Opinion Dynamics

Boston | Headquarters

617 492 1400 tel
617 497 7944 fax
800 966 1254 toll free

1000 Winter St
Waltham, MA 02451

# PacifiCorp Idaho Low Income Weatherization Program

## Evaluation for Program Years 2018–2019

**August 9, 2023**

Opinion Dynamics

# Table of Contents

## Table of Acronyms

| Acronyms | Meaning |
|---|---|
| ARRA | American Reinvestment and Recovery Act |
| CAPAI | Community Action Partnership Association of Idaho |
| CSA | Conditional Savings Analysis |
| CFL | Compact Fluorescent Light Bulb |
| EICAP | Eastern Idaho Community Action Partnership |
| IDHW | Idaho Department of Health and Welfare |
| kWh | Kilowatt-hour |
| LIHEAP | Low Income Home Energy Assistance Program |
| LIWP | Low Income Weatherization Program |
| NEB | Non-Energy Benefit |
| PCT | Participant Cost Test |
| PTRC | PacifiCorp Total Resource Cost Test |
| PUC | Public Utilities Commission |
| RIM | Ratepayer Impact Measure Test |
| SEICAA | SouthEastern Idaho Community Action Agency |
| SIR | Savings-to-Investment Ratio |
| TRC | Total Resource Cost |
| UCT | Utility Cost Test |
| USDHHS | United States Department of Health & Human Services |
| DOE | United States Department of Energy |
| WAP | Weatherization Assistance Program |

# 1. Executive Summary

Opinion Dynamics presents its evaluation findings for the Rocky Mountain Power Low Income Weatherization Program (referred to as the "Program" throughout this report) in operation in the state of Idaho during the 2018 through 2019 program years. We performed both an impact and process evaluation and results from these are presented in the report. Additionally, we conducted payment and arrearage analyses to estimate non-energy program benefits. In this report, we also include cost-effectiveness test results using several approaches. AEG performed the cost-effectiveness tests.

Two Idaho non-profit agencies known for serving low income communities implement the Program: SouthEastern Idaho Community Action Agency (SEICAA) and Eastern Idaho Community Action Partnership (EICAP). These agencies provide energy efficiency services mostly targeted towards weatherization to existing single family (including manufactured) and multi-family homes, so long as the multi-family property is at least 66% occupied by low income qualifying tenants. "Low Income" qualifications follow federal guidelines and eligibility is based on 200% of federal poverty guidelines. Clients receive energy efficiency measures at no cost to them. Instead, Rocky Mountain Power reimburses the agencies for 85% of the installation cost. The agencies receive additional funds to operate the program from the US Department of Energy (DOE) and the US Department of Health and Human Services (USDHHS). These funds are allocated to the Idaho Department of Health and Welfare (IDHW) and administered on its behalf by the Community Action Partnership Association of Idaho (CAPAI). CAPAI also provides oversight of the weatherization agencies. Agencies are also reimbursed for administrative costs.

Opinion Dynamics conducted an evaluation of the Program on behalf of the utility for the 2018 through 2019 program years. The evaluation objectives were to: (1) document and measure effects of the program (energy and non-energy); and (2) identify areas of potential improvement. To quantify energy benefits, we conducted an impact evaluation using a consumption analysis with a comparison group to estimate the ex-post net annual energy savings attributable to the Program. To quantify non-energy benefits such as reduced costs and external payments, we conducted an assistance payment analysis and an arrearage analysis of the treatment and comparison groups. We also conducted a process evaluation based on a program materials review, in-depth interviews with agency staff (SEICAA and EICAP), and client responses to a telephone survey. The telephone survey asked about client satisfaction with the program and implementers, program barriers and bottlenecks, best practices, and any opportunities for improvement. Last, this report includes the cost-effectiveness test results supplied by AEG.

## 1.1 Impact Results

The evaluation team conducted a consumption analysis using a Linear Fixed Effect Regression (LFER) model, with the goal of determining the overall ex-post net program savings. The result shows that the average annual ex-post net energy savings per participant for the 2018–2019 program years is 1,023 kWh. In Table 1, we present the ex-post net savings for each program year and in total. Overall, the Program achieved 75% of its ex-ante gross savings for the evaluation period.

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

| Program Year | Participation | Ex-Ante Gross Energy Savings (kWh) | Ex-post Net Energy Savings (kWh) | Realization Rate |
|---|---|---|---|---|
| 2018 | 64 | 82,868 | 65,498 | 79% |
| 2019 | 69 | 97,935 | 70,615 | 72% |
| **Total** | **133** | **180,803** | **136,112** | **75%** |

The net savings may reflect both measure savings and behavior changes given that many participants took recommended actions to save energy beyond the measures installed. The Program is installing deep energy savings measures that will likely provide persistent savings over time as many of the measures have a long effective useful life, such as insulation. Further, most participants will reap these savings over a long period since most of them (88%) own their homes.

## 1.2 Process Results

The process evaluation examined Program operations from multiple perspectives. Rocky Mountain Power and its implementers, SEICAA and EICAP, have worked together for several years to deliver the Program. Over this time, they have developed expertise in delivering the Program despite its complex funding mechanisms. Combining the funds from Rocky Mountain Power with additional money from government organizations allows the Program to reach more utility clients and demonstrates a best practice in low income energy efficiency program delivery.[1] It is a common practice for utilities to work with community action agencies to bring their energy efficiency programs to low income households since these organizations generally have well-established relationships with them already.

The agencies serve many clients who qualify relatively quickly; most often within three months of applying with some exceptions. One in four surveyed participants (26%) reported wait times of less than 3 months, while 63% reported waiting more than 3 months. The agencies both noted that they work to restructure their waiting lists based on federally mandated Program priorities (such as serving the elderly, disabled, and homes with young children). EICAP noted that it reviews the waitlist daily to re-prioritize applicants based on how long they have been waiting for services, as well as by cost of heating as a proportion of the household's income.

From the agency perspective, the Program is operating smoothly. One agency cited no issues running the Program while the other noted challenges running a program funded through several sources, a lack of customer interest in the Program, and safety and structural issues in the homes.

The Program is helping to educate participants on ways to save energy beyond the direct-install measures. While energy education is not a formal part of this Program and is offered through Rocky Mountain Power's Low Income Energy Conservation Education Program,[2] agency staff still speak to Program participants about ways to save energy in the home. Coupling this informal energy efficiency education with home audits and measure installation is one way implementation staff can take advantage of their visits to help induce behavioral changes that may further reduce energy costs. It is also considered a best practice of energy

[1] Kushler, Martin, York, Dan and Witte, Patti, "Meeting Essential Needs: The Results of a National Search for Exemplary Utility-Funded Low-Income Energy Efficiency Programs," ACEEE Report Number U053, September 2005.
[2] Rocky Mountain Power provides $25,000 annually for Low Income Energy Conservation Education.

efficiency programs designed to serve low income clients.[3] Three in four survey respondents recalled receiving energy education from the Program and the majority of them (67%) found it very helpful.

The Program goes beyond energy and cost benefits by improving the health, comfort, and aesthetics of the homes. In the telephone survey, we asked Program participants if the air quality, appearance, and comfort of their homes were better, the same, or worse after they participated in the Program. Sixty-nine percent of respondents reported an improvement in comfort, 56% in air quality, and 44% in home appearance.

The Program is meeting client needs very well. Participant experience with the Program was very positive. Three in four participants (75%) reported they were "completely satisfied" with the Program and 94% would recommend the Program to others. A little over half of respondents had suggestions for improving the Program (n=10). Among those who provided suggestions, participants most often requested more repairs in the home and faster turnaround times for services.

## 1.3 Payment Analyses Results

To estimate some non-energy benefits from the Program, we compared the change in external assistance payments between program participants and a comparison group. Table 2 presents the annual and overall change in assistance payments for the evaluation period. Assistance payments decreased by an average of over 14% for Program participants while it increased by over 143% for the comparison group. A net reduction in external payments of $38.47 is the net benefit of the Program.

