiveness Results

Navigant estimated the cost-effectiveness results for the LIW program, based on 2016 and 2017 ex-post savings estimates and expenditures provided by Rocky Mountain Power.

The following cost-effectiveness tests were conducted:

- Total Resource Cost Test (PTRC) + Conservation Adder
- Total Resource Cost Test (TRC) No Adder
- Utility Cost Test (UCT)
- Rate Impact Test (RIM)
- Lifecycle Revenue Impacts (\$/kWh)

The Low-Income Weatherization program provides weatherization measures at no cost to eligible customers. Since participants do not incur costs, the Participant Cost Test (PCT) was not conducted, as it is not applicable.

The 2016 and 2017 combined program passed the cost-effectiveness for all tests except the Rate Impact Test (RIM) as shown in Table 1-3.

*Table 1-3: Low Income Weatherization Program
Cost Effectiveness Results PY2016-2017*

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.0350	\$123,988	\$257,711	\$133,723	2.08
Total Resource Cost Test (TRC) No Adder	\$0.0350	\$123,988	\$234,283	\$110,295	1.89
Utility Cost Test (UCT)	\$0.0350	\$123,988	\$234,283	\$110,295	1.89
Rate Impact Test (RIM)		\$547,476	\$234,283	-\$313,193	0.43
Lifecycle Revenue Impacts (\$/kWh)					\$0.0000004600

Table 1-4 includes program level cost effectiveness test results for 2016. The program passed the cost-effectiveness criteria for all tests except the RIM test.

Table 1-4: Low Income Weatherization Program Level Cost Effectiveness Results PY2016

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.0372	\$59,339	\$118,573	\$59,234	2.00
Total Resource Cost Test (TRC) No Adder	\$0.0372	\$59,339	\$107,793	\$48,454	1.82
Utility Cost Test (UCT)	\$0.0372	\$59,339	\$107,793	\$48,454	1.82
Rate Impact Test (RIM)		\$249,320	\$107,793	-\$141,527	0.43
Lifecycle Revenue Impacts (\$/kWh)	\$0.0000004712				

Table 1-5 includes program level costs effectiveness test results for 2017. The program passed the cost-effectiveness criteria for all tests except the RIM test.

Table 1-5: Low Income Weatherization Program Level Cost-Effectiveness Results PY2017

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.0332	\$64,649	\$139,138	\$74,489	2.15
Total Resource Cost Test (TRC) No Adder	\$0.0332	\$64,649	\$126,489	\$61,840	1.96
Utility Cost Test (UCT)	\$0.0332	\$64,649	\$126,489	\$61,840	1.96
Rate Impact Test (RIM)		\$298,156	\$126,489	-\$171,667	0.42
Lifecycle Revenue Impacts (\$/kWh)	\$0.0000004512				

1.4 Conclusions and Recommendations

ADM's evaluation resulted in the following conclusions:

- During the evaluation period, the program resulted in total evaluated energy savings of 362,200 kWh from the following measure categories: lighting 163,500 kWh (45.1%), HVAC 101,095 kWh (27.9%), appliances 92,295 (25.5%) and building shell measures 5,310 (1.5%).
- Rocky Mountain Power continued their long-standing partnership with HCD to implement its LIW program. HCD managed the program through 7 community-based implementation agencies. Program participants expressed a high level of satisfaction with the program that resulted in benefits including lower energy costs, improved interior air quality, and improved home comfort. Participants confirmed that the program had a positive impact on their lives.
- The program passed the cost-effectiveness standards for all tests except the RIM tests for each individual year and across the full program cycle.

Based on its evaluation, ADM recommends the following actions for Rocky Mountain Power to consider in its future implementation of its LIW program in Utah.

- Rocky Mountain Power should continue partnering with HCD to implement its LIW program via subcontracted agencies to leverage state and federal funding and program infrastructure. Rocky Mountain Power benefits in numerous ways by imbedding its low-income program with the state's.
- Rocky Mountain Power and HCD could consider pursuing efforts to reduce client wait times. Wait times vary significantly from agency to agency. Identifying best practices from across the state, and even across other weatherization programs nationally, may help reduce lengthy wait times.
- Rocky Mountain Power could consider moving to an electronic invoicing system. Paper invoicing lengthens processing times and requires duplication of data entry.
- Rocky Mountain Power could consider reducing the interval between program implementation and evaluation to improve verification of installation rates and to improve participant response rates.
- Rocky Mountain Power could consider identifying both qualitative and quantitative program objectives in order to more clearly determine the success of the program.

- Rocky Mountain Power could consider building a stronger relationship with HCD in order to identify opportunities that become apparent through stronger partnership interactions. For example, Rocky Mountain Power could consider touring Utah's training facility and learning about Utah's evidence-based continuous improvement practices.
- Rocky Mountain Power could consider requesting more detailed tracking data from implementers to increase the accuracy and granularity of measures' energy saving data. For example, additional data could include baseline and efficient wattages for bulbs installed through the program, specifications for baseline and replacement efficient refrigerators, and pre- and post-installation insulation conditions. Implementers are already recording extensive data in the DOE-approved auditing software used for projects that include Weatherization Assistance Program (WAP) funding, and therefore the additional data reporting should not create an unreasonable burden.

2. Introduction and Purpose of Study

This report provides results of the ADM Associates, Inc. (ADM) impact and process evaluations of the Rocky Mountain Power's 2016-2017 Low Income Weatherization (LIW) program in Utah. It also includes results of a cost effectiveness evaluation completed by Navigant.

2.1 Impact evaluation

The primary objective of the impact evaluation was to determine ex-post verified gross energy (kWh) savings that resulted from the installation of energy saving measures through the program.

2.2 Process evaluation

The objective of the process evaluation was to gain an in-depth understanding of program operations and identify both program strengths and opportunities for improvement. The process evaluation includes information gathered from Rocky Mountain Power staff, Utah Department of Workforce Services, Housing and Community Development Division (HCD) staff and program participants.

2.3 Cost effectiveness evaluation

The cost-effectiveness evaluation, completed by Navigant using cost estimates provided by Rocky Mountain Power and energy saving estimates provided by ADM, includes results of the following cost effectiveness tests:

- Total Resource Cost Test (PTRC) + Conservation Adder
- Total Resource Cost Test (TRC) No Adder
- Utility Cost Test (UCT)
- Rate Impact Test (RIM)
- Lifecycle Revenue Impacts (\$/kWh)

The Participant Cost Test (PCT) was not conducted since the Low-Income Weatherization program provides weatherization measures at no cost to eligible customers and this test is therefore not applicable.

The following chapters provide descriptions of the methods used to complete these evaluations and their results.

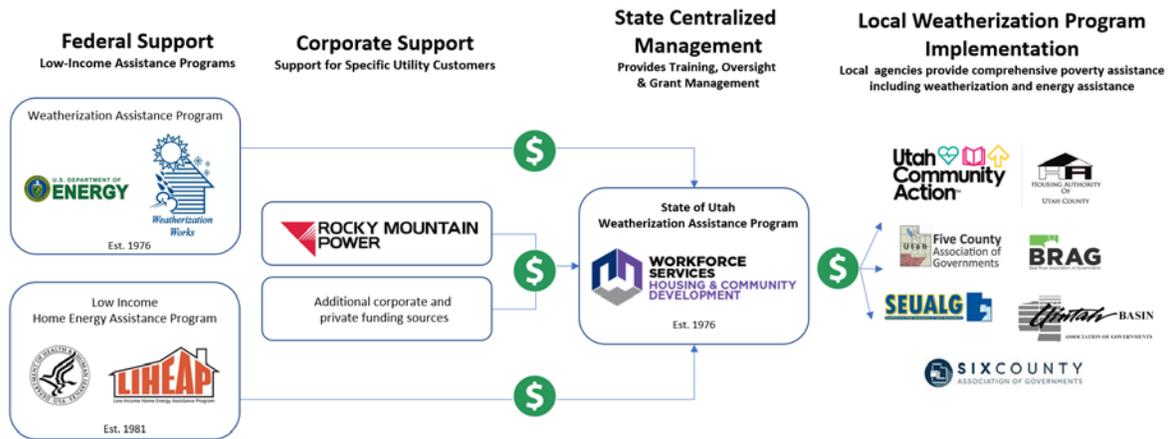
3. Description of Program

In Utah, Rocky Mountain Power’s LIW program is managed by the HCD. HCD centrally manages utility and federal weatherization contracts in the state of Utah.

Rocky Mountain Power’s LIW program uses funds from the U.S. Department of Energy (DOE), U.S. Department of Health and Human Services (HHS), Rocky Mountain Power, Dominion Energy, and a variety of other corporate and private funding sources to provide energy saving measures to income-qualified residents.

The department works with seven implementation agencies in the state; all but one are quasi-governmental agencies. The largest implementer is a nonprofit community action agency. All agencies provide a variety of wrap around services to income-qualified residents. See Figure 3-1.

Figure 3-1: Low Income Weatherization Program Funding Flow



HCD trains agencies to consider each home as a complete system comprised of heating, cooling, air quality, air sealing, health and safety issues and the client. The program evaluates the interaction of all these components when determining which measures to install.

By managing multiple funding sources and their various restrictions, the program can take a comprehensive approach to each home, installing a suite of measures that no single funding source would be able to address alone. Furthermore, HCD leverages government funding sources to cover program costs that are unrecoverable from Rocky Mountain Power and uses Rocky Mountain Power funding sources to extend the number of homes that can be served by federal funds.

Covered costs: During the evaluation period, Rocky Mountain Power funded, for its customers, 50% of the installed cost of electricity saving measures except for light bulbs which are covered at 100%, and furnace fans which are covered at \$100. Rocky Mountain Power also provided funding equal to 10% of measure costs (up to a predetermined

maximum) to cover a portion of administrative costs. Rocky Mountain Power provided funding for shell measures only in electrically heated homes; most homes in the service area are gas heated with gas water heaters. Therefore, the bulk of its funding contributes to lighting measures and replacement refrigerators.

Program goals: HCD stated that the goal of the state’s program is to 1) reduce energy consumption in serviced homes by 30 percent, 2) reduce health and safety issues in clients’ homes, and 3) improve home comfort.

During the evaluation period, a total of 612 Rocky Mountain Power customers participated in the program and benefitted from Rocky Mountain Power-funded installed measures; see Table 3-1.

*Table 3-1: Rocky Mountain Power’s Low Income Weatherization Program in Utah
Number of Participants by Implementation Agency 2016-2017*

Agency	2016	2017	Total
Salt Lake Community Action Program	150	172	322
Housing Authority of Utah County	37	35	72
Five County Association of Governments	36	28	64
Bear River Association of Governments	33	17	50
Six County Association of Governments	24	21	45
Southeastern Utah Association of Local Governments	24	9	33
Uintah Basin Association of Governments	16	8	24
Unspecified ¹	2	0	2
Total	322	289	612²

¹ The implementation agency was not identified for two participants in the tracking data.

² Number of participants is based on billing account numbers. Some account numbers included more than one project during the evaluation period. The program included 333 projects in 2016, and 296 in 2017.

4. Impact Evaluation

This chapter provides the results of ADM’s impact evaluation of the Rocky Mountain Power LIW program in Utah during 2016 and 2017. Table 4-1 and Figure 4-1 presents the impact evaluation results, including the quantity, claimed gross savings, evaluated gross savings, and realization rates for each measure type across both combined program years, 2016 and 2017. Table 4-2 presents the same information for each individual year, 2016 and 2017.

