



## 2021 IDAHO Energy Efficiency and Peak Reduction Annual Report

*Issued April 29, 2022*

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[pacificorp.com/environment/demand-side-management](https://www.pacificorp.com/environment/demand-side-management)

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## EXECUTIVE SUMMARY

Rocky Mountain Power is a multi-jurisdictional electric utility providing retail service to customers in Utah, Idaho, and Wyoming. Rocky Mountain Power, a division of PacifiCorp, serves approximately 85,619 customers in southeastern Idaho. Rocky Mountain Power acquires energy efficiency and peak reduction resources as cost-effective alternatives to the acquisition of supply-side resources.

PacifiCorp develops an integrated resource plan (IRP)<sup>1</sup> as a means of balancing cost, risk, uncertainty, supply reliability/deliverability and long-run public policy goals. The IRP presents a framework of future actions to ensure that Rocky Mountain Power continues to provide reliable, reasonably priced service to customers. Energy Efficiency and peak management opportunities are incorporated into the IRP based on their availability, characteristics, and costs.<sup>2</sup>

Rocky Mountain Power employs external implementers to administer its energy efficiency programs.<sup>3</sup> Evaluations for each program are performed by independent external evaluators to validate energy and demand savings derived from Rocky Mountain Power's energy efficiency programs.<sup>4</sup>

Rocky Mountain Power utilizes earned media, customer communications, education, and outreach advertising as well as program specific marketing to communicate the value of energy efficiency, provide information regarding low-cost, no-cost energy efficiency measures and to educate customers on the availability of programs, services, and incentives.<sup>5</sup>

This report provides details on program results, activities, and expenditures of the Customer Efficiency Tariff Rider ("Schedule 191") as of the reporting period from January 1, 2021, through December 31, 2021. Rocky Mountain Power on behalf of its customers, invested \$4.6 million in energy efficiency resource acquisitions during the reporting period. The investment yielded approximately 18.7 megawatt hours ("MWh") at generator in first-year energy savings, and approximately 3.7 megawatts ("MW") of capacity reduction from energy efficiency. Net benefits

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<sup>1</sup> Information on PacifiCorp's IRP can be found at <https://www.pacificorp.com/energy/integrated-resource-plan.html>.

<sup>2</sup> Information on PacifiCorp's planning process can be found at <https://www.pacificorp.com/environment/demand-side-management.html> under the "Rocky Mountain Power planning" section.

<sup>3</sup> Information on program administration can be found at <https://www.pacificorp.com/environment/demand-side-management.html> under the "Program administration" section.

<sup>4</sup> Information on program evaluations can be found at <https://www.pacificorp.com/environment/demand-side-management.html> under the "Reports and program evaluations by state" section.

<sup>5</sup> Information on communications and outreach can be found at <https://www.pacificorp.com/environment/demand-side-management.html> under the "Communications and outreach" section.

based on the projected value of the energy savings over the life of the individual measures is estimated at \$1,048 million.<sup>6</sup>

The energy efficiency portfolio was cost effective based on the Utility Cost Test (UCT), which is the primary cost benefit test observed in Idaho. Cost-effectiveness results are provided in Table 9 and Appendix A.

In 2021, Rocky Mountain Power's DSM portfolio included the following programs:

- **Energy Efficiency Programs:**
  - Wattsmart Homes
  - Home Energy Reports
  - Low Income Weatherization
  - Wattsmart Business
- **Peak Reduction Program:**
  - Irrigation Load Control

Pursuant to Commission Order No. 32196, the Idaho Irrigation Load Control Program is treated as a system power supply with expenses flowing through base rates in lieu of the Schedule 191 DSM tariff rider. Notwithstanding, information on the Irrigation Load Control Program is provided in this report.

## REGULATORY ACTIVITIES

During the 2021 reporting period, the Company filed compliance and/or informational reports, updates, notices, and requests with the Commission in support of Company DSM programs. The following is a list of those activities:

- On January 29, 2021, the Company circulated the DSM balancing account report for the fourth quarter of 2020.
- On April 20, 2021, pursuant to Order No. 29976, the Company submitted its 2020 Idaho Energy Efficiency and Peak Reduction Annual Report in Case No. PAC-E-05-10.
- On May 5, 2021, the Company circulated the DSM balancing account report for the first quarter of 2021.
- On May 7, 2021, consistent with the flexible tariff process, a notice of changes to the Wattsmart Homes program was posted on the program website,<sup>7</sup> 45 days prior to going into effect June 21, 2021. Program changes included adjusted incentive levels and eligibility criteria for various measure categories.

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<sup>6</sup> See cost effectiveness Appendix A.

<sup>7</sup> <https://www.rockymountainpower.net/savings-energy-choices/home.html>

- On July 15, 2021, the Company applied for approval of a new battery demand response program in Case No. PAC-E-21-16. The Commission approved the Company’s application in Order No. 35370 issued April 14, 2022.
- On August 2, 2021, the Company circulated the DSM balancing account report for the second quarter of 2021.
- On September 14, 2021, consistent with the flexible tariff process, a notice of changes to the Wattsmart Business program was posted on the program website,<sup>8</sup> 45 days prior to going into effect November 1, 2021. Program changes included adjusted incentive levels and eligibility criteria for various measure categories.
- On November 4, the Company circulated the DSM balancing account report for the third quarter of 2021.
- On November 17, 2020, consistent with the 45-day notice process for maximum “up to” incentives, a notice of change to the Wattsmart Business program was posted on the program website,<sup>9</sup> 45 days prior to going into effect January 1, 2021. Program changes included the discontinuation of Light Emitting Diode (LED) lamps due to market adoption.
- On December 20, 2021, the Company circulated its 2021 communications plan with Idaho Commission Staff.

## MEETINGS WITH COMMISSION STAFF

The Company consulted with Idaho Public Utilities Commission Staff throughout 2021, with formal presentations on the following matters:

### June 9, 2021

- Discussed the Company’s 2020 Idaho Energy Efficiency and Peak Reduction Annual Report and Irrigation Load Control Tracking Metrics.
- Reviewed the 2021 Year-to-Date Status and forecast.
- Reviewed the status of the Schedule 191 balancing account.
- Provided updates on the Wattsmart Homes and Wattsmart Business programs; and
- Discussed the concept of a new battery demand response program.

### December 14, 2021

- Discussed the 2021 Integrated Resource Plan selections.
- Discussed the Year-to-Date Status of 2021.
- Reviewed the 2022 forecast.
- Reviewed the status of the Schedule 191 balancing account: and
- Reviewed the program evaluation dashboard.

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<sup>8</sup> <https://www.rockymountainpower.net/savings-energy-choices/business.html>

<sup>9</sup> <https://www.rockymountainpower.net/savings-energy-choices/home.html>

## PORTFOLIO OF PROGRAMS

### ENERGY EFFICIENCY PROGRAMS

#### WATTSMART HOMES

##### *Program Description*

The Wattsmart Homes program is designed to provide access to incentives for using more efficient products and services installed or received by residential customers in the following housing types:

- New Construction Homes
- Single Family Existing Homes
- Multi-family Housing Units
- Manufactured Homes

The program applies to residential customers under Electrical Service Schedules 1 or 36. Landlords who own rental property where the tenant is billed under Electric Service Schedules 1 or 36 also qualify.