Table 2. Payment Assistance Amounts Summary for Participants and Comparison Group

| Year | Participant Group | | | | Comparison Group | | | | Net Difference |
|---|---|---|---|---|---|---|---|---|---|
| | Pre | Post | Change | %Change | Pre | Post | Change | %Change | |
| 2018 | $57.63 | $23.55 | $(34.07) | -59% | $14.81 | $41.51 | $26.70 | 180% | $60.77 |
| 2019 | $33.42 | $43.55 | $10.13 | 30% | $24.93 | $51.23 | $26.30 | 105% | $16.17 |
| **Total** | **$ 45.52** | **$ 33.55** | **$(11.97)** | **-14%** | **$ 19.87** | **$46.37** | **$26.50** | **143%** | **$38.47** |

## 1.4 Cost-Effectiveness Results

AEG completed cost-effectiveness tests of the Program using various approaches: the PacifiCorp Total Resource Cost (PTRC) test, Total Resource Cost (TRC) test, Utility Cost (UTC) test, Ratepayer Impact Measure (RIM) test, and the Participant Cost Test (PCT). Opinion Dynamics and PacifiCorp provided the inputs to AEG for their calculations. The PCT was considered "not applicable" and benefit/cost ratios were not calculated using this approach. The annual and evaluation period benefit/cost ratios are presented in the table below and show that the Low Income Weatherization Program is not considered cost-effective. Note that this Program uses the PTRC to determine cost-effectiveness.

Table 3: 2018-2019 Low Income Weatherization Benefit/Cost Ratios by Program

| Program Year | PTRC | TRC | UCT | RIM | PCT |
|---|---|---|---|---|---|
| Low Income Weatherization with NEBs | 0.75 | 0.72 | 0.23 | 0.17 | n/a |
| Low Income Weatherization | 0.25 | 0.23 | 0.23 | 0.17 | n/a |

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

## 1.5 Recommendations

Based on the evaluation results, we recommend the following:

Rocky Mountain Power is adhering to best practices by delivering the program through community-based agencies. SEICAA and EICAP have served as Program implementers on behalf of Rocky Mountain Power in 2018 and 2019. It is a common practice for utilities to work with community action agencies to bring their energy efficiency programs to low income households since these organizations generally have well-established relationships with them already. Additionally, these agencies are knowledgeable about using funding from utilities in combination with government funding to expand the reach of programs. SEICAA and EICAP both demonstrated their understanding of program processes, requirements, and funding mechanisms. Leveraging community-based organizations is a best practice in low income weatherization programs. **We recommend Rocky Mountain Power continue to use the same Program implementers moving forward.**

Participants continue to be highly satisfied with the Program, the application process, and agency staff. The Program is giving energy conservation education that allows it to go beyond measure savings with behavior savings as well. Most participants recalled this education, found it extremely helpful, and many took some of the recommended actions. While satisfaction is high, some participants noted areas of improvement, which largely focused on reducing the wait times for the Program and expanding Program services to include more structural improvements such as roof replacement and mold remediation. We recommend that **Rocky Mountain Power consider proactive ways to access the new infrastructure funding and layer those funds onto existing funding.**

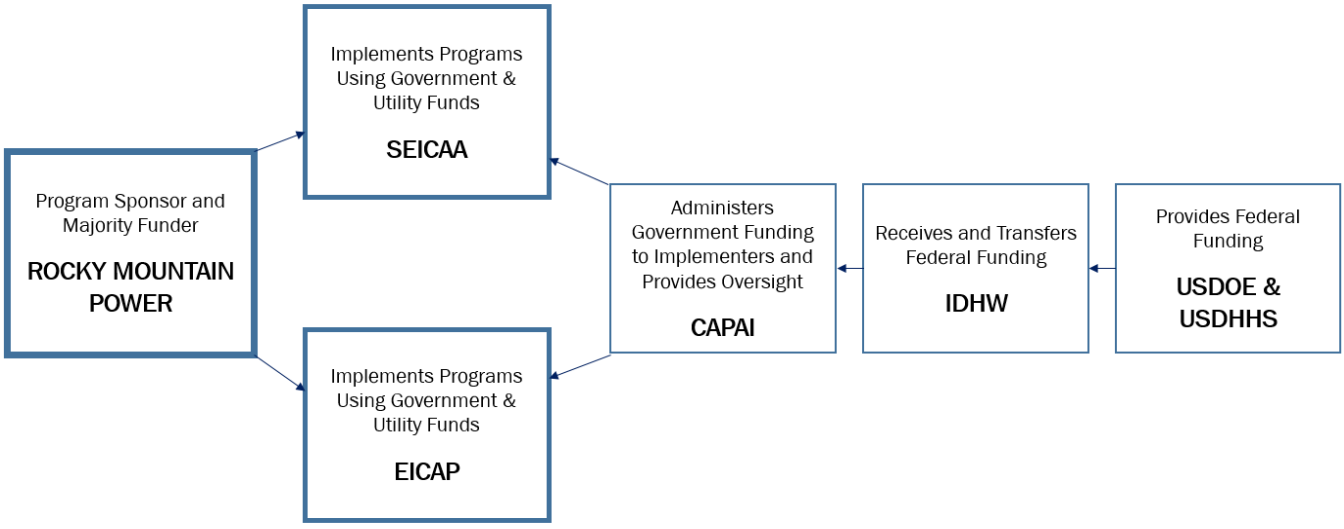
Long waiting lists to receive weatherization services continue to be an issue for this Program, 63% of survey respondents said they waited more than three months for services after applying. **We recommend that Rocky Mountain Power discuss the drivers behind the long wait time for services with each agency and determine whether the utility can help overcome any of them.**

# 2. Introduction

Rocky Mountain Power's Low Income Weatherization Program (Program) provides energy efficiency services to eligible residential clients through a partnership with two non-profit weatherization agencies in Idaho: Eastern Idaho Community Action Partnership (EICAP)[4] and SouthEastern Idaho Community Action Agency (SEICAA).[5] Partnering with agencies that historically serve Idaho's low income communities provides Rocky Mountain Power with access to the clients targeted by this program.

Rocky Mountain Power funds 85% of the cost of approved measures received by participants. To fund the remainder, the agencies leverage government funding through the IDHW. The original sources of these funds come from the DOE and the USDHHS. These funds are administered by the Community Action Partnership Association of Idaho (CAPAI) and directed to SEICAA and EICAP. Leveraging utility, state and federal funding sources allows these agencies to provide comprehensive weatherization services to more low income households than they may have otherwise. Other exemplary utility-funded low income energy efficiency programs also bring together multiple funding sources and implement programs through social service agencies. We show the sources of funding and roles of oversight and implementation in Figure 1.

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




## 2.1 Program Implementation

Program implementation by SEICAA and EICAP involves the following steps, which are described in further detail in the *2020 Idaho Energy Efficiency and Peak Reduction Annual Report*:

[4] EICAP serves Bingham County, Custer County, Bonneville County, Butte County, Clark County, Fremont County, Jefferson County, Lemhi County, Madison County and Teton County

[5] SEICAA serves Bannock County, Bear Lake County, Bingham County, Caribou County, Franklin County, Oneida County and Power County

- income verification based on CAPAI guidelines to ensure participants qualify for program participation,
- energy audit using a DOE-approved tool to determine measures that are cost effective to install,
- installation of measures that have a Savings Investment Ratio of 1.0 or greater,
- post-inspections of all projects, and
- billing notification to Rocky Mountain Power, which includes the measures installed and the associated cost of each project, along with the associated invoice.

The Program is available to all existing single family and multi-family residential units, so long as the multi-family property is at least 66% occupied by low income qualifying tenants. "Low income" qualifications follow Federal low-income guidelines and income eligibility is based on 200% of federal poverty guidelines.

Agencies directly install measures for clients based on heating fuel-type and need. Measures vary by household, are classified as either "major" or "supplemental," and could include the following during the evaluation period: CFLs, water pipe insulation, showerheads, aerators, infiltration, replacement windows, thermal doors, thermostats, health and safety measures, electric furnace repair and replacement, ceiling, floor, wall, and duct, insulation, attic ventilation, water heater repair and replacement and refrigerators.

