



Final Report

Idaho Low-Income Weatherization Program Evaluation (2007–2009)

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PacifiCorp

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April 20, 2011

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Executive Summary

Program Overview

Rocky Mountain Power’s Low-Income Weatherization Program in Idaho is aimed at lowering low-income customers’ energy consumption and utility bills. The program provides, at no cost to an income-qualified customer, a complete home energy audit, installation of energy-efficient measures, and energy education.

Evaluation Approach

Rocky Mountain Power contracted with The Cadmus Group Inc. (Cadmus) to conduct impact and process evaluations of the Program for program years 2007, 2008, and 2009. The process evaluation was designed to assess program delivery and efficacy, bottlenecks, barriers, best practices, and any opportunities for improvement. The impact evaluation assessed energy impacts, non-energy benefits, and program cost-effectiveness. The major tasks associated with the evaluation are described in more detail below.

Data Collection

Data required for this evaluation, and their sources are listed in Table 1.

Table 1. Data Sources

Data	Source
Program participant and measure data	PacifiCorp
Participant and nonparticipant billing histories	PacifiCorp
Customer account data with low-income identifier	PacifiCorp
Participant and nonparticipant transactional data	PacifiCorp
Reported savings (annual reports)	PacifiCorp
Program costs	PacifiCorp
Economic data for non-energy benefit calculation	IMPLAN 2009 Data for Idaho

Process Approach

Telephone surveys were conducted with 31 program participants to assess multiple aspects of the program. These questions focused primarily on installation verification, client satisfaction levels, program delivery, recall of energy education recommendations, and certain non-energy benefits.

An in-depth discussion with a key delivery agency staff person was conducted to ensure that all facets of program delivery were assessed, including bottlenecks, client and agency satisfaction, best practices, methods of improving delivery, and agency assessment of non-energy benefits.

Finally, an interview was conducted with the statewide inspector from the Community Action Program Association of Idaho (CAPAI) to provide insight into the issues identified through this evaluation and by the inspector, as well as to discuss improvements that have been made at the agency level.

Evaluation of Program Energy Savings

Estimated and actual program energy savings were assessed in the following manners:

- Expected Savings: Based on a review of data from Rocky Mountain Power’s 2007, 2008, and 2009 annual reports, we calculated average expected electric savings per participant.
- Actual Savings: A pooled conditional savings analysis (CSA) regression model was run to estimate weather-normalized, program-induced energy (kWh) savings based on participant and nonparticipant billing data.

Assessment of Non-Energy Benefits

A series of non-energy benefits were evaluated for this analysis, including:

- Payment behavior and participant arrearages
- Benefits to the regional economy (e.g., employment, value added, output)
- Benefits to participants (e.g., improved comfort, health and safety, mobility)

Assessment of Cost-Effectiveness

To assess cost-effectiveness, evaluators conducted an analysis of program costs and benefits from various perspectives, using Cadmus’ DSM Portfolio Pro model.

Major Findings

Electric Savings

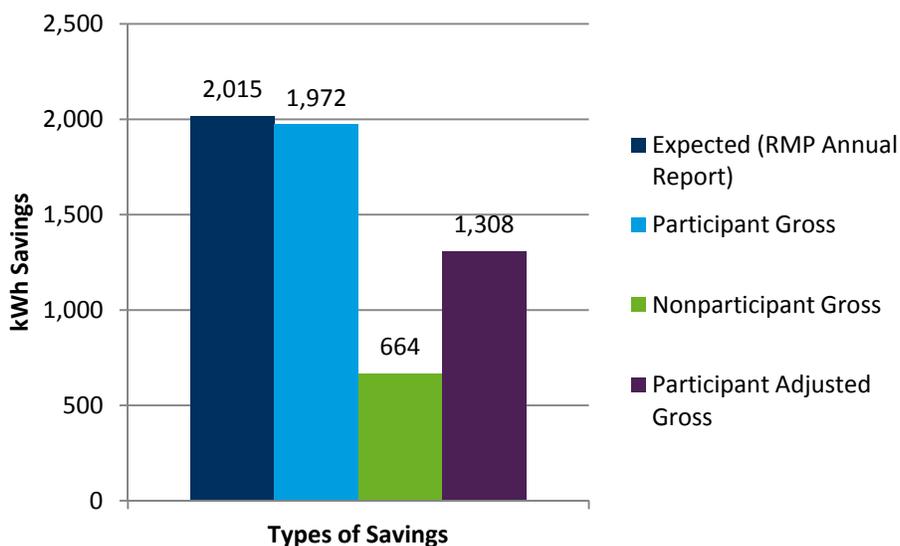
Overall, gross participant savings for program participants are calculated at 1,972 kWh (10.8 percent of pre-program energy consumption), which approximates the expected participant savings of 2,015 kWh, the average savings reported by Rocky Mountain Power across the 2007, 2008, and 2009 program years. Table 2 provides the total program participation and savings for the years evaluated.

Table 2. Program Participation and Evaluated Savings by Year

Program Year	Participation	Gross Savings (MWh)	Evaluated Adj. Gross Savings (MWh)
2007	64	126	84
2008	89	176	116
2009	113	223	148
Total	266	525	348

After adjusting for savings observed in the nonparticipant control group, we calculated the program induced adjusted gross participant savings as 1,308 kWh (7.2 percent of pre-program energy consumption). Figure 1 provides the savings impact with regard to each type of estimated savings.

Figure 1. Savings Estimate Comparison



Participant adjusted gross savings reflects the naturally occurring savings in the non-participant control group. Several factors may have contributed to nonparticipant savings:

- Overall economic downturn, which has inspired many households to reduce expenditures
- High saturations of secondary wood heating in Idaho
- A 43.5 percent rate increase for Rocky Mountain Power customers between the years of analysis from 2006 and 2009 (this residential rate increase consisted of: 8.4 percent general rate case order, 2.2 percent energy efficiency rider increase, and 32.6 percent due to the elimination of the BPA credit).

Non-Energy Benefits

Non-energy benefits were also attributed to program, providing ancillary impacts to participants, the utility, and the state economy. We monetized several of these and include them in a scenario for estimating program cost-effectiveness:

- A reduction of annual arrearages of \$8,331
- An estimated 7.7 net job-years of employment
- Approximately \$144,946 added to the Idaho economy

Cost-Effectiveness

Under the cost-effectiveness tests that did not include non-energy benefits, the program was found to have benefit-cost ratios of less than 1, except under the participant cost test (see Table 3). When all benefits (energy and non-energy) are included, the program is cost-effective from both the total resource cost (TRC) and PacifiCorp total resource cost (PTRC) perspectives, at 1.15 and 1.23 respectively, as shown below in Table 4.

Table 3. Program Cost-Effectiveness Summary Without Non-Energy Benefits 2007-2009*

Cost Effectiveness Test	Levelized \$ / kWh	Costs	Benefits	Net Benefits	Benefit / Cost Ratio
Total Resource + Conservation Adder (PTRC)	\$0.099	\$426,022	\$372,019	-\$54,004	0.87
Total Resource No Adder (TRC)	\$0.099	\$426,022	\$338,199	-\$87,824	0.79
Utility (UCT)	\$0.099	\$426,022	\$338,199	-\$87,824	0.79
Ratepayer Impact (RIM)	\$0.189	\$815,476	\$338,199	-\$477,277	0.41
Participant (PCT)	\$0.083	\$355,470	\$744,924	\$389,454	2.10
Lifecycle Revenue Impact	\$0.00001046				

*The calculations are based on the program components in place during the period 2007-2009 when Rocky Mountain Power provided a rebate covering 75% of the cost of approved measures. As of 12/28/10, they are covering 85% of these costs, which will reduce the net benefits from the utility and rate impact perspectives.

Table 4. Program Cost-Effectiveness Summary Including Non-Energy Benefits 2007-2009*

Cost Effectiveness Test	Levelized \$ / kWh	Costs	Benefits	Net Benefits	Benefit / Cost Ratio
Total Resource + Conservation Adder (PTRC)	\$0.099	\$426,022	\$525,295	\$99,273	1.23
Total Resource No Adder (TRC)	\$0.099	\$426,022	\$491,475	\$65,453	1.15
Utility (UCT)	\$0.099	\$426,022	\$346,529	-\$79,493	0.81
Ratepayer Impact (RIM)	\$0.189	\$815,476	\$346,529	-\$468,947	0.42
Participant (PCT)	\$0.083	\$355,470	\$744,924	\$389,454	2.10
Lifecycle Revenue Impact	\$0.00001028				

* The calculations are based on the program components in place during the period 2007-2009 when Rocky Mountain Power provided a rebate covering 75% of the cost of approved measures. As of 12/28/10, they are covering 85% of these costs, which will reduce the net benefits from the utility and rate impact perspectives.

Recommendations

The program, with energy savings and non-energy benefits considered, passes the TRC and PTRC tests. Below we provide suggested program enhancements that could help to improve the program impact results and overall delivery of the program.

Consider Prioritizing Refrigerator Replacements

We understand that the agencies, in an effort to supply the services and measures that are most cost-prohibitive for low-income customers, do not prioritize refrigerator replacements. This enables the agency to spread its weatherization services across a broader array of customers. However, low-income customers with older, inefficient refrigerators could experience significant electric savings from the installation of newer refrigerators. The installation of new refrigerators is also likely to help increase the program's cost-effectiveness. At a minimum, agencies should suggest to households with older and more inefficient refrigerators that purchasing a new refrigerator could reduce their electric use.

Assist CAPAI in Development of Uniform Energy Education Curriculum

CAPAI mentioned their desire to establish a uniform energy education curriculum in order to ensure that a consistent energy-saving message is being delivered to customers. Rocky Mountain Power stands to benefit from improved energy education, as behavior changes could lead to

higher realization of energy savings. Rocky Mountain Power should continue working with CAPAI to expedite the development and implementation of a uniform statewide curriculum.

Work with Agencies to Determine if Electronic Reporting is Feasible

Rocky Mountain Power is currently upgrading their computer tracking system. The new system will enhance the Company's ability to track:

- Measure quantities (i.e., number of CFLs installed per home)
- Costs for each measure, including the portion that Rocky Mountain Power paid and the total cost
- Invoice data
- Project completion date
- Account and participant contact information for each customer's home
- Identifier for agency completing the work on the customer's home

The influx of federal dollars from the Recovery Act has allowed many states and individual agencies to invest in constructing or refining their databases. Rocky Mountain Power should work with the agencies to determine if an electronic transfer of the tracking information is feasible to increase efficiency and reduce errors.

Increase Rocky Mountain Power Recognition

Less than one-third of participants surveyed knew that Rocky Mountain Power had paid for some of the measure installations in their homes. Agency staff, when reviewing Rocky Mountain Power's educational literature with participants, should indicate who contributed to the services. Rocky Mountain Power could also consider providing branded electroluminescent night lights to participant customers to increase recognition of their contribution to the program.

1. Process Evaluation

Program Services

Eastern Idaho Community Action Partnership and Southeastern Idaho Community Action Agency provide weatherization and efficiency upgrades to income-qualified households in Idaho. The agencies implement the program, with monitoring oversight from the Community Action Partnership Association of Idaho (CAPAI). The program leverages funding from Rocky Mountain Power, the U.S. Department of Energy (DOE), and U.S. Department of Health and Human Services (HHS), among others, to fund comprehensive weatherization of Rocky Mountain Power customer homes. The gas provider in the territory, Intermountain Gas, does not provide weatherization program funding.

Rocky Mountain Power's funding of the program focuses on electricity-saving measures, as delineated in Rocky Mountain Power's tariff.¹ Measures are categorized as either major or supplemental. Major measures include wall and floor insulation and window replacement, and can be installed only in homes with electric heating systems. Supplemental measures target other electric end-uses such as lighting and water heat. Supplemental measures not related to heating can be installed in homes without an electric heating system. Supplemental measures related to water heating efficiencies require that the home have an electric water heater. Rocky Mountain Power also provides reimbursement for administrative expenses as well as a limited amount of funding for measures that promote customer home health and safety.

Program Operations

The agencies employ energy auditors who are trained to evaluate and measure the performance of a home. Using an energy audit tool, they identify the energy-saving opportunities and energy-efficiency measures to install in each home. Agencies follow DOE Weatherization Assistance Program guidelines, which require measures to pass a cost-effectiveness test (savings to investment ratio, or SIR, equal to one or greater). The auditors also focus on enhancing health and safety in the customer's home, especially in instances where the home has been tightened and may need ventilation.

After the work on the home is completed, the agencies submit invoices and documentation to Rocky Mountain Power. Rocky Mountain Power then paid a rebate of 75 percent of the installed cost of each eligible measure, plus a 15 percent administrative payment.² Idaho's annual Rocky Mountain Power funding for this program during the 2007-2009 program was capped at \$150,000.³ Rocky Mountain Power funding of health and safety measures is limited to 15 percent of the cost of all jobs performed by each agency.