The Wattsmart Homes program did not pass the UCT cost tests with a benefit cost ratio of 0.99 for 2021.

##### *Program Performance and Major Achievements in 2021*

- The Wattsmart Homes program generated 880,621 kWh savings at the site.
- Disbursed \$90 thousand in incentives.
- The program added measures for dual fuel heat pumps, ductless heat pump conversions, and variable capacity heat pumps for existing homes.
- The program updated the offerings for new single family, multi-family, and manufactured homes to include Energy Star certification, Northwest Energy Efficient Manufactured homes (NEEM), Home Energy Rating System (HERS), and dual fuel heat pumps as a standalone offering.
- The program also discontinued offering incentives for LED (Light Emitting Diodes) bulbs and fixtures due to market transformation and adoption of LED technology.

Additional information on the program administration can be found on the Company's website under the Program administration section:

<https://www.pacificorp.com/environment/demand-side-management.html>

Direct Link to Wattsmart Homes program administration:

<https://www.pacificorp.com/content/dam/pcorp/documents/en/pacificorp/environment/dsm/idaho/Idaho Program Administration Wattsmart Homes.pdf>

## HOME ENERGY REPORTS PROGRAM

### *Program Description*

The Home Energy Reports program is a behavioral program designed to decrease participant energy usage by providing comparative energy usage data for similar homes located in the same geographical area. Additionally, the report provides the participants with tips to decrease their energy usage.

The Home Energy Reports program passed the UCT with a cost benefit ratio of 10.40 for 2021.

### *Program Performance and Major Achievements in 2021*

- Total savings for 2021 in MWh was 4,239, which equates to 4,238,790 in kWh savings.
- In 2020 reports were initially provided to approximately 18,000, which was expanded to 41,000 customers in July 2020.
- Enhancements to reports were made during 2021.
  - More individual recommendations to save energy
  - Greater insights on how customers are using energy by appliance type
  - Home characteristics included in report with easy access to update home profile
  - Monthly usage history included in reports
- Online portal was improved to provide greater insights for all residential customers.
- In 2021, only 0.24% of customers (91 customers) have requested to be removed from the program.

Additional information on the program administration can be found on the Company's website under the Program administration section:

<https://www.pacificorp.com/environment/demand-side-management.html>

Direct Link to Home Energy Reports program administration:

[https://www.pacificorp.com/content/dam/pcorp/documents/en/pacificorp/environment/dsm/idaho/Idaho\\_Program\\_Administration\\_Home\\_Energy\\_Reports.pdf](https://www.pacificorp.com/content/dam/pcorp/documents/en/pacificorp/environment/dsm/idaho/Idaho_Program_Administration_Home_Energy_Reports.pdf)

## LOW INCOME WEATHERIZATION

### *Program Description*

The Low-Income Weatherization program provides energy efficiency services through a partnership between the Company and local non-profit agencies to residential customers who meet the income-eligible guidelines. Services are provided at no cost to the program participants.

The Company contracts with Eastern Idaho Community Action Partnership, Inc. (“EICAP”) and Southeastern Idaho Community Action Agency (“SEICAA”) to provide services. The two agencies receive federal funds allocated to and administered by the Idaho Department of Health and Welfare (“IDHW”). Energy efficiency measures are installed in the homes of income eligible households throughout the Company’s service territory by EICAP and SEICAA. The Company is required to fund 85 percent of the cost of approved measures, pursuant to Commission Order No. 32151. Under Advice No. 19-01 filed with Idaho Public Utilities Commission on January 16, 2019, Commission approved reimbursement of up to 100% of related installed costs of ductless heat pumps, effective March 6, 2019. Agencies cover remaining costs with the funding received by IDHW.

The Low-Income Weatherization program passed the PTRC with a cost benefit ratio of 4.31 for 2021. Under direction of Case No. GNR-E12-01, Low Income Weatherization program uses the 10 percent conservation adder to the total resource cost test as its primary cost test.

### *Program Performance and Major Achievements in 2021*

- In 2021, the program achieved savings at site of 35,325
- Number of homes served 27

### *Low Income Energy Conservation Education*

Commission Order No. 32788 authorized the Company to fund the Low-Income Energy Conservation Education with \$25,000 annually. These education services are provided by EICAP and SEICAA and target participants who receive Low Income Home Energy Assistance Program (“LIHEAP”) funds. EICAP received \$16,000 program year (“PY”) 2021 funding by the beginning of their 2021/2022 LIHEAP program year. SEICAA received \$9,000 at the beginning of their 2021/2022 LIHEAP program year. SEICAA did not purchase kits as they had inventory of kits purchased with PY 2020 funds to distribute which due to COVID-19 restrictions in operations, weren’t disbursed during the PY 2020 program year. Due to COVID-19 pandemic, agencies faced challenges in their effort to distribute/deliver conservation kits to low-income customers and increased use of funds to ship kits to program clients. Most kits were distributed by mail due to limited contact with participants. While the conservation education activities do result in energy savings, the savings are not considered when calculating the performance results of the Low-Income Weatherization program, other energy efficiency programs or portfolios results.



The agencies provided a conservation education curriculum to households and reported the following activities and program specifics for 2021 in Table 1 below.

**Table 1  
2021 Conservation Education Activities**

	EICAP	SEICAA
<b>Annual Funds</b>	\$ 16,000.00	\$ 9,000.00
<b>Expenditures</b>	\$ 12,971.66	\$ -
<b>Balance as of 12/31/21</b>	\$ 35,868.75	\$ 18,000.00
<b>Households Served</b>	277	65

**Distribution**

EICAP purchased 500 kits using PY 2021 funds. The new kits include two 9W LED bulbs, a window insulation kit, a vinyl foam weatherstrip, two bimetal refrigerator/freezer thermometers, a power strip plus surge protector, ten foam electrical outlet sealing gaskets, and an energy saving wheel (information card). Due to COVID-19, EICAP continued distribution of their PY 2020 kits by mail as they did not interact with clients. As of December 31, 2021, EICAP has 500 kits purchased in 2021 in their inventory.

EICAP’s program objective was to educate Rocky Mountain Power customers on how to conserve energy through useful tips and tools to help them save year-round. They served Rocky Mountain Power households that received energy assistance and/or requested energy conservation education.

SEICAA did not purchase kits in 2021 and intends to utilize PY 2021 funds combined with the PY 2022 funding to purchase new kits as well as reserve some of the fund’s shipping and administrative costs associated with modified operations under COVID-19 restrictions.

Table 2 below provides information regarding the education offered by the agencies.

**Table 2  
Additional Information on Conservation Education by Agencies**

	EICAP	SEICAA
<b>Program Design</b>	Educate Rocky Mountain Power customers about how to conserve energy.	Reduce electricity usage and monthly bills for participants of the LIHEAP program.
<b>Target Audience</b>	Rocky Mountain Power customers who receive Low Income Home Energy Assistance Heat (LIHEAP) Heat and Crisis .	LIHEAP recipients who have not received weatherization program services as a priority. Households can also be identified through SEICAA's other programs.