## 2.2 Evaluation Objectives

Below we list the objectives of our evaluation of the Rocky Mountain Power Low Income Weatherization Program in Idaho and we include in parentheses the evaluation type in which the objective is covered:

- Document and measure effects of the Program (impact and process)
- Verify measure installation and savings (impact)
- Review Program operations (process)
- Document all other funding used by agencies to provide no-charge services to participants (process)
- Quantify non-energy benefits through payment analysis (payment/arrearage analysis)
- Provide data to support Program cost-effectiveness assessments (impact and payment/arrearage analyses)
- Identify areas of potential improvement (impact and process)
- Document compliance with regulatory requirements (process)
- Survey participants and agency staff (process)

In the remainder of the report, we include a description of the data collection and methodologies used to conduct the study, a presentation of the impact evaluation, the findings from the process evaluation, the assistance payment and arrearage analyses, and cost-effectiveness results.

# 3. Data Sources

In this section, we present the data sources used in this evaluation.

## 3.1 Program Tracking Data

We requested and received program tracking data for 2018 and 2019 program years to support both impact and process evaluations. The Program tracking data systems did not include kWh/year savings at the measure level and assumed the same average savings per home. Because we conducted a consumption analysis for the impact evaluation, the kWh/year savings at the measure or participant level were not needed.

While we did not evaluate the 2020 program year, we requested these data for the consumption analysis as well as the payment analysis. We used future Program participants as a comparison group where participants of the Program were matched to them based on zip code and average daily consumption.

We used the program tracking data to identify Program participants and the measures they had installed to develop the participant telephone survey sample. During the survey, we asked respondents to verify their participation.

## 3.2 Client Consumption Data

We received consumption data for 2018, 2019, and 2020 Program participants spanning from January 2017 through January 2023. We retained 12 months pre- and post-participation consumption data for the 2018 and 2019 participants and a similar time span for the 2020 Program participants to adjust for exogenous changes in the consumption analysis. Upon limiting the consumption data to the relevant time span, we merged the data with the participant tracking data and performed further cleaning, such as removing invalid and outlier consumption values, and participant records with insufficient consumption data.

## 3.3 Monthly External Payment Records

The external payment analysis relied on monthly client assistance payments received by participants and the comparison group. Key client payment data we received included the following variables for program participants:

- Client identifier
- Client assistance payment amount
- Client assistance payment date (noted as Created Date)

## 3.4 Agency Interviews and Participant Survey Data

Primary data collection activities included in-depth interviews with staff members at the SouthEastern Idaho Community Action Agency (SEICAA) and Eastern Idaho Community Action Partnership (EICAP). We also conducted a participant telephone survey. The agency interviews helped inform our review of Program operations, compliance with regulatory requirements, as well as major accomplishments and challenges related to Program implementation. We used information gathered through the participant telephone survey to verify the installation of measures and inform process-related Program findings.

# 4. Impact Evaluation

A total of 133 clients participated in the Program over the 2018 and 2019 years. In the participant telephone survey, we asked respondents whether they recalled someone coming to their home to provide weatherization services and perform energy efficiency upgrades. All survey respondents (n=16) confirmed their participation. A list of the various measures installed from the most common (LED light bulbs) to the least common (water heater replacement) is presented in Table 4 below. Other common measures include water pipe insulation, air sealing/infiltration, windows, and ceiling and floor insulation.

Table 4. Idaho Participation Counts and Measures for Program Years 2018–2019

| Measures | 2018 | 2019 | Total | Percent Treated |
|---|---|---|---|---|
| Total # of Treated Homes | 64 | 69 | 133 | 100% |
| LED Bulbs | 64 | 65 | 129 | 97% |
| Pipe Insulation | 62 | 61 | 123 | 92% |
| Air Sealed/Infiltration | 61 | 54 | 115 | 86% |
| Health & Safety Measures | 63 | 49 | 112 | 84% |
| Glass Replacement | 52 | 51 | 103 | 77% |
| Ceiling Insulation | 50 | 47 | 97 | 73% |
| Floor Insulation | 41 | 44 | 85 | 64% |
| Refrigerator Replacement | 39 | 37 | 76 | 57% |
| Attic Ventilation | 14 | 38 | 52 | 39% |
| Furnace Repair | 16 | 18 | 34 | 26% |
| Water Heater Repair | 19 | 12 | 31 | 23% |
| Thermal Door | 14 | 12 | 26 | 20% |
| Duct Insulation | 14 | 6 | 20 | 15% |
| Furnace Replacement | 7 | 2 | 9 | 7% |
| Heat Pump | 0 | 9 | 9 | 7% |
| Wall Insulation | 5 | 4 | 9 | 7% |
| Water Heater Replacement | 2 | 0 | 2 | 2% |

## 4.1 Methodology

The evaluation team conducted a consumption analysis using a Linear Fixed Effect Regression (LFER) model, with the goal of determining the overall ex-post net program savings. The model allows all household factors that do not vary over time to be absorbed by (and therefore controlled for) the individual constant terms in the equation. In other words, this method uses account-specific intercepts.

As part of the consumption analysis of Low Income Weatherization Program (LIWP) participants, the evaluation team followed a standard series of steps for data collection, data cleaning, model specification, and analysis. Our methodology compares pre- and post-participation energy usage for 2018 and 2019 participants. We explored using 2020 participants as a comparison group to better control for exogenous changes in energy consumption over time; however, due to the small size of the comparison group and insufficient consumption history, we were unable to use the 2020 participants as a comparison group. Comparison groups allow us to control for exogenous changes such as naturally occurring adoption of energy-efficient measures. In our

experience, consumption analysis for low income customers that leverages a comparison group generally results in similar energy savings estimates as a more straightforward pre-post regression analysis.

### 4.1.1 Consumption Data Preparation

Upon merging participant and consumption data, we performed the following consumption data cleaning steps:

- **Duplicate records.** We explored duplicate records and made adjustments to arrive at a single bill per period.
- **Inadequate days.** We identified and dropped bill periods with zero or negative days.
- **Extremely low Average Daily Consumption**. We checked for and dropped bills with very low (less than zero kWh) or missing average daily consumption.
- **Extremely high Average Daily Consumption**. We checked for customers with entire pre- or post-installation periods having very high (exceeding three times the standard deviation) average usage.
- **Inadequate billing history before or after program participation**. Many energy-saving measures in these programs are expected to generate energy savings throughout the year. To assess changes in consumption due to program measures before and after installation, we need to ensure that participants have a sufficient billing history. As such, we excluded participants who did not have at least nine months of pre- and post-period participation data.

The largest drops were associated with insufficient pre-period and post-period consumption data. Upon completing data cleaning, we retained 50% of participants in the analysis.

### 4.1.2 Weather Data Preparation

To include weather patterns in our model, we used hourly weather data from numerous weather stations across the ID territory, utilizing the site closest to each account's geographic location. By using multiple sites, we increase the accuracy of the weather data associated with each account. We obtained these data from the National Climatic Data Center (NCDC).

The daily data are based on hourly average temperature readings from each day. We calculated Cooling Degree Days (CDD) and Heating Degree Days (HDD) for each day in the analysis based on average daily temperatures, using the same formula used in weather forecasting.[6] We merged daily weather data into the consumption dataset so that each billing period captured the HDD and CDD for each day within that billing period (including start and end dates).[7] For analysis purposes, we then calculated average daily HDD and average daily CDD, based on the number of days within each billing period.

[6] A "degree-day" is a unit of measure for recording how hot or how cold it has been over a 24-hour period. The number of degree-days applied to any particular day of the week is determined by calculating the mean temperature for the day and then comparing the mean temperature to a base value of 65°F (HDD) and 75°F (CDD). (The "mean" temperature is calculated by adding together the high for the day and the low for the day, and then dividing the result by two.) If the mean temperature for the day is five degrees higher than 75°F, then there have been five cooling degree-days. On the other hand, if the weather has been cool, and the mean temperature is, say, 55°F, then there have been 10 heating degree-days (65 minus 55). "Degree Days," National Weather Service, https://www.weather.gov/ffc/degdays.

[7] Daily weather data are merged based on the given dates of the billing period. Assigning weather this way provides a more accurate representation of the weather experienced during the billing period than using weather for the calendar month of the bill.