Table 4-1: Low Income Weatherization Program Claimed and Evaluated Energy Savings for 2016-2017

Year	Measure Category	Measure Type	Quantity	Claimed Gross Savings (kWh)	Evaluated Gross Savings (kWh/yr.)	Realization Rate
2016-2017	Appliances	Refrigerator Replacement	105	92,295	92,295	100.0%
	Building Shell	Utah Weatherization	4	5,416	5,310	98.0%
	HVAC	Furnace Fan	248	129,704	98,771	76.2%
		Duct Sealing and Insulation	1	2,324	2,324	100.0%
	Lighting	Florescent Lighting	4,485	116,778	97,203	83.2%
		LED Bulbs	3,702	97,843	66,297	67.8%
2016-2017 TOTAL			8,545	444,360	362,200	81.5%

Figure 4-1: Low Income Weatherization Program Claimed and Evaluated Energy Savings for 2016-2017

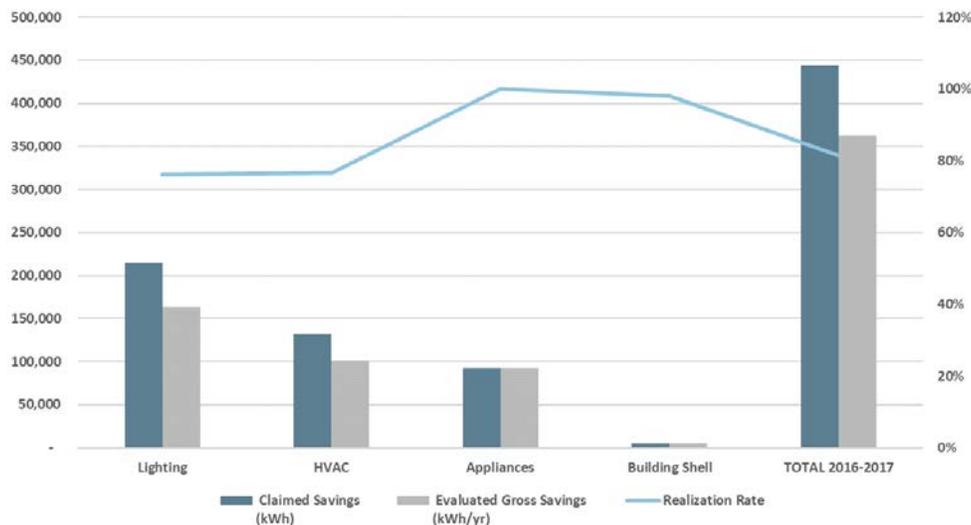


Table 4-2: Low Income Weatherization Program Claimed and Evaluated Energy Savings for 2016 and 2017

Year	Measure Category	Measure Type	Quantity	Claimed Gross Savings (kWh)	Evaluated Gross Savings (kWh/yr.)	Realization Rate
2016	Appliances	Refrigerator Replacement	41	36,039	36,039	100.0%
	Building Shell	Utah Weatherization	4	5,416	5,310	98.0%
	HVAC	Furnace Fan	116	60,668	46,199	76.2%
		Duct Sealing and Insulation	1	2,324	2,324	100.0%
	Lighting	Florescent Lighting	3,985	103,778	86,367	83.2%
		LED Bulbs	73	1,929	1,307	67.8%
2016 TOTAL			4,220	210,154	177,546	84.5%
Year	Measure Category	Measure Type	Quantity	Claimed Gross Savings (kWh)	Evaluated Gross Savings (kWh/yr.)	Realization Rate
2017	Appliances	Refrigerator Replacement	64	56,256	56,256	100.0%
	Building Shell	Utah Weatherization	-	-	-	-
	HVAC	Furnace Fan	132	69,036	52,572	76.2%
		Duct Sealing and Insulation	-	-	-	-
	Lighting	Florescent Lighting	500	13,000	10,836	83.4%
		LED Bulbs	3,629	95,914	64,989	67.8%
2017 TOTAL			4,325	234,206	184,654	78.8%

4.1 Impact Evaluation Methodology

The impact evaluation component of this report estimated annual gross energy savings (kWh) as framed by the following research questions:

- How many and which measure types were installed through the program?
- What were the kWh savings achieved by the program?

The methodology used to address each of these questions is detailed in the following sections.

4.1.1 Data Collection and Measure Verification

ADM reviewed and reconciled program tracking data with participation counts, and ex-ante savings indicated in Rocky Mountain Power's 2016 and 2017 annual reports. ADM reviewed a census of program tracking data. In concert with tracking data reviews, ADM also reviewed the savings values and measure savings assumptions and calculations contained in the Technical Resource Library (TRL) files. ADM issued data requests as needed to ensure that it received all data that could be reasonably expected or required for this evaluation.

ADM conducted surveys to verify measure installation and collected additional primary data from program participants. ADM surveyed a representative sample of known 2016 and 2017 participants in Rocky Mountain Power's LIW program in Utah.

The following provides additional detail regarding data collection and measure verification activities.

- **Review of the program tracking database** is an essential first step for verifying data integrity. ADM assessed the program data management system DSMC – which facilitates data collection and organization. ADM reviewed a census of program tracking data contained in DSMC. Each program year's dataset was reviewed for completeness, consistency, and compliance with the provided TRL files.
- **Review of measure savings assumptions and calculations** occurred concurrent with the DSMC data reviews mentioned above. Savings values are maintained in the TRL. The TRL files sometimes include measure savings assumptions, calculations, source papers or files (e.g. RTF versions), and additional documentation that together comprise the generally accepted rules and guidance for evaluating energy efficiency programs. ADM reviewed all TRL documentation and included in this report any errors, omissions, or inconsistencies identified during ADM's review.
- **Data requests** related to evaluation activities occurred throughout the period of this evaluation. ADM provided Rocky Mountain Power various data requests for DSMC and TRL data pulls and reports, and other program data and verification, as necessary.
- **Online surveys were developed and administered** to verify measure installation rates and to collect additional primary data from program participants. ADM surveyed a representative sample of known 2016 and 2017 participants in Rocky Mountain Power's LIW program in Utah.

4.1.2 Sample Design

A representative participant sample was developed across measure categories in Utah. ADM achieved a sampling precision of $\pm 10\%$ with 90% statistical confidence – or “90/10 precision” – for gross realized savings estimates at the program level. A sample of known program participants was surveyed for measure installation rates and process evaluation questions regarding the specific measures they implemented according to DSMC datasets. The Utah LIW Program Participant Survey sample size is provided in the Table 4-3.

Table 4-3: 2016-2017 Low Income Weatherization Program Participant Survey Sample Size

Survey	Number of Survey Invites Sent	Number of Completed Surveys (n)	Response Rate
Utah LIW Program Participant Survey	521	77	15%

4.1.3 Impact Evaluation Approach by Measure

ADM reviewed the ex-ante energy savings estimates, baseline and efficient condition assumptions, deemed savings values and calculations for each measure. Where realization rates are 100 percent, ADM concurred with the ex-ante assumptions. Realization rates other than 100 percent reflect that ADM used different assumptions to calculate savings than the those used for ex-ante values or that input estimates varied from verified input values (for example, actual installation rates or hours of use based on actual bulb installation locations).

Table 4-4 shows the impact evaluation methodology used for estimating energy savings for each measure category. ADM did not calculate net savings as the net to gross (NTG) value is assumed to be 1.0 for low income weatherization programs.

*Table 4-4: 2016-2017 Low Income Weatherization Program Impact Evaluation
Methodology by Measure*

Measure Category	Measure Type	Impact Evaluation Methodology	Inputs Collected by ADM to Calculate Evaluated Savings
Appliances	Refrigerator Replacement	Deemed savings review / UT 2016-2017 LIW Program Participant Survey / Benchmarking to other Low Income UES value	ISR (%)
Building Shell	Utah Weatherization	Deemed savings review/ Engineering analysis / Primary data collection from publicly available housing or county assessor data	Home size (sq. ft.)
Lighting	Florescent Lighting and LED Bulbs	Engineering analysis / UT 2016-2017 LIW Program Participant Survey / ADM UT 2017-2018 Residential Program Evaluation	ISR (%) HOU (hours)
HVAC	Furnace Fan	Engineering analysis / UT 2016-2017 LIW Program Participant Survey / Primary data collection from publicly available housing or county assessor data	ISR (%) HDD/CDD AC capacity (tons) AC saturation (%)
	Duct Sealing and Insulation	Deemed savings review	-

4.2 Evaluated Gross Annual Energy (kWh) Savings

The following measures were installed through the LIW program in 2016-2017:

- Lighting measures, including LED bulbs and CFL bulbs
- HVAC measures, including furnace fans and duct sealing and insulation
- Appliance measures, including refrigerator replacement
- Building shell measures, including weatherization measures

Engineering calculations and deemed savings reviews were performed for a census of program measures. Detailed methodology descriptions are outlined in the sections below.

ADM determined evaluated gross unit energy savings (UES) values by incorporating verified measure installation rates together with engineering analyses for lighting, furnace fans and some building shell measures; and deemed savings reviews for refrigerator replacements, duct sealing and insulation and some building shell measures. ADM's estimation of verified UES per measure takes into consideration Utah's deemed savings

values and the measure savings assumptions and calculations contained in the provided TRL files.

4.2.1 Lighting Measures

Lighting measures included in Rocky Mountain Power’s LIW program included LED bulbs and florescent lighting (CFL bulbs) and represented 45.1% of total LIW program claimed savings. Rocky Mountain Power claimed the following gross energy savings for lighting measures shown in Table 4-5.

Table 4-5: 2016-2017 Utah LIW Program Claimed Gross Energy Savings for Lighting

Measure Category	Measure Type	2016 Quantity	2016 Savings (kWh)	2017 Quantity	2017 Savings (kWh)
Lighting	Florescent Lighting	3,985	103,778	500	13,000
	LED Bulbs	73	1,929	3,629	95,914
	TOTAL	4,058	105,707	4,129	108,914

4.2.1.1 Database Review of Ex-Ante Values

For all lighting measures in Rocky Mountain Power’s LIW program in 2016 and 2017, ADM reviewed and reconciled the program tracking data to the claimed participation counts and ex-ante claimed savings in the 2016 and 2017 annual reports. Further, ADM conducted the ex-ante review activities detailed below for lighting measures:

- Verified that the program tracking dataset did not include duplicate or erroneous data entries
- Confirmed data entries in program tracking dataset included all necessary fields for savings calculations
- Verified that all energy savings were claimed in accordance with the applicable TRL documents and calculations

For the florescent lighting measure in 2016 and 2017, Rocky Mountain Power claimed an ex-ante UES value of 26.0 kWh. ADM was not able to verify the source of the claimed ex-ante UES value because a source document was not identified in the program tracking dataset or the TRL file extract. ADM verified that the claimed ex-ante UES value of 26.0 kWh per CFL bulb is reasonable and compares to a UES value of 27.93 kWh for direct install CFL bulbs sourced from Rocky Mountain Power’s TRL file “3-10-2014_UT_HES_CFLs_Brief”.

For the LED Lighting measure in 2016 and 2017, Rocky Mountain Power claimed an ex-ante UES value of 26.43 kWh, which was based on the weighted average UES of Mail by

Request LED bulbs as listed in the TRL file “03-10-2014_UT_HES_LEDs_Brief”. Program tracking data did not include specific wattages for LED bulbs installed through the program. ADM suggests that 23.75 kWh, the weighted average UES value for Direct-Install general LED bulbs from the TRL file “03-10-2014_UT_HES_LEDs_Brief” would have been a more appropriate ex-ante value since the wattages of bulbs were not specified in the tracking data.

4.2.1.2 Inputs to Savings Calculations

The annual energy (kWh) savings per LED and CFL light bulb were calculated per the engineering calculation below in Equation 4-1 and the inputs specified in Table 4-6 and Table 4-7.

Equation 4-1: Calculations for Energy Savings (kWh): Lighting Measures

$$kWh(savings) = \frac{\Delta Watts}{1000} \times ISR * Hours \times IEF_e$$

Where:

$\Delta Watts$ = Watts, baseline bulb - Watts, energy efficient bulb

ISR = “In Service Rate” or installation rate for LIW program lighting measures in Utah in 2016-2017

$Hours$ = Hours of Use (HOU) per year, or the product of 365.25 days per year and the average daily hours of use for efficient lighting measures

IEF_e = Interactive Effects Factor (IEF) to account for cooling energy savings and heating energy penalties

Table 4-6: Inputs for Energy Savings Calculations: CFL Measures

Variable	Description	Ex-Ante Value	Ex-Ante Source	Ex-Post Value	Ex-Post Source
Watts _{base}	The deemed wattage of existing bulbs	50.15 watts	Rocky Mountain Power TRL file “3-10-2014_UT_HES_CFLs_Brief”	50.15 watts	Rocky Mountain Power TRL file “3-10-2014_UT_HES_CFLs_Brief”
Watts _{EE}	The wattage of the new CFL bulbs	16.01 watts	Rocky Mountain Power TRL file “3-10-2014_UT_HES_CFLs_Brief”	16.01 watts	Rocky Mountain Power TRL file “3-10-2014_UT_HES_CFLs_Brief”
Hours	Average hours of use per year	828.55 hours	Cadmus Evaluation of Rocky Mountain Power’s HES Program in UT, 2011-12	719.05 hours	ADM 2017-2018 Utah Residential General Population Survey KEMA Study on Residential Lighting End-Use Consumption ³
ISR	In Service Rate (the percentage of bulbs provided by the program that are installed)	98.0%	RTF Storage and Removal Rate v3.0	87.7%	ADM Utah LIW Program Participant Survey
IEF _e	Interactive Effects Factor for Energy (to account for cooling savings from efficient lighting)	1.007	Rocky Mountain Power TRL file “3-10-2014_UT_HES_CFLs_Brief”	1.007	Rocky Mountain Power TRL file “3-10-2014_UT_HES_CFLs_Brief”
kWh _{savings}	Lighting savings per CFL bulb	26.0 kWh	Unknown ⁴	21.67 kWh	Calculated

³ Residential Lighting End-Use Consumption Study: Estimation Framework and Initial Estimates; DNV KEMA Energy and Sustainability, Pacific Northwest National Laboratory; December 2012.

⁴ The source document for the actual claimed ex-ante value of 26.0 kWh was not identified or provided. ADM verified that the claimed ex-ante UES value of 26.0 kWh per CFL bulb is reasonable and compares to a UES value of 27.93 kWh for direct install CFL bulbs sourced from Rocky Mountain Power’s TRL file “3-10-2014_UT_HES_CFLs_Brief”.