	EICAP	SEICAA
<b>How Company Funds Were Used</b>	Funds used to purchase energy efficiency kits in August 2021 and for shipping of kits.	Plan to utilize portion of funds for shipping cost and will use remaining to purchase kits in CY 2022.

Additional information on the program administration can be found on the Company’s website under the Program administration section:

<https://www.pacificorp.com/environment/demand-side-management.html>

Direct Link to Low Income Weatherization program administration:

<https://www.pacificorp.com/content/dam/pcorp/documents/en/pacificorp/environment/dsm/idaho/Idaho Program Administration Low Income.pdf>

## WATTSMART BUSINESS PROGRAM

### WATTSMART BUSINESS

#### *Program Description*

The commercial, industrial, and agricultural energy efficiency program portfolio is offered through a single Non-Residential Energy Efficiency program called Wattsmart Business.

Wattsmart Business is designed to influence new and existing non-residential customers to increase the efficiency of electric energy usage both through the installation of efficient equipment as well as adoption of improved energy management protocols. Qualifying measures include those which produce verifiable electric energy efficiency improvements compared to an established baseline.

Wattsmart Business offerings include:

- Typical Upgrades
- Midstream/Instant incentives
- Custom Analysis
- Energy Management
- Energy Project Manager Co-funding

The Wattsmart Business program passed the UCT with a cost benefit analysis of 1.85.

## ***Program Performance and Major Achievements in 2021***

- In 2021, the program achieved gross energy savings at site of 11,863,445 kWh.
- Distributed incentives of \$1,497,466.
- To foster continued growth and utilization of the Wattsmart Business Vendor Network (WBVN) and to increase customer satisfaction, the Company continued to employ full-time Idaho-based lighting staff member. This staff member provides an outreach and support role to both vendors and customers interested in lighting incentives.
- In 2021, participating WBVN vendors continued receiving quarterly vendor performance scorecards to provide timely feedback and encourage vendors to strive to reach “Premium” status, which entitles qualifying vendors to improved visibility and enhanced co-branding with Rocky Mountain Power. In 2021, two more Wattsmart Business Vendors achieved premium status, bringing the total number to three.

Additional information on the program administration can be found on the Company’s website under the Program administration section:

<https://www.pacificorp.com/environment/demand-side-management.html>

Direct Link to Wattsmart Business program administration:

[https://www.pacificorp.com/content/dam/pcorp/documents/en/pacificorp/environment/dsm/idaho/Idaho\\_Program\\_Administration\\_NonResidential.pdf](https://www.pacificorp.com/content/dam/pcorp/documents/en/pacificorp/environment/dsm/idaho/Idaho_Program_Administration_NonResidential.pdf)

## **PEAK REDUCTION PROGRAMS**

### **IRRIGATION LOAD CONTROL**

#### ***Program Description***

The irrigation load control program is offered to irrigation customers receiving electric service on Schedule 10, Irrigation and Soil Drainage Pumping Power Service. Participants enroll in the program with a third-party administrator and allow the curtailment of their electricity usage in exchange for an incentive. Customer incentives are based on the site’s average available load during load control program hours, adjusted by opt outs or non-participation.

For most participants, their irrigation pumps are set up with a dispatchable two-way control system giving Rocky Mountain Power control over their loads. Participants are notified four hours ahead of control events and have the choice to opt-out of a limited number of dispatch events per season.

The Irrigation Load control program passed the UCT cost test for 2021.

### ***Program Performance and Major Achievements in 2021***

- There were 7 load control events initiated in 2021. All events were mandatory.
- The available load from the Irrigation Program can be utilized as reserves which provides value to the program and benefits the customer.
- The real-time Irrigation pilot continued during the 2021 season to test equipment requirements, system responsiveness, and impact on irrigators.
- Customers were given a 20% incentive bonus for participation in general.
- Total customers participating in the program are 167, participation sites 1,204.
- Total enrolled MW (Gross -at Gen) in 2021 is 193, maximum realized MW (at Gen) is 155.

Additional information on the program administration can be found on the Company's website under the Program administration section:

<https://www.pacificorp.com/environment/demand-side-management.html>

Direct Link to Irrigation Load Control program administration:

[https://www.pacificorp.com/content/dam/pcorp/documents/en/pacificorp/environment/dsm/idaho/Idaho\\_Program\\_Administration\\_Irrigation\\_Load\\_Control.pdf](https://www.pacificorp.com/content/dam/pcorp/documents/en/pacificorp/environment/dsm/idaho/Idaho_Program_Administration_Irrigation_Load_Control.pdf)

## EXPENDITURES

### TOTAL ENERGY EFFICIENCY PORTFOLIO SAVINGS AND EXPENDITURES

**Table 3**  
**Program Results for January 1, 2021– December 31, 2021<sup>10</sup>**

Energy Efficiency Programs	kWh/Yr. Savings (at site)	kWh/Yr. Savings (at gen)	Program Expenditures
Low Income Weatherization	35,325	38,526	\$ 155,472
Home Energy Reporting	4,238,790	4,622,867	\$ 90,087
Wattsmart Homes	880,308	960,073	\$ 489,854
<b>Total Residential</b>	<b>5,154,423</b>	<b>5,621,465</b>	<b>\$ 735,412</b>
<b>Total Wattsmart Business</b>	<b>11,863,445</b>	<b>13,070,972</b>	<b>\$ 3,392,844</b>
<b>Total Energy Efficiency</b>	<b>17,017,868</b>	<b>18,692,437</b>	<b>\$ 4,128,258</b>
<b>Other Portfolio Expenditures</b>			
	Commercial & Industrial Evaluation Costs		\$ 157,237
	Residential Evaluation Costs		\$ 70,187
	Outreach & Communications		\$ 172,894
	Potential Study		\$ 5,611
	System Support		\$ 50,607
	<b>Total Other Portfolio Expenditures</b>		<b>\$ 456,356</b>
<b>Total Idaho Energy Efficiency Portfolio Expenditures</b>			<b>\$ 4,584,793</b>

## GROSS SAVINGS BY MEASURE CATEGORY

**Table 4**  
**2021 Annual Savings by Wattsmart Homes**

Measure Category	Total kWh (at Site)	Total Incentive	Total Measure Quantity
Appliances	2,609	\$ 1,150	29
Building Shell	16,466	\$ 8,003	13,517
Electronics	68	\$ 20	2
Energy Kits	60,397	\$ 2,168	328
HVAC	193,067	\$ 35,424	339
Lighting	545,333	\$ 24,914	27,747
Water Heating	16,150	\$ 5,800	10
Whole Home	20,710	\$ 5,000	5
Whole Building	20,885	\$ 6,800	15
Transportation	4,623	\$ 310	3
<b>Grand Total</b>	<b>880,308</b>	<b>\$ 89,588</b>	

<sup>10</sup> The energy efficiency reported savings are gross, ex-ante. The values at generation include line losses between the customer site and the generation source.