¹ Rocky Mountain Power, Electric Service Schedule No. 21, State of Idaho, Low Income Weatherization Services Optional for Income Qualifying Customers, Issued January 10, 2007 and revised December 28, 2010.

² As of December 28, 2010, Rocky Mountain Power will be providing a rebate of 85% for each qualifying measure.

³ As of December 28, 2010, the costs for the Rocky Mountain Power program expenses will be capped at \$300,000.

Methodology

Data collection for this portion of the evaluation consisted of:

- Telephone survey with a sample of program participants
- Telephone interview with community action agency staff
- Telephone interview with CAPAI staff
- In-person interview with program staff from Rocky Mountain Power

Participant Survey

Telephone surveys were conducted with a sample of program participants to assess multiple aspects of the program. Survey questions asked about the following topics:

- Program awareness
- Installation verification
- Client satisfaction with measures
- Recall of energy education recommendations
- Non-energy benefits such as improved health and reduced mobility
- Program satisfaction

Sample Selection Methodology

The phone survey was fielded in December 2010 using the population of participants. Of the total population of 266, viable contact information (name and telephone number) was available for only 201. This was due primarily to phone numbers that had been disconnected or changed. Although target sample sizes were calculated based on the total population, the limited number of contacts in combination with the small number of participants restricted the achievement of desired targets.

The objective was to achieve 90 complete surveys to target 10 percent precision at the 90 percent confidence level in each of two strata: participants with insulation and those without. Table 5 presents the desired and achieved samples.

Table 5. Target and Achieved Samples for Participant Survey

Stratum	Total Population	Viable Population	Target Completes	Desired Precision at 90% Conf.	Achieved Completes	Achieved Precision at 90% Conf.
Idaho Participants with Insulation	150	119	47	10%	22	16%
Idaho Participants without Insulation	116	82	43	10%	9	27%
Total	266	201	90	7%	31	14%

Participants were initially called in randomized order, but the targets had not been met after an attempt to contact every participant. Subsequently, up to six attempts were made to contact each participant at varying times of day and on both weekdays and weekends. Ultimately, the 31 surveys completed resulted in an overall precision of 90 percent confidence and ± 14 percent precision.

Table 6 below provides the full distribution of measure installations for the participants of the Idaho sample.

Table 6. Participant Survey Sample Distribution of Selected Measures

Measure	Population	Number of Surveyed Participants
CFLs	163	18
Refrigerator/Freezer	9	3
Insulation	150	22
Air Sealing/Infiltration Control	192	18
Furnace Repair/Replacement	57	6
Windows	153	18
Thermal Door	152	12

Interviews with Stakeholders (Agency, State Administrator & Rocky Mountain Power Program Manager)

Three interviews were conducted with agency, CAPAI, and Rocky Mountain Power staff to gather information about the program’s processes and functioning. Topics discussed in the interview included the following:

- Program goals
- Impact and adequacy of Rocky Mountain Power funding
- Impact of American Recovery and Reinvestment Act (Recovery Act) funding for low-income weatherization
- Provision of energy education
- Volume of homes, prioritization, and wait-listing
- Invoicing and payments
- Staff training
- Reporting and monitoring
- Program achievements and lessons learned

Process Findings

This section discusses first the findings of the participant surveys, and then the findings of stakeholder interviews. The conclusion summarizes and synthesizes information from both surveys and interviews.

Participant Survey Findings

Program Awareness

Of those participants who recalled how they first heard of the program, 10 reported that they heard about it via word of mouth. Only two participants reported learning about the program directly from Rocky Mountain Power. Furthermore, when asked whether they were aware that Rocky Mountain Power provided funding for these services, 74 percent (23 out of 31) said they were not. The local agencies that supply weatherization services do not generally inform

customers that Rocky Mountain Power is providing funding for their services. The agencies work with a variety of funds to pay for the cost of weatherization.

Installation Verification

When customers were asked to verify Rocky Mountain Power’s records of the measures installed in their home, there were eight instances in which the customer’s recollection did not match Rocky Mountain Power records. Although it may seem unlikely, this is a common occurrence in energy conservation programs, where even households purchasing and installing sizable measures do not always recall their participation.⁴ Those measures not recalled by participants in Rocky Mountain Power’s weatherization program were insulation, air sealing, furnace repair/replacement, and windows (see Table 7 below for details).

Measure Satisfaction

Customers were asked questions about selected measures that were installed in their homes. The measure-specific satisfaction ratings are presented in Table 7.

Table 7. Measure Satisfaction Ratings

Measure	Excellent	Good	Fair	Poor	Don't Know	Did Not Recall Measure	Total Surveyed Participants with Meas.
CFLs	4	8	2	3	1		18
Refrigerator/Freezer	2	1					3
Insulation	5	10	2	1	2	2	22
Air Sealing	7	4	2		2	3	18
Furnace Repair/Replacement	2	1	1			2	6
Windows	10	3	3	1		1	18
Thermal Door	4	6	1	1			12

CFLs

A majority of recipients were satisfied with their new CFLs, 12 out of 18 (67 percent) giving them a good or excellent rating. Half of the participants surveyed (9 out of 18) stated that the agency staff installed the bulbs in their home, while the other half reported that agency staff simply left the bulbs. When asked to elaborate on their stated level of satisfaction with the bulbs, four respondents gave a negative response: that the bulbs burned out quickly. The remaining comments were all positive, and included: I don’t have to change the bulb frequently (mentioned by 4 respondents), they save electricity (2), they give good light (2), and they lower the electric bill (1).

Recipients of CFLs were also asked whether they had replaced any of the CFLs, and if so why. Seven respondents reported replacing their CFLs, with an average of four bulbs each. Of those bulb replacers, 43 percent (3 respondents) reported using incandescent bulbs in place of the CFLs. None of these seven respondents provided a reason for replacing the bulbs.

⁴ Sarah Castor, The Energy Trust of Oregon, presentation at Behavior, Energy, and Climate Change, November, 2010.

Refrigerators and Freezers

All three surveyed recipients of refrigerators and freezers rated this measure good or excellent. When asked to elaborate on their satisfaction ratings, they cited electricity savings and bill savings, as well as satisfaction with the new appliance working better than the one it replaced.

Insulation

Of the 22 recipients of insulation, seven reported noticing that the insulation kept their home warmer in the winter and cooler in the summer. Other reasons for satisfaction with their new insulation included reduced energy use, bill savings, the house being more comfortable, and the fact that it was free. Only one negative comment was reported: that not enough insulation was installed in the home.

Furnaces

The four respondents who remembered having work performed on their furnaces were asked whether their furnaces worked prior to these services. Two said no, their furnaces did not work at all. The comments from the four respondents on the furnace work included that the contractor did a nice job, they needed a furnace anyway, and it keeps the house warmer.

Windows

Eighteen survey respondents had work performed on windows in their homes. Of these, most (14 out of 18, or 78 percent) stated that the windows were replaced, and six respondents reported that prior to these services there had been broken or cracked glass in their windows. Seven respondents said the contractor did a nice job, and three reported that the new windows kept their homes warmer. Negative comments included two people reporting that they did not like the way the new windows worked, and one stating that the windows did not keep the house more comfortable.

Thermal Doors

Respondents receiving thermal doors were generally pleased, with 10 out of 12 (80 percent) giving a good or excellent rating. Their explanations were various, but included: keeping the house warmer, that they needed a new door anyway, the contractor did a nice job, and that the house is more safe and secure. There were only two negative comments: in one case the respondent reported that the contractor didn't finish the job, and the other respondent did not like the way the door worked.

Energy Education

The majority of participants surveyed (21 of the 31, 68 percent) recalled receiving a pamphlet or booklet with information about how to save energy. Of those, 19 (61 percent of all respondents) reported reading the pamphlet after the agency staff left their homes.

Respondents were asked about tips given by agency staff about how to save money on their electric bills. Thirteen of the 31 respondents (42 percent) remembered getting energy-saving tips. Of those, the most commonly recalled tips were lowering the hot water thermostat to 120 degrees (recalled by 8 respondents, representing 26 percent of all respondents), and keeping thermostats low in winter (5 percent) and high in summer (16 percent). The same two tips were also the most common responses when participants were asked which tips they had put into use in their homes.

Qualitative Non-Energy Benefits⁵

The participant surveys included questions to evaluate certain qualitative non-energy benefits of the program. These questions were asked only to the 22 participants who had received insulation measures. Homes with insulation were targeted for these questions because insulation typically has the largest impact on heat retention, levels of comfort, reduction in illnesses, and a decrease in forced mobility.

Improved Comfort

When asked whether their homes were more comfortable to live in after the weatherization work was performed, 72 percent of respondents (16 out of the 22 homes that received insulation) responded affirmatively. An additional 23 percent reported that the level of comfort had remained about the same, and 5 percent were unsure.

Reduced Electricity Expenses

The same subset of 22 respondents receiving insulation was asked whether they noticed any change in their electric bills, since a reduction in household electricity expenses is an important benefit of low-income weatherization programs. Nearly half (10 out of the 22, 45 percent) said their bills had been noticeably more affordable since the work was performed, while the same number of respondents said their bills had stayed about the same.⁶

Improved Health

If insufficiently heated homes are causing or exacerbating illness, weatherization and efficiency improvements can improve a family's overall health. When Idaho insulation recipients were asked whether the work performed on their home had any impact on their health, only three said yes. These three cited getting better sleep and not being as cold in their homes, but none specified that they had suffered fewer illnesses.

Reduced Mobility

Finally, weatherization programs have been linked to participants being able to stay in their homes when they otherwise might have been forced to move. This results in various benefits, including avoiding the cost of moving homes, as well as keeping children in the same school, avoiding absences, and avoiding employment disruptions. This benefit was examined from two perspectives: participant surveys and analysis of payment data. The latter is discussed in Section 3, Non-Energy Benefits.

In the participant survey, insulation recipients were asked whether having this work done made them more likely to be able to stay in their homes, and 15 out of 22 (68 percent) said yes. While this finding is only speculative, it does show that many participants felt more confident about being able to stay in their homes.

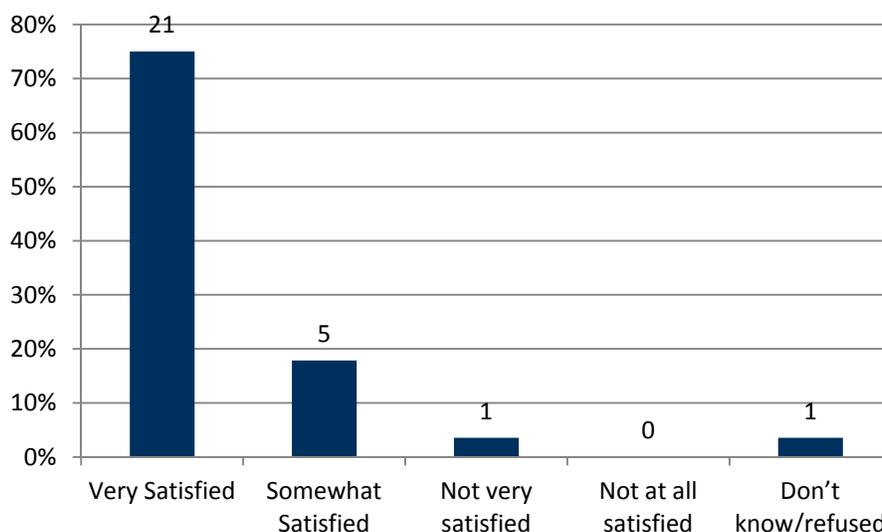
⁵ The total number of participants surveyed is less than that required to achieved a level of statistical significance that would allow these benefits to be quantified. Section 3, Non-Energy Benefits, describes the program's quantifiable benefits including economic benefits and the reduction in arrearage.

⁶ In the 2006-2009 period, rates for Rocky Mountain Power customers rose significantly, in part because of the elimination of the Bonneville Power Administration (BPA) credit to customers of investor-owned utilities. Net residential retail rates paid by customers in Idaho increased 44 percent (this increase includes: 8.4% general rate case, 2.2% energy efficiency rider increase, 32.6% elimination of BPA credit).

Program Delivery and Satisfaction

We asked participants to rate their satisfaction with the program overall. As shown in Figure 2, a vast majority of respondents reported being very satisfied.

Figure 2. Participants’ Overall Satisfaction with the Services Provided



When asked to identify areas for improvement, most respondents could not think of anything that needed to improve. One person surveyed suggested that Rocky Mountain Power provide more funding so that more people have access to these services.