### 4.1.3 Modeling Specifications

To estimate savings for the LIWP, Opinion Dynamics specified an LFER model in a pre-/post-design that incorporates weather and interaction terms that show the effect of weather in the post-installation period. The fixed effect for the model is set at the account level, which allows us to control for all household factors that do not vary over time. In the process of determining the appropriate model for the analysis, we specified a range of models from simple pre-post to more complex models incorporating a variety of terms and interactions. Notably, we attempted to model 2018 and 2019 participants separately to determine program-year specific energy savings estimates. Due to the small participant population sizes, the year-specific models did not result in statistically significant savings estimates.

We judged our final models on several criteria. Primarily, we aimed to use a model that explained as much about changes in the dependent variable as possible. The most direct measure of this is the adjusted R-squared, which gives an estimate of how much the model explains of the difference between post-period usage and the baseline. We also compared Akaike Information Criterion (AIC) values of each model specification within the same sample. The AIC provides a measure of relative quality between models; a lower value indicates a relatively more efficient model. This method inherently incorporates explained variation as well as how many variables we use to achieve that level.

Equation 1 contains final model specification.

Equation 1. Final Model Specification

$$ADC_{it} = B_h + B_1 TreatPost_{it} + B_2 HDD_{it} + B_3 CDD_{it} + B_{4-16} MonthDummies_t + B_{17} TreatPost_{it}{:}HDD_{it} + B_{17} TreatPost_{it}{:}CDD_{it} + \varepsilon_{it}$$

Where:

$ADC_{it}$ = Average daily consumption (in kWh) for the billing period

$TreatPost$ = Indicator for treatment group in post-installation period (coded "0" in the pre-participation period, coded "1" in post-installation period)

$HDD$ = Average daily heating degree days from NCDC

$CDD$ = Average daily cooling degree days from NCDC

$TreatPost{:}HDD$ = Indicator for treatment group in post-installation period (coded "0" in the pre-participation period, coded "1" in post-installation period) interacted with average daily heating days

$TreatPost{:}CDD$ = Indicator for treatment group in post-installation period (coded "0" in the pre-participation period, coded "1" in post-installation period) interacted with average daily cooling days

$B_h$ = Average household-specific constant

$B_1$ = Main program effect (change in ADC associated with being a participant in the post-installation program period)

$B_2$ = Increment in ADC associated with one-unit increase in HDD

$B_3$ = Increment in ADC associated with one-unit increase in CDD

$B_{4-15}$ = Increments in ADC associated with each calendar month, excluding January

$B_{17}$ = Change in ADC associated with being a participant in the post-installation program period and having a one-unit increase in HDD.

$B_{18}$ = Change in ADC associated with being a participant in the post-installation program period and having a one-unit increase in CDD.

$\varepsilon_{it}$ = Error term

Table 8 displays coefficient output for all models.

Table 6. Final Model Coefficients

| Variable | Parameter Estimate | Standard Error | t Value | Pr > \|t\| |
|---|---|---|---|---|
| treat_post | -2.30194 | 1.6446 | -1.3997 | 0.1664 |
| hdd | 0.86135 | 0.3206 | 2.6867 | 0.0092 |
| cdd | -0.39898 | 3.0161 | -0.1323 | 0.8952 |
| month02 | 4.85247 | 1.8407 | 2.6362 | 0.0105 |
| month03 | 3.26132 | 4.4773 | 0.7284 | 0.4690 |
| month04 | -0.14997 | 7.2998 | -0.0205 | 0.9837 |
| month05 | -2.45017 | 9.3680 | -0.2615 | 0.7945 |
| month06 | -0.06618 | 10.4215 | -0.0064 | 0.9950 |
| month07 | 5.36157 | 11.0750 | 0.4841 | 0.6300 |
| month08 | 1.86201 | 10.1165 | 0.1841 | 0.8546 |
| month09 | -2.74803 | 8.9996 | -0.3054 | 0.7611 |
| month10 | -2.84047 | 5.7969 | -0.4900 | 0.6258 |
| month11 | -1.14054 | 2.9890 | -0.3816 | 0.7040 |
| month12 | -1.69545 | 1.8865 | -0.8987 | 0.3722 |
| treat_post:hdd | -0.01979 | 0.0646 | -0.3064 | 0.7603 |
| treat_post:cdd | -0.11496 | 0.5378 | -0.2138 | 0.8314 |

### 4.1.4 Savings Estimation

The pre-post model results presented in section 4.1.3 show a statistically significant reduction in electric consumption for all territories. Table 9 shows an estimate of the average daily savings associated with the Program per participant. These values reflect actual savings under actual weather conditions observed in the post period.

Table 7. Modeled Savings Estimates

| Input | Result |
|---|---|
| Modeled Treatment Participants | 65 |
| Average Daily Savings Estimate (kWh) | 2.80 |
| Average Daily Modeled Baseline (kWh) | 41.40 |
| Standard Error | 0.94 |
| t | 80.77 |
| P>[t] | - |
| Adjusted R-squared | 0.81 |
| 90% Confidence Interval – Lower Bound | 1.26 |
| 90% Confidence Interval – Upper Bound | 4.35 |

Table 10 shows the average annual baseline consumption per participant, average per household annual savings, and savings as a percentage of baseline consumption.

Table 8. Estimated Annual Savings from Consumption Analysis

| Input | Result |
|---|---|
| Average Annual Baseline Energy Consumption per Participant (kWh) | 15,111 |
| Average per Participant Ex-Post Net Annual Savings (kWh) | 1,023 |
| Average per Participant Savings Percentage | 7% |

## 4.2 Results

We found an average savings of 1,023 kWh per participant, per year after Program measures are installed. This represents a reduction of 7% of participants' baseline energy use.

### 4.2.1 Ex-Post Net Energy Savings from the Program

In Table 11, we present the annual ex-ante gross and ex-post net energy savings for the Program.[8] The program achieved 136,112 kWh in energy savings between 2018 and 2019 program years. The net savings realization rate is 75% for the 2018–2019 evaluation period.

Table 9. Ex-Ante Gross and Ex-Post Net Energy Savings (kWh)

| Program Year | Participation | Ex-Ante Gross Energy Savings (kWh) | Ex-Post Net Energy Savings (kWh) | Realization Rate |
|---|---|---|---|---|
| 2018 | 64 | 82,868 | 65,498 | 79% |
| 2019 | 69 | 97,935 | 70,615 | 72% |
| **Total** | **133** | **180,803** | **136,112** | **75%** |

[8] We retrieved ex-ante gross energy savings by year from Pacific Power's Washington Annual Report on Conservation Acquisition for the years 2018 and 2019.

### 4.2.2 Analysis of Program's Net Ex-Post Savings Estimate

The net savings estimate of 1,023 kWh per participant, derived as part of this evaluation, is lower than the savings observed in previous evaluations. Specifically, per participant energy savings in 2018 and 2019 were 21% lower than the per participant savings derived through the previous evaluation. Lower savings can result from a variety of factors such as characteristics of the participants who participated in the Program. Naturally occurring energy efficiency trends also tend to change customer energy usage patterns over time.

### 4.2.3 LED Persistence

To get a sense of the persistence of LEDs installed through the Program, we inquired whether participants still had the bulbs installed. Fifteen percent (n=2 out of 13) of participants who recalled receiving LEDs stated all LED bulbs were still installed, and 46% (n=6 out of 13) did not recall how many of the LED bulbs were still installed. Around 38% Program participants (n=5 out of 13) removed some of the LED bulbs. None of the participants who recalled receiving LEDs indicated that they removed all the LED bulbs.

# 5. Process Evaluation

In this process evaluation, we examined the Program's operations from the perspective of the agencies and participants.

## 5.1 Agency Perspective

We conducted a total of two agency interviews in November and December 2022. Both interviews were with a representative from EICAP and SEICAA. These interviews were conducted to gain a deeper understanding of the Program's operations and any key areas of improvement. We present each agency's perspective in the subsections below. Notably, 90% of Program participants received EICAP Program services and 10% received SEICAA services.

### 5.1.1 Eastern Idaho Community Action Partnership (EICAP)

EICAP serves a larger number of Rocky Mountain Power clients, roughly 30% of the 75 customers serviced by the Program per year are Rocky Mountain Power customers. EICAP receives funding from Rocky Mountain Power along with additional state and federal funding sources to implement weatherization services.