**Table 5**  
**Low Income Homes Served and Measures Installed**

Measure Type	Installed
Air Sealed/Infiltration	22
Insulation	71
Attic Ventilation	15
Lighting CFL/LED	25
Furnace Repair or Replacement	13
Duct Sealing and/or Insulation	13
Ductless Heat Pump	2
Thermal Doors and/or Window Replacement	17
Water Heater Repair	13
<b>Total Number of Homes Served</b>	<b>27</b>
<b>Total kWh Savings @ Site</b>	<b>35,325</b>

**Table 6**  
**Wattsmart Business Savings by Sector**

Sector	Total kWh (at Site)	Total Incentive
Commercial	8,377,602	\$ 1,104,165
Industrial	190,037	\$ 21,175
Irrigation	3,295,806	\$ 372,127
<b>Grand Total</b>	<b>11,863,445</b>	<b>\$ 1,497,466</b>

**Table 7**  
**2021 Annual Net Savings by Wattsmart Business**

Measure Category	Total kWh (at Site)	Total Incentive	Total Projects
Building Shell	19,560	\$ 5,416	6
Compressed Air	15,603	\$ 2,340	1
Energy Management	250,345	\$ 5,007	4
HVAC	534,434	\$ 62,633	15
Irrigation	3,958,599	\$ 462,042	190
Lighting	4,172,213	\$ 511,087	327
Motors	2,671,538	\$ 368,873	8
Refrigeration	241,152	\$ 36,173	3
Energy Project Manager Co-Funding	-	\$ 43,895	1
<b>Grand Total</b>	<b>11,863,445</b>	<b>\$ 1,497,466</b>	<b>555</b>

## LOAD CONTROL EVENTS

**Table 8**  
**Irrigation Load Control Events<sup>11</sup>**

Date	Event	Event Times	Estimated Load Reduction at Gen (MW)
6/14/2021	1	8:00 PM - 9:00 PM MDT	155
6/16/2021	2	8:00 PM - 9:00 PM MDT	145
7/7/2021	3	5:00 PM - 9:00 PM MDT	145
7/12/2021	4	4:00 PM - 8:00 PM MDT	121
7/21/2021	5	5:00 PM - 9:00 PM MDT	125
7/28/2021	6	8:00 PM - 9:00 PM MDT	65
7/29/2021	7	7:00 PM - 9:00 PM MDT	79

**Table 9**  
**Irrigation Load Program Performance**

Total Enrolled MW (Gross – at Gen)	193 MW
Average Realized Load MW (at Gen)	119 MW
Maximum Realized Load MW (at Gen)	155 MW
Participation Customers	167
Participation (Sites)	1,204

## COST EFFECTIVENESS

### TOTAL COST EFFECTIVENESS RESULTS BY PORTFOLIO AND PROGRAM

Program cost effectiveness is performed using a Company specific modeling tool, created by a third-party consultant. The tool is designed to incorporate PacifiCorp data and values such as avoided costs, and generally follows the methodology specified in California’s Standard Practice Manual. The analysis assesses the costs and benefits of DSM resource programs from different stakeholder perspectives, including participants and non-participants, based on four tests described in the Standard Practice Manual (TRC, UCT, PCT and RIM) as well as an additional fifth test, PTRC.

Each of the cost-effectiveness tests for Rocky Mountain Power’s programs is outlined below. The primary cost/benefit test observed in Idaho is the UCT for all programs other than the Low-Income Weatherization program, which uses the PTRC.<sup>12</sup>

<sup>11</sup> (v) = voluntary events

<sup>12</sup> Under direction of Case No. GNR-E-12-01, *Low Income Weatherization* program uses the 10 percent energy conservation adder to the total resource cost test.

- PacifiCorp Total Resource Test (PTRC) is the total resource cost test with an additional 10% added to the net benefit side of the benefit/cost formula to account for non-quantified environmental and non-energy benefits of conservation resources over supply side alternatives.
- Total Resource Cost (TRC) Test considers the benefits and costs from the perspective of all utility customers, comparing the total costs and benefits from both the utility and utility customer perspectives.
- Utility Cost (UCT) Test also called the program administrator cost test, provides a benefit to cost perspective from the utility only. The test compares the total utility cost incurred to the benefit/value of the energy and capacity saved and contains no customer costs or benefits in calculation of the ratio.
- Participant Cost Test (PCT) compares the portion of the resource paid directly by participants to the savings realized by the participants.
- Ratepayer Impact Cost Test (RIM) examines the impact of energy efficiency expenditures on non-participating ratepayers overall. Unlike supply-side investments, energy efficiency programs reduce energy sales. Reduced sales typically lower revenue requirements while putting near-term upward pressure on the rates remaining fixed costs are spread over fewer kilowatt-hours.

**Table 10**  
**2021 Cost-Effectiveness Results by Program<sup>13</sup>**

Program	Benefit/Cost Test <sup>14</sup>				
	PTRC	TRC	UCT	PCT	RIM
Irrigation Load Control Program <sup>15</sup>	Pass	Pass	Pass	Pass	Pass
Energy Efficiency Portfolio (inc. LIW)	1.13	1.03	1.68	2.20	0.47
Energy Efficiency Portfolio (exc. LIW)	1.07	0.97	1.73	2.23	0.48
Non-Residential Energy Efficiency Portfolio	1.20	1.09	1.85	2.65	0.45
Residential Energy Efficiency Portfolio	1.19	1.12	1.99	1.29	0.75
Low Income Weatherization <sup>16</sup>	4.31	4.28	0.23	n/a	0.19
Home Energy Reporting	11.44	10.40	10.40	n/a	1.88
Wattsmart Homes	0.34	0.31	0.99	0.64	0.38
Wattsmart Business	1.20	1.09	1.85	2.65	0.45

Portfolio-level cost effectiveness includes portfolio costs, such as the Potential Assessment and DSM system database. Sector-level cost effectiveness, reported in the Residential and Non-Residential sections of this report, includes sector-specific evaluation, measurement, and verification expenditures.

The Company includes quantifiable non-energy impacts at the portfolio and residential level, as well as the Wattsmart Homes and Low-Income Weatherization program level.

<sup>13</sup> Cost-effectiveness memo detail is provided in Appendix A.

<sup>14</sup> The Low-Income Weatherization and Wattsmart Homes programs include non-energy impacts.

<sup>15</sup> A “Pass” designation equates to a benefit cost ratio of 1.0 or better.

<sup>16</sup> Low-Income Weatherization conservation education funding is excluded from the program level cost-effectiveness testing but is included in the portfolio and residential sector cost-effectiveness.



## APPENDIX

### Appendix A: Cost-effectiveness Results<sup>1</sup>

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<sup>1</sup> Cost-effectiveness results were generated by Applied Energy Group (AEG) using the approved Cost-effectiveness methodologies.



## MEMORANDUM

To: Alesha Pino, PacifiCorp  
From: Andrew Cottrell, Andy Hudson, Dylan Royalty, AEG  
Date: April 25, 2022  
Re: PacifiCorp Idaho Portfolio and Sector Level Cost-Effectiveness Results (including Low-Income) – PY2021

AEG estimated the cost-effectiveness of PacifiCorp's overall energy efficiency portfolio in the state of Idaho based on Program Year (PY) 2021 costs and savings estimates provided by PacifiCorp. This memo provides cost-effectiveness results at the portfolio and sector levels. The portfolio (including NEBs) passes the following cost effectiveness tests: Total Resource Cost Test (TRC), the PacifiCorp Total Resource Cost Test (PTRC), the Utility Cost Test (UCT), and the Participant Cost Test (PCT).