We also asked participants about their interactions with the agency staff, finding that 23 out of 31 respondents (74 percent) reported that staff members were very courteous. Two of the 31 individuals surveyed mentioned that some contractors had an attitude of “not caring” about the work. Twenty-seven respondents (87 percent) reported that agency staff had adequately explained the work that would be completed in their home.

Participants were asked if they knew who to call if they had any problems, and 10 of the 31 (32 percent) said no. This may indicate that agencies did not always give participants contact information for any necessary follow-up.

All respondents were asked if the changes made to their home caused any problems. Four out of 31 (13 percent) cited difficulties, and three gave further details:

When they turned down my water heater it caused problems with my water. And since they made the vent go from through the attic to through the roof, and the kids have reported sounds of mice in the attic.

The door – it’s leaking air.

When they put the insulation in the attic, they covered up the fan. The exhaust got covered in the insulation and it got burnt out.

All four respondents citing problems stated that the problems were not resolved to their satisfaction.

Process Stakeholder Interview Findings

The three interviews with program stakeholders (Rocky Mountain Power, one of the two agencies, and CAPAI) conducted for this process evaluation all followed a similar structure. The interview guide addressed the topics listed in the methodology section on page 3, but allowed for conversation to move in different directions should other subjects of interest arise. All the individuals interviewed were cooperative and understood the importance of the evaluation and their feedback.

Program Goals

All stakeholders agreed that the program's primary goal was to save energy. The agency staff also specified that a goal was to reduce participants' heating bills. All parties agreed that these goals were being met. No targets are set in terms of number of participants or kWh savings for just the Rocky Mountain Power portion of the program. Agencies do strive to complete weatherization of a certain number of homes every year based on goals for their federal funding.

Impact and Adequacy of Rocky Mountain Power Funding

Stakeholders reported that the Rocky Mountain Power funding supplemented other funding sources and enabled agencies to complete more homes per year. The additional funding supports a higher volume of homes than would otherwise be possible. The Idaho agencies are able to exhaust the funding provided by Rocky Mountain Power each year due to the relatively high percentage of electrically heated homes in the state. According to the agency, between 35 and 48 percent of homes served are electrically heated, the remainder being heated with natural gas, heating oil, or other fuels. The area natural gas provider, Intermountain Gas, does not provide funding for their customer homes treated by the weatherization program.

While measure feasibility is determined by the home energy audit, agencies are able to exercise discretion in selecting measures for homes. For example, only a small number of refrigerators were replaced in Idaho. When asked to explain why, the agency interviewed pointed out that although it tests refrigerators to see whether an upgrade is cost-effective, it must prioritize its limited funds. The agency indicated that refrigerators are less expensive, readily available, and easy to install. Measures like insulation are more expensive, less likely to be purchased, more difficult to install, but provide a greater benefit to the participant.

Impact of Recovery Act Funding on Low-Income Weatherization

In 2009, the Recovery Act brought an influx of additional funding for weatherization programs. While this only affected part of one program year covered by this evaluation (2009), the effect was notable, according to stakeholders. The agency staff member interviewed reported that prior to the Recovery Act it was completing about 220 total homes a year on average, and with the increase in funding they are completing over 400 a year. The state administrator from CAPAI reported that as of the date of the interview (November 19, 2010), 3,113 homes had been weatherized in Idaho with the support of the Recovery Act funding.

This fast increase in volume came with some challenges. The state administrator reported that the Recovery Act's Davis-Bacon wage requirements caused some delay in ramping up, as it took some time to establish procedures for compliance. Agencies also had to juggle other funding sources, such as Rocky Mountain Power, in with the huge quantity and demand of the Recovery

Act funding. The agency reported that in addition to Davis-Bacon requirements, the Recovery Act has specific requirements relating to lead abatement and historic preservation.

Increased weatherization funding from the Recovery Act allowed for investment in improvements to the organization and implementation of the existing program in Idaho. The state administrator hired additional technical monitoring staff, and agencies trained and hired staff and contractors to meet the increased volume, working toward the job-creation objective of the Recovery Act. In addition, the agency staff member interviewed reported that it instituted a policy that final inspection of weatherized homes be conducted by an auditor who had not done the initial audit or the work on the home. This change, instituted in summer 2009, was reported to have improved quality. The state administrator reported that with the Recovery Act funding the agencies have: increased their administrative and organizational capacity, and strengthened their long term planning skills. Agencies also gained greater cohesiveness in working together as a statewide team. Both the state administrator and the agency interviewed speculated that these improvements will continue to benefit the program after the Recovery Act funding is exhausted.

Provision of Energy Education

The agencies aim to educate their clients about energy use in their homes. The agency staff interviewed explained that most of the energy education occurs during the initial audit. Auditors give residents the Rocky Mountain Power booklet and explain what actions they can take to reduce energy use. When the crew returns to complete the work, crew members discuss their work plan for the home with the resident.

The state administrator pointed out that while each home gets *some* energy education message, it may not always be a consistent message from home to home. CAPAI has taken steps toward developing a statewide energy education curriculum, but for the moment the audit works well to engage residents in thinking about energy use.

Prioritization and Wait-Listing

Homes are prioritized based on DOE requirements, which give preference to homes with elderly residents or young children under six, as well as handicapped individuals. Wait lists for low-income weatherization programs can be quite long, due to high demand for services. The state administrator estimated that agency waiting lists average about two years in Idaho, but that wait time can be as long as 12 years in some cases. The agency staff member interviewed reported that prior to the Recovery Act funding, its waiting list was approximately two years long, but that after stimulus funding came in it increased to around three years. The increase in the wait list is due to two reasons: 1) increased eligibility to 200% of the Federal Poverty Level (FPL) expanded the enrollment⁷, and 2) the economic downturn resulted in an increase of potential applicants.

⁷ The DOE guidelines for program year 2010 have maintained the 200% of FPL income eligibility requirement. However, consistent with the Rocky Mountain Power tariff, homes served with their dollars are only spent on households whose income are at or below 150% FPL.

Invoicing and Payments

In the Idaho program, the agencies send invoices directly to Rocky Mountain Power for processing and payment. Rocky Mountain Power does not provide any up-front funding, but pays rebates after the work has been completed and it has received an invoice. The agency interviewed reported typically sending invoices on a monthly basis and including a report of work done in each home along with customer information. Rocky Mountain Power stated that both of the Idaho agencies invoice on a timely basis, and that there have not been any issues with invoicing or data. CAPAI, the state administrator, is not involved in the invoicing or payment process.

Staff Training

A variety of training prepares agency staff to work for the weatherization program. According to the agency, inspectors and auditors are both certified by the State of Idaho, while weatherization crews are mostly trained in-house. The exception to this rule is lead renovator training, which is provided by an outside company and paid for by federal funding CAPAI receives. The agency, CAPAI, and Rocky Mountain Power all agreed that the level of staff training was sufficient. CAPAI pointed out that the agency sends an inspector to approve each home, so there is a built-in process that allows them to identify individuals or specific tasks needing additional training.

Reporting and Monitoring

Program reporting to Rocky Mountain Power occurs in conjunction with invoicing. Agencies submit a cover invoice requesting payment on the homes submitted, which includes:

- Invoice number,
- Date, and
- Total dollar amount.

Additionally, agencies submit a one-page form on each completed home, detailing:

- Home occupant (owner versus renter)
- Client's name (or owner's name in case of rental)
- Account number
- Primary heat type
- Water heat type
- Air Conditioning type
- Date measures installed
- Type of structure (single family, multi-family, manufactured home)
- Total cost per measure
- Rocky Mountain Power rebate for each measure
- Calculation of agency administrative fee billed to Rocky Mountain Power
- Total reimbursement requested
- kWh savings estimated for total job
- Total cost of all measures

They also keep the property owner's signature on file, authorizing the agency to work on the property and Rocky Mountain Power to provide a rebate. No additional documentation or reporting aside from invoicing is required.

CAPAI, in compliance with DOE requirements, monitors a minimum of 5 percent of the homes that are weatherized through the program. According to CAPAI, Rocky Mountain Power's involvement in monitoring is relatively new, but Rocky Mountain Power is now engaged in the process. CAPAI noted that it does not submit any monitoring reports to Rocky Mountain Power, but would be willing to if Rocky Mountain Power desired that.

Any issues that are identified through monitoring are written up, and agencies are given 30 days to submit a description of their plan to correct the problem. CAPAI reported that this system works well for all parties. One example given was the documentation for DOE's lead safety requirements: at first the agencies were not meeting the new DOE lead-safety documentation standards. CAPAI and the agencies worked to establish a formalized process for their paperwork and DOE is now very pleased with Idaho's lead-safety documentation.

Program Achievements and Lessons Learned

Both CAPAI and the agency noted that ramping up to spend the Recovery Act funding was a big achievement in 2009. They report that the increase in volume of homes was challenging, but it led all parties involved in the program to pull together, and they believe that the agencies were able to improve the consistency and quality of their work through the ramp-up. Furthermore, CAPAI highlighted the fact that the Recovery Act built capacity at the agency level by forcing them to see things from a big-picture perspective and to be more effective planners and project managers.

Process Evaluation Conclusions

The participant survey and process interviews provided a comprehensive overview of this program. Overall, respondents felt that Rocky Mountain Power's contribution to the program is working effectively to increase the number of homes weatherized, and that the administration of both the Rocky Mountain Power funding and the program in general is functioning smoothly.

2. Impact Evaluation

This section describes the approach used to develop the Low-Income Weatherization Program's expected savings estimate and adjusted gross energy savings, based on utility electric billing data. First, a review of program participant data and annual reports is provided. Next, the billing analysis approach is presented, including explanation of which customers were included in this analysis, the data analyzed, and the selection of a nonparticipant sample. This is followed by discussion of the model developed for this study, and the results of our analyses.

Introduction

A statistical billing analysis was conducted to determine kWh savings and realization rates for the program for 2007, 2008, and 2009 program participation years.

Typical measures installed and the frequency of installation are listed in Table 9 on page 15. Measures most frequently installed include: air sealing and infiltration control, pipe insulation, compact fluorescent lighting, window glass replacement, thermal door installation, and ceiling insulation.

The savings estimate was determined from a pooled conditional savings analysis (CSA) regression model. This model included data from a group of nonparticipant homes, which served as the baseline.

Impact evaluation data were obtained from a number of different sources, including:

- **Program data:** Rocky Mountain Power provided information regarding the program's participants and installed measures. Specifically, these data included square footage and the list of measures installed per home. However, these data did not include quantity of measures installed (such as number of CFLs) or measure-specific savings estimates.
- **Billing records:** Rocky Mountain Power provided participant and nonparticipant meter records from January 2006 through October 2010. The nonparticipant population was identified based on their receipt of energy assistance on their Rocky Mountain Power bill and homes that did not receive weatherization with Rocky Mountain Power funds during the program period.
- **Weather data:** Cadmus collected Idaho weather data for four representative stations for the corresponding time period from the National Weather Service (NOAA).

Cadmus first matched participant accounts from program data with billing data. This separated billing data into groups of participants and nonparticipants. Daily heating and cooling degree days were then matched to each of the respective monthly read date periods in the billing data for use in weather-adjusted savings modeling.

Data and Document Review

Correct Participant Data Corresponding to Sites

The initial data extract of program participants included names and account numbers that didn't always correspond to those of program participants. While most customer names and account

numbers did match participants, some corresponded to previous occupants, in some cases from more than five years back. We therefore relied on site ID and address to match the participants with the billing and payment data.

Invoice Date

The date field in the program data extract indicated the date that Rocky Mountain Power entered the program data into its system. Invoice date is not tracked in their database. Delays between the invoice date and the date a job was entered in the system made it difficult to determine the specific program year in which jobs were completed.⁸ Annual program costs are associated with invoice date and were inconsistent with tracking of weatherization jobs occurring for a given year. For this reason, and because there were small numbers of jobs in each year, we summarized program impacts across all program years rather than providing annual values. Another issue associated with this date field is that we were unable to identify the date weatherization was completed and therefore unable to specifically determine start and end dates for the pre- and post-consumption periods for the billing analysis.

Quantity and Cost Data Collection

The data collection system tracks measure names and total measure costs per home, but does not collect the quantity of the installed measures (e.g., number of CFLs). Measure quantity is necessary in most cases for calculating deemed savings estimates and is also helpful for assessing cost-effectiveness at the measure level. For this project, expected savings estimates (based on annual reports) as well as cost-effectiveness, are calculated at the program level.

Program Participation and Savings

Cadmus reviewed program data and annual reports to determine average annual savings and participant levels, as well as the distribution of measures installed over the program years being evaluated. Table 8 provides a summary of Rocky Mountain Power’s 2007, 2008, and 2009 program results.

