Final Report

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

Prepared for
PacifiCorp

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Executive Summary

Program Overview

Rocky Mountain Power's Low-Income Weatherization Program in Utah seeks to lower low-income customers' energy consumption and utility bills. At no cost to an income-qualified customer, the program provides a complete home energy audit and installation of energy-efficient measures.

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 assessed program delivery and efficacy, bottlenecks, barriers, best practices, and opportunities for improvements. The impact evaluation assessed energy impacts and program cost-effectiveness. Major evaluation tasks are described in detail below.

Data Collection

Table 1 lists data required for this evaluation and their sources.

Table 1. Data Sources

Data	Source
Program participant and measure data	PacifiCorp
Reported savings (annual reports)	PacifiCorp
Program costs	PacifiCorp

Process Approach

Cadmus conducted telephone surveys with 81 program participants to assess multiple program aspects. These questions focused primarily on installation verification, client satisfaction levels, program delivery, and recall of energy information relayed by weatherization staff.

Two in-depth discussions conducted with key delivery agency staff ensured assessments of all program delivery facets, including bottlenecks, client and agency satisfaction, best practices, and methods for improving delivery.

An interview with the statewide inspector from the State of Utah's Division of Housing and Community Development provided insights into the program issues from his perspective and discussed improvements made at the agency level.

Evaluation of Program Energy Savings

The evaluation assessed estimated and evaluated program energy savings as follows:

- Expected Savings: Based on data reviews from Rocky Mountain Power's 2007, 2008, and 2009 annual reports, average expected electric savings per participant were calculated.
- Evaluated Savings: An engineering analysis estimated energy (kWh) savings associated with measures reported as installed and listed in the utility's tracking database.

Cost-Effectiveness Assessment

Cost-effectiveness was assessed through analysis of program costs and benefits from various perspectives, using Cadmus' DSM Portfolio Pro model.

Major Findings

Electric Savings

Overall, savings from program participants are calculated at 1,052 kWh. This amounts to 80 percent of expected average participant savings of 1,320 kWh, as reported by Rocky Mountain Power across the 2007, 2008, and 2009 program years. Table 2 provides total program participation and savings for the years evaluated.

Table 2. Program Participation and Evaluated Savings by Year

Program Year	Participation	Savings (MWh)
2007	440	463
2008	381	401
2009	982	1,033
Total	1,803	1,896

Note: Totals may not add exactly due to rounding.

Cost-Effectiveness

As shown in Table 3 , the program proved cost-effective from the total resource cost (TRC), the PacifiCorp total resource cost (PTRC), and the utility cost test (UTC) perspectives.

Table 3. Program Cost-Effectiveness Summary, 2007–2009

Cost-Effectiveness Test	Levelized $ / kWh	Costs	Benefits	Net Benefits	Benefit/ Cost Ratio
Total Resource + Conservation Adder (PTRC)	$0.027	$429,840	$1,219,688	$789,848	2.84
Total Resource, No Adder (TRC)	$0.027	$429,840	$1,108,807	$678,967	2.58
Utility (UCT)	$0.027	$429,840	$1,108,807	$678,967	2.58
Ratepayer Impact (RIM)	$0.113	$1,799,161	$1,108,807	-$690,353	0.62
Participant (PCT)	$0.019	$298,286	$1,667,607	$1,369,321	5.59
Lifecycle Revenue Impact	$0.00000324				

Recommendations

Work with Agencies to Determine if Electronic Reporting is Feasible

As Rocky Mountain Power is currently upgrading its computer tracking system, the new system will greatly enhance the company's ability to track the following:

- Measure quantities (i.e., number of CFLs installed per home);
- Costs for each measure, including portions that Rocky Mountain Power pays and total costs;
- Invoice data;
- Project completion date;
- Account and participant contact information for each customer's home; and
- Identifier for agency completing 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 the feasibility of an electronic transfer of tracking information to increase efficiency and reduce errors.

Increase Rocky Mountain Power Recognition

Less than one-half of participants surveyed knew Rocky Mountain Power paid for some measure installations in their homes. Although a higher rate than other, similar programs, recognition of Rocky Mountain Power's contribution to the program provides positive customer engagement. Agency staff could indicate which entities contributed to providing these services. Rocky Mountain Power could also consider providing branded electroluminescent night lights to participant customers to increase recognition of the company's contribution to the program.

1. Process Evaluation

Program Services

Eight organizations (one community action agency, five government associations, and two additional weatherization program entities; collectively cited as the "agencies" in this report) provide weatherization and efficiency upgrades to income-qualified households in Utah. The State of Utah provides monitoring oversight of the agencies' program implementation. The program leverages funding from Rocky Mountain Power, the U.S. Department of Energy (DOE), and the U.S. Department of Health and Human Services (HHS), among others, for comprehensive weatherization of Rocky Mountain Power customer homes. Questar Gas, the major natural gas provider in Utah, also provides funding to the agencies for gas appliance inspections repairs and replacements.[1]

Rocky Mountain Power's program funding focuses on electricity-saving measures, as delineated in Rocky Mountain Power's tariff.[2] Measures installed through the program 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 homes have an electric water heater. Rocky Mountain Power also provides reimbursement for administrative expenses.