This memo provides analysis inputs and results in the following tables:

- Table 1: Cost-Effectiveness Analysis Inputs
- Table 2: Portfolio Level Costs, Nominal - PY2021
- Table 3: Benefit/Cost Ratios by Portfolio Type
- Table 4: 2021 Total Portfolio Cost-Effectiveness Results (Including NEBs)
- Table 5: 2021 Total Portfolio Cost-Effectiveness Results (Without NEBs)
- Table 6: 2021 C&I Energy Efficiency Sector Cost-Effectiveness Results
- Table 7: 2021 Residential Energy Efficiency Sector Cost-Effectiveness Results (Including NEBs)
- Table 8: 2021 Residential Energy Efficiency Sector Cost-Effectiveness Results (Without NEBs)
- Table 9: 2021 Low Income NEBs
- Table 10: 2021 Home Energy Savings NEBs by Measure

The following assumptions were utilized in the analysis:

- **Avoided Costs:** Hourly values provided by PacifiCorp based on the 2021 Integrated Resource Plan (IRP) Preferred Portfolio, converted into annual values using Idaho load shapes from the same IRP.
- **Modeling Inputs:** 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, energy-to-capacity conversion factor, and inflation rate values were provided by PacifiCorp and are presented in **Error! Reference source not found.** below.

Tables 1 and 2 below summarize cost-effectiveness assumptions for the PacifiCorp Idaho energy efficiency portfolio. All costs and impacts are presented at the portfolio level.

Table 1: Cost-Effectiveness Analysis Inputs

Parameter	PY2021
Discount Rate	6.92%
Residential Line Loss	8.59%
Commercial Line Loss	3.83%
Industrial Line Loss	9.05%
Irrigation Line Loss	9.06%
Residential Energy Rate* (\$/kWh)	\$0.1013
Commercial Energy Rate* (\$/kWh)	\$0.0872
Industrial Energy Rate* (\$/kWh)	\$0.0636
Irrigation Energy Rate* (\$/kWh)	\$0.0907
Inflation Rate	2.28%

Table 2: Portfolio Level Costs, Nominal - PY2021<sup>1</sup>

Portfolio Level Expense	Cost
C&I Evaluation Costs	\$157,237
Residential Evaluation Costs	\$70,187
Low Income Energy Conservation Education	\$0
Outreach & Communications	\$172,894
Potential Study	\$5,611
System Support	\$50,607
<b>Total</b>	<b>\$456,536</b>

Tables 3 through 8 present the cost-effectiveness results at the portfolio and sector levels. Tables 9 and 10 present the NEBs impacts for the low income and HES programs.

Table 3: Benefit/Cost Ratios by Portfolio Type

Cost-Effectiveness Test	PTRC	TRC	UCT	PCT	RIM
Total Portfolio (Including NEBs)	1.13	1.03	1.68	2.30	0.47
Total Portfolio	1.05	0.95	1.68	2.21	0.47
C&I Programs	1.20	1.09	1.85	2.65	0.45
Residential (Including NEBs)	1.19	1.12	1.99	1.29	0.75
Residential	0.84	0.76	1.99	0.92	0.75

<sup>1</sup> To align with annual budget expectations, cost-effectiveness inputs are presented in nominal dollars.



Table 4: 2021 Total Portfolio Cost-Effectiveness Results (Including NEBs)

Cost-Effectiveness Test	Levelized \$/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.0772	\$8,114,961	\$9,155,836	\$1,040,874	1.13
Total Resource Cost Test (TRC) No Adder	\$0.0772	\$8,114,961	\$8,384,328	\$269,367	1.03
Utility Cost Test (UCT)	\$0.0436	\$4,584,793	\$7,723,201	\$3,138,408	1.68
Participant Cost Test (PCT)		\$6,075,307	\$13,984,847	\$7,909,540	2.30
Rate Impact Test (RIM)		\$16,299,980	\$7,723,201	-\$8,576,779	0.47
Lifecycle Revenue Impacts (\$/kWh)					\$0.0004338
Discounted Participant Payback (years)					4.17

Table 5: 2021 Total Portfolio Cost-Effectiveness Results (Without NEBs)

Cost-Effectiveness Test	Levelized \$/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.0772	\$8,114,961	\$8,486,583	\$371,622	1.05
Total Resource Cost Test (TRC) No Adder	\$0.0772	\$8,114,961	\$7,715,076	-\$399,886	0.95
Utility Cost Test (UCT)	\$0.0436	\$4,584,793	\$7,723,201	\$3,138,408	1.68
Participant Cost Test (PCT)		\$6,075,307	\$13,421,261	\$7,345,954	2.21
Rate Impact Test (RIM)		\$16,299,980	\$7,723,201	-\$8,576,779	0.47
Lifecycle Revenue Impacts (\$/kWh)					\$0.0004338
Discounted Participant Payback (years)					4.17

Table 6: 2021 C&I Energy Efficiency Sector Cost-Effectiveness Results

Cost-Effectiveness Test	Levelized \$/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.0614	\$5,754,179	\$6,885,927	\$1,131,747	1.20
Total Resource Cost Test (TRC) No Adder	\$0.0614	\$5,754,179	\$6,259,933	\$505,754	1.09
Utility Cost Test (UCT)	\$0.0362	\$3,392,844	\$6,259,933	\$2,867,089	1.85
Participant Cost Test (PCT)		\$4,523,093	\$11,990,073	\$7,466,979	2.65
Rate Impact Test (RIM)		\$13,885,451	\$6,259,933	-\$7,625,517	0.45
Lifecycle Revenue Impacts (\$/kWh)					\$0.0005692
Discounted Participant Payback (years)					4.81



Table 7: 2021 Residential Energy Efficiency Sector Cost-Effectiveness Results (Including NEBs)

Cost-Effectiveness Test	Levelized \$/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.1829	\$1,904,246	\$2,269,909	\$365,663	1.19
Total Resource Cost Test (TRC) No Adder	\$0.1829	\$1,904,246	\$2,124,395	\$220,149	1.12
Utility Cost Test (UCT)	\$0.0706	\$735,412	\$1,463,268	\$727,855	1.99
Participant Cost Test (PCT)		\$1,552,214	\$1,994,775	\$442,561	1.29
Rate Impact Test (RIM)		\$1,957,993	\$1,463,268	-\$494,725	0.75
Lifecycle Revenue Impacts (\$/kWh)					\$0.0000521
Discounted Participant Payback (years)					3.01

Table 8: 2021 Residential Energy Efficiency Sector Cost-Effectiveness Results (Without NEBs)