Table 8. Average Annual Savings and Participant Levels⁹

Program Year	Participation	Savings (MWh)	Average Savings per Participant (kWh)*
2007	64	146	2,282
2008	89	195	2,195
2009	113	197	1,740
Total	266	538	2,015

* Average per participant savings derived from 2007, 2008, and 2009 annual reports

Average savings per participant reported by the utility were used as a benchmark to check the results of the billing analysis and to calculate the realization rate.

⁸ Rocky Mountain Power indicated that these delays occurred during a period of understaffing and that its current protocol is for jobs to be entered into its tracking system in the same month in which they are invoiced.

⁹ Participation determined by PacifiCorp database entries.

Frequency of installed measures is tracked for each participant household in Rocky Mountain Power’s data collection system for the program. Table 9 lists the frequency of homes receiving different weatherization measures across the three program years. Note that the frequency reflects the number of homes that have received a specific type of measure, such as CFLs, rather than the total number of individual measures installed through the program.

Table 9. Frequency of Measure Installations

Measure Type	2007	2008	2009	Grand Total
Infiltration controls	52	49	91	192
Pipe insulation	48	54	66	168
CFLs	10	61	92	163
Windows - double glass replacement	35	39	79	153
Doors - thermal door replacement	39	51	62	152
Ceiling insulation	27	32	56	115
Attic ventilation	15	21	22	58
Floor insulation	17	13	25	55
Furnace repair (electric)	2	14	24	40
Duct sealing and insulation	1	3	17	21
Water heater wrap		7	12	19
Water heater replacement	2	4	13	19
Windows - storm windows	5	3	10	18
Wall insulation	3	8	7	18
Furnace replacement (electric)	1	4	12	17
Refrigerator replacement		1	8	9
Heat exchanger			1	1

Of the total 266 participants, approximately 150 (56 percent) received at least one type of insulation measure, while 246 (93 percent) received a mix of other shell measures aimed at infiltration control (including air sealing, attic ventilation, duct sealing and insulation, double glass window replacement, and window weather-stripping). There are 144 participants (54 percent) that received both insulation and infiltration, while 252 participants (95 percent) received either insulation or infiltration. Only 14 sites (about 5 percent) received neither insulation nor infiltration measures. The majority of these sites were electrically heated and received installations consisting of pipe insulation, CFLs, and health and safety measures.

Billing Analysis

Methodology

Rocky Mountain Power provided monthly billing data for all residential customers from January 2006 to October 2010. They also provided a customer information file, which contained a list of

customers that had received energy assistance for their Rocky Mountain Power bill, and were assumed to meet income requirements for the weatherization program.

Data Screening

Once participant billing data were combined with residential nonparticipant billing data, we conducted a series of steps to screen participant and nonparticipant usage data. These screens ensured the analysis was conducted with a clean, reliable dataset.

The first screening step was to summarize the monthly kWh usage and the total number of billing days for the pre-installation (2006) and post-installation (October 2009 – September 2010) periods for each account. Pre- and post-period total usage was normalized to 365 days to prevent bias if more or fewer days occurred in each time period. Participant and nonparticipant sites were removed from analysis if any of the following applied:

1. Fewer than 10 months of pre- and post-billing data were available.
2. Fewer than 250 billing days or more than 400 billing days in either the pre- or post-period.
3. Total annual pre- or post-consumption of less than 1000 kWh; total annual pre- or post-consumption more than 50,000 kWh.
4. An account changing usage from the pre- to post-period by more than 70 percent.

These criteria, commonly used in billing data analyses, were selected to ensure sufficient data were available, and to reduce chances of including sites where significant confounding changes (other than the measures installed through the program) affecting energy consumption occurred. After application of the screening criteria, 166 participants remained in the analysis from the original population of 266 participants.

Nonparticipant Selection

An appropriate research approach for conducting impact analysis is a “quasi-experimental” research design. In this case, this approach consists of comparing the change in pre- to post-energy consumption between participants and a comparison group of customers who, though eligible, did not participate in the program. By accounting for non-program-related factors that can affect energy use from the pre- to the post-program periods, this method can provide estimates of “net” program impacts.

Quartiles of participant annual pre-period kWh usage were obtained for this group. The nonparticipant population was first reduced by matching to participant zip codes. Nonparticipants were then assigned to their respective participant quartiles, and a random sample of four times more nonparticipants than participants was selected for each quartile. The final nonparticipant group consisted of 664 nonparticipants, matched to the participant quartiles. Once the nonparticipant quartile usage matching was performed, average daily participant pre-consumption (2006) was 50.0 kWh, and average daily nonparticipant pre-consumption was 50.2 kWh. Through this method and the proximity of these consumption estimates, we felt the nonparticipant group was well matched to participants for this analysis.

Once the screened participant group of 166 participants and matching nonparticipant group were selected, accounts were matched back to billing data to obtain final, screened, monthly modeling billing data.

Billing Analysis Results

The final CSA regression monthly model specification below was used to estimate savings from insulation measures:

$$ADC_{it} = \alpha + \beta_1 ANNUALPRE_i + \beta_2 POST_t + \beta_3 PARTPOST_{it} + \beta_4 CDD_{it} + \beta_5 HDD_{it} + \beta_6 MOVER_i + \epsilon_{it}$$

Where for customer (i) and month (t):

- ADC_{it} = average daily kWh consumption
- $ANNUALPRE_i$ = the total annual 2006 pre- period kWh usage.
- $POST_t$ = indicator variable that is 1 in the post- period for both participants and nonparticipants, 0 otherwise.
- $PARTPOST_{it}$ = indicator variable that is 1 in the post- period for participants, 0 otherwise.
- HDD_{it} = average daily heating degree-days (base 65)
- CDD_{it} = average daily cooling degree-days (base 65)
- $MOVER_i$ = indicator variable that is 1 if the customer account number is different in the pre- and post- periods (indicating the same customer is not living at the same site)

The key coefficient determining average program savings was β_3 . This coefficient represents the average daily savings per program participant, after accounting for nonparticipant trends. The inclusion of the $ANNUALPRE$ variable was used to ensure no participants or nonparticipants had an undue influence over the final savings estimate; resulting in a more robust model.

Table 10 summarizes overall adjusted gross kWh model savings results for the program. The table compares average, expected savings with the average per participant model savings to obtain an adjusted gross realization rate of 65 percent. A common measure of model reliability is the relative precision of an estimate, defined as $1.645 \times \text{standard error} / \text{Beta}$ (or $1.645 / t\text{-value}$). This reliability measure indicates the estimated coefficient’s relative precision—the higher the precision (percent error relative to the savings) the lower the estimate’s reliability.

As sample sizes were rather small, a large error bound occurred for the final model savings estimate. The relative precision at the 90 percent confidence level for the program savings estimate was 26 percent. As participant pre- period usage was 18,274 kWh, the 1,308 kWh savings represented approximately 6 percent savings.

Table 10. Model Adjusted Gross Savings and Realization Rate Summary, kWh/Year

	Modeled Savings per Participant (Adj. Gross kWh)	Expected kWh Savings per Participant	Realization Rate	Relative Precision at 90% Conf. Level
Overall Model	1,308	2,015	65%	26%

We investigated whether homes in the nonparticipant sample may have been weatherized outside of the program using non- Rocky Mountain Power funding resulting in weatherization savings untracked by the utility. In reviewing agency tracking data, as well as speaking with an agency

contact, we found that thirteen percent of low-income customers listed as non-participants had had their homes weatherized solely with federal dollars. We adjusted the nonparticipant savings estimate to account for these homes.

Table 11 provides a comparison of pre- and post-usage and savings estimates between the participant and nonparticipant groups. The model estimate of participant gross savings was consistent with the expected savings, showing a difference of 0.2 percent when comparing each as a percentage of pre- period usage.

Table 11. Savings Comparison

	Participants Gross (n = 166)	Nonparticipants Gross (n = 664)	Participant Adj. Gross
Annual Pre- (kWh)	18,274	18,275	18,274
Annual Post- (kWh)	16,302	17,611*	16,966
Savings	1,972	664	1,308
Savings as % of Pre	10.8%	3.6%	7.2%
Expected Savings as % of Pre	11.0%		11.0%

* Nonparticipant annual post- usage adjusted upward to account for weatherized homes

In addition to nonparticipant homes receiving weatherization, the savings observed in the non-participant sample may be attributed to a few other factors.

- Between 2006 and 2009 residential rates in Idaho increased by 44 percent due to the reduction of the Bonneville Residential Exchange Credit.
- Effects of the U.S. economic recession are present in the post- period of this analysis.

These factors would likely also affect the participant population, however, after receiving weatherization, the impact of these on their household would have been less than for the participating population.

3. Non-Energy Benefits

Non-energy benefits of low-income programs are those that create positive change within the homes of participants. Additional non-energy benefits accruing to the program and to society as a whole include: changes in bill payment behavior and community economic benefits.

Participant surveys, as described in the process evaluation, were used to assess non-energy benefits at the household level in the form of increased comfort, more disposable income, fewer illnesses, and the ability to remain in the home. Additionally, billing and payment data were used to estimate the program's impact on arrearages and participant mobility. The economic impacts of the program were modeled using the IMPLAN input/output model.

Participant Impacts

In the participant survey, participants who had received Rocky Mountain Power -funded insulation were asked a series of questions related to non-energy benefits resulting from the program. These questions focused on the areas of increased comfort, reduced electricity payments, improved health, and reduced mobility. Results for these findings were not quantified and are presented in the process evaluation section.

Low-income households move on a more frequent basis than other households. One benefit of weatherization can be that participants are less likely to need to move because of inability to pay utility bills. These reductions in mobility were analyzed through the payment analysis by comparing the number of times an account changed for a specific site between the pre- and post-periods for participants and nonparticipants. While 38 percent of participants moved homes between the pre- and the post-periods, 43 percent of nonparticipants moved homes in the same time period. The difference between these impacts was not statistically significant, however, so no economic impact was estimated.

Economic Impacts

Economic impacts occurring as a result of the program include jobs, income earned from employment, value added to the regional economy, and total economic output. Direct monetary changes to the Idaho regional economy as a result of the program include:

- **Program Spending:** The program pays for retrofitting activities, including administration, construction labor and materials. Some program spending, such as payment processing in Oregon, occurs outside the region and is not included in the regional analysis.
- **Program Costs:** The program is funded by customer dollars, which are collected from all Rocky Mountain Power customers in Idaho.
- **Low-Income Avoided Electric Payments:** Well-weatherized homes use less energy than average homes and result in an increase in disposable income for participants.
- **Electric Provider Reduced Demand:** Energy savings at the household level will result in reduced final demand for electricity.

To determine the impacts of these “events,” we use an input/output model which contains, at its core, a matrix that represents the regional economy. This matrix tracks what households and industries buy and sell from each other. Because all industries are interconnected, a change in one sector will affect other sectors, which affect other sectors, and so on, causing a domino effect.

There are direct, indirect, and induced impacts based on how the changes ripple through the economy. The direct effects are due to direct program spending, for example, purchase of efficient windows for use in a weatherized house. Indirect effects arise from changes in demand for products used in sectors directly affected by program activities. For example, if glass is an input used in window manufacturing, an increase in demand for glass would be considered an indirect effect. Induced effects are a result of changes in worker or household spending on consumer goods and services in the general economy.

We used IMPLAN v3.0 for the analysis of economic impacts and purchased the 2009 (most recent) Idaho-state level data package. Model inputs are summarized in Table 12.

Table 12. IMPLAN Model Inputs

Category	Event Description	Value	Comment
Program spending	Agency administration payment	\$46,889	Idaho agency administrative costs
	Agency weatherization (54% labor, 46% equipment*)	\$519,664	75% paid for by Rocky Mountain Power, 25% from federal government**
	Rocky Mountain Power employee expenses	\$1,546	Rocky Mountain Power staff travel occurring in Idaho
	Reporting and other program management	\$28,422	These expenses occur outside of Idaho and are modeled as Rocky Mountain Power program dollars spent outside the regional economy
Program costs	Ratepayer funding	-\$466,606	This figure is the same as program spending minus the federal government's share for weatherization. In our model it is a cost to all Idaho Rocky Mountain Power customer households.
Avoided electric payments	Participants have lower electricity bills	\$744,924	This is modeled as an increase in disposable spending amongst eligible households (maximum participant household income for a 3 person household is \$27,465)
Electric provider reduced demand	Rocky Mountain Power lost revenue	-\$744,924	Utility loses an amount of final demand equal to the avoided electric payments

* Equipment includes insulation and other hardware. This model assumes that goods were purchased in Idaho, but the model also has a “regional purchase” coefficient which takes into consideration were goods were produced.

** The 25 percent contribution from the federal government is considered to be exogenous to the Idaho economy and is not reflected as a cost to Idaho ratepayers.