Program Operations

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

After completing work on a home, the agencies submit invoices and documentation to Rocky Mountain Power. Rocky Mountain Power pays a rebate of 50 percent of the installed cost for each eligible major or supplemental measure, plus a 10 percent administrative payment. Additional measures include CFLs, which are reimbursed at 100 percent of cost, and efficient furnace fans, installed with higher-efficiency gas furnaces. Furnace fans are reimbursed at $100 per home.

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[1] The State of Utah's contract with Questar Gas makes $750,000 available annually to the weatherization program. Their Green Sticker Program contributes $250,000 to safety checks on gas appliances and other minor repairs. Another $500,000 is provided for the furnace replacement program, which replaces all gas standing pilot furnaces with an AFUE of 60 percent.

[2] Rocky Mountain Power, Electric Service Schedule No. 118, State of Utah, Low Income Weatherization, Issued December 7, 2006.

Methodology

For this portion of the evaluation, data collection consisted of:

- Telephone surveys with a sample of program participants;
- Telephone interviews with community action agency staff;
- Telephone interviews with Utah Division of Housing and Community Development staff; and
- In-person interviews with program staff from Rocky Mountain Power

Participant Survey

Telephone surveys sampled program participants to assess multiple program aspects. Survey questions addressed the following topics:

- Program awareness;
- Installation verification;
- Customer satisfaction with measures;
- Recall of energy education recommendations; and
- Program satisfaction.

Sample Selection Methodology

The December 2010 participant phone survey sought to achieve 66 complete surveys, targeting 10 percent precision at the 90 percent confidence level. Of the total population of 1,803, viable contact information (name and telephone number) was available for 916, primarily due to disconnected or changed phone numbers. In addition, the sample included participants who did not have measures installed (e.g., participants who had refrigerator testing, but did not replace their refrigerator). Cadmus conducted additional surveys to achieve greater representation of participants with installed measures. Table 4 presents the desired and achieved samples.

Table 4. Target and Achieved Samples for Utah Participant Survey

Total Population	Viable Population	Target Completes	Desired Precision at 90% Conf.	Achieved Completes	Achieved Precision at 90% Conf.
1,803	916	66	10%	81	9%

Table 5 provides the full distribution of measure installations for participants in the sample.

Table 5. Participant Survey Sample Distribution of Selected Measures

Measure	Population*	Number of Surveyed Participants
CFLs	719	43
Refrigerator/Freezer	818	48
Insulation	1	1

*Cadmus found the population of people receiving CFLs was larger than the Rocky Mountain Power database stated. When the surveys were fielded, only those listed in the database as having received CFLs were asked to comment on them.

Stakeholder Interviews

Four interviews addressed program stakeholders: two with key agency weatherization staff; one with the State of Utah; and one with Rocky Mountain Power staff to gather information about the program's processes and functioning. Interview topics included:

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

Process Findings

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

Participant Survey Findings

Program Awareness

Participants were asked how they first heard of the program; 40 percent (32 out of 81) reported they heard about it via word-of-mouth. Only two participants reported learning about the program directly from Rocky Mountain Power. Almost half (44 percent, or 26 out of 81) reported being aware that Rocky Mountain Power provided funding for these services. This awareness level is higher than that found in similar evaluations, which show less than 30 percent of participating customers understand which utilities help fund the services.

Installation Verification

When asked to verify Rocky Mountain Power's records of measures installed in their homes, customers' recollections did not match Rocky Mountain Power records in only two instances. Although it may seem unlikely, mismatches commonly occur in energy conservation programs, where even households purchasing and installing sizable measures do not always recall their participation.[3] Measures not recalled by Rocky Mountain Power's weatherization program participants were CFLs and a refrigerator (see Table 6 for more details).

Measure Satisfaction

Customers were asked about selected measures installed in their homes. Table 6 presents measure-specific satisfaction ratings.

Table 6. Measure Satisfaction Ratings

Measure	Excellent	Good	Fair	Poor	Don't Know	Did Not Recall Measure	Total Surveyed Participants with Measure
CFLs	19	13	5	2	3	1	43
Refrigerator/Freezer	24	17	4	1	1	1	48
Insulation	1						1

CFLs

A large majority of recipients were satisfied with their new CFLs; 32 out of 43 (82 percent) giving them a good or excellent rating. Over half of the participants surveyed (23, or 54 percent) stated agency staff installed the bulbs in their homes, while 37 percent (16 respondents) reported agency staff simply left the bulbs. When asked to elaborate on their stated level of satisfaction with the bulbs, some feedback was negative, including the light was too dim (mentioned by five respondents), and the bulbs took too long to light up (two respondents). The remaining comments were positive, and included the CFLs being better than the old bulbs (nine), giving good light (six), not needing to be changed as frequently (five), and saving energy (three).

CFL recipients were asked whether they replaced any of the CFLs, and, if so, why. Twelve respondents (28 percent) reported replacing their CFLs, averaging six bulbs each. Of those replacing bulbs, six respondents (50 percent) reported installing new CFLs, two replaced CFLs with used incandescent bulbs, and the remaining four were unsure.[4] None of these respondents provided a reason for replacing the bulbs.