Cost-Effectiveness Test	Levelized \$/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.1829	\$1,904,246	\$1,600,657	-\$303,589	0.84
Total Resource Cost Test (TRC) No Adder	\$0.1829	\$1,904,246	\$1,455,142	-\$449,103	0.76
Utility Cost Test (UCT)	\$0.0706	\$735,412	\$1,463,268	\$727,855	1.99
Participant Cost Test (PCT)		\$1,552,214	\$1,431,188	-\$121,026	0.92
Rate Impact Test (RIM)		\$1,957,993	\$1,463,268	-\$494,725	0.75
Lifecycle Revenue Impacts (\$/kWh)					\$0.0000521
Discounted Participant Payback (years)					3.01

Table 9: 2021 Low Income NEBs

Non-Energy Benefit	NPV Program Impact	Perspective Adjusted
Total NEBs	\$630,561	PTRC, TRC

Table 10: 2021 Home Energy Savings NEBs by Measure

Measure Name	Total NEBs (\$/yr)	Quantity	Measure Life	Discount Rate	Total NPV Benefits
Appliances	\$156	29	14.0	6.92%	\$1,341
Energy Kits	\$5,333	328	10.1	6.92%	\$37,350



## MEMORANDUM

To: Alesha Pino, PacifiCorp  
From: Andrew Cottrell, Andy Hudson, Dylan Royalty, AEG  
Date: April 25, 2022  
Re: PacifiCorp Idaho Portfolio and Sector Level Cost-Effectiveness Results (without Low-Income) – PY2021

AEG estimated the cost-effectiveness of PacifiCorp's overall energy efficiency portfolio in the state of Idaho based on Program Year (PY) 2021 costs and savings estimates provided by PacifiCorp. This memo provides cost-effectiveness results at the portfolio and sector levels. The portfolio (including NEBs) passes the following cost effectiveness tests: PacifiCorp Total Resource Cost Test (PTRC), the Utility Cost Test (UCT), and the Participant Cost Test (PCT).

This memo provides analysis inputs and results in the following tables:

- Table 1: Cost-Effectiveness Analysis Inputs
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- Table 6: 2021 C&I Energy Efficiency Sector Cost-Effectiveness Results
- Table 7: 2021 Residential Energy Efficiency Sector Cost-Effectiveness Results (Including NEBs)
- Table 8: 2021 Residential Energy Efficiency Sector Cost-Effectiveness Results (Without NEBs)
- Table 9: 2021 Home Energy Savings NEBs by Measure

The following assumptions were utilized in the analysis:

- **Avoided Costs:** Hourly values provided by PacifiCorp based on the 2021 Integrated Resource Plan (IRP) Preferred Portfolio, converted into annual values using Idaho load shapes from the same IRP.
- **Modeling Inputs:** 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, energy-to-capacity conversion factor, and inflation rate values were provided by PacifiCorp and are presented in **Error! Reference source not found.** below.

Tables 1 and 2 below summarize cost-effectiveness assumptions for the PacifiCorp Idaho energy efficiency portfolio. All costs and impacts are presented at the portfolio level.

Table 1: Cost-Effectiveness Analysis Inputs

Parameter	PY2021
Discount Rate	6.92%
Residential Line Loss	8.59%
Commercial Line Loss	3.83%
Industrial Line Loss	9.05%
Irrigation Line Loss	9.06%
Residential Energy Rate* (\$/kWh)	\$0.1013
Commercial Energy Rate* (\$/kWh)	\$0.0872
Industrial Energy Rate* (\$/kWh)	\$0.0636
Irrigation Energy Rate* (\$/kWh)	\$0.0907
Inflation Rate	2.28%

Table 2: Portfolio Level Costs, Nominal - PY2021<sup>1</sup>

Portfolio Level Expense	Cost
C&I Evaluation Costs	\$157,237
Residential Evaluation Costs	\$70,187
Low Income Energy Conservation Education	\$0
Outreach & Communications	\$172,894
Potential Study	\$5,611
System Support	\$50,607
<b>Total</b>	<b>\$456,536</b>

Tables 3 through 8 present the cost-effectiveness results at the portfolio and sector levels. Table 9 presents the NEBs impacts for the Home Energy Savings program.

Table 3: Benefit/Cost Ratios by Portfolio Type

Cost-Effectiveness Test	PTRC	TRC	UCT	PCT	RIM
Total Portfolio (Including NEBs)	1.07	0.97	1.73	2.24	0.48
Total Portfolio	1.06	0.96	1.73	2.23	0.48
Commercial	1.20	1.09	1.85	2.65	0.45
Residential (Including NEBs)	0.92	0.83	2.45	0.92	0.80

<sup>1</sup> To align with annual budget expectations, cost-effectiveness inputs are presented in nominal dollars.



Residential 0.89 0.81 2.45 0.89 0.80

Table 4: 2021 Total Portfolio Cost-Effectiveness Results (Including NEBs)

Cost-Effectiveness Test	Levelized \$/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.0759	\$7,959,490	\$8,486,495	\$527,005	1.07
Total Resource Cost Test (TRC) No Adder	\$0.0759	\$7,959,490	\$7,718,513	-\$240,977	0.97
Utility Cost Test (UCT)	\$0.0423	\$4,429,321	\$7,679,822	\$3,250,501	1.73
Participant Cost Test (PCT)		\$5,956,288	\$13,313,540	\$7,357,252	2.24
Rate Impact Test (RIM)		\$16,111,352	\$7,679,822	-\$8,431,529	0.48
Lifecycle Revenue Impacts (\$/kWh)					\$0.0004288
Discounted Participant Payback (years)					4.17

Table 5: 2021 Total Portfolio Cost-Effectiveness Results (Without NEBs)

Cost-Effectiveness Test	Levelized \$/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.0759	\$7,959,490	\$8,447,804	\$488,315	1.06
Total Resource Cost Test (TRC) No Adder	\$0.0759	\$7,959,490	\$7,679,822	-\$279,668	0.96
Utility Cost Test (UCT)	\$0.0423	\$4,429,321	\$7,679,822	\$3,250,501	1.73
Participant Cost Test (PCT)		\$5,956,288	\$13,269,085	\$7,312,797	2.23
Rate Impact Test (RIM)		\$16,111,352	\$7,679,822	-\$8,431,529	0.48
Lifecycle Revenue Impacts (\$/kWh)					\$0.0004288
Discounted Participant Payback (years)					4.17

Table 6: 2021 C&I Energy Efficiency Sector Cost-Effectiveness Results

Cost-Effectiveness Test	Levelized \$/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.0614	\$5,754,179	\$6,885,927	\$1,131,747	1.20
Total Resource Cost Test (TRC) No Adder	\$0.0614	\$5,754,179	\$6,259,933	\$505,754	1.09
Utility Cost Test (UCT)	\$0.0362	\$3,392,844	\$6,259,933	\$2,867,089	1.85
Participant Cost Test (PCT)		\$4,523,093	\$11,990,073	\$7,466,979	2.65
Rate Impact Test (RIM)		\$13,885,451	\$6,259,933	-\$7,625,517	0.45
Lifecycle Revenue Impacts (\$/kWh)					\$0.0005692
Discounted Participant Payback (years)					4.81





Table 7: 2021 Residential Energy Efficiency Sector Cost-Effectiveness Results (Including NEBs)