The program expenditures, which were spread out over 2007-2009 in nominal dollars, were adjusted to 2009 dollars using the U.S. Bureau of Labor Statistics’ Consumer Price Index inflation calculator. The expenditures across these years of analysis are included in the program spending category. Program savings, which are used to calculate avoided electric payments and reduced demand, were calculated to be 1,308 kWh per participant annually, or 32,700 kWh per participant over 25 years, which is the weighted measure life of the weatherization program’s energy efficiency installations. Avoided electric payments are set equal to the net-present value

of participant benefits, which are the participant dollar savings and are equal to the amount of the utility’s lost revenue.

Results from IMPLAN Model

The macroeconomic impacts of the 2007-2009 program expenditures include the net creation of 7.7 total job-years¹⁰ in the Idaho economy over the 25-year weighted measure life. A summary of the direct, indirect, and induced employment increase are given in Table 13.

Table 13. Economic Impacts Summary

Impact Type	Employment	Labor Income	Total Value Added	Output
Direct Effect	4.2	\$90,532	-\$186,781	-\$176,824
Indirect Effect	0.4	\$14,241	\$20,485	\$23,541
Induced Effect	3.1	\$96,324	\$175,124	\$298,229
Total Effect	7.7	\$201,097	\$8,827	\$144,946

This table also contains the income, value added, and output¹¹ of the regional economy. Impacts occurring outside the Idaho economy are outside the scope of the study. The results indicate that the program has an overall positive effect on the Idaho economy (total effect row). Direct losses accrue primarily to Rocky Mountain Power (negative total value added and output), but this is countered by the positive indirect and induced effect in the greater economy.

The total employment increase as a result of program funding is shown by sector in Table 14, below. This chart shows the top ten industries where jobs are being created.

¹⁰ Each job-year represents one year of employment for one person.

¹¹ **Labor Income:** Labor income represents all forms of employment income, including employee compensation (wages and benefits) and proprietor income.

Value Added: Value added is the difference between an industry’s total output and the cost of its intermediate inputs. It equals gross output (sales or receipts and other operating income, plus inventory change) minus intermediate inputs (consumption of goods and services purchased from other industries or imported). Value added consists of compensation of employees, taxes on production and imports less subsidies (formerly indirect business taxes and nontax payments), and gross operating surplus (formerly “other value added”).

Output: Output represents the value of industry production. In IMPLAN these are annual production estimates for the year of the data set and are in producer prices. For manufacturers this would be sales plus/minus change in inventory. For service sectors production = sales. For retail and wholesale trade, output = gross margin and not gross sales.

Table 14. Top Ten Industries by Total Employment

IMPLAN Sector	Description	Total Employment	Total Labor Income	Total Value Added	Total Output
40	Maint & repair construct of residential struc	3.1	\$110,459	\$136,664	\$283,869
319	Wholesale trade businesses	1.7	\$96,123	\$165,034	\$254,329
437	* Special (S&LG Non-Ed Emp & Payroll)	0.9	\$41,275	\$46,889	\$46,889
360	Real estate establishments	0.4	\$2,479	\$18,605	\$24,745
394	Offices of physicians- dentists- and other he	0.2	\$15,136	\$16,153	\$26,697
329	Retail Stores - General merchandise	0.2	\$4,433	\$7,215	\$8,496
413	Food services and drinking places	0.2	\$2,769	\$3,941	\$8,154
324	Retail Stores - Food and beverage	0.1	\$4,312	\$7,033	\$8,327
397	Private hospitals	0.1	\$7,363	\$7,860	\$16,056
398	Nursing and residential care facilities	0.1	\$3,161	\$3,412	\$5,843

*Sector 437 represents state and local government housing programs and authorities.

The sector receiving the largest impact is the construction, maintenance, and repair of residential structures industry. Rocky Mountain Power's funding of the 2007-2009 Idaho low-income weatherization program resulted in 3.1 additional jobs in this sector for one year. The next largest impact was on the wholesale trade business, which is a result of purchases of weatherization materials such as insulation.

Payment Analysis and Arrearage Impacts

Monthly energy bills and payment histories were used to quantify the program impacts on payment patterns and customer arrearages. Changes between the pre- and post- periods were compared between the participant and nonparticipant groups to measure the net effects of the program.

Methodology

Rocky Mountain Power provided monthly payment data for the low income customer sample from January 2006 to October 2010. The sample included all participants in addition to a nonparticipant pool that had been identified as customers that had received energy assistance on their Rocky Mountain Power bills. These Rocky Mountain Power payment datasets included the following information:

- Payment transaction date¹² (monthly)
- Actual billed amount
- Actual paid amount

¹² Payment transaction date is the date the payment was processed by Rocky Mountain Power.

- Source of payment (i.e., customers vs. external source)
- Arrearage amount (customer's monthly unpaid ending account balance)
- Disconnection / reconnection data (date occurred, fee)

In this analysis, four specific measurements were analyzed:

1. How the number of payments changed during the pre- and post- periods.
2. The total payment amounts that individuals made during the pre- and post- periods.
3. The proportion of payments to the amount billed during the pre- and post- periods.
4. The number of reconnections required during the pre- and post- periods.

Data Screening

To ensure the analysis was conducted with a clean, reliable dataset, we screened participant and nonparticipant payment data.

The first screening step was to summarize the monthly payment data and the total number of billing days for the pre- (2006) and post- (October 2009 – September 2010) periods for each account. Pre- and post-period payment information was normalized to 365 days to prevent bias if more or fewer days occurred in each time period. Participant and nonparticipant sites were removed from analysis if any of the following screens applied:

- Removal of sites with substantially more or less than 365 days in the measurement periods (<330 and >400).
- Removal of sites with fewer than 11 bills or more than 13 bills in the pre- or post- periods.
- Removal of sites with billed amount more than \$2,500 in the pre- period or more than \$3,400 in the post- period.
- Removal of sites where the total payment amount was over 150 percent of the billed amount in either the pre- or post- period.

These criteria were selected to ensure sufficient data were available, and to reduce chances of including sites where significant changes (other than the measures installed through the program) affecting payments occurred. After applying the screening criteria, 229 participants and 1,429 nonparticipants remained from the original counts of 266 and 2,334, respectively.

Payment Analysis Results

Number of Customer Payments

Table 15 shows the change in the average number of customer payments made out of the 12 month pre- and post-periods, with participants showing a slight increase(3 percent) in the number of payments they were able to make (not including any energy assistance payments). However, the nonparticipants experienced an 11 percent reduction in the number of payments they could make (8.8 to 7.8 percent).

Table 15. Changes in Number of Customer Payments

	Participants				Nonparticipants				Net Difference	
	Pre-	Post-	Change	Change %	Pre-	Post-	Change	Change %	\$	%
Number of Payments	8.4	8.7	-0.3	-3.2%	8.8	7.8	1.0	11.3%	-1.3 *	-14.6% *

* Significant at the 95 percent level

Payment Amounts

The total amount of individual monthly bills increased substantially between the pre- and post-periods. As shown in Table 16, the annual average bills went from \$941 to \$1,378 for participants and from \$981 to \$1,563 for nonparticipants. This amounts to a net difference of \$145 between the participants and nonparticipants.

Table 16. Payment Amounts Summary

Payment Type	Participants			Nonparticipants			Net Difference
	Pre- \$	Post- \$	Change \$	Pre- \$	Post- \$	Change \$	\$
Total Billed Amount	\$941	\$1,378	-\$437	\$981	\$1,563	-\$582	\$145 ***
Customer Pmt	\$595	\$826	-\$231	\$783	\$770	\$13	-\$244 ***
Customer Shortfall	\$346	\$552	-\$206	\$198	\$793	-\$595	\$389
External Pmt	\$226	\$307	-\$80	\$110	\$438	-\$328	\$248 ***
Net Shortfall	\$120	\$245	-\$126	\$88	\$355	-\$267	\$141

*** Significant at the 95% level

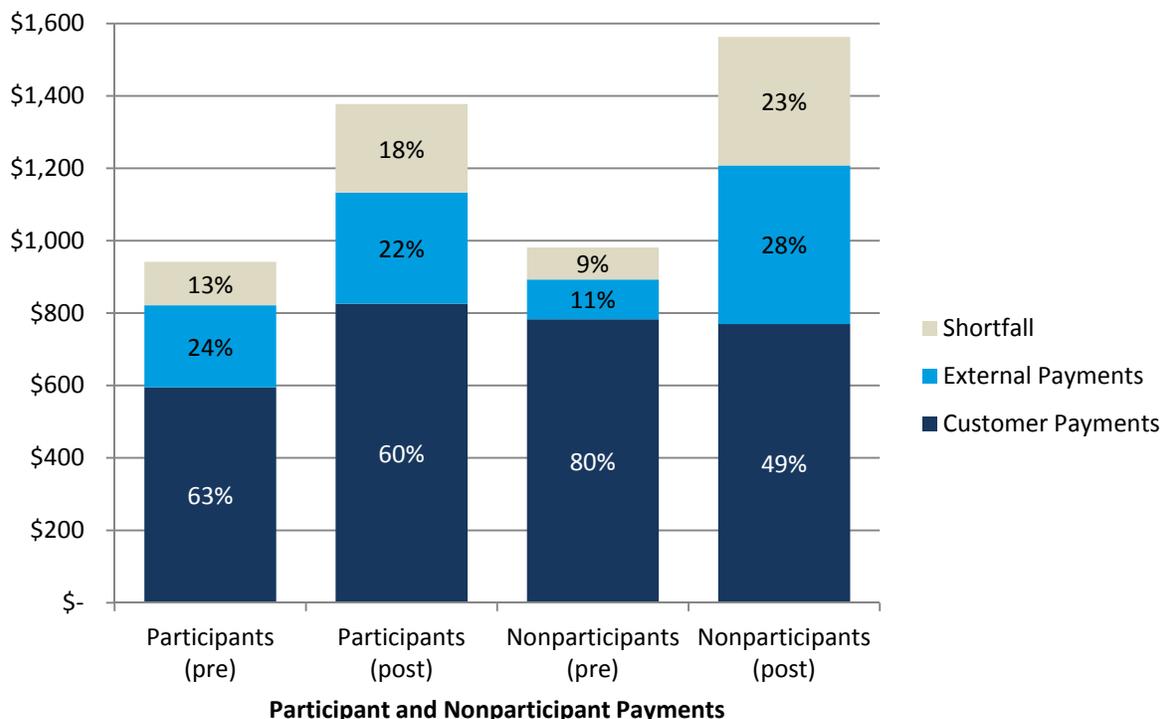
The participants were able to make larger payments in the post-period while the non-participants made somewhat smaller payment then before. This resulted in a more pronounced shortfall for the nonparticipants (shortfall representing the unpaid portion of the customer's energy bill). Table 16 shows that the participant shortfall, before external payments are applied, had increased by \$206 while the nonparticipant shortfall had increased by \$595.

In both cases, participants and nonparticipants required additional external agency payments in the post-period to cover their energy bills.¹³ Here again, the participants fair better. Table 16 shows the average amount of external payments to participants increased by \$80 while those to nonparticipants increased by \$328. Overall, both participants and nonparticipants' net shortfall increased. The participants' increased by \$126 while the non participants' increased by \$267.

¹³ In the post-period, the amount of energy assistance Idaho state had available to assist low-income customers was almost double the pre-period. Rocky Mountain Power reports the amount of energy assistance they received for their customers increased from almost \$400,000 in 2007 and 2008 to almost \$800,000 in 2009.

Figure 3 below provides a visual depiction of the change in percent of bills paid by customers compared to external payments between the pre- and post- periods for participants and nonparticipants.

Figure 3. Payment Impact Summary



The values (arrearage amounts) associated with the figure are provided in Table 16 above. While an overall increase in bills affected all customers, participants were able to pay a larger portion of their electric bill as a result of the program when compared with nonparticipants.

Number of Reconnects

We examined the number of reconnects (or disconnections) in two ways: first, as the number of total reconnections and secondly, as the number of households with reconnections. Table 17 shows both participants and nonparticipants had a reduction in the total number of reconnections between the pre- and post- periods.

Table 17. Reconnection Summary

	Participants				Nonparticipants				Net Difference	
	Pre-	Post-	Change	Change %	Pre-	Post-	Change	Change %	Change	Change %
Number of Reconnects	0.07	0.03	0.04	59%	0.09	0.06	0.03	33%	0.01	26%
Number of Sites with 1+ Reconnects	0.05	0.03	0.02	42%	0.07	0.05	0.02	28%	0.00	13%

Participants had 59-percent fewer reconnections while nonparticipants had 33-percent fewer. Similarly, both showed a drop in the total number of households experiencing a disconnection. A comparison of average reconnection charges between the participants and nonparticipants reveals a similar story. Both groups had lower total charges in the post- period; however, there was more improvement for the participants.