Table 4-7: Inputs for Energy Savings Calculations: LED Measures

Variable	Description	Ex-Ante Value	Ex-Ante Source	Ex-Post Value	Ex-Post Source
Watts _{base}	The deemed wattage of existing bulbs	42.93 watts	Rocky Mountain Power TRL file "3-10-2014_UT_HES_LEDs_Brief"	36.95 watts ⁵	Rocky Mountain Power TRL file "3-10-2014_UT_HES_LEDs_Brief" ADM 2017-2018 Final Evaluation Report for Utah Residential wattsmart Homes Program
Watts _{EE}	The wattage of the new LED bulbs	13.28 watts	Rocky Mountain Power TRL file "3-10-2014_UT_HES_LEDs_Brief"	10.18 watts	Rocky Mountain Power TRL file "3-10-2014_UT_HES_LEDs_Brief" ADM 2017-2018 Final Evaluation Report for Utah Residential wattsmart Homes Program
Hours	Average hours of use per year	828.55 hours	Cadmus Evaluation of Rocky Mountain Power's HES Program in UT, 2011-12	719.05 hours	ADM 2017-2018 Utah Residential General Population Survey KEMA Study on Residential Lighting End-Use Consumption
ISR	In Service Rate (the percentage of bulbs provided by the program that are installed)	96.0%	RTF Storage and Removal Rate v3.0	92.4%	ADM Utah LIW Program Participant Survey
IEF _e	Interactive Effects Factor for Energy (to account for cooling savings from efficient lighting)	1.007	Rocky Mountain Power TRL file "3-10-2014_UT_HES_LEDs_Brief"	1.007	Rocky Mountain Power TRL file "3-10-2014_UT_HES_LEDs_Brief"
kWh _{savings}	Lighting savings per LED bulb	26.43 kWh	Rocky Mountain Power TRL file "3-10-2014_UT_HES_LEDs_Brief"	17.91 kWh	Calculated

⁵ Utah-specific baseline and efficient wattages were calculated by weighting the wattages reported in the Rocky Mountain Power TRL by the quantity of bulbs distributed through the Utah Residential wattsmart Homes program.

The ex-post baseline and energy efficient wattages for CFL bulbs were calculated based on weighted averages in the TRL file. The ex-post baseline and energy efficient wattages for LED bulbs were calculated using a weighted average of the wattages in the TRL file and the assortment of LED bulbs in Rocky Mountain Power's 2017 and 2018 residential wattsmart Homes Program in Utah. This was a robust sample of 105,508 LED bulbs that represented LED bulb distribution in Utah.

The ex-ante HOU values for both CFL bulbs and LED bulbs are identified in the TRL files provided by Rocky Mountain Power and are based on a Cadmus Evaluation of Rocky Mountain Power's Home Energy Savings (HES) Program in Utah in 2011 and 2012. The ex-post HOU values for both CFL bulbs and LED bulbs were calculated based on results derived from ADM's 2017-2018 Residential Wattsmart Homes General Population Survey in Utah regarding installation percentage by room type in Utah and HOU values by room type contained in a KEMA Study on Residential Lighting End-Use Consumption.⁶ Because ADM collected installation percentages by room type through a Residential General Population Survey in Utah, a study that includes HOU values by room type is appropriate to use in this case. Additionally, this is the most recent lighting study of its magnitude. The overall HOU values in the study are within the range of other HOU values and studies reviewed by ADM.

The ex-ante ISR values for both CFL bulbs and LED bulbs are identified in the TRL files provided by Rocky Mountain Power and are based on the storage and removal rates in the lighting RTF file version 3.0. The ex-post ISR values for both CFL bulbs and LED bulbs were calculated based on results derived from ADM's 2016-2017 LIW Program Participant Survey in Utah. ADM analyzed the responses to various questions related to lighting installation, including questions regarding removals and burnouts.

The ex-ante IEF value for both CFL bulbs and LED bulbs are identified in the TRL files provided by Rocky Mountain Power. The ex-post IEF values for both CFL and LED bulbs were sourced from the same TRL file.

4.2.1.3 Evaluated Ex-Post Gross Unit Energy Savings

Table 4-8 below shows the claimed and evaluated gross savings and realization rate by lighting measure category. The realization rates for both CFL bulbs and LED bulbs are lower than the claimed (ex-ante) savings because of actual ISR and HOU values and because of the ex-ante savings values (see discussion in section 4.2.1.1).

⁶ Residential Lighting End-Use Consumption Study: Estimation Framework and Initial Estimates; DNV KEMA Energy and Sustainability, Pacific Northwest National Laboratory; December 2012.

Table 4-8: 2016-2017 Low Income Weatherization Program Claimed and Evaluated Gross Energy Savings for Lighting

Measure Category	Year	Measure Type	Claimed Savings (kWh)	Evaluated Gross Savings (kWh)	Realization Rate
Lighting	2016	Florescent Lighting	103,778	86,367	83.2%
		LED Bulbs	1,929	1,307	67.8%
	2017	Florescent Lighting	13,000	10,836	83.4%
		LED Bulbs	95,914	64,989	67.8%
2016-2017 TOTAL			214,621	163,500	76.2%

4.2.2 HVAC Measures

HVAC measures included in Rocky Mountain Power’s LIW program included 249 furnace fans and one duct sealing and insulation measure and represented 27.9% of total LIW program claimed savings. Rocky Mountain Power claimed the following gross energy savings for HVAC measures shown in Table 4-9.

Table 4-9: 2016-2017 Utah LIW Program Claimed Gross Energy Savings for HVAC

Measure Category	Measure Type	2016 Quantity	2016 Savings (kWh)	2017 Quantity	2017 Savings (kWh)
HVAC	Furnace Fan	116	60,668	132	69,036
	Duct Sealing and Insulation	1	2,324	-	-
	TOTAL	117	62,992	132	69,036

4.2.2.1 Database Review of Ex-Ante Values

For all HVAC measures in Rocky Mountain Power’s LIW program in 2016 and 2017, ADM reviewed and reconciled the program tracking data to the claimed participation counts and ex-ante claimed savings in the 2016 and 2017 annual reports. Further, ADM conducted the ex-ante review activities detailed below for HVAC measures:

- Verified that the program tracking dataset did not include duplicate or erroneous data entries
- Confirmed data entries in program tracking dataset included all necessary fields for savings calculations
- Verified that all energy savings were claimed in accordance with the applicable TRL documents and calculations

For the furnace fan measure in 2016 and 2017, Rocky Mountain Power claimed an ex-ante UES value of 523 kWh. ADM verified that the source for this ex-ante UES value is

the Rocky Mountain Power 2013-2014 Home Energy Savings Residential Evaluation⁷ as indicated in the TRL extract file.

For the duct sealing and insulation measure in 2016 and 2017, Rocky Mountain Power claimed an ex-ante UES value of 2,324 kWh for the one instance of this measure. ADM verified that the source for this ex-ante UES value is the Rocky Mountain Power TRL file, “04-02-2014_UT_HES_DS&I_Brief”.

4.2.2.2 Inputs to Savings Calculations

The annual energy (kWh) savings for furnace fans was calculated per the engineering calculation below in Equation 4-2 and the inputs specified in Table 4-10. Through the Utah LIW Program Participant Survey, ADM verified a 100% ISR for the furnace fan measure.

Equation 4-2: Calculations for Energy Savings (kWh): Furnace Fan Measure

$$kWh(savings\ total) = kWh(savings\ cool) + kWh(savings\ heat) + kWh(savings\ circulation)$$

$$kWh(savings\ cool) = tons \times EFLH(cooling) \times 12 \times \left(\frac{1}{SEER(base)} - \frac{1}{SEER(ECM)} \right) \times \% AC$$

$$kWh(savings\ heat) = hours(heat) \times \Delta kW(heat)$$

$$kWh(savings\ circulation) = hours(circulation) \times \Delta kW(circulation)$$

Where:

<i>tons</i>	= Air conditioner capacity
<i>EFLH_{cooling}</i>	= Effective full load cooling hours
<i>SEER_{base}</i>	= Baseline SEER
<i>SEER_{ECM}</i>	= Efficient SEER
<i>% AC</i>	= Percentages of furnaces with air conditioning
<i>hours_{heat}</i>	= Hours of heating operation
<i>ΔkW_{heat}</i>	= Power savings in heating
<i>hours_{circulation}</i>	= Hours of fan-only operation
<i>ΔkW_{circulation}</i>	= Power savings in fan-only operation

⁷ Final Report: 2013-2014 Utah Home Energy Savings Program Evaluation; Cadmus; April 25, 2016.

Table 4-10: Inputs for Energy Savings Calculations: Furnace Fan Measure

Variable	Description	Ex-Post Value	Ex-Post Source
<i>tons</i>	Air conditioner capacity	2.13 tons	Energy Star Database Public Housing Data
<i>EFLH_{cooling}</i>	Effective full load cooling hours	1,351 hours	ADM Utah 2017-2018 Residential Evaluation billing analysis
<i>SEER_{base}</i>	Baseline SEER	12	Cadmus Wisconsin Metering Study (2014) ⁸
<i>SEER_{ECM}</i>	Efficient SEER	13	Cadmus Wisconsin Metering Study
<i>% AC</i>	Percentages of furnaces with air conditioning	36%	Public Housing Data
<i>kWh_{savings, cooling}</i>	Cooling operation savings	80 kWh	Calculated
<i>hours_{heat}</i>	Annual hours of heating operation	921 hours	ADM Utah 2017-2018 Residential Evaluation billing analysis ⁹ (HDD Utah) EPA 2002 (HDD Wisconsin) Cadmus Wisconsin Metering Study (Wisconsin hours of heating operation) ¹⁰
<i>ΔkW_{heat}</i>	Power savings in heating	0.116 kW	Cadmus Wisconsin Metering Study
<i>kWh_{savingsheating}</i>	Heating operation savings	107 kWh	Calculated
<i>hours_{circulation}</i>	Hours of fan-only operation	1,020 hours	Cadmus Wisconsin Metering Study
<i>ΔkW_{circulation}</i>	Power savings in fan-only operation	0.207 kW	Cadmus Wisconsin Metering Study
<i>kWh_{savings circulation}</i>	Circulation operation savings	211 kWh	Calculated
<i>kWh_{savings total}</i>	Total Savings	398 kWh	Calculated

⁸ Focus on Energy Evaluated Deemed Savings Changes; Cadmus; November 14, 2014.

⁹ Final Evaluation Report for Rocky Mountain Power Residential wattsmart Homes Program in Utah; ADM; October 25, 2019.

¹⁰ Hours of operation were adjusted using the ratio of heating degree days (HDD) in Wisconsin (sourced from an EPA database) to HDD in Utah (sourced from ADM's billing analysis for furnace fan participants in the 2017-2018 Utah Residential wattsmart Homes Program Evaluation).

The ex-post input value for air conditioner capacity is calculated based on the participant home size and the Energy Star Database for air conditioning sizing. ADM collected participant home sizes using public housing data sources, such as Zillow.com. The Energy Star Database estimates air conditioning sizing based on the square footage of homes in the relevant climate zone.

The ex-post input value for effective full load cooling hours is based on a billing analysis that ADM completed for furnace fan participants in the 2017-2018 Utah Residential wattsmart Homes Program Evaluation.

The ex-post input values for baseline and efficient SEER conditions are sourced from the Cadmus Wisconsin Metering Study. This is the only available furnace fan study of which ADM is aware.

The ex-post input value for percentage of furnaces with air conditioning is based on information ADM collected for each participant from public housing data sources in Utah, such as Zillow.com.

The Cadmus Wisconsin metering study is the only available furnace fan study of which ADM is aware. In the absence of local estimates, the ex-post input value for hours of heating operation is based on the hours of heating operation for Wisconsin, as determined in the Cadmus Wisconsin Metering Study. Wisconsin hours of operation were adjusted using the ratio of heating degree days in Wisconsin (sourced from an EPA database) and Utah (sourced from ADM's billing analysis for furnace fan participants in the 2017-2018 Utah Residential wattsmart Homes Program Evaluation).

The remaining ex-post input values, for power savings in heating operation, hours of fan-only operation, and power savings in fan-only operation are sourced from the Cadmus Wisconsin Metering Study.

4.2.2.3 Evaluated Ex-Post Gross Unit Energy Savings

Table 4-11 below shows the claimed and evaluated gross savings by HVAC measure category in addition to the realization rates. The realization rate of 76.2% for furnace fans is a result of ADM's engineering calculation and the inputs discussed above compared to the claimed ex-ante UES value for furnace fans in Utah. The realization rate for the one duct sealing and insulation measure is 100%. ADM reviewed the claimed ex-ante UES value and found it to be the correct savings value.