EICAP contacts customers who received energy assistance through IDHW. That waitlist is roughly 300 people, with Rocky Mountain Power customers comprising roughly 30%. EICAP prioritizes customers based on high energy burden households, date of application, and which utility services the customer. The agency reviews the waitlist daily to re-prioritize applicants based on how long they have been waiting for services, as well as the ratio of heating cost to household income. Once an applicant comes up on the waitlist, EICAP sends out a letter and waits to hear back from the applicant.

EICAP mentioned the only change to the Program during the 2018–2019 program years was the introduction of ductless heat pumps, which Rocky Mountain Power pays 100% of the cost.

Agency staff noted that most instances where steps need to be completed before weatherization can be completed are able to be done by EICAP as they have federal home aid funding from the affordable housing program. Resultingly, less than five percent of customers are deferred, and those instances are usually due to clutter in the home obstructing access to areas.

Agency staff noted the Program is running extremely well and did not note any major challenges to implementation or barriers to participation. Agency staff did mention they would like an increase in the maximum income level needed to participate in weatherization to expand potential customer participation.

### 5.1.2 SouthEastern Idaho Community Action Agency (SEICAA)

Funding for SEICAA low income weatherization services comes from a variety of state and federal sources such as the DOE, USDHHS, LIHEAP, and IDHW, in addition to Rocky Mountain Power. Rocky Mountain Power funding seems to be sufficient to meet demand as SEICAA did not use all available Rocky Mountain Power funds.

The waitlist is composed of roughly 6000 people who received energy assistance from IDHW, a few thousand of which are Rocky Mountain Power customers. Customers can also be placed on the waitlist through an online application. Customers on the waitlist are prioritized based on households with young children, elderly or disabled residents, or high energy burden.

Agency staff did not mention any major changes to the program design during the 2018–2019 program years. SEICAA indicated that the Program is running smoothly from their perspective but noted the following challenges:

- One key challenge in operating a weatherization program sponsored by several different funding sources, is that the agency must find contractors who are willing to abide by all state and federal requirements. These increased requirements cause finding contractors interested in doing the work to be very difficult.
- Rocky Mountain Power customers specifically seem uninterested in receiving weatherization services, agency staff mentioned fewer than 10 Rocky Mountain Power customers received weatherization services per year. SEICAA could not think of any barriers causing that disinterest. SEICAA noted that this is not the case for other utility customers, where 50–60 customers are serviced per year.
- Safety and structural issues in the home are barriers to Program participation and contribute to program costs without energy-saving benefits. If an auditor comes to a home and finds faulty wiring, excessive mold, lead paint, or sewer leaks that could be harmful to the health of weatherization crews, clients are asked to deal with these concerns before Program measures can be installed. Residents may not have the funds to address these issues, or they may rent their homes from a homeowner who chooses not to address these issues. SEICAA provides those customers with a number to call if those issues are addressed and keeps track of those deferred customers separately.

## 5.2 Participant Perspective

The evaluation team attempted to reach a census of clients who participated in the Program in 2018 and 2019 with a telephone survey. Of the 133 clients who participated in 2018–2019, we had valid phone numbers for 120. A total of 16 participants completed telephone interviews, yielding a response rate of 23% and cooperation rate of 67%.[9] (Table 5).

Table 5. Idaho Client Telephone Survey

| Population Frame | Unique Telephone Numbers | Final Survey Responses | Survey Response Rate | Survey Cooperation Rate |
|---|---|---|---|---|
| 133 | 120 | 16 | 23% | 67% |

The call center attempted to reach participants multiple times. Table 6 lists the survey disposition categories.

[9] Response rate is calculated using American Association for Public Opinion Research (AAPOR) Response Rate 3.

Table 6. Participant Survey Disposition

| Survey Disposition | Sample |
|---|---|
| **Completed** | **16** |
| Answering Machine | 45 |
| Disconnected Phone | 33 |
| Initial Refusal | 7 |
| No Answer | 5 |
| Language Barrier | 5 |
| Wrong Number | 4 |
| Busy | 2 |
| Do Not Call List | 1 |
| Screened Out | 1 |
| Call Block | 1 |
| **Total** | **120** |

We used this survey to collect data about participant household characteristics and Program experience. Based on demographic data provided by clients during the participant survey, approximately 75% (n=12) resided in single family or manufactured homes, 12%lived in mobile homes (n=2), and 12% lived in apartments or condominiums (n=2). A total of 88% (n=14) owned their homes and the remaining 12% (n=2) rented their residences. Sixty-nine percent of surveyed participants also self-reported that their homes were built before 1996 (n=11).

### 5.2.1 Program Awareness

Participants were asked how they heard about the Program. Table 7 shows that 25% participants heard about the Program by word of mouth from family, friends, or neighbors (n=4 of 16). 19% of participants learned about it through written materials from agency staff or agency material (n=3 of 16).

Table 7. How Participants Learned of the Program (n=16)

| Source | n | % |
|---|---|---|
| Family/Friends/Word of Mouth | 4 | 25% |
| Written Materials at Agency | 2 | 13% |
| Rocky Mountain Power Representative | 1 | 6% |
| Other | 3 | 19% |
| Don't Know | 6 | 38% |

Most participants were not able to identify the funding source for the Program. As seen in Table 8, participants who could identify a funding source often associated the Program with the agency, not Rocky Mountain Power. The agency staff from SEICAA reported that implementation staff place a sign in the front yards of homes to acknowledge both SEICAA and Rocky Mountain Power are providing the weatherization services.

Table 8. Participant Awareness of Program Funding Sources (n=16)

| Program Funding Source | n | % |
|---|---|---|
| Agency | 4 | 25% |
| Rocky Mountain Power | 1 | 6% |
| Federal Funds | 1 | 6% |
| Other | 1 | 6% |
| Don't Know | 10 | 63% |

*Note*: Percentages do not sum to 100% and contain multiple responses

One in four respondents reported receiving weatherization services within three months of submitting their application (n=4 of 16), but the majority of respondents waited more than three months (63%).

Table 9. Time from Application Process to Receiving Weatherization Services (n=16)

| Amount of Time | n | % |
|---|---|---|
| Less than One Month | 2 | 13% |
| One to Three Months | 2 | 13% |
| Three to Six Months | 2 | 13% |
| Six Months to A Year | 5 | 31% |
| More Than a Year | 3 | 19% |
| Don't Know | 2 | 13% |

### 5.2.2 Energy Education

The Program does not formally offer energy education; however, three-fourths of survey respondents indicated they learned about ways to save energy from the agency staff (n=12 of 16), and most of them (n=9 of 12) took some recommended energy-saving actions (Table 10). Even though the Program does not officially include energy education, the opportunity to present energy-saving recommendations during audits or measure installations has had a positive impact on Program participants.

Table 10. Weatherization Staff Provided information on Ways to Save Energy in the Home (n=9)

| Action Taken | n | % |
|---|---|---|
| Installed Energy-Efficient Light Bulbs/LEDs/LEDs | 6 | 50% |
| Turn Off Lights When Not in Use | 5 | 42% |
| Lower Thermostat Temperature in Winter/Higher Temp in Summer | 5 | 42% |
| Unplug Appliances/Power Strips | 2 | 17% |
| Installed/Added Insulation | 1 | 8% |
| Turn Off Appliances When Not in Use | 1 | 8% |
| Installed New Windows/Doors | 1 | 8% |
| Other | 5 | 42% |

*Note*: Percentages do not sum to 100% and contain multiple responses

Participants provided positive feedback on the energy education received informally, as most participants indicated the energy education they received was "extremely helpful" (Table 11). The mean rating for the helpfulness of the energy education received was 8.2.

Table 11. Helpfulness of Energy Education (n=12)

| Energy Education Rating | n | % |
|---|---|---|
| 0–4 | - | - |
| 5–7 | 4 | 33% |
| 8–10 | 8 | 67% |

*Note*: Scale from 0 to 10 where 0 is "Not at All Helpful" and 10 is "Extremely Helpful"

In addition to ways to save energy in the house, just over half of participants (n=9 of 16) indicated the weatherization staff discussed ways to improve health and safety in the home (Table 12).

Table 12. Ways to Improve Health and Safety in the Home (n=16)

| Received Health and Safety Education | n | % |
|---|---|---|
| Received Education | 9 | 56% |
| Did Not Receive Education | 6 | 38% |
| Don't Know | 1 | 6% |

### 5.2.3 Program Delivery and Satisfaction

Participant feedback was highly positive. Most participants (n=12 of 16) were "completely satisfied" with the Program, as seen in Table 13.