Change in Arrearage

Arrearage is that portion of a customer’s bill they do not pay in a given month (their unpaid ending balance). Table 18, below, shows the program impact on customer arrearage amounts.

Table 18. Arrearage Summary

	Participants				Nonparticipants				Net Difference	
	Pre- \$	Post- \$	Change \$	Change %	Pre- \$	Post- \$	Change \$	Change %	Change \$	Change %
Average Customer Arrearage	\$100	\$154	-\$54	-53%	\$122	\$226	-\$104	-85%	\$31*** ¹⁴	31%

*** Significant at the 95% level

The average customer arrearage represents their ending balance amount across the 12-month period. In order to determine how the program impacts a customer’s ability to cover their bill, we exclude any external payment amounts. The arrearage value also takes into account the existing arrearage for each customer prior to the 12-month pre- and post- periods. Participant arrears levels increased by \$54 (from \$100 to \$154) between the pre- and post- periods, while nonparticipant arrearages increased by \$104. The percent change improvement between participants and nonparticipants is 31 percent, which results in an average participant arrearage improvement of \$31.

¹⁴ This amount is based on the net percent change multiplied by the average pre-period participant arrearage.

4. Cost-Effectiveness Analysis

To assess cost-effectiveness, we conducted an analysis of program costs and benefits from four different perspectives, using Cadmus’ DSM Portfolio Pro model consistent with the evaluations recently conducted on Rocky Mountain Power’s residential and C&I portfolio. The tests include:

- a. **PacifiCorp Total Resource Cost Test (PTRC):** This test examines program benefits and costs from Rocky Mountain Power’s and Rocky Mountain Power customers’ perspectives, combined. On the benefit side, it includes avoided energy costs, capacity costs, and line losses, plus a 10 percent adder to reflect non-quantified benefits. On the cost side, it includes costs incurred by both the utility and participants.
- b. **Total Resource Cost Test (TRC):** This test examines program benefits and costs from Rocky Mountain Power’s and Rocky Mountain Power customers’ perspectives, combined. On the benefit side, it includes avoided energy costs, capacity costs, and line losses. On the cost side, it includes costs incurred by both the utility and participants.
- c. **Utility Cost Test (UCT):** From Rocky Mountain Power’s perspective, benefits are avoided energy and capacity costs and line losses. Costs include any program administration, implementation or incentive costs associated with funding the program.
- d. **Ratepayer Impact (RIM):** All ratepayers (participants and nonparticipants) may experience an increase in rates to recover lost revenue. This test includes all Rocky Mountain Power program costs as well as lost revenues. As benefits, this test includes all avoided energy costs, capacity costs, and line losses.
- e. **Participant Cost Test (PCT):** From this perspective, program benefits include bill reductions. Costs include any customer contribution to the measure cost.

Table 19, below, summarizes the components of the four tests.

Table 19: Benefits and Costs Included in Various Tests

Test	Benefits	Costs
PTRC	Present Value of Avoided Energy and Capacity Costs* with 10% Adder for Non-quantified Benefits	Program Administrative and Marketing Cost
TRC	Present Value of Avoided Energy and Capacity Costs*	Program Administrative and Marketing Cost
UCT	Present Value of Avoided Energy and Capacity Costs*	Program Administrative, Marketing, and Incentive Cost
RIM	Present Value of Avoided Energy and Capacity Costs*	Program Administrative and Marketing Cost + Present Value of Lost Revenues
PCT	Present Value of Bill Savings	Participant Share of Measure Cost (which is zero)

* Present Value of Avoided Energy and Capacity Costs includes avoided line losses occurring from reduction in customer electric use.

Table 20 below provides selected inputs to the cost analysis. These include the evaluated energy savings for each year (based on the per-participant savings of 1,308 kWh, shown in Table 10 on

page 17 above), discount rate, line loss, and program costs. All of these values other than the energy savings are provided by Rocky Mountain Power. The discount rate is from Rocky Mountain Power’s 2008 Integrated Resource Plan. Rocky Mountain Power also provided the values for line loss and the program costs.

Table 20: Selected Cost Analysis Inputs

Input Description	2007	2008	2009
Program Participants	64	89	113
Program Savings (kWh/year)	83,686	116,376	147,758
Discount Rate	7.40%	7.40%	7.40%
Line Loss	11.39%	11.39%	11.39%
Program Costs			
Agency Administrative Costs	\$10,545	\$17,221	\$18,819
Incentive Costs	\$79,904	\$139,015	\$168,557
Utility Administrative Costs	\$10,838	\$8,341	\$10,443
Total Program Costs	\$101,287	\$164,578	\$197,819

Program benefits are comprised of energy savings and their associated avoided costs. The energy savings used in the cost-effectiveness analysis are the evaluated kWh from this study. The analysis used a weighted average measure life of 25 years, based on planning assumptions and weighted by savings and frequency of installations.

Two scenarios are described in Table 21 and Table 23:

- Table 21 presents the results of the cost-effectiveness analysis for the program for the evaluation period (2007-2009) without taking into account any non-energy benefits aside from those represented by the 10 percent conservation adder included in the PTRC.
- Table 23 depicts the analysis for the same period and includes non-energy benefits, as listed in Table 22.

All analyses used the avoided costs associated with the Rocky Mountain Power 2008 IRP 46 Percent Load Factor Eastside Residential Whole Home Decrement.¹⁵

As shown in Table 21, cost-effectiveness analysis results for this base-case scenario indicate that the program is not cost-effective from any of the perspectives other than the participant cost test (PCT) perspective. A benefit-cost ratio of 1.0 or greater is considered cost-effective. This analysis is based on the incentives provided during the period 2007-2009 where Rocky Mountain Power funded 75% of measure costs. As of December 28, 2010 the Rocky Mountain Power incentive funds 85% of measure costs which may lead to a lower benefit-cost ratio.

¹⁵ IRP decrements are detailed in Appendix G of PacifiCorp’s 2008 Integrated Resource Plan Vol. II Appendices: http://www.pacificorp.com/content/dam/pacificorp/doc/Environment/Environmental_Concerns/Integrated_Resource_Planning_6.pdf

Table 21: Program Cost-Effectiveness Summary for 2007-2009¹⁶

Cost Effectiveness Test	Levelized \$ / kWh	Costs	Benefits	Net Benefits	Benefit / Cost Ratio
Total Resource + Conservation Adder (PTRC)	\$0.099	\$426,022	\$372,019	-\$54,004	0.87
Total Resource No Adder (TRC)	\$0.099	\$426,022	\$338,199	-\$87,824	0.79
Utility (UCT)	\$0.099	\$426,022	\$338,199	-\$87,824	0.79
Ratepayer Impact (RIM)	\$0.189	\$815,476	\$338,199	-\$477,277	0.41
Participant (PCT)	\$0.083	\$355,470	\$744,924	\$389,454	2.10
Lifecycle Revenue Impact	\$0.00001046				

Table 22 provides the non-energy benefits that have been quantified through our analysis. The cost-test perspective is also listed for each benefit to indicate where these benefits will be added in the following cost-effectiveness scenario.

Table 22: Assignment of Non-Energy Benefits to Cost-Effectiveness Tests

Non-Energy Benefit	Program Impact	Perspective Adjusted
Arrearage	\$8,331	UCT, RIM, TRC
Economic	\$144,946	TRC
Total	\$153,277	

As shown in Table 23, in addition to the PCT, the program is cost-effective from the TRC and PTRC perspectives with the addition of non-energy benefits.

Table 23: Program Cost-Effectiveness Summary Including Non-Energy Benefits 2007-2009

Cost Effectiveness Test	Levelized \$ / kWh	Costs	Benefits	Net Benefits	Benefit / Cost Ratio
Total Resource + Conservation Adder (PTRC)	\$0.099	\$426,022	\$525,295	\$99,273	1.23
Total Resource No Adder (TRC)	\$0.099	\$426,022	\$491,475	\$65,453	1.15
Utility (UCT)	\$0.099	\$426,022	\$346,529	-\$79,493	0.81
Ratepayer Impact (RIM)	\$0.189	\$815,476	\$346,529	-\$468,947	0.42
Participant (PCT)	\$0.083	\$355,470	\$744,924	\$389,454	2.10
Lifecycle Revenue Impact	\$0.00001028				

¹⁶ Lifecycle revenue impact is the change in dollars per kWh over the lifetime of the program.

Appendix A: Participant Survey Instrument

PARTICIPANT SURVEY

Rocky Mountain Power Low Income Weatherization Program 2007-2009

TO RESPONDENT: Hello, my name is **(FIRST NAME)** from _____ and I'm calling on behalf of Rocky Mountain Power.

We are talking with people who received energy-saving services from **(The Agency)** during the past few years.

[IF RESPONDENT EXPRESSES RESERVATIONS AT THIS POINT, USE THE FOLLOWING SCRIPT TO PERSUADE. IF RESPONDENT DOES NOT EXPRESS RESERVATIONS, SKIP TO S1.]:

We'd like to ask some questions about your opinion of the services you received to help improve the programs and understand how to assist customers in saving money on their energy bills. Please be assured this is not a sales call and my questions are for research purposes only. All of your answers are confidential, and will not be shared with Rocky Mountain Power or **(The Agency)** in any way that identifies you.

S. SCREENING QUESTIONS

S1. Do you remember receiving services such as new light bulbs, having a refrigerator replaced, or getting new insulation through **(The Agency)**?

- 1 Yes [*GO TO S4*]
- 2 No [*GO TO S2*]
- 98 Don't know/don't remember [*GO TO S2*]
- 99 Refused

S2. Is there anyone else at your home we could talk to who might know more about these services?

1. Yes [*IF SO, ASK IF YOU MAY SPEAK TO THIS PERSON NOW*]
2. No/ Don't know/don't remember

IF NO OR DON'T KNOW: Thank you. We are only able to talk with people who remember receiving these services. We appreciate your help. [**TERMINATE** politely.]

S3. Are you still living in the same home where you received these services?

- 1 Yes [*GO TO A1*]
- 2 No
- 98 Don't know/don't remember

99 Refused

IF NO OR DON'T KNOW: Thank you. We are only able to talk with people who still live in the home where the services were performed. We appreciate your help. **[TERMINATE]** politely.]

A. PARTICIPATION / VERIFICATION

A1. How did you first hear about the program? *[INTERVIEWER RECORD AND VERIFY ANSWER, DO NOT READ LIST]*

- 1 Agency staff
- 2 Information with my Electric bill
- 3 Rocky Mountain Power website
- 4 Other website *[IF YES, WHICH WEBSITE(S)?]* _____
- 5 Through another energy assistance program
- 6 Another public service agency
- 7 Written materials at Agency
- 8 Written materials at a public service agency
- 9 Family/friends/word-of-mouth
- 10 Rocky Mountain Power Representative
- 11 Radio
- 12 TV
- 13 HVAC Contractor
- 14 Other *[SPECIFY AND RECORD VERBATIM]* _____
- 98 Don't know/don't remember
- 99 Refused

A2. Did you know Rocky Mountain Power paid for part of these services?

- 1 Yes
- 2 No
- 98 Don't know
- 99 Refused

[FOLLOWING MEASURE LIST FOR EACH PARTICIPANT, ASK MEASURE-SPECIFIC QUESTIONS ONLY FOR THOSE MEASURES THE PARTICIPANT RECEIVED]

[IF MEASURE=CFLs, READ A3, ELSE SKIP TO A10]

A3. Our records show that you received several new light bulbs. Did the agency staff install these new light bulbs directly into light fixtures or did they leave them with you? *[DO NOT READ LIST – CHOOSE APPROPRIATE ANSWER BASED ON RESPONSE]:*

- 1 The new light bulbs were installed by the agency staff directly in the light fixture
- 2 The agency staff left behind new lights for me to install
- 3 I didn't receive new light bulbs *[SKIP TO A10]*
- 98 Don't know *[SKIP TO A10]*
- 99 Refused *[SKIP TO A10]*

A4. How would you rate your new light bulbs? Would you say they were *[READ LIST]*:

- 1 Excellent
- 2 Good
- 3 Fair
- 4 Poor
- 98 Don't know *[SKIP TO A10]*
- 99 Refused *[SKIP TO A10]*

A5. Why did you give the light bulbs a(n) (**RESPONSE FROM A4**) rating? *[DO NOT READ, RECORD FIRST THREE RESPONSES]*

Negative

- 1 I don't like the color of the light
- 2 The light is too bright
- 3 The light is too dim
- 4 They flicker
- 5 They take too long to light up
- 6 They don't fit well in my fixtures
- 7 They don't look nice in my fixtures
- 8 I just didn't like them
- 9 They burn out quickly

Positive

- 10 They're better than the bulbs I had
- 11 They're just fine or I just like them
- 12 I like the way they look
- 13 They give good light
- 14 They save energy/electricity
- 15 They lower the electric bill
- 16 They [will] save me money
- 17 They were free
- 18 I needed new light bulbs anyway
- 19 I won't have to change hard to reach fixture
- 20 I won't have to change the bulb frequently

- 21 Other *[SPECIFY]* _____
- 98 Don't know
- 99 Other

A6. Did you replace any of the light bulbs that were installed with different ones?