Table 4-11: 2016-2017 Utah LIW Program Claimed and Evaluated Gross Energy Savings for HVAC

Measure Category	Year	Measure Type	Claimed Savings (kWh)	Evaluated Gross Savings (kWh)	Realization Rate
HVAC	2016	Furnace Fan	60,668	46,199	76.2%
		Duct Sealing and Insulation	2,324	2,324	100.0%
	2017	Furnace Fan	69,036	52,572	76.2%
2016-2017 TOTAL			132,028	101,095	76.6%

4.2.3 Appliance Measures

Appliance measures included in Rocky Mountain Power’s LIW program included refrigerator replacements and represented 25.5% of total LIW program claimed savings. Rocky Mountain Power claimed the following gross energy savings for appliance measures shown in Table 4-12.

Table 4-12: 2016-2017 Utah LIW Program Claimed Gross Energy Savings for Appliances

Measure Category	Measure Type	2016 Quantity	2016 Savings (kWh)	2017 Quantity	2017 Savings (kWh)
Appliances	Refrigerator Replacement	41	36,039	64	56,256
	TOTAL	41	36,039	64	56,256

4.2.3.1 Database Review of Ex-Ante Values

For the appliance measure in Rocky Mountain Power’s LIW program in 2016 and 2017, ADM reviewed and reconciled the program tracking data to the claimed participation counts and ex-ante claimed savings in the 2016 and 2017 annual reports. Further, ADM conducted the ex-ante review activities detailed below for the appliance measure:

- Verified that the program tracking dataset did not include duplicate or erroneous data entries
- Confirmed data entries in program tracking dataset included all necessary fields for savings calculations
- Verified that all energy savings are claimed in accordance with the applicable TRL documents and calculations

For the refrigerator replacement measure in 2016 and 2017, Rocky Mountain Power claimed an ex-ante UES value of 879 kWh. ADM verified that the source for this ex-ante UES value is the Rocky Mountain Power Utah Low-Income Weatherization Program Evaluation Report for Program Years 2010-2012 as indicated in the TRL extract file.

4.2.3.2 Inputs to Savings Calculations

Through the Utah LIW Program Participant Survey, ADM verified a 100% ISR for the refrigerator replacement measure.

4.2.3.3 Evaluated Ex-Post Gross Unit Energy Savings

Table 4-13 below shows the claimed and evaluated gross savings for the appliance measure category in addition to the realization rate. The realization rate for the refrigerator replacement measure is 100%. ADM performed a deemed savings review of the claimed ex-ante UES value of 879 kWh and found this value to be the proper savings value for the measure.

ADM attempted to obtain data from the Utah Department of Housing and Community Development regarding baseline or efficient replacement product information and/or energy usage data associated with baseline or efficient replacement refrigerators. This information would inform an engineering calculation related to savings from the refrigerator replacement measure specific to the LIW program in Utah. ADM was not able to obtain this information and recommends that in future program years, Rocky Mountain Power request that this information is provided to them by the agency implementers.

Table 4-13: 2016-2017 Low Income Weatherization Program Claimed and Evaluated Gross Energy Savings for Appliances

Measure Category	Year	Measure Type	Claimed Savings (kWh)	Evaluated Gross Savings (kWh)	Realization Rate
Appliances	2016	Refrigerator Replacement	36,039	36,039	100.0%
	2017	Refrigerator Replacement	56,256	56,256	100.0%
2016-2017 TOTAL			92,295	92,295	100.0%

4.2.4 Building Shell Measures

Building shell measures included in Rocky Mountain Power's LIW program included Utah weatherization measures that represented approximately 1.5% of total LIW program claimed savings. Rocky Mountain Power claimed the following gross energy savings for building shell measures shown in Table 4-14.

Table 4-14: 2016-2017 Utah LIW Program Claimed Gross Energy Savings for Building Shell Measures

Measure Category	Measure Type	2016 Quantity	2016 Savings (kWh)	2017 Quantity	2017 Savings (kWh)
Building Shell	Utah Weatherization	4	5,416	-	-
	2016 TOTAL	4	5,416	-	-

4.2.4.1 Database Review of Ex-Ante Values

For the building shell measure in Rocky Mountain Power's LIW program in 2016 and 2017, ADM reviewed and reconciled the program tracking data to the claimed participation counts and ex-ante claimed savings in the 2016 and 2017 annual reports. Further, ADM conducted the ex-ante review activities detailed below for the building shell measure:

- Verified that the program tracking dataset did not include duplicate or erroneous data entries
- Confirmed data entries in program tracking dataset included all necessary fields for savings calculations
- Verified that all energy savings were claimed in accordance with the applicable TRL documents and calculations

For the building shell measure in 2016 and 2017, Rocky Mountain Power claimed an ex-ante UES value of 1,354.0 kWh. This value reflects a bundled Utah weatherization measure that includes individual building shell measures of ceiling insulation and double glass replacement. ADM was not able to verify the source of the claimed ex-ante UES value. The source document for this measure was identified in Rocky Mountain Power's TRL file extract as the "Rocky Mountain Power Utah Low Income Weatherization Analysis, Quantec 2004". Rocky Mountain Power was not able to provide this document to ADM.

4.2.4.2 Inputs to Savings Calculations

For the four homes that received the Utah building shell weatherization measure, ADM collected primary data regarding home size and heat type from publicly available housing or county assessor data. The average home size that participated in the LIW program building shell measure was 1,064 square feet.

4.2.4.3 Evaluated Ex-Post Gross Unit Energy Savings

Table 4-15 below shows the claimed and evaluated gross savings for the building shell measure category in addition to the realization rate. The realization rate for the Utah building shell weatherization measure is 98%. ADM performed a deemed savings review and engineering calculation for each of the four homes that received the building shell weatherization measure in Utah. All four of the homes received the ceiling insulation measure and three homes received the double glass replacement measure within the bundled building shell weatherization measure. For the ceiling insulation individual measure, ADM used the UES value of 1.20 kWh per square foot for ceiling insulation in electrically heated homes contained in the Rocky Mountain Power TRL file "03-05-2014_UT_HES_Attic_Insulation_Brief". ADM applied this UES value to the home size data collected for each participant home to calculate ceiling insulation savings per home.

For the double glass replacement individual measure, ADM used the UES value of 1.06 kWh per square foot for Tier 1 (U-0.30 upgrade) window replacement contained in the Rocky Mountain Power TRL file “03-10-2014_UT_HES_Windows_Brief”. ADM applied this UES value to the quantity of windows installed in each participant home and an assumed an average window size of 16 square feet. These calculated savings for the individual installed measures for each participant household were then summed, resulting in a 98% realization rate compared to the claimed UES value for the bundled building shell weatherization measure.

Table 4-15: 2016 Low Income Weatherization Program Claimed and Evaluated Gross Energy Savings for Building Shell

Measure Category	Year	Measure Type	Claimed Savings (kWh)	Evaluated Gross Savings (kWh)	Realization Rate
Building Shell	2016	Utah Weatherization	5,416	5,310	98.0%
2016-2017 TOTAL			5,416	5,310	98.0%

5. Process Evaluation

ADM completed a process evaluation of the Rocky Mountain Power LIW program during 2016 and 2017 that consisted of:

- Review of program materials
- In-depth interviews with program staff
- Program participant survey

5.1 Review of Program Materials and In-depth Interviews with Program Staff

ADM evaluators interviewed LIW program staff from Rocky Mountain Power and from State of Utah Department of Workforce Services, Housing and Community Development Division (HCD) to gain insight into program design, to identify program objectives, and to assess the program during the evaluation period of 2016 and 2017.

5.1.1 Roles and Responsibilities

Rocky Mountain Power is a subsidiary of PacifiCorp. PacifiCorp's LIW program manager oversees the program in Utah, Wyoming, Washington, Idaho and California. The program manager who oversaw the program during the 2016-2017 evaluation period is no longer with PacifiCorp and was therefore unavailable to interview. Current program staff, some of whom held positions in the LIW program during evaluation period, were interviewed.

PacifiCorp's LIW program manager works with the weatherization program manager at the HCD to implement the program for Rocky Mountain Power in Utah. HCD centrally manages utility and federal weatherization contracts in the state of Utah.

The evaluators interviewed HCD's weatherization program manager who has been responsible for overseeing the State of Utah's weatherization program since 2010.

Utah's HCD program staff is responsible for the following program management activities:

- Determine applicants' eligibility and priority status as established by federal guidelines
- Oversee agencies that perform energy audits and install qualifying measures
- Verify that agencies' certified quality control inspectors visit all project sites
- Manage federal grants and utility funds and disbursements to implementation agencies
- Inspect a sample of completed program project homes
- Verify that invoices from agencies are correct and process them for payment by the appropriate funding sources

5.1.2 Tracking and Reporting

During the evaluation period, HCD submitted documentation for completed weatherization jobs on a multi-part paper form which was mailed to Rocky Mountain Power for processing. Rocky Mountain Power provided ADM with program tracking data that specified what measures were installed per project and estimated energy savings per measure. Customers' phone numbers and email addresses (when available) at the time of participation in the program were included in the tracking data.

5.1.3 Communication

The HCD weatherization program manager indicated that communications with Rocky Mountain Power is comprised primarily of email messages and transference of invoices. Neither HCD nor Rocky Mountain Power expressed concerns about the current level of communication between Rocky Mountain Power and HCD. HCD reports having a close and effective working relationship with the implementation agencies.

5.1.4 Marketing and Outreach

The availability of the program is communicated to potential participants primarily through implementation agencies and the HCD when individuals apply for assistance from other income-qualifying programs such as the Low Income Home Energy Assistance Program (LIHEAP). Because the demand for weatherization services challenges the implementation agencies' capacity, additional marketing and outreach efforts are limited.

5.1.5 Quality Assurances and Quality Controls (QA/QC)

Much of the State of Utah's weatherization program funding comes from the DOE Weatherization Assistance Program (WAP). Therefore, the state program's quality assurance and quality control practices are driven by DOE's QA/QC requirements that were implemented in 2015, after the previous program evaluation period. DOE requires that all jobs are inspected by Quality Control Inspectors (QCIs) who have been certified by the Building Performance Institute. HCD reported that implementation agencies complied with federal weatherization program auditing, quality control and inspection requirements.

Certified QCIs inspect each site before submitting invoices to HCD, who in turn submits them to Rocky Mountain Power. Additionally, HCD inspects a sample of projects: 10% per agency for agencies that use the same person to conduct their energy audits and inspections, and 5% per agency for agencies that use different people to conduct their energy audits and inspections.

HCD indicated that Rocky Mountain Power did not complete any additional QA/QC processes. Rocky Mountain Power did not visit HCD offices, implementation agencies or client sites during the evaluation period.

5.1.6 In Depth Interview Takeaways

The following findings resulted from ADM's in-depth interviews with program staff:

- Two notable program changes took place during the evaluation period: 1) the transition from CFLs in 2016 to LED light bulbs in 2017, and 2) the addition of inspections completed by certified QCIs in 2015 as required by the DOE.
- Only electrically heated homes are eligible for shell measures paid for with Rocky Mountain Power funding. During the 2016-2017 evaluation period, 5 out of 612 homes received Rocky Mountain Power-funded shell measures.
- Rocky Mountain Power funding of the program did not exceed its funding cap in either 2016 or 2017.
- HCD used evidence-based continuous improvement practices to increase the percentage of homes that achieved the program's energy savings target of a 30 percent decrease in energy consumption.
- Wait times from application to program enrollment vary widely across agencies ranging from 6 months to over 2 years. The average time on a wait list was about 1 year.
- Prior to the evaluation period, Utah HCD built a state-of-the art weatherization training facility with a full-scale model home used to provide year-round technical weatherization training.
- Utah HCD hosts an annual training event for all LIW program staff around the state – roughly 70 employees. The annual event provides technical training and recognizes employee longevity and service. The average tenure of approximately 7 years reflects the stability of the workforce and the program.
- No formal client survey or satisfaction survey tools were used by HCD to collect data from program participants.
- HCD works with Utah's LIHEAP program to establish income eligibility. This process eliminates the duplication of efforts by program clients and staff. Most LIW participants were also enrolled in LIHEAP.
- During the evaluation period, HCD recognized the need to improve its energy efficiency education efforts with LIW clients. New education training was implemented in 2019.

- During the evaluation period, the Utah’s weatherization program manager requested that Rocky Mountain Power add cooling measures to the list of reimbursed measures so that more homes would be eligible for Rocky Mountain Power-funded shell measures. Cooling measures were added to the tariff in 2019.

5.2 Program Participant Survey

The participant survey evaluation was designed to research and document the experiences of program participants. ADM used survey results to assess implementation strategies and program design. The participant survey was designed to answer the following questions.

- How did participants hear about the program?
- Why did customers decide to participate in the program?
- How satisfied were participants with the work performed, the scheduling and application processes, and other aspects of program participation?
- What were the perceived energy and non-energy benefits associated with the program?

To address these researchable issues, ADM reviewed program documentation and administered participant surveys.