Refrigerator Replacement

A large majority (85 percent) of surveyed recipients of refrigerators rated this measure good or excellent. When asked to elaborate on their satisfaction ratings, the most common response was the new appliance worked better than the replaced appliance, reported by 22 participants.

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[3] Sarah Castor, The Energy Trust of Oregon, presentation at the Behavior, Energy, and Climate Change conference, November, 2010.

[4] CFL savings were not discounted based on bulb removals, as the small number of respondents reporting on CFL installations was not statistically significant.

Insulation

Only one participant received insulation rebated by Rocky Mountain Power. As the majority of homes in the Utah service territory are gas-heated,[5] they are not eligible for insulation paid for by Rocky Mountain Power. This single participant rated the insulation as excellent. When asked to elaborate, the participant said the insulation saved energy and lowered their electric bills, and indicated the contractor did a "nice" job.

Energy Information

The majority of participants surveyed (51 of 81; 63 percent) recalled receiving a pamphlet or booklet with information about how to save energy. Of those receiving this information, 46 (57 percent of all respondents) reported reading the pamphlet after the agency staff left their home.

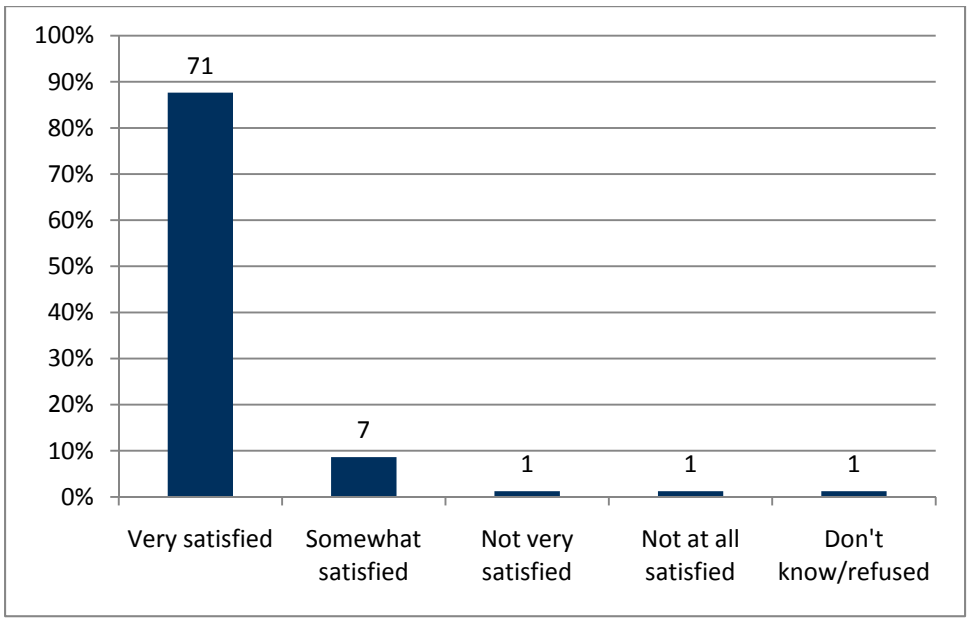
Participants were asked about tips agency staff provided on how to save money on customers' electric bills. Forty-one of 81 respondents (51 percent) remembered receiving energy-saving tips. Of those, the most commonly recalled tips were: lowering the hot water thermostat to 120 degrees (recalled by 22 respondents, representing 27 percent); keeping thermostats low in winter and high in summer (recalled by 13 respondents; 16 percent); and closing windows, doors, and shades during the day to keep the sun out (recalled by 13 respondents; 16 percent). The same three tips were also the most common responses when participants were asked which tips they used in their home.

Program Delivery and Satisfaction

Participants were asked to rate their satisfaction with the program overall. As shown in Figure 1, a vast majority of respondents reported being very satisfied.

[5] Approximately 87 percent of Utah single-family homes have central heating systems, 7 percent of which are electric heat. (Source: Cadmus, *PacifiCorp Assessment of Long-Term, System-Wide Potential*, PacifiCorp, 2011, [http://www.pacificorp.com/content/dam/pacificorp/doc/Energy_Sources/Demand_Side_Management/DSM_Volume_II_2011_Study.pdf])

Figure 1. Participant Overall Satisfaction with Services Provided (n=81)



Participants identified saving money (mentioned by 34 respondents) as the biggest benefit from having the program work performed in their homes.

When asked to identify areas for improvement, most respondents (57 out of 81) had no suggestions. Table 7 shows the suggestions participants did offer.

Table 7. Suggestions for Program Improvement

Suggestion	Number of Respondents	Percent of Respondents (n=81)
No suggestions	57	70%
Reduce waiting time	4	5%
Improve quality of installers work or skills	4	5%
Communicate better about what work will be conducted	4	5%
Follow-up more with clients	3	4%
Replace all windows, not just some*	3	4%
Improve quality of equipment	3	4%
More advertising/let more people know	3	4%

* Windows were replaced in these three homes with non-Rocky Mountain Power funds.