- 1 Yes
- 2 No *[SKIP TO QUESTION A10]*
- 98 Don't know *[SKIP TO QUESTION A10]*
- 99 Refused *[SKIP TO QUESTION A10]*

[IF ANSWER = YES IN A6, READ A7, ELSE SKIP TO A10]

A7. How many light bulbs did you replaced?
[RECORD NUMBER VERBATIUM] _____

A8. Did you replace these with incandescent light bulbs or energy-saving light bulbs (CFLs)?

- 1 Incandescent
- 2 CFL
- 98 Don't know [SKIP TO A10]
- 99 Refused [SKIP TO A10]

A9. Why did you replace these bulbs?

[RECORD Answer VERBATIUM]_____

[IF MEASURE=REFRIGERATOR OR FREEZER, READ A10, ELSE SKIP TO A13]

A10. Our records show that you received a new refrigerator(s) or freezer. Is this correct?

- 1 Yes
- 2 No [SKIP TO QUESTION A13]
- 98 Don't know [SKIP TO QUESTION A13]
- 99 Refused [SKIP TO QUESTION A13]

[IF A10 = YES, READ A11, ELSE SKIP TO A13]

A11. How would you rate the new refrigerator or freezer that was installed in your home? Would you say it was [READ LIST]:

- 1 Excellent
- 2 Good
- 3 Fair
- 4 Poor
- 98 Don't know [SKIP TO A13]
- 99 Refused [SKIP TO A13]

A12. Why did you give it a(n) (**RESPONSE FROM A11**) rating? [DO NOT READ, RECORD FIRST THREE RESPONSES]

Negative

- 1 I don't like the way it looks
- 2 I don't like the color
- 3 The refrigerator or freezer is too small
- 4 The refrigerator or freezer is too large
- 5 It doesn't keep the food at the right temperature
- 6 It stopped working
- 7 I just didn't like it

Positive

- 8 It saves energy/electricity
- 9 It lowers the electric bill
- 10 It was free
- 11 I like the way it looks
- 12 I like the color
- 13 The refrigerator or freezer is a good size
- 14 It keeps the food at the right temperature
- 15 It works
- 16 I was glad not to have to clean out my old refrigerator

- 17 I needed a new refrigerator or freezer anyway
- 18 My old refrigerator stopped working/wasn't working well
- 19 It is just fine or I just like it

- 20 Other [SPECIFY] _____
- 98 Don't know
- 99 Other

[IF MEASURE=INSULATION, READ A13, OTHERWISE SKIP TO A15]

A13. Our records show you received some new insulation. [PROVIDE DESCRIPTION OF INSULATION IF RESPONDENT IS NOT SURE: fluffy material put in attic or walls to keep your home more comfortable]

How would you rate the new insulation that was installed in your home? Would you say it was

[READ LIST]:

- 1 Excellent
- 2 Good
- 3 Fair
- 4 Poor
- 5 Didn't receive insulation [SKIP TO A15]
- 98 Don't know [SKIP TO A15]
- 99 Refused [SKIP TO A15]

A14. Why did you give the insulation a (**RESPONSE FROM A13**) rating? [DO NOT READ, RECORD FIRST THREE RESPONSES]

Negative

- 1 It wasn't enough
- 2 It was too much
- 3 It didn't help keep the house more comfortable
- 4 The contractor didn't finish
- 5 The contractor left a mess

Positive

- 6 It saves energy/electricity
- 7 It lowers the electric bill
- 8 It was free
- 9 The house is more comfortable
- 10 The contractor did a nice job
- 11 I needed additional insulation anyway
- 12 It keeps the house warmer / cooler

- 13 Other [SPECIFY] _____
- 98 Don't know
- 99 Refused

[IF MEASURE=INFILTRATION / CRACK SEALING READ A15, ELSE SKIP TO A16]

A15. Our records show that you had some cracks sealed up on your home where outside air used to leak in. How would you rate the work that was done to seal these cracks? Would you say it was [READ LIST]:

- 1 Excellent

- 2 Good
- 3 Fair
- 4 Poor
- 5 Didn't receive air sealing
- 98 Don't know
- 99 Refused

[IF MEASURE=FURNACE REPAIR/REPLACEMENT READ A16, ELSE SKIP TO A19]

A16. Our records show that you had your furnace either replaced or repaired. How would you rate the work that was done on your furnace? Would you say it was *[READ LIST]*:

- 1 Excellent
- 2 Good
- 3 Fair
- 4 Poor
- 5 Didn't receive furnace repair/replacement *[SKIP TO A19]*
- 98 Don't know
- 99 Refused *[SKIP TO A19]*

A17. Before the work was done, did your furnace work?

- 1 Yes, it worked fine
- 2 Worked but had problems
- 3 No, it did not work at all
- 98 Don't know/don't remember
- 99 Refused

A18. Why did you give the work on your furnace a (**RESPONSE FROM A16**) rating? *[DO NOT READ, RECORD FIRST THREE RESPONSES]*

Negative

- 1 My furnace worked better before
- 2 I didn't need a new furnace/furnace repairs
- 3 It didn't help keep the house more comfortable
- 4 The contractor didn't finish
- 5 The contractor left a mess

Positive

- 6 It saves energy/electricity
- 7 It lowers the electric bill
- 8 It was free
- 9 The house is more comfortable
- 10 The contractor did a nice job
- 11 I needed a new furnace anyway
- 12 It keeps the house warmer

- 13 Other *[SPECIFY]* _____
- 98 Don't know
- 99 Refused

[IF MEASURE=WINDOWS READ A19, ELSE SKIP TO A23]

A19. Our records show that you had some work performed on one or more windows in your home. Can you tell me whether they replaced windows or repaired existing windows?

- 1 Replaced
- 2 Repaired
- 3 Replaced some and repaired some
- 98 Don't know/don't remember
- 99 Refused [SKIP TO A23]

A20. Was the glass broken or cracked in any of the windows they worked on?

- 1 Yes, glass was broken
- 2 No, glass was intact
- 98 Don't know/don't remember
- 99 Refused

A21. How would you rate the work that was done on your windows? Would you say it was [READ LIST]:

- 1 Excellent
- 2 Good
- 3 Fair
- 4 Poor
- 5 Didn't receive windows [SKIP TO A23]
- 98 Don't know
- 99 Refused [SKIP TO A23]

A22. Why did you give it a (**RESPONSE FROM A21**) rating? [DO NOT READ, RECORD FIRST THREE RESPONSES]

Negative

- 1 I liked my old windows better
- 2 I don't like the way the new window looks
- 3 I don't like the way the new window works (opens/does not open, etc.)
- 4 My home is not as secure
- 5 I didn't need new windows or repairs
- 6 It didn't help keep the house more comfortable
- 7 The contractor didn't finish
- 8 The contractor left a mess

Positive

- 9 It saves energy/electricity
- 10 It lowers the electric bill
- 11 It was free
- 12 I like the way it looks
- 13 The house is more comfortable
- 14 The house is more secure/safer
- 15 The contractor did a nice job
- 16 I needed a new window or window repair anyway
- 17 It keeps the house warmer

- 18 Other [SPECIFY] _____
- 98 Don't know

99 Refused

[IF MEASURE=THERMAL DOOR READ A23, ELSE SKIP TO B1]

A23. Our records show that you had a thermal door installed. How would you rate the work that was done on your door? Would you say it was *[READ LIST]*:

- 1 Excellent
- 2 Good
- 3 Fair
- 4 Poor
- 5 Didn't receive door *[SKIP TO B1]*
- 98 Don't know
- 99 Refused *[SKIP TO B1]*

A24. Why did you give it a (**RESPONSE FROM A23**) rating? *[DO NOT READ, RECORD FIRST THREE RESPONSES]*

Negative

- 1 I liked my old door better
- 2 I don't like the way the new door looks
- 3 I don't like the way the new door works (e.g., problem with lock, handle)
- 4 My home is not as secure/safe
- 5 I didn't need new door
- 6 It didn't help keep the house more comfortable
- 7 The contractor didn't finish
- 8 The contractor left a mess

Positive

- 9 It saves energy/electricity
- 10 It lowers the electric bill
- 11 It was free
- 12 I like the way it looks
- 13 The house is more comfortable
- 14 The house is more secure/safer
- 15 The contractor did a nice job
- 16 I needed a new door anyway
- 17 It keeps the house warmer

- 18 Other *[SPECIFY]* _____
- 98 Don't know
- 99 Refused

B. Energy Education / Non-Energy Benefits

B1. Do you remember receiving a booklet or pamphlet with information about how to save energy?

- 1 Yes
- 2 No *[SKIP TO QUESTION B3]*
- 98 Don't know *[SKIP TO QUESTION B3]*
- 99 Refused *[SKIP TO QUESTION B3]*

B2. Did you read the pamphlet or look at it after the agency staff left your home?

- 1 Yes
- 2 No
- 98 Don't know
- 99 Refused

B3. Did the agency staff who came to your home give you any tips on how you could save money on your energy bill?

- 3 Yes
- 4 No *[SKIP TO QUESTION B7]*
- 98 Don't know
- 99 Refused *[SKIP TO QUESTION B7]*

B4. Can you please list any tips you remember about how to use less hot water in order to lower your energy bill?

[IF "Yes", DO NOT PROMPT BUT MARK ALL THAT APPLY; IF "Don't Know", PROMPT WITH LIST OF TIPS BELOW; IF "No," DO NOT PROMPT, MARK "No," AND GO TO NEXT QUESTION]

- 1 Lower hot water thermostat to 120F
- 2 Take short showers instead of baths
- 3 Repair leaky faucets
- 4 Turn off water while shaving, brushing teeth or doing the dishes
- 5 Wash only full loads of dishes and clothes
- 6 Use cold water when possible
- 7 Wash clothes in cold water
- 8 Other *[SPECIFY]* _____
- 9 No
- 98 Don't know *[MARK ONLY IF AFTER PROMPTS THE RESPONDENT STILL INDICATES "Don't Know"]*
- 99 Refused

B5. Can you please list any tips you remember about how to save money on heating or cooling your home?

[IF "Yes", DO NOT PROMPT BUT MARK ALL THAT APPLY; IF "Don't Know", PROMPT WITH LIST OF TIPS BELOW; IF "No," DO NOT PROMPT, MARK "No," AND GO TO NEXT QUESTION]

- 1 Set thermostats high in summer and low in winter
- 2 Use ceiling fans, window fans, or table fans instead of air conditioners
- 3 Use open windows with fans to cross ventilate on cool nights instead of air conditioners
- 4 Close windows, doors, shades and drapes during the day to keep the sun's heat out
- 5 Plant leafy green trees on the sunny side of your home
- 6 Clean cooling coils and filters on your air conditioners monthly in the summer
- 7 Use the recirculate setting so your air conditioner doesn't have to work as hard
- 8 Plant trees to shade air conditioners but not block air flow
- 9 Check furnace filter monthly and change if needed
- 10 Other *[SPECIFY]* _____
- 11 No

- 98 Don't know [MARK ONLY IF AFTER PROMPTS THE RESPONDENT STILL INDICATES "Don't Know"]
- 99 Refused

B6. Can you please list any tips you remember about how to use your appliances – like refrigerators, washers, dryers, stove tops or ovens – so that they use less energy and save you money?