- **Program Documentation Review:** ADM reviewed tracking data that included information about install measures and program participants contact information.
- **Participant Survey:** ADM conducted a mixed mode (online and telephone) survey of qualifying income-qualified participants who received measures or services from the program. Participant emails ($n = 289$) and phone numbers ($n = 606$) were identified from data provided by Rocky Mountain Power and linked to the tracking data. ADM attempted to contact a total of 520 program participants as part of the survey efforts.

ADM sent emails to participants a total of four times throughout the month of December 2019 inviting them to participate in the survey, resulting in 34 completed surveys and 17 hard bounced email replies. ADM staff made 244 phone calls to 237 participants with phone numbers during the month of December (up to two times per household) resulting in 43 completed surveys, 20 refusals, five who did not recall participating in the program, 47 disconnected phones and 10 wrong numbers. Phone calls and email campaign messages were discontinued after ADM collected enough surveys ($n = 77$) to represent the total population of 612 program participants with at least 90% statistical confidence and +10% precision (typically the quantity of 68 is a standard sample size for 90/10 precision and ADM rounds up beyond this value).

ADM analyzed survey responses from 77 participants: online responses to an email campaign (n = 34) and telephone responses (n = 43). Program participants were offered monetary incentives (\$10 gift cards) for completing the survey. Survey topics covered measure installation rates as well as customer experiences with the program, installation crew, and agency staff.

5.2.1 Participant Survey Results

This section summarizes feedback received from survey respondents. ADM conducted a mixed mode (online/email and telephone) survey in December of 2019 and received 77 responses. The survey collected data on program awareness, confirmation of and satisfaction with measures installed, audit experience, and overall program satisfaction.

5.2.1.1 Program Awareness

LIW program participants first learned about the program through a variety of channels. Most participants reported learning about the program from a community agency (32%), word of mouth (31%) from friends or neighbors, from the internet (13%), from Rocky Mountain Power (10%) as well as other sources as indicated below in Table 5-1.

Table 5-1: How did participants learn about the program?

Response	<i>n</i>	Percentage of Respondents
From a community agency/another program	25	32%
From a friend/neighbor	24	31%
From the internet	10	13%
From information received through Rocky Mountain Power	8	10%
From an information brochure	4	5%
Don't remember	3	4%
Other	3	4%

Respondents reported deciding to participate in the program to save money on their energy bills (92%), to improve home comfort (80%), because the services were provided at no cost (72%), to reduce energy use for environmental reasons (45%), to improve the value of the home (42%) and other reasons (9%) as shown in Table 5-2.

Table 5-2: Why did respondents decide to participate in the program?

Response	<i>n</i>	Percentage of Respondents
To save money on energy bills	68	92%
To improve home comfort	33	80%
The services were provided at no cost	53	72%
To reduce energy use for environmental reasons	59	45%
To improve value of the home	31	42%
Other	7	9%

*Note: The sum of *n* may exceed the total surveyed (77) and percentages may exceed 100% because respondents could choose more than one response.*

5.2.1.2 Measures Installed

ADM asked survey respondents to confirm measures were installed in their homes through the program. Survey respondents confirmed receipt of ENERGY STAR refrigerators (92%), CFL light bulbs (90%), LED light bulbs (89%) and furnace fans (88%). Table 5-3 displays a summary of the measures that survey respondents reported receiving. Program participants who received the remaining measures did not complete the survey for the following reasons: window replacement (50% disconnected phone, 25% refused, 25% unable to reach), ceiling insulation (25% disconnected phone, 50% refused, 25% unable to reach) and duct ceiling and/or insulation (100% refused).

Table 5-3: What measures did survey respondents receive?

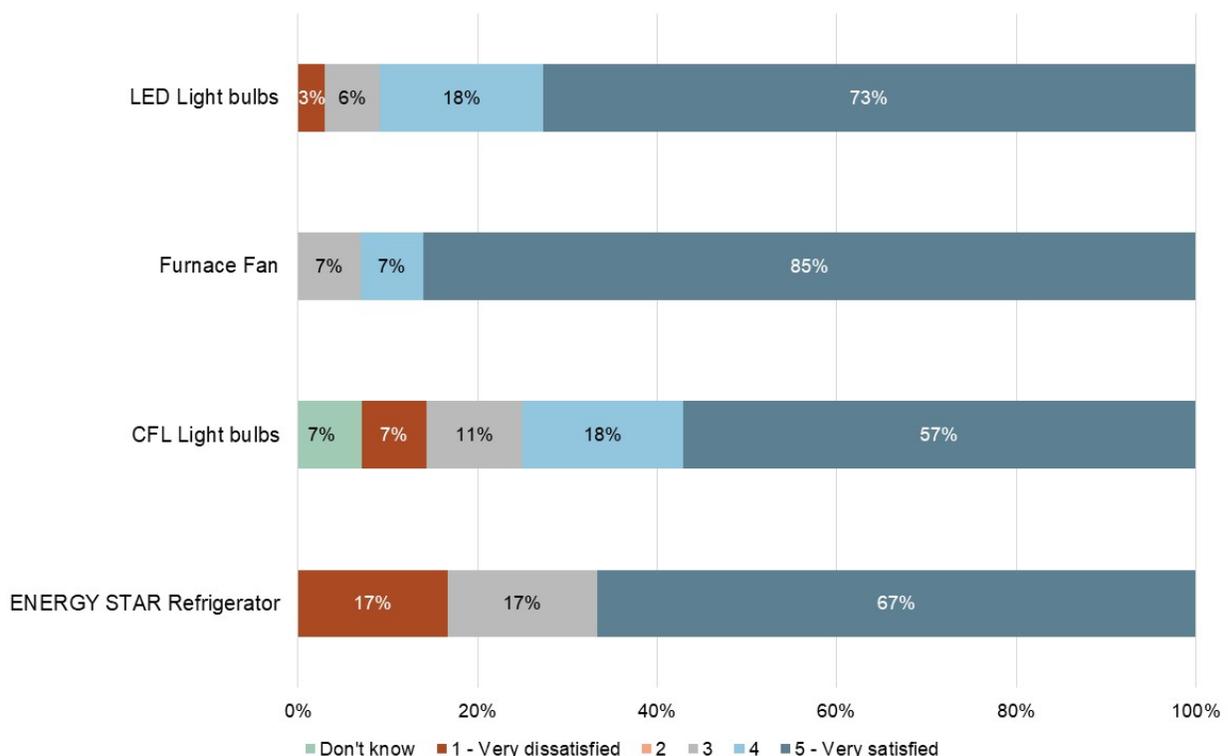
Measures	Yes	No	Don't know	Percentage confirming Yes
ENERGY STAR certified refrigerator	12	1	0	92%
CFL light bulbs	28	1	2	90%
LED light bulbs	33	2	2	89%
Furnace fan	30	0	4	88%
Window replacement	0	0	0	0%
Ceiling insulation	0	0	0	0%
Duct sealing and/or insulation	0	0	0	0%

Note: The percentages may exceed 100% because respondents were only asked to confirm receipt of measures indicated in tracking data and percentages were calculated for each item individually.

ADM asked respondents to rate their satisfaction with the measures they received through the program on a scale from 1 to 5, in which 1 meant “very dissatisfied” and 5

meant “very satisfied”. Almost all respondents (91%) rated their satisfaction with the LED light bulbs a 4 (18%) or 5 (73%). Similarly, nearly all respondents (86%) rated their satisfaction with the furnace fan they received through the program a 4 (7%) or 5 (85%). Figure 5-1 displays survey respondents’ level of satisfaction with LED light bulbs, furnace fans, CFL light bulbs and ENERGY STAR refrigerators. Respondents noted reasons for dissatisfaction including the bulbs being too dim and the refrigerator arriving broken or damaged. Two ratings of “1” were removed from analysis regarding the furnace fan either not working or the respondent was not taught how to program it.

Figure 5-1: Satisfaction with Energy Savings Measures



Approximately two-thirds of respondents (62% LED, 59% CFL) reported they had not uninstalled any of the lightbulbs they received through the program. The remainder of respondents noted they had either removed some of the lightbulbs they received through the program (31% LED, 29% CFL), they did not recall (4% LED, 6% CFL) or did not know (4% LED, 6% CFL). Respondents who recalled details on the number of bulbs received from the program were able to verify approximately 5% (both LED and CFL) were never installed, or they were given to them as extras or spares. Overall, respondents’ data show the program years 2016-2017 installation service rates (ISR) were approximately 94% for LED and 87% for CFL light bulbs.

Of the respondents that mentioned some or all LED light bulbs had been removed, all of them noted the reason was they broke or burned out (100%). Of the respondents that mentioned some or all CFL light bulbs had been removed, 80% noted the reason was that they broke or burned out and 20% noted other reasons (bulbs were stolen). Most respondents (81% LED, 54% CFL) who reported receiving light bulbs said they replaced incandescent bulbs, 19% noted the LEDs replaced CFLs while some (12% LED, 8% CFL) could not recall the type of lighting the new bulbs replaced, or did not know (0% LED, 4% CFL).

All respondents who confirmed receipt of refrigerators and furnace fans through the program reported they were still installed (100%). Respondents who could not confirm receipt of these measures were minimal, therefore, ADM assumed 100% installation rate for the sake of the engineering calculations as these surveys were administered approximately two to four years after the installation date and respondents may not accurately recall the measures installed.

5.2.1.3 Audit Experience

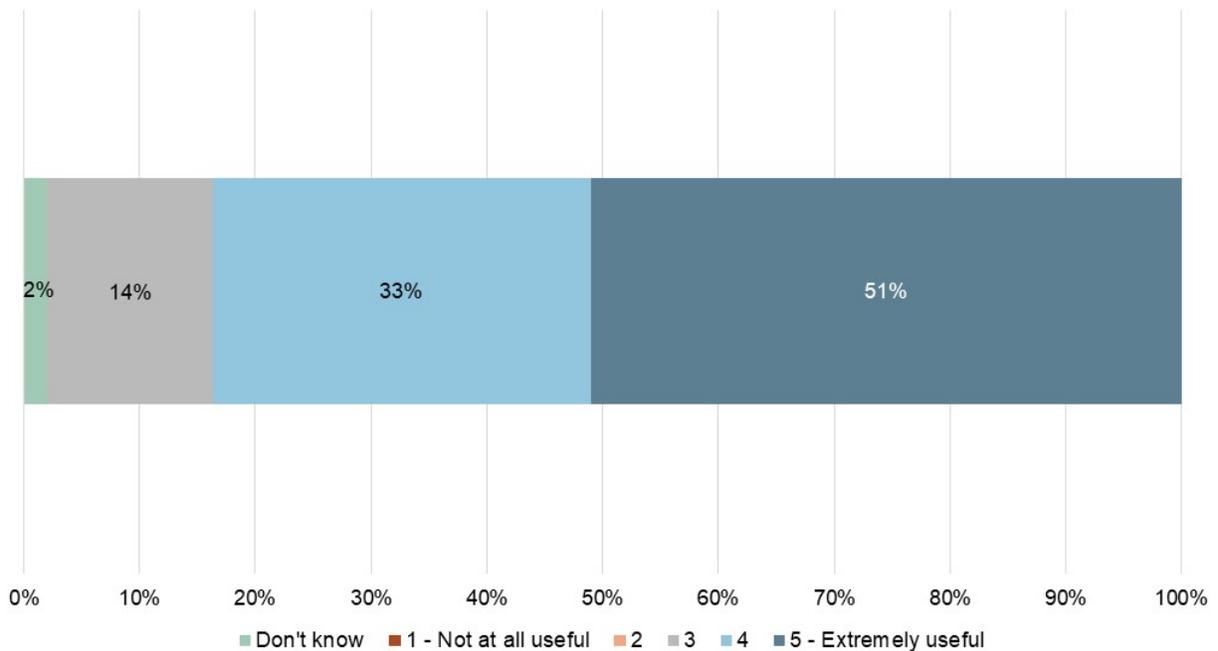
Most survey respondents reported they had a positive experience with the home energy audit. Seventy-eight percent of respondents rated their satisfaction with scheduling their audit a 4 (17%) or 5 (61%) while 9% responded they did not know. Nearly all respondents stated their visit was scheduled at a convenient time (82%) and the home energy auditor or inspector arrived at their home on time or at least within 15 minutes of the scheduled appointment (74%).

Despite overall satisfaction with promptness and scheduling of their audit, some customers voiced dissatisfaction with their overall audit and/or appliance drop-off experience. About 5% of survey respondents noted issues relating to the delivery of their appliances regarding the lack of professionalism of the workers, poor quality of appliance received or incomplete or unsatisfactory installation. A similar portion of respondents also mentioned a desire to receive assessments for, or consideration to receive additional program measures (e.g. windows) and expressed dissatisfaction with the scheduling process. Finally, some participants indicated they could not remember specific details of their audit experience (9-17%).