Table 13. Program Satisfaction (n=16)

| Program Satisfaction Rating | n | % |
|---|---|---|
| 0–4 | 2 | 13% |
| 5–7 | 2 | 13% |
| 8–10 | 12 | 75% |

*Note*: Scale from 0 to 10 where 0 is "Completely Dissatisfied" and 10 is "Completely Satisfied"

Further, almost all participants (n=15 of 16) said they would recommend the Program to others.

Table 14. Recommend Program to Family and Friends (n=16)

| Response | n | % |
|---|---|---|
| Yes | 15 | 94% |
| No | 1 | 6% |

A little over half of respondents had suggestions for improving the Program (n=10). Among those who provided suggestions, participants most often requested more repairs in the home and faster turnaround times for services. Table 15 includes the verbatim suggestions from survey respondents.

Table 15. Participant Recommendations for Program Improvements (n=10)

| Participant Recommendations for Program Improvements |
|---|
| Time and efficiency of time. I feel if they were to be able to hire more people so that they can get to jobs faster. I feel that would definitely be an improvement. |
| They could look more carefully at what is pulling energy. |
| The wait list times could be shorter. |
| Offer the program to more people. |
| Not going with the cheapest bid if work is needed. If something goes wrong with the services provided the company should come back and attempt to fix the errors. |
| Just a little more observation and be willing to do more to make changes make house look like a home and keep mold out. |
| It would have been nicer for the power bill to be paid for during the colder months. |
| I wished they would get more funding from the government to do the roof. The funding and what they do to help people is tremendous. What they do for people is amazing. It helps people keep their houses warm. |
| Giving a wider spectrum of what the program can cover. |
| Get the word out to improve their situation. |

Half of respondents indicated the application process was "Extremely Easy." Of those who indicated the application process was not "Extremely Easy," five respondents stated more than six months elapsed between submitting their application and receiving services. Further, all participants were very pleased with the weatherization staff, with all stating "Yes" when asked if the agency staff was courteous and respectful towards participants and their family members and almost all (n=14 of 16) agreed the work crew worked carefully to protect the home.

### 5.2.4 Impact of Program

There were thirteen participants who recalled the weatherization staff installing LED bulbs. Of those, 69% (n=9 of 13) were more satisfied with the LEDs than their previous lighting and the remaining 31% stated the lighting quality was about the same (Table 16).

Table 16. Satisfaction with LEDs (n=13)

| Satisfaction with LEDs | n | % |
|---|---|---|
| More Satisfied | 9 | 69% |
| About the Same | 4 | 31% |
| Less Satisfied | - | - |

As seen in Table 17, 75% (n=12 of 16) of participants noticed a change in their electric bill, and of those 75% (n=9 out of 12) said their bill was lower following the weatherization services.

Table 17. Change Noticed in Electric Bill (n=12)

| Change in Electric Bill | n | % |
|---|---|---|
| Higher | 2 | 17% |
| Lower | 9 | 75% |
| Don't Know | 1 | 8% |

We also explored non-energy impacts. In the telephone survey, we asked Program participants if the air quality, appearance, and comfort were better, the same, or worse after they participated. As Table 18 shows, comfort of the home improved the most, with 11 of 16 participants noting an improvement. Home appearance and air quality in the home were better for 44% and 56% of participants, respectively, as well. This provides further evidence of the positive impact of the Program beyond energy-saving benefits.

Table 18. Impact of Measures on Home Characteristics (n=16)

| Home Characteristics | n | % |
|---|---|---|
| **Comfort** | | |
| Better | 11 | 69% |
| Worse | 1 | 6% |
| Stayed the Same | 4 | 25% |
| **Appearance** | | |
| Better | 7 | 44% |
| Worse | 2 | 13% |
| Stayed the Same | 7 | 44% |
| **Air Quality** | | |
| Better | 9 | 56% |
| Worse | 2 | 13% |
| Stayed the same | 4 | 25% |

# 6. Payment Analysis for Non-Energy Benefits

We completed an external payment analysis to quantify some non-energy impacts of the Program. We compared changes to external assistance payments between Program participants and a comparison group over the evaluation period and relied on a difference-in-differences approach. These cost savings serve as non-energy benefit inputs to calculate cost-effectiveness for the Program.

In addition to the external payment data described in the Data Sources section (Section 3), additional data used in the analysis came from the Program tracking data. We merged the cost recovery date, which allowed us to determine the pre- and post-participation periods based on when the client received the energy efficient measures. With this data, we calculated the difference in external payments made to participants and the comparison group during pre- and post-periods of participation. The pre-period is the time for which we have data before the cost recovery date and the post-period is the time for which we have data after the cost recovery date. For the comparison group, we estimated the average participation for all participants and used it for every household in the comparison group.

Opinion Dynamics first reviewed the participant and comparison group external payment data provided by Rocky Mountain Power. We removed participant and comparison group customers who did not have external payment data available in the data provided. After applying the screening criterion, we were left with 76 participants and 13 comparison group clients out of the original counts of 134 participants and 23 comparison group clients for the payment analysis.

Table 19 presents the annual change in assistance payments annually and overall for the evaluation period. Assistance payments decreased by an average of 14% for Program participants while it increased by over 140% for the comparison group. A net reduction in external payments of $38.47 is the net benefit of the Program.

Table 19. Payment Assistance Amounts Summary for Participants and Comparison Group

| Year | Participant Group | | | | Comparison Group | | | | Net Difference |
|---|---|---|---|---|---|---|---|---|---|
| | Pre | Post | Change | %Change | Pre | Post | Change | %Change | |
| 2018 | $57.63 | $23.55 | $(34.07) | -59% | $14.81 | $41.51 | $26.70 | 180% | $60.77 |
| 2019 | $33.42 | $43.55 | $10.13 | 30% | $24.93 | $51.23 | $26.30 | 105% | $16.17 |
| **Total** | **$ 45.52** | **$ 33.55** | **$(11.97)** | **-14%** | **$ 19.87** | **$46.37** | **$26.50** | **143%** | **$38.47** |

This means that without the Program intervention, customers who participated in Low Income Weatherization Program would have required an average of $38.47 more in external payment assistance.

# 7. Cost-Effectiveness

AEG estimated the cost-effectiveness of PacifiCorp's evaluated savings for the Low Income Weatherization program in the state of Idaho based on Program Year (PY) 2018 and 2019 costs and savings provided by PacifiCorp. The program does not pass any of the cost effectiveness tests with or without Non-Energy Benefits (NEBs).

The following assumptions were utilized in the analysis:

- Avoided Costs: Hourly values provided by PacifiCorp based on the 2017 Integrated Resource Plan (IRP) Preferred Portfolio, converted into annual values using Idaho load shapes from the same IRP.
- Modeling Inputs: evaluated measure savings, costs, measure lives, incentive levels, and portfolio costs were based on estimates provided by PacifiCorp.
- Other Economic Assumptions: Discount rate, line loss, retail rate, and inflation rate values were provided by PacifiCorp and are presented in the table below.

Tables below summarize cost-effectiveness assumptions for the Low Income Weatherization program. All costs and impacts are presented at the program level.

Table 20: Cost-Effectiveness Analysis Inputs

| Parameter | Value |
|---|---|
| Discount Rate | 6.57% |
| Residential Line Loss | 11.47% |
| Residential Energy Rate ($/kWh) | $0.1006 |
| Inflation Rate[1] | 2.20% |

Table 21: Low Income Weatherization Annual Program Costs, Nominal – PY2018-2019[10]

| Program Year | Program Delivery | Utility Admin | Program Development | Incentives | Total Utility Budget | Gross Customer Costs |
|---|---|---|---|---|---|---|
| Low Income Weatherization | $20,414 | $22,030 | $12,307 | $542,686 | $597,436 | $0 |
| Total Program | $20,414 | $22,030 | $12,307 | $542,686 | $597,436 | $0 |

Tables below present the savings and cost-effectiveness results at the program level.