[IF "Yes", DO NOT PROMPT BUT MARK ALL THAT APPLY; IF "Don't Know", PROMPT WITH LIST OF TIPS BELOW; IF "No," DO NOT PROMPT, MARK "No," AND GO TO NEXT QUESTION]

- 1 Remove lint from dryer trap between loads
- 2 Vent dryer to outdoors
- 3 Unplug second refrigerator or freezer
- 4 Use 38 to 40 degrees F for fresh food and 0 to 5 for the freezer
- 5 Clean condenser coils on refrigerators and freezers
- 6 Make sure your refrigerator door seals are tight
- 7 Use a microwave, toaster oven or crockpot before conventional oven
- 8 Avoid preheating the oven
- 9 Use smallest pan necessary for cooking
- 10 Defrost frozen foods in refrigerator
- 11 Heat water for beverages in the microwave oven
- 12 Clean inside surfaces of microwave
- 13 Other [SPECIFY] _____
- 14 No
- 98 Don't know [MARK ONLY IF AFTER PROMPTS THE RESPONDENT STILL INDICATES "Don't Know"]
- 99 Refused

B7. Of the energy saving tips you remember, which ones have you practiced at your own home?
[IF NECESSARY, PROMPT WITH ANSWERS TO PREVIOUS RESPONSES FROM B4, B5, B6]

- 1 [SPECIFY] _____
- 2 Other [SPECIFY] _____
- 3 None
- 98 Don't know [MARK ONLY IF AFTER PROMPTS THE RESPONDENT STILL INDICATES "Don't Know"]
- 99 Refused

[IF MEASURE = INSULATION, ASK B8-B12, ELSE SKIP TO B13]

B8. Since (**The Agency**) completed the work your home, would you say that your home is [READ LIST]:

- 1 More comfortable to live in
- 2 Just about as comfortable to live in as it was before the weatherization
- 3 Less comfortable to live in
- 98 Don't know/don't remember
- 99 Refused

B9. Since this work was completed, would you say that your electric bills have been [READ LIST]:

- 1 More affordable
- 2 About the same
- 3 Less affordable

- 98 Don't know/don't remember
- 99 Refused

B10. Would you say that your health has been affected in any way since this work was performed on your home?

- 1 Yes
- 2 No
- 98 Don't know/don't remember
- 99 Refused

[IF B10 = 1, READ B11, ELSE SKIP TO B12]

B11. Why do you say that? *[DO NOT READ, CHOOSE MULTIPLE]*

- 1 I recently had an illness (associated with this work)
- 2 I recently had an illness and my health has improved because of this work
- 3 I recently had an illness (not associated with this work)
- 4 I recently had an injury (associated with this work)
- 5 I recently had an injury and my health has improved because of this work
- 6 I recently had an injury (not associated with this work)
- 7 It is more comfortable in my home and I'm healthier
- 8 I haven't needed to visit the doctor/hospital as frequently
- 9 I haven't had to make repairs as much
- 10 I'm not as worried about my home
- 11 I feel safer (more secure) in my home
- 12 Other *[SPECIFY]* _____
- 98 Don't know/don't remember
- 99 Refused

B12. Do you think having your home weatherized made you more likely to be able to stay in your home?

- 1 Yes, more likely to stay
- 2 No, just as likely to stay
- 3 No, more likely to move
- 98 Don't know
- 99 Refused

B13. What were the biggest benefits you got from having your home weatherized?

- 1 *[SPECIFY]* _____
- 2 No benefits
- 98 Don't know/don't remember
- 99 Refused

B14. Did having these changes made to your home create any problems for you?

- 1 Yes *[SPECIFY]* _____
- 2 No *[SKIP TO QUESTION C1]*
- 98 Don't know/don't remember *[SKIP TO QUESTION C1]*
- 99 Refused *[SKIP TO QUESTION C1]*

B15. Was the problem resolved to your satisfaction?

- 1 Yes *[SKIP TO QUESTION C1]*

- 2 No
- 98 Don't know/don't remember [SKIP TO QUESTION C1]
- 99 Refused [SKIP TO QUESTION C1]

[IF B15=2, READ B16]

B16. How would you have liked them to resolve this problem?

[SPECIFY AND RECORD VERBATIM] _____

C. OVERALL PROGRAM SATISFACTION

TO RESPONDENT: Next, I have a few questions about (**The Agency's**) service in providing these services to you and your home.

C1. How courteous and respectful was the agency staff? Would you say they were [READ LIST]:

- 1 Very courteous
- 2 Somewhat courteous
- 3 Not very courteous
- 4 Not at all courteous
- 98 Don't know/don't remember
- 99 Refused

C2. Before agency staff came to your home to perform work, did you understand what they were going to do in your home?

- 1 Yes
- 2 No
- 98 Don't know/don't remember
- 99 Refused

C3. Were you happy with their plan?

- 1 Yes
- 2 No
- 98 Don't know/don't remember
- 99 Refused

C4. How satisfied are you overall with the services this program provided? Would you say that you are [READ LIST]:

- 1 Very satisfied
- 2 Somewhat satisfied
- 3 Not very satisfied
- 4 Not at all satisfied
- 98 Don't know
- 99 Refused

C5. How would you improve the program?

[RECORD VERBATIM] _____

C6. Do you know who to call if you have any problems?

- 1 Yes
- 2 No
- 98 Don't know/don't remember
- 99 Refused

[IF NO OR DON'T KNOW, PROVIDE THE APPROPRIATE CONTACT INFORMATION – SEE AGENCY PHONE NUMBER ON PARTICIPANT INFORMATION PROVIDED]

D. HOUSEHOLD CHARACTERISTICS / DEMOGRAPHICS

I just have a few more general questions for you.

D1. Which of the following best describes your home?

- 1 Single family house
- 2 A unit in a multifamily apartment
- 3 Manufactured or mobile home
- 98 Don't Know
- 99 Refused

D2. Do you rent or own your property?

- 1 Own
- 2 Rent
- 3 Other [SPECIFY] _____
- 98 Don't Know
- 99 Refused

D3. How is your home heated? [READ]

- 1 Electricity
- 2 Natural gas
- 3 Propane
- 4 Other [SPECIFY] _____
- 98 Don't Know
- 99 Refused

D4. How is your water heated? [READ]

- 1 Electricity
- 2 Natural gas
- 3 Wood
- 4 Propane
- 5 Other [SPECIFY] _____
- 98 Don't Know
- 99 Refused

D5. Do you have in your home any: [READ – MARK NUMBER THAT APPLIES FOR EACH]

- 1 Room air-conditioners
- 2 Central air-conditioners

- 3 Swamp coolers
- 4 Fans or ceiling fans
- 5 Other [SPECIFY]_____
- 98 Don't Know
- 99 Refused

D6. Which best describes how your energy bills are paid? [READ]

- 1 I pay the energy bills
- 2 My landlord pays the energy bills
- 3 A relative pays the energy bills
- 4 Other [SPECIFY]_____
- 98 Don't Know
- 99 Refused

D7. Do you recall receiving energy assistance from [THE AGENCY]? [READ – MARK ALL THAT APPLY] [IF NECESSARY TO EXPLAIN “ENERGY ASSISTANCE,” EXPLAIN “The program may have been called LIHEAP and it helps you pay your energy bills”]

- 1 Never
- 2 Not recently
- 3 In the past few years
- 4 Before the work was completed
- 5 After the work was completed
- 6 Other [SPECIFY]_____
- 98 Don't Know
- 99 Refused

D8. In the past few years, how many people typically lived in your home at the same time?

____ [RECORD RESPONSE]

- 98 Don't know
- 99 Refused

D9. Have any of the following changes occurred in your home in the past few years [READ LIST]?

- 1 Family or roommates moved in
- 2 Family or roommates moved out
- 3 Using more rooms in the house now
- 4 Using less rooms in the house now
- 98 Don't know
- 99 Refused

D10. How many persons are living in your home in the following age groups [READ LIST – RECORD NUMBER]?

- 1 Under the age of 6
- 2 Between 6 and 18
- 3 Between 19 and 60
- 4 Over the age of 60
- 98 Don't know
- 99 Refused

D11. Can you please tell us your age?

____ [RECORD RESPONSE]

98 Don't know

99 Refused

[DO NOT ASK, BUT RECORD GENDER OF RESPONDENT (MALE/FEMALE): _____]

That concludes the survey. Thank you for your time today, Rocky Mountain Power appreciates your feedback.

Appendix B: Stakeholder Interview Guide

Rocky Mountain Power Low-Income Weatherization Program Stakeholder Interview Guide

The Cadmus Group, Inc. has been hired by PacifiCorp to conduct a process evaluation of the low-income weatherization program. The process evaluation focuses at a high level on how the program flows and whether it was delivered as intended. We are interviewing a variety of program stakeholders including staff from: Rocky Mountain Power, Utah Housing and Community Development (HCD), the Community Action Partnership of Idaho (CAPAI), and local community action agencies (CAAs). None of the comments you share today will be attributed to you as an individual. However, some comments may be attributed to your organization.

Can you begin by telling us your title and role in the weatherization program?

Program Design and Implementation

1. (Utility only) What are the goals for Rocky Mountain Power's funding of the program?
 - a. Are these goals being met? [Probe for participation goals, kWh goals, and agency-specific performance goals.]
2. (Utility, State, Agency Assoc., CAAs) Did the Rocky Mountain Power funding have an impact on the program (number of households served, amount of money spent in a home, or the depth of the weatherization work performed)?
3. (Utility, State, Agency Assoc., CAAs) Were Rocky Mountain Power funds exhausted in each program year (2007-2009)?
4. (Utility, State, Agency Assoc., CAAs) What are the restrictions placed on Rocky Mountain Power funds?
 - a. How are Rocky Mountain Power funds incorporated into the other dollars available for weatherization?
5. (Utility, State, Agency Assoc., CAAs) What is the typical Rocky Mountain Power cost share of a project – is it by measure or total house?
 - a. What percent of health and safety installations are paid by Rocky Mountain Power – are there any specific constraints with how these funds are spent?
6. (Utility, State, Agency Assoc., CAAs) Have the goals of the program changed because of the ARRA weatherization funding? How has the use of utility funding changed?
7. (CAAs) What were the total homes in Rocky Mountain Power service territory completed for years 2007, 2008, and 2009? What was the percent of homes completed by different heating source (e.g. electric, gas, other)?
8. (CAAs) Were more homes completed in Rocky Mountain Power service territory than were tracked by Rocky Mountain Power? In other words, does Rocky Mountain Power funding touch every home weatherized in their own serviced territory and, if not, how many other homes are weatherized?

9. How is it decided to use Rocky Mountain Power funding for a specific home?
 - a. Are most homes billed to Rocky Mountain Power electrically-heated, non-electrically heated, or is there another method of selection?
10. (Utility, State, Agency Assoc., CAAs) Who delivers weatherization services in the field, community action agency staff or contractors? Does that differ from agency to agency?
11. (Utility, State, Agency Assoc., CAAs) Does the program provide energy education for the resident? If so, what materials are used and how is it provided to participants?
12. (Utility, State, Agency Assoc., CAAs) How large is the waiting list, generally – both in terms of size and length of wait time?
13. (Utility, State, Agency Assoc., CAAs) How are homes or residents prioritized for weatherization?
14. (Utility, State, Agency Assoc.) Are there any Native American tribes participating in weatherization? Are they implementing and administrating the program themselves?
15. (Utility, State, Agency Assoc., CAAs) How is Rocky Mountain Power invoiced for their contribution? Do agencies provide invoices or do they have funds available to access from Rocky Mountain Power at the beginning of the program year? Please explain this process.
16. (Utility, State, Agency Assoc., CAAs) Are payments made in a timely manner?
17. (Utility, State, Agency Assoc., CAAs) How would you rate the communication between Rocky Mountain Power, [Utah HCD/CAPAI], and the CAAs? Are there any changes you would suggest to improve communication?

Program Training and Qualifications

18. (Utility, State, Agency Assoc., CAAs) What training is required for CAA staff or contractors delivering the program? Are there any certifications necessary?
19. (Utility, State, Agency Assoc., CAAs) In your opinion, is this training sufficient?
20. (State, Agency Assoc.) If reoccurring issues are identified through monitoring, are those issues addressed in trainings?

Program Reporting and Monitoring

21. (Utility, State, Agency Assoc., CAAs) What are Rocky Mountain Power's reporting requirements and expectations?
22. (Utility, State, Agency Assoc., CAAs) What project tracking is required of the CAA's? Is there a centralized state database that is maintained on the program?
23. (Utility, State, Agency Assoc., CAAs) Does most reporting occur electronically? Is there a move towards electronic record keeping?
24. (Utility, State, Agency Assoc., CAAs) What data are reported to Rocky Mountain Power? How frequently does Rocky Mountain Power receive reports?
25. (Utility, State, Agency Assoc., CAAs) Are there any problems with data collection or reporting that you haven't already mentioned?
26. (Utility, State, Agency Assoc.) How many projects were monitored in 2007-2009, and what is the monitoring rate? Is this sufficient, in your opinion?
27. (Utility, State, Agency Assoc.) What percentage of those monitoring visits found problems to be resolved? What problems were most common?

28. (Utility, State, Agency Assoc.) When oversights are found, how is the problem addressed?

Program Achievements

29. How do you think the program performed in the 2007-2009 period? What are the program successes, or most important achievements?
30. What are the obstacles or challenges with the program? Were there any bottlenecks?
31. Are there any program lessons learned over the past 3 years?
32. How would you rate the quality of the program?
33. Do you have any suggestions for program improvements?
34. Is there any information you would like to see the evaluation deliver to help with program process?