Many respondents (64%) indicated they spoke with the auditor about ways to save energy in their home or that the auditor left educational materials about how to save energy, while the remainder reported they did not receive information (10%), they did not remember (22%) or did not know (4%). Eighty-eight percent of respondents indicated they felt they knew more about saving energy after the auditor's visit. Eighty-four percent of respondents rated the information's usefulness a 4 (33%) or a 5 (51%) on a scale from 1 to 5 in which 1 represented "not at all useful" and 5 represented "extremely useful". Figure

5-2 displays respondents' rating of the usefulness of the information provided by the auditor.

Figure 5-2: Usefulness of Energy Savings Tips and Information



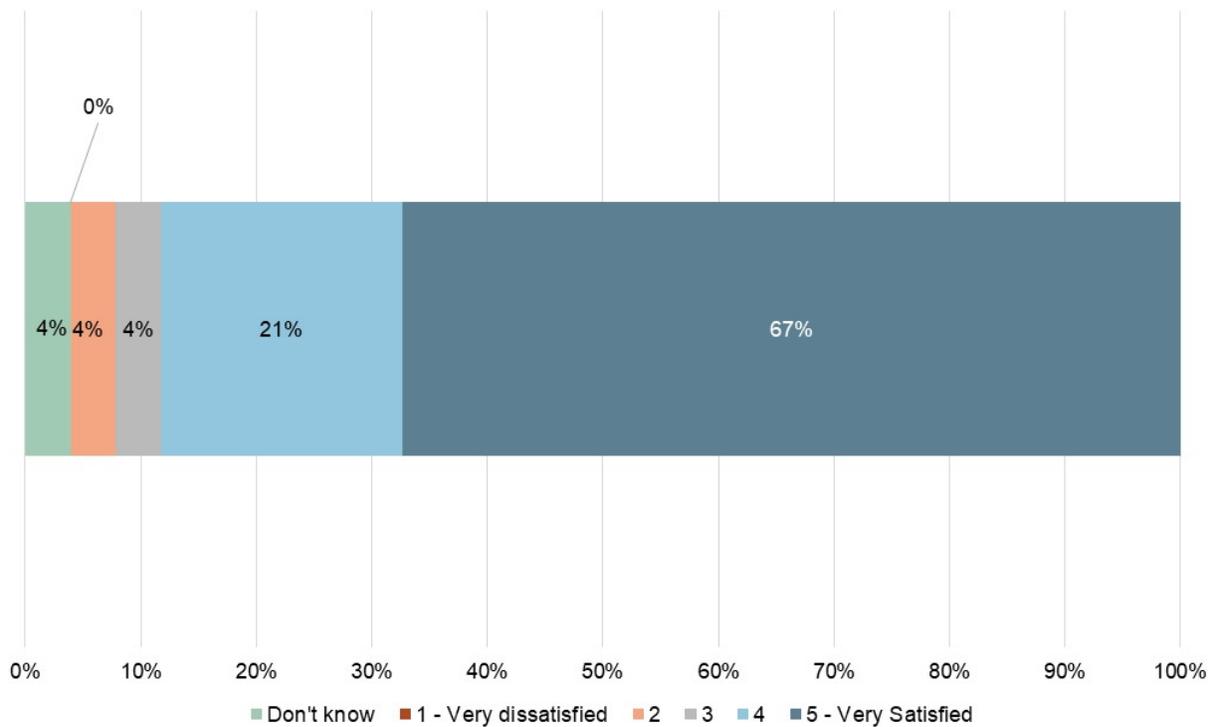
Seventy-three percent of respondents noted that they had done something in their home or changed their behavior to use less electricity since the auditor had visited, while the remainder changed nothing (22%) or weren't sure (4%). Of the respondents who reported an effort to use less electricity and left comments with specifics, half noted turning off lights and being more conscious of keeping lights off when they are not in use. Other common actions that respondents noted included changing their thermostat, hot water heater, or refrigerator temperature settings, unplugging appliances or purchasing more energy efficient products such as LED light bulbs, large appliances and insulation or sealants. About two-thirds of respondents (67%) said that they had noticed energy savings since participating in the program; of these respondents 87% rated their satisfaction with the savings either a 4 (24%) or 5 (63%).

5.2.1.4 Program Satisfaction

Almost half of survey respondents (48%) indicated they had contacted agency staff with questions about the items or services they could receive through this program through the course of participation. Of those that contacted agency staff, 75% rated their satisfaction a 4 (24%) or 5 (51%). Twenty-two percent of respondents rated their communication with agency staff a 3 or lower and noted dissatisfaction with staff being hard to reach, or a general failure to follow up, return calls or provide adequate support for reported equipment issues.

Overall, the vast majority (88%) of program participants surveyed reported satisfaction with the LIW program. Most participants rated the program a 4 (21%) or 5 (67%) out of 5, indicating they were satisfied with the program overall. Only 9% of respondents rated the program a 2 (4%) or 3 (4%) out of 5 or reported they “don’t know” (4%). Figure 5-3 displays the results. Respondents were given the opportunity to provide additional feedback and took this opportunity to request a more clear or direct process to communicate with staff, inclusion or consideration of additional measures (e.g. windows), and to voice dissatisfaction with the audit visit and contractor staff. One participant rated the program a one out of five due to their unhappiness with inflation. This rating was removed from the analysis.

Figure 5-3: Overall Program Satisfaction



5.2.2 Participant Survey Takeaways

ADM noted the following results from the participant survey:

- Most survey respondents shared positive feedback and support for the program.
- A small portion of respondents noted issues with the program and shared comments regarding areas for potential improvement including:
 - More direct or clear ways to communicate issues with agency staff
 - Inclusion of additional measures
 - Improving customer service
- A small portion of participants chose the “don’t remember” or “don’t know” option available in many questions indicating difficulty recalling details 2-4 years after participation.

6. Cost Effectiveness Evaluation

Rocky Mountain Power contracted with Navigant to calculate the program cost-effectiveness based on the evaluated savings assessed by ADM. ADM provided the measure life and incremental cost inputs needed to calculate the cost-effectiveness of the program. Measure life and incremental cost values were assigned on an individual measure basis and came from the TRL files provided by Rocky Mountain Power.

Table 6-1 includes the cost effectiveness evaluation inputs for 2016 and 2017.

Table 6-1: Low Income Weatherization Program Inputs

Parameter	PY2016	PY2017
Discount Rate	6.66%	6.66%
Residential Line Loss	9.32%	9.32%
Residential Energy Rate (\$/kWh) ¹	\$0.1111	\$0.1117
Inflation Rate	1.90%	1.90%

¹ Future rates determined using a 1.90% annual escalator.

Table 6-2 reports program costs by year.

Table 6-2: Low Income Weatherization Annual Program Costs

Program Year	Engineering Costs	Utility Admin	Program Delivery	Program Development	Incentives	Total Utility Costs	Gross Customer Costs
2016	\$0	\$17,586	\$2,648	\$11,268	\$27,837	\$59,339	\$0
2017	\$0	\$13,956	\$4,045	\$3,055	\$43,592	\$64,649	\$0
2016-2017	\$0	\$31,543	\$6,693	\$14,323	\$71,429	\$123,988	\$0

Table 6-3 includes energy savings resulting from the program for the evaluation period.

Table 6-3: Low Income Weatherization Program – Savings by Program Year

Program Year	Gross kWh Savings	Realization Rate	Adjusted Gross kWh Savings	Net to Gross Ratio	Net kWh Savings	Measure Life
2016	210,154	84%	177,546	100%	177,546	12
2017	234,206	79%	184,654	100%	184,654	15
2016-2017	444,361	82%	362,200	100%	362,200	14

Table 6-4 includes the summarized results of the following cost effectiveness tests for the evaluation period: Total Resource Cost Test with conservation adder (PTRC), Total Resource Cost Test without conservation adder (TRC), Utility Cost Test (UCT), and Rate Impact Test (RIM). The Participant Cost Test (PCT) was not conducted since the Low-Income Weatherization program provides weatherization measures at no cost to eligible customers and this test is therefore not applicable.

Table 6-4: Benefit/Cost Ratios by Program Year

Program Year	PTRC	TRC	UCT	RIM
2016	2.00	1.82	1.82	0.43
2017	2.15	1.96	1.96	0.42
2016-2017	2.08	1.89	1.89	0.43

Table 6-5 includes program level cost effectiveness test results for the 2016 and 2017. The program passed the cost-effectiveness criteria for all tests except the RIM test.

Table 6-5: Low Income Weatherization Program Level Results – PY2016-2017

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.0350	\$123,988	\$257,711	\$133,723	2.08
Total Resource Cost Test (TRC) No Adder	\$0.0350	\$123,988	\$234,283	\$110,295	1.89
Utility Cost Test (UCT)	\$0.0350	\$123,988	\$234,283	\$110,295	1.89
Rate Impact Test (RIM)		\$547,476	\$234,283	-\$313,193	0.43
Lifecycle Revenue Impacts (\$/kWh)					\$0.0000004600

Table 6-6 includes program level cost effectiveness test results for 2016. The program passed the cost-effectiveness criteria for all tests except the RIM test.

Table 6-6: Low Income Weatherization Program Level Cost-Effectiveness Results – PY2016

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.0372	\$59,339	\$118,573	\$59,234	2.00
Total Resource Cost Test (TRC) No Adder	\$0.0372	\$59,339	\$107,793	\$48,454	1.82
Utility Cost Test (UCT)	\$0.0372	\$59,339	\$107,793	\$48,454	1.82
Rate Impact Test (RIM)		\$249,320	\$107,793	-\$141,527	0.43
Lifecycle Revenue Impacts (\$/kWh)	\$0.0000004712				

Table 6-7 includes program level costs effectiveness test results for 2017. The program passed the cost-effectiveness criteria for all tests except the RIM test.

Table 6-7: Low Income Weatherization Program Level Cost-Effectiveness Results – PY2017

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.0332	\$64,649	\$139,138	\$74,489	2.15
Total Resource Cost Test (TRC) No Adder	\$0.0332	\$64,649	\$126,489	\$61,840	1.96
Utility Cost Test (UCT)	\$0.0332	\$64,649	\$126,489	\$61,840	1.96
Rate Impact Test (RIM)		\$298,156	\$126,489	-\$171,667	0.42
Lifecycle Revenue Impacts (\$/kWh)	\$0.0000004512				

7. Conclusions and Recommendations

ADM's evaluation resulted in the following conclusions:

- During the evaluation period, the program resulted total energy saving of 362,200 kWh from the following measure categories: lighting 163,500 kWh (45.1%), HVAC 101,095 kWh (27.9%), appliances 92,295 (25.5%) and building shell measures 5,310 (1.5%).
- Rocky Mountain Power continued their long-standing partnership with Utah HCD to implement the LIW program. HCD managed the program through 7 community-based implementation agencies. Program participants expressed a high level of satisfaction with the program that resulted in benefits including lower energy costs, improved interior air quality, and improved home comfort. Participants confirmed that the program had a positive impact on their lives.
- The 2016 and 2017 combined program, and each individual year, passed the cost-effectiveness standards for all tests except the RIM test.

Based on its evaluation, ADM recommends the following actions for Rocky Mountain Power to consider in its future implementation of its LIW program in Utah.

- Rocky Mountain Power should continue partnering with HCD to implement its LIW program via subcontracted agencies to leverage state and federal funding and program infrastructure. Rocky Mountain Power benefits in numerous ways by imbedding its low-income program with the state's.
- Rocky Mountain Power and HCD could consider pursuing efforts to reduce client wait times. Wait times vary significantly from agency to agency. Identifying best practices from across the state, and even across other weatherization programs nationally, may help reduce lengthy wait times.
- Rocky Mountain Power could consider moving to an electronic invoicing system. Paper invoicing lengthens processing times and requires duplication of data entry.
- Rocky Mountain Power could consider reducing the interval between program implementation and evaluation to improve verification of installation rates and to improve participant response rates.
- Rocky Mountain Power could consider identifying both qualitative and quantitative program objectives in order to more clearly determine the success of the program.
- Rocky Mountain Power could consider building a stronger relationship with HCD in order to identify opportunities that become apparent through stronger partnership interactions. For example, Rocky Mountain Power could consider touring Utah's training facility and learning about UT's evidence-based continuous improvement practices.

- Rocky Mountain Power could consider requesting more detailed tracking data from implementers to increase the accuracy and granularity of measures' specifications. For example, additional data could include baseline and efficient wattages for bulbs installed through the program, specifications for baseline and replacement efficient refrigerators, and pre- and post-installation insulation conditions. Implementers are already recording extensive data in the DOE-approved auditing software used for projects that include Weatherization Assistance Program (WAP) funding, and therefore the additional data reporting should not create an unreasonable burden.