Table 22: 2018-2019 Low Income Weatherization kWh Savings by Program

| Program Year | Gross kWh Savings at Site | Realization Rate | Adjusted Gross kWh Savings at Site | Net to Gross Ratio | Net kWh Savings at Site | Measure Life |
|---|---|---|---|---|---|---|
| Low Income Weatherization | 181,988 | 75% | 136,967 | 100% | 136,967 | 24 |
| Total Program | 181,988 | 75% | 136,967 | 100% | 136,967 | 24 |

Table 23: 2018-2019 Low Income Weatherization Benefit/Cost Ratios by Program

| Program Year | PTRC | TRC | UCT | RIM | PCT |
|---|---|---|---|---|---|
| Low Income Weatherization with NEBs | 0.75 | 0.72 | 0.23 | 0.17 | n/a |
| Low Income Weatherization | 0.25 | 0.23 | 0.23 | 0.17 | n/a |

Table 24: 2018-2019 Low Income Weatherization Program Cost-Effectiveness Results (without NEBs) - (Load Shape - ID_Single_Family_Cooling)

| Cost-Effectiveness Test | Levelized $/kWh | NPV Costs | NPV Benefits | Net Benefits | Benefit/Cost Ratio |
|---|---|---|---|---|---|
| Total Resource Cost Test (PTRC) + Conservation Adder | $0.30 | $576,373 | $144,328 | ($432,045) | 0.25 |
| Total Resource Cost Test (TRC) No Adder | $0.30 | $576,373 | $131,207 | ($445,166) | 0.23 |
| Utility Cost Test (UCT) | $0.30 | $576,373 | $131,207 | ($445,166) | 0.23 |
| Participant Cost Test (PCT) | | $0 | $734,220 | $734,220 | n/a |
| Rate Impact Test (RIM) | | $787,237 | $131,207 | ($656,030) | 0.17 |
| Lifecycle Revenue Impacts ($/kWh) | | | | | 0.00003 |

Tables below present the NEB impacts for the Low-Income Weatherization program and the cost-effectiveness results including NEBs at the program level.

[10] To align with annual budget expectations, cost-effectiveness inputs are presented in nominal dollars.

Table 25: 2018-2019 Low Income Weatherization NEBs

| Non-Energy Benefit | Program Impact | Perspective Adjusted |
|---|---|---|
| Health & Safety Benefit | $78,993 | PTRC, TRC |
| Pymnt Assist & Arrearage | $211,825 | PTRC, TRC |
| **Total** | **$290,818** | |

Table 26: 2018-2019 Low Income Weatherization Program Cost-Effectiveness Results (Including NEBs) - (Load Shape - ID_Single_Family_Cooling)

| Cost-Effectiveness Test | Levelized $/kWh | NPV Costs | NPV Benefits | Net Benefits | Benefit/Cost Ratio |
|---|---|---|---|---|---|
| Total Resource Cost Test (PTRC) + Conservation Adder | $0.30 | $576,373 | $435,146 | ($141,227) | 0.75 |
| Total Resource Cost Test (TRC) No Adder | $0.30 | $576,373 | $414,118 | ($162,255) | 0.72 |
| Utility Cost Test (UCT) | $0.30 | $576,373 | $131,207 | ($445,166) | 0.23 |
| Participant Cost Test (PCT) | | $0 | $734,220 | $734,220 | n/a |
| Rate Impact Test (RIM) | | $787,237 | $131,207 | ($656,030) | 0.17 |
| Lifecycle Revenue Impacts ($/kWh) | | | | | 0.00003 |

AEG estimated the cost-effectiveness of PacifiCorp's evaluated savings for the Low Income Weatherization program in the state of Idaho based on Program Year (PY) 2018 costs and savings provided by PacifiCorp. The program does not pass any of the cost effectiveness tests with or without Non-Energy Benefits (NEBs).

The following assumptions were utilized in the analysis:

- Avoided Costs: Hourly values provided by PacifiCorp based on the 2017 Integrated Resource Plan (IRP) Preferred Portfolio, converted into annual values using Idaho load shapes from the same IRP.
- Modeling Inputs: evaluated measure savings, costs, measure lives, incentive levels, and portfolio costs were based on estimates provided by PacifiCorp.
- Other Economic Assumptions: Discount rate, line loss, retail rate, and inflation rate values were provided by PacifiCorp and are presented in the table below.

Tables below summarize cost-effectiveness assumptions for the Low Income Weatherization program. All costs and impacts are presented at the program level.

Table 27: Cost-Effectiveness Analysis Inputs

| Parameter | Value |
|---|---|
| Discount Rate | 6.57% |
| Residential Line Loss | 11.47% |
| Residential Energy Rate ($/kWh) | $0.1006 |
| Inflation Rate[1] | 2.20% |

Table 28: Low Income Weatherization Annual Program Costs, Nominal - PY2018[11]

| Program Year | Program Delivery | Utility Admin | Program Development | Incentives | Total Utility Budget | Gross Customer Costs |
|---|---|---|---|---|---|---|
| Low Income Weatherization | $9,249 | $11,012 | $6,373 | $229,138 | $255,771 | $0 |
| Total Program | $9,249 | $11,012 | $6,373 | $229,138 | $255,771 | $0 |

Tables below present the savings and cost-effectiveness results at the program level.

Table 29: 2018 Low Income Weatherization kWh Savings by Program

| Program Year | Gross kWh Savings at Site | Realization Rate | Adjusted Gross kWh Savings at Site | Net to Gross Ratio | Net kWh Savings at Site | Measure Life |
|---|---|---|---|---|---|---|
| Low Income Weatherization | 82,868 | 79% | 65,498 | 100% | 65,498 | 25 |
| Total Program | 82,868 | 79% | 65,498 | 100% | 65,498 | 25 |

Table 30: 2018 Low Income Weatherization Benefit/Cost Ratios by Program

| Program Year | PTRC | TRC | UCT | RIM | PCT |
|---|---|---|---|---|---|
| Low Income Weatherization with NEBs | 0.83 | 0.80 | 0.25 | 0.18 | n/a |
| Low Income Weatherization | 0.28 | 0.25 | 0.25 | 0.18 | n/a |

[11] To align with annual budget expectations, cost-effectiveness inputs are presented in nominal dollars.

Table 31: 2018 Low Income Weatherization Program Cost-Effectiveness Results (without NEBs) - (Load Shape - ID_Single_Family_Cooling)

| Cost-Effectiveness Test | Levelized $/kWh | NPV Costs | NPV Benefits | Net Benefits | Benefit/Cost Ratio |
|---|---|---|---|---|---|
| Total Resource Cost Test (PTRC) + Conservation Adder | $0.27 | $255,771 | $70,755 | ($185,016) | 0.28 |
| Total Resource Cost Test (TRC) No Adder | $0.27 | $255,771 | $64,322 | ($191,449) | 0.25 |
| Utility Cost Test (UCT) | $0.27 | $255,771 | $64,322 | ($191,449) | 0.25 |
| Participant Cost Test (PCT) | | $0 | $333,411 | $333,411 | n/a |
| Rate Impact Test (RIM) | | $360,045 | $64,322 | ($295,722) | 0.18 |
| Lifecycle Revenue Impacts ($/kWh) | | | | | 0.00001 |

Tables below present the NEB impacts for the Low-Income Weatherization program and the cost-effectiveness results including NEBs at the program level.

Table 32: 2018 Low Income Weatherization NEBs

| Non-Energy Benefit | Program Impact | Perspective Adjusted |
|---|---|---|
| Health & Safety Benefit | $39,518 | PTRC, TRC |
| Pymnt Assist & Arrearage | $101,937 | PTRC, TRC |
| **Total** | **$141,456** | |

Table 33: 2018 Low Income Weatherization Program Cost-Effectiveness Results (Including NEBs) - (Load Shape - ID_Single_Family_Cooling)

| Cost-Effectiveness Test | Levelized $/kWh | NPV Costs | NPV Benefits | Net Benefits | Benefit/Cost Ratio |
|---|---|---|---|---|---|
| Total Resource Cost Test (PTRC) + Conservation Adder | $0.27 | $255,771 | $212,210 | ($43,561) | 0.83 |
| Total Resource Cost Test (TRC) No Adder | $0.27 | $255,771 | $205,778 | ($49,993) | 0.80 |
| Utility Cost Test (UCT) | $0.27 | $255,771 | $64,322 | ($191,449) | 0.25 |
| Participant Cost Test (PCT) | | $0 | $333,411 | $333,411 | n/a |
| Rate Impact Test (RIM) | | $360,045 | $64,322 | ($295,722) | 0.18 |
| Lifecycle Revenue Impacts ($/kWh) | | | | | 0.00001 |

AEG estimated the cost-effectiveness of PacifiCorp's evaluated savings for the Low Income Weatherization program in the state of Idaho based on Program Year (PY) 2019 costs and savings provided by PacifiCorp. The program does not pass any of the cost effectiveness tests with or without Non-Energy Benefits (NEBs).