Participants were asked about their interactions with the agency staff, with 75 of 81 respondents (93 percent) reporting staff members were very courteous. Nearly as many, 73 out of 81 (90 percent), reported agency staff adequately explained the work that would be completed in their homes.

All respondents were asked if changes made to their homes caused any problems. Ten of 81 (12 percent) cited difficulties. Of those, four reported problems with the new equipment

installed. Only a couple of respondents citing problems stated the problem was not resolved to their satisfaction.

Thirty-two percent of respondents (26 of 81) indicated they did not know who to call with problems. This may indicate agencies did not always provide participants their contact information for follow-up.

Process Stakeholder Interview Findings

The four interviews conducted with program stakeholders (Rocky Mountain Power, two implementing organizations, and the State) for this process evaluation all followed a similar structure. The interview guide addressed topics listed in the Methodology section, above, but allowed for conversations to move in different directions should other subjects of interest arise. All individuals interviewed were cooperative and understood the importance of the evaluation and their feedback.

Program Goals

All stakeholders agreed the program's primary goal was to save energy. One agency staff member also specified the goal to reduce participants' utility bills. All parties agreed these goals were being met. Though targets were not set for the number of participants, nor kWh savings for the Rocky Mountain Power portion of the program, agencies sought to complete weatherization at a certain number of homes each year, based on goals for their federal funding.

Impact and Adequacy of Rocky Mountain Power Funding

Stakeholders reported the Rocky Mountain Power funding supplemented other funding sources, enabling agencies to complete more homes per year. The additional funding supported a higher volume of homes than would have otherwise been possible. The Utah agencies typically do not exhaust funding provided by Rocky Mountain Power each year due to low percentages of electrically heated homes in the state. According to the state administrator, the program only served between five and 10 electrically-heated homes each year, with the remainder of programs homes heated with natural gas, propane, heating oil, or other fuels. As a result, there were a limited number of measures available for Rocky Mountain Power reimbursements in most homes.

Impact of American Recovery and Reinvestment Act of 2009 (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. All interviewees noted additional homes were served with Recovery Act funding. One agency staff member estimated the increase in funding allowed his organization to double the volume of homes they have served.

Increased weatherization funding from the Recovery Act also allowed for investment in improvements to the organization and implementation of the existing program in Utah. The state of Utah used Recovery Act funding to build a new training center for weatherization professionals (Intermountain Weatherization Training Center in Clearfield, Utah). Agencies also hired additional staff and contractors to meet the increased volume, working toward the Recovery Act's job creation objective.

Provision of Energy Education

The agencies sought to educate their clients about energy use in their homes and provide pointers on ways to save additional energy. The state administrator reported improvements could be made to the program's energy education portion. To that end, the state developed energy education training curriculum to deliver to implementers at the new training center. Agencies were required to provide information to clients about new furnaces installed to ensure safe operation. Such measure-specific energy education was provided by the installers. Customers were also provided with information on behavioral changes that reduce energy use in their homes.

Staff Training

A variety of training prepared agency staff to work for the weatherization program. The agencies, the state administrator, and Rocky Mountain Power agreed the level of staff training was sufficient. According to the agencies, the training provided by the state of Utah has been very helpful. Weatherization auditors were required to be certified by the state of Utah, and additional training was available through the Intermountain Weatherization Training Center, which was funded by the Recovery Act. The training center included a model home inside a warehouse, which allows hands-on training on weatherization techniques.

Prioritization and Wait-Listing

Participant homes were prioritized on the state's waiting list based on DOE requirements, which prioritized homes with elderly residents or children under six years old as well as homes with disabled individuals. Wait lists for low-income weatherization programs could be quite long due to high demand for services. The state administrator estimated agency waiting lists averaged 12 to 15 months in Utah, but stated Recovery Act funding helped reduce wait times in some cases. One agency staff member noted that while he thought the Recovery Act funding would reduce wait time, it remained the same. He thought this occurred due to difficult economic times, and the corresponding increase in unemployment.

Both the state administrator and one of the agencies noted wait times were much longer for the Navajo Nation in San Juan County due to higher demand in that part of the state. The state administrator estimated households in that area typically were on the wait list for two years. This could cause difficulties with account verification, since account numbers commonly change over a two year period (for instance, sometimes an account would be closed due to non-payment, and a new account would be started for the same household).

Invoicing and Payments

For the Utah program, the state contracted with Rocky Mountain Power, and was responsible for invoicing on behalf of all implementing agencies. Rocky Mountain Power did not provide upfront funding, but paid rebates to the state after work had been completed and an invoice received. The state administrator reported sending invoices on a monthly basis that include a report of work completed in each home, along with customer information. Rocky Mountain Power reported the state was very timely in sending monthly invoices, and there were not issues with invoicing or data.

In 2008, Rocky Mountain Power began paying for 100 percent of CFL costs upfront. Each agency was then allotted an inventory of CFLs to use in homes of Rocky Mountain Power

customers. Agencies were required to document CFLs they installed, and this information was included in the invoices they submitted to the state.