8. Appendix: Participant Survey

Rocky Mountain Power Low Income Weatherization Program Participant Survey

Variables

- 09 Ceiling Insulation - UT
- 15 Duct Sealing & Insulation - Electric FAF without CAC - UT
- 21 Florescent Lighting - UT
- 275 Furnace Fan - UT
- 276 Energy Education - UT
- 32 Double Glass Replacement - UT
- 50 LED bulbs - UT
- 901 Refrigerator Replacement - UT
- Customer Name
- Site Address1
- Site City
- Site State
- Site Zip
- Customer Phone (CSS)
- Contact Email Address

Page exit logic: Skip / Disqualify Logic IF: Question "Do you recall participating in Rocky Mountain Power's Low Income Weatherization Program? Through this program you may have received light bulbs, or you may have had an appliance replaced with an ENERGY STAR certified appliance; you may also have received home weatherization or other home energy improvement measures." is one of the following answers ("No", "Don't Know") THEN: Disqualify and display: "Thank you for your time!"

Do you recall participating in Rocky Mountain Power's Low Income Weatherization Program? Through this program you may have received light bulbs, or you may have had an appliance replaced with an ENERGY STAR certified appliance; you may also have received home weatherization or other home energy improvement measures.

- Yes
- No
- Don't Know

How did you first learn about the Low Income Weatherization Program?

- From an information brochure
- From a friend/neighbor
- From your property owner/landlord
- From a community agency
- From a contractor
- From the internet
- Other:

Why did you choose to participate in the program? (select all that apply)

- To save money on energy bills
- To reduce energy use for environmental reasons
- The services were provided at no cost
- To improve home comfort
- To improve value of the home
- Other (please specify):
- Don't remember
- Don't know

Program records indicate that you received the following items from the Low Income Weatherization Program. Could you please confirm whether these records are correct?*

	Yes	No	Don't know
LED light bulbs			
CFL light bulbs			
ENERGY STAR certified refrigerator			
Window replacement			
Ceiling insulation			
Furnace fan			
Duct sealing and/or duct insulation			

Logic: Hidden unless: Question "LED light bulbs" is one of the following answers ("Yes")

Before today, had you ever heard of light emitting diode light bulbs, or LED light bulbs?

- Yes
- No
- Don't know

Logic: Hidden unless: Question "LED light bulbs" is one of the following answers ("Yes")

Do you believe you could correctly identify a typical LED light bulb if one was placed in front of you?

- Yes
- No
- Don't know

Logic: Hidden unless: Question "CFL light bulbs" is one of the following answers ("Yes")

Before today, had you ever heard of compact fluorescent light bulbs, or CFL light bulbs?

- Yes
- No
- Don't know

Logic: Hidden unless: Question "CFL light bulbs" is one of the following answers ("Yes")

Do you believe you could correctly identify a typical CFL light bulb if one was placed in front of you?

- Yes
- No
- Don't know

Logic: Show/hide trigger exists.

Did someone visit your household to discuss ways to save energy and to install energy efficient equipment?

- Yes
- No
- Don't know

Logic: Show/hide trigger exists. Hidden unless: #4 Question "Did someone visit your household to discuss ways to save energy and to install energy efficient equipment?" is one of the following answers ("Yes")

Are you the person who scheduled the home visit?

- Yes
- No
- Don't know

Logic: Hidden unless: #5 Question "Are you the person who scheduled the home visit?" is one of the following answers ("Yes")

On a scale of 1 to 5, where 1 is "very difficult" and 5 is "very easy," how would you rate the process of scheduling of the visit?

Very difficult

Very easy

Don't know

1

2

3

4

5

Logic: Show/hide trigger exists. Hidden unless: #4 Question "Did someone visit your household to discuss ways to save energy and to install energy efficient equipment?" is one of the following answers ("Yes")

Were you at home at the time of this visit?

- Yes
- No
- Don't remember
- Don't know

Logic: Hidden unless: #7 Question "Were you at home at the time of this visit?" is one of the following answers ("Yes")

During the home visit, did the program representative talk to you about how to save energy in your home, or provide recommendations about how to use your appliances and equipment in an energy efficient way?

- Yes
- No
- Don't remember
- Don't know

Logic: Hidden unless: #7 Question "Were you at home at the time of this visit?" is one of the following answers ("Yes")

Using a scale where 1 means completely disagree and 5 means completely agree, how much do you agree with the following statements about the work that was done on the home:

	Completely disagree 1	2	3	4	Completely agree 5	Don't know
The completion of the work was timely and efficient						
The work crew was courteous and professional						
The information provided about your home's energy use was useful						
The information provided about your home's energy use was easy to understand						

Logic: Show/hide trigger exists. Hidden unless: Question "LED light bulbs" is one of the following answers ("Yes")

You indicated that you received LED light bulbs from the program. Program records indicate you received [question('value'), id='589'] LED light bulb(s). To the best of your knowledge, is that number correct or did you receive a different number of LED light bulbs?*

- Yes, that is the correct number of LED light bulbs
- No, I received a different number of LED light bulbs
- Don't remember
- Don't know

Validation: Must be numeric Whole numbers only

Logic: Hidden unless: Question "You indicated that you received LED light bulbs from the program. Program records indicate you received [question('value'), id='589'] LED light bulb(s). To the best of your knowledge, is that number correct or did you receive a different number of LED light bulbs?" is one of the following answers ("No, I received a different number of LED light bulbs")

What is the correct number of LED light bulbs that you received?*

Please enter the number of LEDs you received.

Logic: Show/hide trigger exists. Hidden unless: (Question "You indicated that you received LED light bulbs from the program. Program records indicate you received [question('value'), id='589'] LED light bulb(s). To the best of your knowledge, is that number correct or did you receive a different number of LED light bulbs?" is one of the following answers ("Yes, that is the correct number of LED light bulbs") OR Question "What is the correct number of LED light bulbs that you received?" is greater than "0")

Has anyone removed any of the LED light bulbs that were installed through this program?*

- Yes
- No
- Don't remember
- Don't know

Logic: Show/hide trigger exists. Hidden unless: Question "Has anyone removed any of the LED light bulbs that were installed through this program?" is one of the following answers ("Yes")

Why were some LED light bulbs removed?

Please select all that apply.

- LED light bulb(s) broke or burned out
- LED light bulb(s) not working as needed (e.g., lights too dim)
- Using them in another home or at work
- Storing them for later use
- Gave them away
- Returned them to the program
- Other (specify): *

Logic: Hidden unless: Question "Why were some LED light bulbs removed? " is one of the following answers ("LED light bulb(s) broke or burned out", "LED light bulb(s) not working as needed (e.g., lights too dim)", "Using them in another home or at work", "Storing them for later use", "Gave them away", "Returned them to the program", "Other (specify)")

Were the LED light bulbs removed within one year or more than one year after being installed?

- Within one year
- More than one year

Logic: Show/hide trigger exists. Hidden unless: (Question "You indicated that you received LED light bulbs from the program. Program records indicate you received [question('value'), id='589'] LED light bulb(s). To the best of your knowledge, is that number correct or did you receive a different number of LED light bulbs?" is one of the following answers ("Yes, that is the correct number of LED light bulbs") OR Question "What is the correct number of LED light bulbs that you received?" is greater than "0")

Were any of the LED light bulbs you received from the program never installed?*

- Yes
- No
- Don't know

Logic: Hidden unless: Question "Were any of the LED light bulbs you received from the program never installed?" is one of the following answers ("Yes")

Why were some of the LED light bulbs never installed?

Page entry logic: This page will show when: (Question "LED light bulbs" is one of the following answers ("Yes") AND Question "You indicated that you received LED light bulbs from the program. Program records indicate you received [question('value'), id='589'] LED light bulb(s). To the best of your knowledge, is that number correct or did you receive a different number of LED light bulbs?" is one of the following answers ("Yes, that is the correct number of LED light bulbs")) Validation: Must be numeric Whole numbers only

Logic: Hidden unless: (Question "LED light bulbs" is one of the following answers ("Yes") AND Question "You indicated that you received LED light bulbs from the program. Program records indicate you received [question('value'), id='589'] LED light bulb(s). To the best of your knowledge, is that number correct or did you receive a different number of LED light bulbs?" is one of the following answers ("Yes, that is the correct number of LED light bulbs"))

To verify, of the [question("value"), id="589"] LED light bulbs you received, how many are currently installed, were installed & removed, or were never installed?*

- # of LED light bulbs currently installed
- # of LED light bulbs installed and removed
- # of LED light bulbs never installed

Page entry logic: This page will show when: (Question "LED light bulbs" is one of the following answers ("Yes") AND Question "What is the correct number of LED light bulbs that you received?" is greater than "0") Validation: Must be numeric Whole numbers only

Logic: Hidden unless: (Question "LED light bulbs" is one of the following answers ("Yes") AND Question "What is the correct number of LED light bulbs that you received?" is greater than "0")

To verify, of the [question("value"), id="298"] LED light bulbs you received, how many are currently installed, were installed & removed, or were never installed?*

- # of LED light bulbs currently installed
- # of LED light bulbs installed and removed
- # of LED light bulbs never installed

Logic: Hidden unless: Question "You indicated that you received LED light bulbs from the program. Program records indicate you received [question('value'), id='589'] LED light bulb(s). To the best of your knowledge, is that number correct or did you receive a different number of LED light bulbs?" is one of the following answers ("Yes, that is the correct number of LED light bulbs", "No, I received a different number of LED light bulbs")

On a scale of 1 to 5, where 1 is "not at all confident" and 5 is "completely confident," how confident do you feel with your memory of where in the home the LED light bulbs are currently installed?

Not at all confident					Completely confident	Don't know
1	2	3	4	5		

Page entry logic: This page will show when: (Question "You indicated that you received LED light bulbs from the program. Program records indicate you received [question('value'), id='589'] LED light bulb(s). To the best of your knowledge, is that number correct or did you receive a different number of LED light bulbs?" is one of the following answers ("Yes, that is the correct number of LED light bulbs") AND Question "LED light bulbs" is one of the following answers ("Yes"))

Validation: Must be numeric Whole numbers only Positive numbers only

Logic: Hidden unless: (Question "LED light bulbs" is one of the following answers ("Yes") AND Question "You indicated that you received LED light bulbs from the program. Program records indicate you received [question('value'), id='589'] LED light bulb(s). To the best of your knowledge, is that number correct or did you receive a different number of LED light bulbs?" is one of the following answers ("Yes, that is the correct number of LED light bulbs"))

To the best of your recollection, how many of the [question('option value'), id='427', option='10831'] LED light bulbs received through the program are currently installed in each of the following locations?*

- Bedrooms
- Bathrooms
- Living room
- Kitchen
- Entryway
- Dining room
- Garage
- Basement
- Den
- Stairway
- Office
- Laundry room
- Other

Page entry logic: This page will show when: (Question "What is the correct number of LED light bulbs that you received?" is greater than "0" AND Question "LED light bulbs" is one of the following answers ("Yes"))

Validation: Must be numeric Whole numbers only Positive numbers only

Logic: Hidden unless: (Question "LED light bulbs" is one of the following answers ("Yes") AND Question "What is the correct number of LED light bulbs that you received?" is greater than "0")

To the best of your recollection, how many of the [question("option value"), id="436", option="10846"] LED light bulbs received through the program are currently installed in each of the following locations?*

- Bedrooms
- Bathrooms
- Living room
- Kitchen
- Entryway
- Dining room
- Garage
- Basement
- Den
- Stairway
- Office
- Laundry room
- Other

Logic: Hidden unless: (Question "You indicated that you received LED light bulbs from the program. Program records indicate you received [question('value'), id='589'] LED light bulb(s). To the best of your knowledge, is that number correct or did you receive a different number of LED light bulbs?" is one of the following answers ("Yes, that is the correct number of LED light bulbs") OR Question "What is the correct number of LED light bulbs that you received?" is greater than "0")

What types of light bulbs did the LED light bulbs replace? Please select all that apply.

- Incandescent
- CFL light bulbs
- LED light bulbs
- Installed in a new fixture
- Other (Please specify):
- Don't remember
- Don't know

Logic: Show/hide trigger exists. Hidden unless: Question "CFL light bulbs" is one of the following answers ("Yes")

You indicated that you received CFL light bulbs from the program. Program records indicate you received [question("value"), id="590"] CFL light bulbs. To the best of your knowledge, is that number correct or did you receive a different number of CFL light bulbs?*

- Yes, that is the correct number of CFL light bulbs
- No, received a different number of CFL light bulbs
- Don't remember
- Don't know

Validation: Must be numeric

Logic: Hidden unless: Question "You indicated that you received CFL light bulbs from the program. Program records indicate you received [question("value"), id="590"] CFL light bulbs. To the best of your knowledge, is that number correct or did you receive a different number of CFL light bulbs?" is one of the following answers ("No, received a different number of CFL light bulbs")

What is the correct number of CFL light bulbs that you received?*

Logic: Show/hide trigger exists. Hidden unless: (Question "You indicated that you received CFL light bulbs from the program. Program records indicate you received [question("value"), id="590"] CFL light bulbs. To the best of your knowledge, is that number correct or did you receive a different number of CFL light bulbs?" is one of the following answers ("Yes, that is the correct number of CFL light bulbs") OR Question "What is the correct number of CFL light bulbs that you received?" is greater than "0")

Were any of the CFL light bulbs you received from the program never installed?*

- Yes
- No
- Don't remember
- Don't know

Logic: Show/hide trigger exists. Hidden unless: Question "Were any of the CFL light bulbs you received from the program never installed?" is one of the following answers ("Yes")

Why were some CFL light bulbs removed? (select all that apply)

- CFL light bulbs broke or burned out
- CFL light bulbs did not work as needed (e.g., lights too dim)
- Using them in another home or at work
- Storing them for later use
- Gave them away
- Returned them to the program
- Other (please specify): *

Logic: Show/hide trigger exists. Hidden unless: Question "Why were some CFL light bulbs removed? (select all that apply)" is one of the following answers ("CFL light bulbs broke or burned out", "FL light bulbs did not work as needed (e.g., lights too dim)", "Using them in another home or at work", "Storing them for later use", "Gave them away", "Returned them to the program", "Other (please specify)")

Were the CFL light bulbs removed within one year or more than one year after being installed?*

- Within one year
- More than one year

Logic: Hidden unless: Question "Were the CFL light bulbs removed within one year or more than one year after being installed?" is one of the following answers ("Within one year")

Why were some of the CFL light bulbs never installed?