The following assumptions were utilized in the analysis:

- Avoided Costs: Hourly values provided by PacifiCorp based on the 2017 Integrated Resource Plan (IRP) Preferred Portfolio, converted into annual values using Idaho load shapes from the same IRP.
- Modeling Inputs: evaluated measure savings, costs, measure lives, incentive levels, and portfolio costs were based on estimates provided by PacifiCorp.
- Other Economic Assumptions: Discount rate, line loss, retail rate, and inflation rate values were provided by PacifiCorp and are presented in the table below.

Tables below summarize cost-effectiveness assumptions for the Low Income Weatherization program. All costs and impacts are presented at the program level.

Table 34: Cost-Effectiveness Analysis Inputs

| Parameter | Value |
|---|---|
| Discount Rate | 6.57% |
| Residential Line Loss | 11.47% |
| Residential Energy Rate ($/kWh) | $0.0994 |
| Inflation Rate[1] | 2.20% |

Table 35: Low Income Weatherization Annual Program Costs, Nominal - PY2019[12]

| Program Year | Program Delivery | Utility Admin | Program Development | Incentives | Total Utility Budget | Gross Customer Costs |
|---|---|---|---|---|---|---|
| Low Income Weatherization | $11,165 | $11,018 | $5,934 | $313,548 | $341,665 | $0 |
| Total Program | $11,165 | $11,018 | $5,934 | $313,548 | $341,665 | $0 |

Tables below present the savings and cost-effectiveness results at the program level.

Table 36: 2019 Low Income Weatherization kWh Savings by Program

| Program Year | Gross kWh Savings at Site | Realization Rate | Adjusted Gross kWh Savings at Site | Net to Gross Ratio | Net kWh Savings at Site | Measure Life |
|---|---|---|---|---|---|---|
| Low Income Weatherization | 99,120 | 72% | 71,469 | 100% | 71,469 | 23 |
| Total Program | 99,120 | 72% | 71,469 | 100% | 71,469 | 23 |

Table 37: 2019 Low Income Weatherization Benefit/Cost Ratios by Program

| Program Year | PTRC | TRC | UCT | RIM | PCT |
|---|---|---|---|---|---|
| Low Income Weatherization with NEBs | 0.67 | 0.65 | 0.21 | 0.16 | n/a |

[12] To align with annual budget expectations, cost-effectiveness inputs are presented in nominal dollars.

| Program Year | PTRC | TRC | UCT | RIM | PCT |
|---|---|---|---|---|---|
| Low Income Weatherization | 0.23 | 0.21 | 0.21 | 0.16 | n/a |

Table 38: 2019 Low Income Weatherization Program Cost-Effectiveness Results (without NEBs) - (Load Shape - ID_Single_Family_Cooling)

| Cost-Effectiveness Test | Levelized $/kWh | NPV Costs | NPV Benefits | Net Benefits | Benefit/Cost Ratio |
|---|---|---|---|---|---|
| Total Resource Cost Test (PTRC) + Conservation Adder | $0.34 | $341,665 | $78,407 | ($263,259) | 0.23 |
| Total Resource Cost Test (TRC) No Adder | $0.34 | $341,665 | $71,279 | ($270,386) | 0.21 |
| Utility Cost Test (UCT) | $0.34 | $341,665 | $71,279 | ($270,386) | 0.21 |
| Participant Cost Test (PCT) | | $0 | $423,371 | $423,371 | n/a |
| Rate Impact Test (RIM) | | $451,488 | $71,279 | ($380,209) | 0.16 |
| Lifecycle Revenue Impacts ($/kWh) | | | | | 0.00001 |

Tables below present the NEB impacts for the Low-Income Weatherization program and the cost-effectiveness results including NEBs at the program level.

Table 39: 2019 Low Income Weatherization NEBs

| Non-Energy Benefit | Program Impact | Perspective Adjusted |
|---|---|---|
| Health & Safety Benefit | $39,475 | PTRC, TRC |
| Pymnt Assist & Arrearage | $109,888 | PTRC, TRC |
| **Total** | **$149,363** | |

Table 40: 2019 Low Income Weatherization Program Cost-Effectiveness Results (Including NEBs) - (Load Shape - ID_Single_Family_Cooling)

| Cost-Effectiveness Test | Levelized $/kWh | NPV Costs | NPV Benefits | Net Benefits | Benefit/Cost Ratio |
|---|---|---|---|---|---|
| Total Resource Cost Test (PTRC) + Conservation Adder | $0.34 | $341,665 | $227,770 | ($113,896) | 0.67 |
| Total Resource Cost Test (TRC) No Adder | $0.34 | $341,665 | $220,642 | ($121,024) | 0.65 |
| Utility Cost Test (UCT) | $0.34 | $341,665 | $71,279 | ($270,386) | 0.21 |
| Participant Cost Test (PCT) | | $0 | $423,371 | $423,371 | n/a |
| Rate Impact Test (RIM) | | $451,488 | $71,279 | ($380,209) | 0.16 |
| Lifecycle Revenue Impacts ($/kWh) | | | | | 0.00001 |

# 8. Conclusions and Recommendations

Rocky Mountain Power is adhering to best practices by delivering the Program through community-based agencies. SEICAA and EICAP have served as Program implementers on behalf of Rocky Mountain Power in 2018 and 2019. It is a common practice for utilities to work with community action agencies to bring their energy efficiency programs to low income households since these organizations generally have well-established relationships with them already. Additionally, these agencies are knowledgeable about using funding from utilities in combination with government funding to expand the reach of programs. SEICAA and EICAP both demonstrated their understanding of program processes, requirements, and funding mechanisms. Leveraging these type of agencies is a best practice in low income weatherization programs. **We recommend that Rocky Mountain Power continue to use the same Program implementers moving forward.**

Participants continue to be highly satisfied with the Program, the application process, and agency staff. The Program is giving energy conservation education that allows it to go beyond measure savings with behavior savings as well. Most participants recall this education, find it extremely helpful, and many took some of the recommended actions. While satisfaction is high, some participants noted areas of improvement which largely focused on reducing the wait-times for the Program and expanding Program services to include more structural improvements such as roof replacement and mold remediation. **We recommend that Rocky Mountain Power consider proactive ways to access the new infrastructure funding and layer those funds onto existing funding.**

Long waitlists to receive weatherization services continue to be an issue for this Program. Sixty-three percent of survey respondents said they waited more than three months for services after applying. **We recommend that Rocky Mountain Power discuss the drivers behind the long wait-time for services with each agency and determine whether the utility can help overcome any of them.**

Based on the consumption analysis, the net energy savings (1,023 kWh per participant) translate to 7% in annual electric savings per participant. The savings will likely be persistent for many years as most participants are homeowners (88%) and the measures installed have long effective useful lives. In addition, the Program is inducing non-energy benefits as well, including reducing bills, reducing the need for external payments, and increasing the comfort, safety and aesthetics of the home.

## For more information, please contact:


### Megan Campbell
### Senior Vice President

(858) 270-5010 tel
mcampbell@opiniondynamics.com




**Boston** | Headquarters
617 492 1400 tel
617 492 7944 fax
800 966 1254 toll free

1000 Winter Street
Waltham, MA 02451

**San Francisco Bay**
510 444 5050 tel
510 444 5222 fax

1 Kaiser Plaza
Suite 445
Oakland, CA 94612

**San Diego**
858 270 5010 tel
858 270 5211 fax

1200 Prospect Street
Suite #G-100
La Jolla, CA 92037

**Portland**
503 287 9136 tel
503-281-7375 fax

1500 NE Irving Street
Suite #370
Portland, OR 97232