Agencies sent invoices to the state monthly; the state paid agencies based on these invoices, and then compiled data to submit the statewide invoice to Rocky Mountain Power. The state of Utah received payments from Rocky Mountain Power for their monthly invoices; the state administrator stated Rocky Mountain Power took three or four months to process payments. He emphasized this was not a major inconvenience, but it did sometimes cause account verification problems: a customer's account might have been correct at the time the invoice was sent in, but, if the account became cancelled or changed while waiting on payment, then Rocky Mountain Power could not verify that account.

Reporting and Monitoring

Program reporting to Rocky Mountain Power occurred in conjunction with invoicing. Agencies submitted a Building Work Report (BWR) to the state for each home they perform work on. This document included:

- Report number;
- Customer name and address;
- Agency job number;
- Work start date;
- Home occupant (owner versus renter);
- Building type (single-family, multifamily, manufactured home);
- Primary heat type;
- Building improvements (measures installed);
- Account number;
- Blower door results;
- Material and labor costs; and
- Completion date.

Additionally, agencies submitted a one-page addendum for each completed home. The addenda, prepared specifically for Rocky Mountain Power, detailed:

- Customer name and address (and owner's name and address in case of rental);
- Account number;
- Home occupant (owner versus renter);
- Dwelling type (single-family, multifamily, manufactured home);
- Measures installed;
- Material, labor, and total cost per measure;

- Rocky Mountain Power rebate for each measure;
- Agency administrative fee billed to Rocky Mountain Power;
- Total reimbursement requested;
- kWh savings estimated per measure and for total job; and
- Total cost of all measures.

Agencies also kept the property owner's signature on file, authorizing the agency to work on the property and for Rocky Mountain Power to provide a rebate. No additional documentation or reporting, aside from invoicing, the BWR, and the addendum for Rocky Mountain Power, was required.

Both agencies and the state administrator noted paperwork required could be burdensome, considering the Rocky Mountain Power rebate was very small for many homes. For example, if a home had refrigerator testing, the agency had to submit a BWR and an addendum to receive the Rocky Mountain Power rebate of $12.50. However, the agencies and the state administrator valued the additional funding and their relationship with Rocky Mountain Power and understood the necessity of documentation.

For quality control on all weatherized homes, the state of Utah, in compliance with DOE requirements, monitored a minimum of 5 percent of homes. Rural agencies were monitored every six months, while agencies in urban areas (with a larger volume of homes) were monitored roughly every four months. The state administrator noted additional federal reporting was required with Recovery Act funding, and he hired additional monitoring staff to meet these requirements.

Program Achievements and Lessons Learned

All parties interviewed reported the program operated smoothly from 2007–2009. The increased volume brought about with the support of the Recovery Act was the most notable change occurring in the evaluation period. Additionally, the Intermountain Weatherization Training Center, which was also funded by the Recovery Act, helped increase training opportunities for agency staff.

Both agency staff members and the state administrator mentioned that they would like to be able to include additional electric measures in their weatherization work, but no cost-effective options had come to their attention. Due to the limited number of electrically heated homes in Utah, the agencies and the state felt restricted in their ability to take full advantage of Rocky Mountain Power's support of the program.

Process Evaluation Conclusions

The participant survey and process interviews provided a comprehensive overview of this program. Overall, respondents reported Rocky Mountain Power's contribution to the program worked effectively to increase the number of homes weatherized, and administration of Rocky Mountain Power funding and the program in general functioned smoothly. Process interviews indicated program implementers would like to expand the number of eligible measures in non-electrically heated homes.

2. Impact Evaluation

This section describes the approach Cadmus used to calculate the Low-Income Weatherization Program's electric energy savings. For most measures, an engineering analysis was applied, and deemed savings estimates were used for the measures installed less frequently. A review of program participant data and the Rocky Mountain Power annual program reports follows below. Analysis results are then presented, along with explanations of methodologies used for estimating measure-level savings.

Introduction

The engineering analysis sought to determine kWh savings and realization rates for the 2007, 2008, and 2009 program participation years. Prior to this evaluation, Rocky Mountain Power claimed program savings based on earlier deemed savings estimates for these weatherization measures. This engineering analysis built in additional program-specific data, as detailed below.

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

- ***Program database***: Rocky Mountain Power provided information regarding program participants and installed measures in a database drawn from their data collection system. Specifically, these data included participant contact information and lists of measures installed per home. However, these data did not include the quantity of measures installed (such as number of CFLs) or measure-specific saving estimates.
- ***Sample of BWRs***: A random sample of participant home BWR's were requested to collect information on the average number of CFLs installed in each home, and the baseline energy use of refrigerators replaced by the program. The state of Utah's Division of Housing and Community Development provided these application forms, which Cadmus then entered into a database.

Cadmus incorporated primary data collected by the agencies into the evaluation and engineering analysis, such as pre- and post-installation measure characteristics to better reflect actual impacts occurring in participating homes. Specifically, this study provided improved savings estimates for refrigerator replacement and CFLs (discussed in more detail below) by using agency-collected installation data from a statistically significant sample of 2007–2009 participants.