Page entry logic: This page will show when: Question "You indicated that you received CFL light bulbs from the program. Program records indicate you received [question("value"), id="590"] CFL light bulbs. To the best of your knowledge, is that number correct or did you receive a different number of CFL light bulbs?" is one of the following answers ("Yes, that is the correct number of CFL light bulbs")

Validation: Must be numeric

To verify, of the [question("value"), id="590"] CFL light bulbs you received, how many are currently installed, were installed & removed, or were never installed?*

- # of CFL light bulbs currently installed
- # of CFL light bulbs installed and removed
- # of CFL light bulbs never installed
- Don't know

Page entry logic: This page will show when: Question "What is the correct number of CFL light bulbs that you received?" is greater than "0"

Validation: Must be numeric

Logic: Hidden unless: (Question "CFL light bulbs" is one of the following answers ("Yes") AND Question "What is the correct number of CFL light bulbs that you received?" is greater than "0")

To verify, of the [question("value"), id="446"] CFL light bulbs you received, how many are currently installed, were installed & removed, or were never installed?*

- # of CFL light bulbs currently installed
- # of CFL light bulbs installed and removed
- # of CFL light bulbs never installed

Logic: Hidden unless: Question "You indicated that you received CFL light bulbs from the program. Program records indicate you received [question("value"), id="590"] CFL light bulbs. To the best of your knowledge, is that number correct or did you receive a different number of CFL light bulbs?" is one of the following answers ("Yes, that is the correct number of CFL light bulbs", "No, received a different number of CFL light bulbs")

On a scale of 1 to 5, where 1 is "not at all confident" and 5 is "completely confident," how confident do you feel with your memory of where in the home the CFL light bulbs are currently installed?

Not at all confident					Completely confident	Don't know
1	2	3	4	5		

Page entry logic: This page will show when: Question "You indicated that you received CFL light bulbs from the program. Program records indicate you received [question("value"), id="590"] CFL light bulbs. To the best of your knowledge, is that number correct or did you receive a different number of CFL light bulbs?" is one of the following answers ("Yes, that is the correct number of CFL light bulbs")

Validation: Must be numeric Whole numbers only Positive numbers only

Logic: Hidden unless: (Question "CFL light bulbs" is one of the following answers ("Yes") AND Question "You indicated that you received CFL light bulbs from the program. Program records indicate you received [question("value"), id="590"] CFL light bulbs. To the best of your knowledge, is that number correct or did you receive a different number of CFL light bulbs?" is one of the following answers ("Yes, that is the correct number of CFL light bulbs"))

To the best of your recollection, how many of the [question ("option value"), id="452", option="10898"] CFL light bulbs received through the program are installed in each of the following room locations?*

- Bedrooms
- Bathrooms
- Living room
- Kitchen
- Entryway
- Dining room
- Garage
- Basement
- Den
- Stairway
- Office
- Laundry room
- Other

Page entry logic: This page will show when: Question "What is the correct number of CFL light bulbs that you received?" is greater than "0"

Validation: Must be numeric Whole numbers only Positive numbers only

Logic: Hidden unless: (Question "CFL light bulbs" is one of the following answers ("Yes") AND Question "What is the correct number of CFL light bulbs that you received?" is greater than "0")

To the best of your recollection, how many of the [question('option value'), id='460', option='10928'] CFL light bulbs received through the program are installed in each of the following room locations? *

- Bedrooms
- Bathrooms
- Living room
- Kitchen
- Entryway
- Dining room
- Garage
- Basement
- Den
- Stairway
- Office
- Other

Logic: Hidden unless: Question "ENERGY STAR certified refrigerator" is one of the following answers ("Yes")

You indicated that your refrigerator was replaced. What is the door-style of the new refrigerator? *

- Freezer-on-top
- Freezer-on-bottom
- Side-by-side
- Don't know

Logic: Hidden unless: Question "901 Refrigerator Replacement - UT" is greater than "1"

According to program records, you had 2 refrigerators replaced. What was the door-style of the second refrigerator?*

- Freezer-on-top
- Freezer-on-bottom
- Side-by-side
- Don't remember
- Don't know

Page entry logic: This page will show when: Question "Duct sealing and/or duct insulation" is one of the following answers ("Yes")

Logic: Hidden unless: ((Question "09 Ceiling Insulation - UT" is exactly equal to "1" OR Question "32 Double Glass Replacement - UT" is exactly equal to "1") OR Question "Utah Weatherization - UT" is exactly equal to "1")

Program records show that you had some home energy improvements such as window replacement or insulation installed by a participating agency or contractor. Is that correct?*

	Yes	No	Don't know
Window replacement			
Ceiling insulation			

Logic: Hidden unless: ((Question "09 Ceiling Insulation - UT" is exactly equal to "1" OR Question "32 Double Glass Replacement - UT" is exactly equal to "1") OR Question "Utah Weatherization - UT" is exactly equal to "1")

On a scale of 1 to 5, where 1 is “not at all important” and 5 is “extremely important,” how important were the following three factors in your decision to receive the window replacement or insulation?

	Not at all important 1	2	3	4	Extremely important 5	Don't know
Improve home comfort						
The improvements were provided at no cost						
Reduce your electric bills						

Logic: Hidden unless: ((Question "09 Ceiling Insulation - UT" is exactly equal to "1" OR Question "32 Double Glass Replacement - UT" is exactly equal to "1") OR Question "Utah Weatherization - UT" is exactly equal to "1")

Were there any other factors that were also important in your decision to receive the home energy improvements? If so, what were they?

Logic: Show/hide trigger exists. Hidden unless: Question "275 Furnace Fan - UT" is exactly equal to "1"

You indicated that you received an energy saving furnace fan from the program. Is the furnace fan currently installed?*

- Yes
- No
- Don't remember
- Don't know

Logic: Show/hide trigger exists. Hidden unless: Question "You indicated that you received an energy saving furnace fan from the program. Is the furnace fan currently installed?" is one of the following answers ("No")

Why isn't the furnace fan currently installed?*

- It broke
- It did not work as needed
- It was returned to the program
- It was never installed
- Other (please specify):
- Don't remember
- Don't know

Logic: Hidden unless: Question "Why isn't the furnace fan currently installed?" is one of the following answers ("It was never installed")

Why was the furnace fan never installed?

Logic: Hidden unless: Question "15 Duct Sealing & Insulation - Electric FAF without CAC - UT" is exactly equal to "1"

Program records show that you had some home energy improvements such as duct sealing and/or duct insulation installed by a participating agency or contractor. Is that correct?

	Yes	No	Don't remember	Don't know
Duct sealing				
Duct insulation				

On a scale of 1 to 5, where 1 is “not at all important” and 5 is “extremely important,” how important were the following 3 factors in your decision to receive the duct sealing and/or duct insulation?

	Not at all important 1	2	3	4	Extremely important 5	Don't know
Improve home comfort						
The improvements were provided at no cost						
Reduce your electric bills						

Were there any other factors that were important to your decision to receive the home energy improvements? If so, what were they?

Was the home visit scheduled at a convenient time for you?

- Yes
- No
- Don't remember
- Don't know

Did the home energy auditor or inspector arrive within 15 minutes of the scheduled appointment?

- Yes
- No
- Don't remember
- Don't Know

Logic: Hidden unless: QUESTION NOT FOUND! is one of the following answers [NO OPTIONS SET]

Which appliances were tested, metered, or evaluated? Select all that apply

- Refrigerator
- Furnace
- Other (Specify):
- Don't know/recall

Logic: Show/hide trigger exists.

When the auditor or inspector visited your home, did they talk with you about ways to use less electricity in your home or leave materials with you that described how you could save electricity?

- Yes
- No
- Don't remember
- Don't know

Page entry logic: This page will show when: Question "When the auditor or inspector visited your home, did they talk with you about ways to use less electricity in your home or leave materials with you that described how you could save electricity?" is one of the following answers ("Yes")

Because of the information you received from the auditor or inspector, do you feel you now know more about how to save electricity in your home?

- Yes, I know more now
- No, I know about the same as before
- Don't know

Logic: Show/hide trigger exists.

Because of the information you received from the auditor or inspector, have you done anything in your home or changed any habits to use less electricity?

- Yes
- No
- Don't know

Logic: Hidden unless: Question "Because of the information you received from the auditor or inspector, have you done anything in your home or changed any habits to use less electricity " is one of the following answers ("Yes")

Because of the information you received from the auditor or inspector, what are the things you have done to use less electricity?

Logic: Hidden unless: Question "When the auditor or inspector visited your home, did they talk with you about ways to use less electricity in your home or leave materials with you that described how you could save electricity? " is one of the following answers ("Yes")

Logic: Hidden unless: (((((((Question "LED light bulbs you received through the program" is one of the following answers ("Very dissatisfied 1"," 2") OR Question "CFL light bulbs you received through the program" is one of the following answers ("Very dissatisfied 1"," 2") OR Question "ENERGY STAR certified refrigerator(s) you received through the program" is one of the following answers ("Very dissatisfied 1"," 2") OR Question "Window replacements you received through the program" is one of the following answers ("Very dissatisfied "," 2") OR Question "Ceiling insulation you received through the program" is one of the following answers ("Very dissatisfied 1"," 2") OR Question "Home weatherization you received through the program" is one of the following answers ("Very dissatisfied 1") OR Question "Furnace fan you received through the program" is one of the following answers ("Very dissatisfied 1"," 2") OR Question "Duct insulation or duct sealing you received through the program" is one of the following answers ("Very dissatisfied 1"," 2") OR Question "The visit scheduling process" is one of the following answers ("Very dissatisfied 1"," 2") OR Question "The information you received during the home visit" is one of the following answers ("Very dissatisfied 1"," 2")

You indicated you were less than satisfied with some product(s) or service(s) you received. What was less than satisfactory about the product(s) or service(s)?

Logic: Show/hide trigger exists.

In the course of participating in the program, how often did you contact agency staff with questions about the items or services you could or did receive through this program?

- Never
- Once
- 2 or 3 times
- 4 times or more
- Don't know

Logic: Show/hide trigger exists. Hidden unless: Question "In the course of participating in the program, how often did you contact agency staff with questions about the items or services you could or did receive through this program? " is one of the following answers ("Once","2 or 3 times","4 times or more")

How satisfied were you with the communication from agency staff? Please rate your satisfaction on a scale of 1 to 5, where 1 is “very dissatisfied” and 5 is “very satisfied.”

very dissatisfied					very satisfied	
1	2	3	4	5	Don't know	

Logic: Hidden unless: Question "How satisfied were you with the communication from agency staff? Please rate your satisfaction on a scale of 1 to 5, where 1 is “very dissatisfied” and 5 is “very satisfied.”" is one of the following answers ("Very dissatisfied 1"," 2")

What was not satisfactory?

Logic: Show/hide trigger exists.

Have you noticed any savings on your electric bills since the home improvements were completed or items were installed?

- Yes
- No
- Not sure
- Don't know

Logic: Hidden unless: Question "Have you noticed any savings on your electric bills since the home improvements were completed or items were installed?" is one of the following answers ("Yes")

How satisfied are you with any savings you noticed on your electric bills? Please rate your satisfaction on a scale of 1 to 5, where 1 is "very dissatisfied" and 5 is "very satisfied."

very dissatisfied					very satisfied	
1	2	3	4	5	Don't know	

How satisfied were you overall with the Low Income Weatherization Program? Please rate your satisfaction on a scale of 1 to 5, where 1 is "very dissatisfied" and 5 is "very satisfied."

very dissatisfied					very satisfied	
1	2	3	4	5	Don't know	

Logic: Show/hide trigger exists.

Do you have any suggestions for improving the program?

- Yes
- No

Logic: Hidden unless: Question "Do you have any suggestions for improving the program?" is one of the following answers ("Yes")

What suggestions do you have for improving the program?

Would you like your gift card to be sent to the following email address:

- Yes
- No (please enter the correct email address): *

Thank You!