Cost-Effectiveness Test	Levelized \$/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.1728	\$1,748,774	\$1,600,569	-\$148,206	0.92
Total Resource Cost Test (TRC) No Adder	\$0.1728	\$1,748,774	\$1,458,580	-\$290,195	0.83
Utility Cost Test (UCT)	\$0.0573	\$579,941	\$1,419,889	\$839,948	2.45
Participant Cost Test (PCT)		\$1,433,195	\$1,323,467	-\$109,727	0.92
Rate Impact Test (RIM)		\$1,769,365	\$1,419,889	-\$349,476	0.80
Lifecycle Revenue Impacts (\$/kWh)					\$0.0000471
Discounted Participant Payback (years)					2.94

Table 8: 2021 Residential Energy Efficiency Sector Cost-Effectiveness Results (Without NEBs)

Cost-Effectiveness Test	Levelized \$/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.1728	\$1,748,774	\$1,561,878	-\$186,897	0.89
Total Resource Cost Test (TRC) No Adder	\$0.1728	\$1,748,774	\$1,419,889	-\$328,885	0.81
Utility Cost Test (UCT)	\$0.0573	\$579,941	\$1,419,889	\$839,948	2.45
Participant Cost Test (PCT)		\$1,433,195	\$1,279,012	-\$154,182	0.89
Rate Impact Test (RIM)		\$1,769,365	\$1,419,889	-\$349,476	0.80
Lifecycle Revenue Impacts (\$/kWh)					\$0.0000471
Discounted Participant Payback (years)					2.94

Table 9: 2021 Home Energy Savings NEBs by Measure

Measure Name	Total NEBs (\$/yr)	Quantity	Measure Life	Discount Rate	Total NPV Benefits
Appliances	\$156	29	14.0	6.92%	\$1,341
Energy Kits	\$5,333	328	10.1	6.92%	\$37,350



## MEMORANDUM

To: Alesha Pino, PacifiCorp  
From: Andrew Cottrell, Andy Hudson, Dylan Royalty, AEG  
Date: April 25, 2022  
Re: PacifiCorp Idaho Home Energy Savings Cost-Effectiveness Results – PY2021

AEG estimated the cost-effectiveness of PacifiCorp's overall energy efficiency portfolio in the state of Idaho based on Program Year (PY) 2021 costs and savings estimates provided by PacifiCorp. This memo provides cost-effectiveness results for the Home Energy Savings program.

This memo provides analysis inputs and results in the following tables:

Table 1: Cost-Effectiveness Analysis Inputs

Table 2: HES Annual Program Costs, Nominal - PY2021

Table 3: 2021 Home Energy Savings kWh Savings by Measure Category

Table 4: 2021 Benefit/Cost Ratios by Measure Category

Table 5: 2021 HES Program Cost-Effectiveness Results (Without NEBs)

Table 6: 2021 Appliances Cost-Effectiveness Results (Without NEBs) - (Load Shape - Residential\_ERWH\_7P)

Table 7: 2021 Building Shell Cost-Effectiveness Results (Without NEBs) - (Load Shape - ID\_Single Family\_Cooling)

Table 8: 2021 Electronics Cost-Effectiveness Results (Without NEBs) - (Load Shape - ID\_Single Family\_Plug)

Table 9: 2021 Home Energy Kits Cost-Effectiveness Results (Without NEBs) - (Load Shape - Residential\_LIGHTING\_7P)

Table 10: 2021 HVAC Cost-Effectiveness Results (Without NEBs) - (Load Shape - ID\_Single Family\_Cooling)

Table 11: 2021 Lighting Cost-Effectiveness Results (Without NEBs) - (Load Shape - Residential\_LIGHTING\_7P)

Table 12: 2021 Water Heating Cost-Effectiveness Results (Without NEBs) - (Load Shape - Residential\_HPWH\_7P)

Table 13: 2021 Whole Home Cost-Effectiveness Results (Without NEBs) - (Load Shape - ID\_Single Family\_Cooling)



Table 14: 2021 Whole Building Cost-Effectiveness Results (Without NEBs) - (Load Shape - ID\_Single\_Family\_Cooling)

Table 15: 2021 Transportation Cost-Effectiveness Results (Without NEBs) - (Load Shape - ID\_Single\_Family\_Heating)

Table 16: 2021 Home Energy Savings NEBs by Measure

Table 17: 2021 HES Program Cost-Effectiveness Results (Including NEBs)

Table 18: 2021 Appliances Cost-Effectiveness Results (Including NEBs) - (Load Shape - Residential\_ERWH\_7P)

Table 19: 2021 Home Energy Kits Cost-Effectiveness Results (Including NEBs) - (Load Shape - Residential\_LIGHTING\_7P)

The following assumptions were utilized in the analysis:

- **Avoided Costs:** Hourly values provided by PacifiCorp based on the 2021 Integrated Resource Plan (IRP) Preferred Portfolio, converted into annual values using Idaho load shapes from the same IRP.
- **Modeling Inputs:** 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 **Error! Reference source not found.** below.

Tables 1 and 2 below summarize cost-effectiveness assumptions for the Home Energy Savings program. All costs and impacts are presented at the program and measure category level.

Table 1: Cost-Effectiveness Analysis Inputs

Parameter	PY2021
Discount Rate	6.92%
Residential Line Loss	8.59%
Residential Energy Rate (\$/kWh)	\$0.1013
Inflation Rate	2.28%

Tables 3 through 15 present the savings and cost-effectiveness results at the program and measure category levels. Tables 16 and 19 present the NEBs impacts for the HES program and the cost-effectiveness results including NEBs at the program and measure category levels.



Table 2: HES Annual Program Costs, Nominal - PY2021<sup>1</sup>

Measure Category	Program Delivery	Utility Admin	Program Development	Incentives	Total Utility Budget	Gross Customer Costs
Appliances	\$3,193	\$38	\$18	\$1,150	\$4,399	\$24,882
Building Shell	\$20,151	\$239	\$115	\$8,003	\$28,508	\$114,071
Electronics	\$83	\$1	\$0	\$20	\$105	\$53
Energy Kits	\$2,779	\$876	\$420	\$2,168	\$6,244	\$0
HVAC	\$236,272	\$2,801	\$1,344	\$35,424	\$275,841	\$111,379
Lighting	\$42,562	\$7,912	\$3,796	\$24,914	\$79,183	\$64,114
Water Heating	\$19,764	\$234	\$112	\$5,800	\$25,911	\$12,878
Whole Home	\$25,345	\$300	\$144	\$5,000	\$30,789	\$781,687
Whole Building	\$25,559	\$303	\$145	\$6,800	\$32,808	\$149,047
Transportation	\$5,658	\$67	\$32	\$310	\$6,067	\$310
<b>Total</b>	<b>\$381,366</b>	<b>\$12,772</b>	<b>\$6,127</b>	<b>\$89,588</b>	<b>\$489,854</b>	<b>\$1,258,422</b>

Table 3: 2021 Home Energy Savings kWh Savings by Measure Category

Measure Category	Gross kWh Savings at Site	Realization Rate	Adjusted Gross kWh Savings at Site	NTG Ratio	Net kWh Savings at Site	Measure Life
Appliances	2,609	80%	2,087	88%	1,837	14
Building Shell	16,466	61%	10,044	88%	8,839	45
Electronics	68	52%	35	97%	34	5
Energy Kits	60,397	55%	33,218	87%	28,900	10
HVAC	193,067	101%	194,370	90%	174,156	7
Lighting	545,333	92%	503,328	72%	362,841	12
Water Heating	16,150	61%	9,852	99%	9,753	13
Whole Home	20,710	100%	20,710	88%	18,225	45
Whole Building	20,885	100%	20,885	93%	19,408	33
Transportation	4,623	100%	4,623	100%	4,623	7
<b>Total Program</b>	<b>880,308</b>	<b>91%</b>	<b>799,153</b>	<b>79%</b>	<b>628,616</b>	<b>13</b>

<sup>1</sup> To align with annual budget expectations, cost-effectiveness inputs are presented in nominal dollars.