While Cadmus prefers billing analysis as a methodology for estimating weatherization program savings, it cannot be applied in every situation. Expected project savings must be at least 10 percent of total metered consumption to achieve valid results.[6] As Rocky Mountain Power's Utah territory has high saturations of gas heating, and most installed program measures impacted base-load usage, the program was unlikely to result in savings over 10 percent of total metered consumption.

[6] International Performance Measurement and Verification Protocols, 2010.

Data and Document Review

Participant Data and Participating Sites

The initial group of participant home audit forms received from the state of Utah included names and account numbers not always corresponding to those of program participants from the Rocky Mountain Power database. While most customer names and account numbers matched participants, some corresponded to previous occupants.

Invoice Date

Program data provided by Rocky Mountain Power included dates completed weatherization project data were entered into the program database. Invoice dates or project completion dates were not tracked. Delays between invoice dates and dates when jobs were entered in the system made it difficult to determine specific program years in which jobs were completed.[7] Annual program costs associated with invoice dates were inconsistent with tracking of weatherization jobs for a given year.

Quantity and Cost Data Collection

The program database tracked measure names and total measure costs per home, but did not include the quantity of the installed measures (e.g., number of CFLs). In most cases, measure quantity is necessary for calculating deemed savings estimates, and is helpful in assessing cost-effectiveness at the measure level. For this project, expected savings were estimated (based on annual reports) at a measure level and for the program overall.

Primary Heating Fuel Flag

The program database indicated the primary heating fuel for each customer. In summarizing the database, over 800 Utah participants (nearly half of the total participants in Utah) were listed as having electric heat. This was inconsistent with our understanding of Rocky Mountain Power's service territory in Utah. Rocky Mountain Power staff indicated this field's default was set to "electric heat," and was often not updated correctly. While this field was not essential for the evaluation, it raised concerns about data validity.

Measure Tracking

In several cases, inconsistencies with measure tracking appeared in the program database, prompting a request for a sample of BWRs for individual customers from the Utah's Department of Housing and Community Development. These were provided for a random sample of participants. Analysis indicated the following:

- Roughly half of participants listed as receiving a refrigerator replacement actually had refrigerator testing paid for by Rocky Mountain Power.
- Many customers received CFLs paid for by Rocky Mountain Power, but were not tracked in the program database.

[7] Rocky Mountain Power indicated its current protocol is to enter projects in its tracking system during the same month they are invoiced.

Ultimately, Cadmus determined which households had refrigerator replacements versus refrigerator testing based on costs billed to Rocky Mountain Power for that measure. To determine the number of CFLs installed in homes, total CFL savings were estimated across all program years, assuming installation of an average number of bulbs per home.

Program Participation and Savings

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

Table 8. Average Annual Savings and Participant Levels[8]

Program Year	Participation	Savings (MWh)	Average Savings per Participant (kWh)*
2007	440	394	897
2008	381	527	1,382
2009	982	1,537	1,565
Total	1,803	2,458	1,320

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

Average savings per participant reported by the utility were compared to evaluated savings per participant, deriving a number for calculating the realization rate.

Annual participation was calculated using Rocky Mountain Power's program database, generated from the utility's internal data collection system. As noted, discrepancies emerged within the database and in comparison to totals in Rocky Mountain Power's 2007, 2008, and 2009 annual reports. For this report, analysis was based on participation calculated from the program tracking database.

Engineering Analysis

Results

Table 9 summarizes overall evaluated per participant kWh savings calculated in the engineering analysis. This is compared to expected per participant savings reported by Rocky Mountain Power over the evaluation years, resulting in an 80 percent realization rate.

Table 9. Overall Savings and Realization Rate Summary, kWh/Year

Evaluated kWh Savings per Participant	Expected kWh Savings per Participant	Realization Rate
1,052	1,320	80%

Table 10 provides measure-specific frequencies, quantities, per unit savings, and total program savings. Assumptions used in calculating measure-specific savings are discussed below. As seen in the table, CFLs and refrigerator replacements made up approximately 99 percent of total

[8] Participation determined by PacifiCorp database entries.

program savings. All other measures amounted to roughly 0.3 percent of total program savings over the evaluation period.

Table 10. Measure-Specific Installations and Savings Summary, kWh/Year

Measure Type	Frequency	Average Quantity	Per Unit kWh	Total kWh Savings**
CFLs *	1,803	15.4	38	1,044,751
Refrigerator testing	1,781	n/a	n/a	n/a
Agency administration	1,207	n/a	n/a	n/a
Refrigerator replacement	818	1	1,034	845,451
Furnace Fan	18	1	164	2,957
Faucet Aerator	1	1	38	38
Window AC replacement	1	1	211	211
Weatherstrip windows	1	1	115	115
Low-flow showerhead	1	1	112	112
Ceiling insulation	1	1	2,411	2,411
Total **	5,632			1,896,047

* Due to discrepancies in the program database, where CFL installations were not accurately tracked for program participants; this analysis calculated an average quantity of CFLs installed across all participant homes.

** Totals may not match the exact quantities within the columns due to rounding.

For each participant household in Rocky Mountain Power's program database, the frequency of installed measures were tracked. Frequencies listed in Table 10 reflect homes receiving different weatherization measures across the three program years. The frequency also reflects the number of homes receiving a specific type of measure, such as CFLs, rather than the total number of individual measures installed through the program.

Table 11 provides the frequency of measures installed in participant homes by year. Due to high saturations of non-electrically heated homes and non-electric water heaters in the service territory, instances of shell-measure and water saving measure installations were rare.

Table 11. Frequency of Measure Installations

Measure Type	2007	2008	2009	Grand Total
CFLs	440	381	982	1,803
Refrigerator testing	428	377	976	1,781
Agency administration	437	281	489	1,207
Refrigerator replacement	183	171	464	818
Furnace Fan			18	18
Faucet Aerator	1			1
Window AC replacement		1		1
Weatherstrip windows		1		1
Low-flow showerhead		1		1
Ceiling insulation		1		1
Total				5,632

Measure-Specific Methodology

This section provides details about specific assumptions used in the engineering analysis to explain differences in approach across different measure groups.

A sample of BWRs were requested from the state to calculate inputs needed for the engineering analysis specific to CFL and refrigerator replacement savings. For CFLs, these data were used to determine the average number of bulbs installed per home. For refrigerator replacements, agency meter data were used to calculate the average usage of an existing refrigerator and the average size and type of an efficient unit installed.

Initially, a random sample of 80 participants was selected from the total population of homes listed as receiving refrigerator replacements; this sample sought to determine the average baseline usage of existing refrigerators at the 90 percent confidence level with 10 percent precision.

Upon receiving the sample, a discrepancy emerged between the database and the home audit forms, as not all customers listed as receiving refrigerators in the database actually received a new refrigerator. Additional data were requested from Rocky Mountain Power to verify the actual participant population receiving refrigerators. Another sample of 50 participant BWRs (verified as having refrigerator replacements) was requested from the state and used to develop average installation estimates required to achieve a 90 percent confidence level with ±10 percent precision.

CFLs Savings Approach

Estimating total savings associated with CFL installations required developing inputs for the following values:

- Average CFLs per home.
- Average hours-of-use per bulb.
- Average wattage per CFL installed.

Based on the survey of home audit forms, an average program participant home received 15.4 CFLs, as calculated from the sample of 130 participant home audit forms,[9] and averaging the quantity of CFLs reported as installed per home.

The savings calculation used an average of two hours-of-use per bulb, a value consistent with hours-of-use required for CFL installation in the Rocky Mountain Power tariff, and which provided a conservative estimate, given typical ranges used in the industry fall between two and four
hours-of-use.

A weighted average CFL wattage of 16 watts was calculated, based on information provided by Rocky Mountain Power on a the number of 14-watt, 19-watt, and 23-watt CFLs the program paid for. Similarly, a weighted average was calculated for a replaced incandescent of 67 watts, based on replacements of 60-watt, 75-watt, and 100-watt bulbs.

Using these assumptions, the program achieved 38 kWh in average savings per CFLs installed.

[9] Two outliers and one missing application were excluded from the total sample used for this calculation, resulting in a total sample of n = 127.

Refrigerator Replacement Savings Approach

Refrigerator replacement savings were calculated by subtracting the average consumption of the efficient unit installed from the average consumption of the existing (baseline) unit replaced. Using refrigerator metering data reported on the sample of building audit forms for participants receiving refrigerator replacement (n = 81),[10] average energy usage (kWh) could be calculated for the existing equipment. Utah's weatherization protocols require metering every refrigerator for more than 72 hours, providing a highly reliable estimate of average consumption.

Calculating usage of the efficient unit was based on the size and type of refrigerator replaced. Rocky Mountain Power rebated six different types of refrigerators, varying by type (top-mount freezer and side-by-side) and size (approximately 15, 18, and 21 cubic feet for top-mount units, and 22 and 25 cubic feet for side-by-side units). A weighted average of installed units was used to calculate average usage of the efficient unit replaced through the program.

Using this approach, the average baseline unit of 1,462 kWh was replaced by an average efficient unit of 428 kWh, saving approximately 1,034 kWh per refrigerator replaced.

Deemed Measures Savings Approach

Table 12 shows kWh savings for remaining measures installed by the program. These measures comprised 0.3 percent of total program savings. Per unit savings for these measures were derived using the deemed savings assumptions calculated through the 2010 Conservation Potentials Assessment[11] for PacifiCorp territory, specific to the Utah residential sector.

Table 12. Additional Measure Savings, kWh/Year

Measure Type	Per Unit kWh
Furnace Fan	164
Faucet Aerator	38
Window AC replacement	211
Weatherstrip windows	115
Low-flow showerhead	112
Ceiling insulation	2,411

[10] This total was based on 31 participants from the initial sample receiving refrigerator replacements, supplemented with the 50 additional participant building audit forms sampled.

[11] *PacifiCorp Assessment of Long-Term, System-Wide Potential for Demand-Side and Other Supplemental Resources Volume I*, The Cadmus Group Inc., December 2010.

3. Cost-Effectiveness Analysis

Assessing cost-effectiveness required an analysis of program costs and benefits from five different perspectives, using Cadmus' DSM Portfolio Pro model, which was consistent with evaluations recently conducted on Rocky Mountain Power's residential and commercial and industrial portfolios. Cost-effectiveness tests included:

a. **PacifiCorp Total Resource Cost Test (PTRC):** This test examined program benefits and costs from Rocky Mountain Power and Rocky Mountain Power customer perspectives, combined. On the benefit side, it included avoided energy costs, capacity costs, and line losses, plus a 10 percent adder to reflect non-quantified benefits. On the cost side, it included costs incurred by both the utility and participants.

b. **Total Resource Cost Test (TRC):** This test examined program benefits and costs from Rocky Mountain Power and Rocky Mountain Power customer perspectives, combined. On the benefit side, it included avoided energy costs, capacity costs, and line losses. On the cost side, it included costs incurred by both the utility and participants.

c. **Utility Cost Test (UCT):** From Rocky Mountain Power's perspective, benefits were avoided energy and capacity costs and line losses. Costs included any program administration, implementation, or incentive costs associated with funding the program.

d. **Ratepayer Impact (RIM):** All ratepayers (participants and nonparticipants) may experience increased rates to recover lost revenues. This test included all Rocky Mountain Power program costs as well as lost revenues. As benefits, this test included all avoided energy costs, capacity costs, and line losses.

e. **Participant Cost Test (PCT):** From this perspective, program benefits included bill reductions. Costs included any customer contributions to the measure cost.

Table 13 summarizes the five tests' components.

Table 13: 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 costs
TRC	Present value of avoided energy and capacity costs*	Program administrative and marketing costs
UCT	Present value of avoided energy and capacity costs*	Program administrative, marketing, and incentive costs
RIM	Present value of avoided energy and capacity costs*	Program administrative and marketing costs + present value of lost revenues
PCT	Present value of bill savings	Participant share of measure costs (which is zero)

* Present value of avoided energy and capacity costs includes avoided line losses occurring from reductions in customer electric use.

Table 14 provides selected inputs to the cost analysis. These include evaluated energy savings for each year (based on the per-participant savings of 1,052 kWh, shown in Table 9), the discount rate, line loss, and program costs. All these values (other than energy savings) were provided by Rocky Mountain Power. The discount rate came from Rocky Mountain Power's

2008 Integrated Resource Plan. Rocky Mountain Power also provided the values for line loss and the program costs.

Table 14: Selected Cost Analysis Inputs

Input Description	2007	2008	2009
Program Participants	440	381	982
Program Savings (kWh/year)	462,707	400,662	1,032,678
Discount Rate	7.40%	7.40%	7.40%
Line Loss	9.72%	9.72%	9.72%
Program Costs			
Agency Administrative Costs	$7,686	$7,162	$9,516
Incentive Costs	$79,540	$103,042	$141,658
Utility Administrative Costs	$26,660	$43,019	$48,716
Total Program Costs	$113,886	$153,223	$199,889

Note: Totals may not match the exact quantities within the columns due to rounding.

Energy savings and their associated avoided costs comprised program benefits. Energy savings used in the cost-effectiveness analysis were the evaluated kWh drawn from this study. Analysis used a weighted average measure life of 11.7 years, based on the measures' lifetimes and weighted by savings and frequency of installations.

Table 15 presents the results of program cost-effectiveness analysis for the evaluation period (2007–2009). The PTRC includes a 10 percent conservation adder.

Analysis used avoided costs associated with the Rocky Mountain Power 2008 IRP 46 Percent Load Factor Eastside Residential Whole Home Decrement.[12]

As shown in Table 15, analysis results indicate the program has been very cost-effective from all perspectives other than ratepayer impacts.[13] A benefit-cost ratio of 1.0 or greater is considered cost-effective, and the program achieved benefit/cost ratios of greater than 2.5 from four of the perspectives.

Table 15: Program Cost-Effectiveness Summary for 2007-2009

Cost-Effectiveness Test	Levelized $ / kWh	Costs	Benefits	Net Benefits	Benefit/ Cost Ratio
Total Resource + Conservation Adder (PTRC)	$0.027	$429,840	$1,219,688	$789,848	2.84
Total Resource No Adder (TRC)	$0.027	$429,840	$1,108,807	$678,967	2.58
Utility (UCT)	$0.027	$429,840	$1,108,807	$678,967	2.58
Ratepayer Impact (RIM)	$0.113	$1,799,161	$1,108,807	-$690,353	0.62
Participant (PCT)	$0.019	$298,286	$1,667,607	$1,369,321	5.59
Lifecycle Revenue Impact*	$0.00000324				

* The lifecycle revenue impact is the change in dollars per kWh over program's lifetime.

[12] 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

[13] The benefit/cost ratio for the ratepayer impact test is seldom greater than 1.0 for energy-efficiency programs. This test measures increased rates due to reductions in sales associated with such programs.

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", *PROMT 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", *PROMT 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*", PROMT 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 MESURE = 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 QUESTIONC1]*
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?