Table 4: 2021 Benefit/Cost Ratios by Measure Category

Cost-Effectiveness Test	PTRC	TRC	UCT	PCT	RIM
Appliances	0.04	0.04	0.24	0.12	0.16
Appliances (with NEBs)	0.09	0.09	0.24	0.18	0.16
Building Shell	0.14	0.12	0.58	0.22	0.34
Building Shell (with NEBs)	0.14	0.12	0.58	0.22	0.34
Electronics	0.07	0.06	0.08	0.66	0.07
Electronics (with NEBs)	0.07	0.06	0.08	0.66	0.07
Energy Kits	3.91	3.56	2.32	0.00	0.40
Energy Kits (with NEBs)	13.08	12.72	2.32	0.00	0.40
HVAC	0.54	0.49	0.62	1.26	0.43
HVAC (with NEBs)	0.54	0.49	0.62	1.26	0.43
Lighting	1.89	1.72	2.57	6.07	0.34
Lighting (with NEBs)	1.89	1.72	2.57	6.07	0.34
Water Heating	0.16	0.15	0.19	1.22	0.13
Water Heating (with NEBs)	0.16	0.15	0.19	1.22	0.13
Whole Home	0.05	0.04	1.11	0.05	0.47
Whole Home (with NEBs)	0.05	0.04	1.11	0.05	0.47
Whole Building	0.22	0.20	1.06	0.28	0.49
Whole Building (with NEBs)	0.22	0.20	1.06	0.28	0.49
<b>Total</b>	<b>0.32</b>	<b>0.29</b>	<b>0.99</b>	<b>0.61</b>	<b>0.38</b>
<b>Total with NEBs</b>	<b>0.34</b>	<b>0.31</b>	<b>0.99</b>	<b>0.64</b>	<b>0.38</b>

Table 5: 2021 HES Program Cost-Effectiveness Results (Without NEBs)

Cost-Effectiveness Test	Levelized \$/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.2885	\$1,658,687	\$531,304	-\$1,127,384	0.32
Total Resource Cost Test (TRC) No Adder	\$0.2885	\$1,658,687	\$483,004	-\$1,175,684	0.29
Utility Cost Test (UCT)	\$0.0852	\$489,854	\$483,004	-\$6,850	0.99
Participant Cost Test (PCT)		\$1,433,195	\$871,092	-\$562,102	0.61
Rate Impact Test (RIM)		\$1,271,358	\$483,004	-\$788,354	0.38
Lifecycle Revenue Impacts (\$/kWh)					\$0.0000338
Discounted Participant Payback (years)					19.00



Table 6: 2021 Appliances Cost-Effectiveness Results (Without NEBs) - (Load Shape - Residential\_ERWH\_7P)

Cost-Effectiveness Test	Levelized \$/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$1.4410	\$28,131	\$1,179	-\$26,952	0.04
Total Resource Cost Test (TRC) No Adder	\$1.4410	\$28,131	\$1,071	-\$27,059	0.04
Utility Cost Test (UCT)	\$0.2253	\$4,399	\$1,071	-\$3,328	0.24
Participant Cost Test (PCT)		\$28,275	\$3,518	-\$24,757	0.12
Rate Impact Test (RIM)		\$6,767	\$1,071	-\$5,695	0.16
Lifecycle Revenue Impacts (\$/kWh)					\$0.0000003
Discounted Participant Payback (years)					112.65

Table 7: 2021 Building Shell 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	\$0.9513	\$134,575	\$18,213	-\$116,362	0.14
Total Resource Cost Test (TRC) No Adder	\$0.9513	\$134,575	\$16,558	-\$118,018	0.12
Utility Cost Test (UCT)	\$0.2015	\$28,508	\$16,558	-\$11,950	0.58
Participant Cost Test (PCT)		\$129,626	\$28,403	-\$101,223	0.22
Rate Impact Test (RIM)		\$48,908	\$16,558	-\$32,350	0.34
Lifecycle Revenue Impacts (\$/kWh)					\$0.0000013
Discounted Participant Payback (years)					205.67

Table 8: 2021 Electronics Cost-Effectiveness Results (Without NEBs) - (Load Shape - ID\_Single Family\_Plug)

Cost-Effectiveness Test	Levelized \$/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.8424	\$138	\$10	-\$129	0.07
Total Resource Cost Test (TRC) No Adder	\$0.8424	\$138	\$9	-\$130	0.06
Utility Cost Test (UCT)	\$0.6394	\$105	\$9	-\$96	0.08
Participant Cost Test (PCT)		\$55	\$36	-\$19	0.66
Rate Impact Test (RIM)		\$121	\$9	-\$113	0.07
Lifecycle Revenue Impacts (\$/kWh)					\$0.0000000
Discounted Participant Payback (years)					7.54



Table 9: 2021 Home Energy Kits Cost-Effectiveness Results (Without NEBs) - (Load Shape - Residential\_LIGHTING\_7P)

Cost-Effectiveness Test	Levelized \$/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.0161	\$4,076	\$15,955	\$11,879	3.91
Total Resource Cost Test (TRC) No Adder	\$0.0161	\$4,076	\$14,505	\$10,429	3.56
Utility Cost Test (UCT)	\$0.0247	\$6,244	\$14,505	\$8,261	2.32
Participant Cost Test (PCT)		\$0	\$32,112	\$32,112	n/a
Rate Impact Test (RIM)		\$36,188	\$14,505	-\$21,683	0.40
Lifecycle Revenue Impacts (\$/kWh)					\$0.0000019
Discounted Participant Payback (years)					0.00

Table 10: 2021 HVAC 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	\$0.3219	\$351,796	\$189,472	-\$162,325	0.54
Total Resource Cost Test (TRC) No Adder	\$0.3219	\$351,796	\$172,247	-\$179,549	0.49
Utility Cost Test (UCT)	\$0.2524	\$275,841	\$172,247	-\$103,594	0.62
Participant Cost Test (PCT)		\$124,306	\$156,550	\$32,244	1.26
Rate Impact Test (RIM)		\$396,967	\$172,247	-\$224,720	0.43
Lifecycle Revenue Impacts (\$/kWh)					\$0.0000295
Discounted Participant Payback (years)					5.38

Table 11: 2021 Lighting Cost-Effectiveness Results (Without NEBs) - (Load Shape - Residential\_LIGHTING\_7P)

Cost-Effectiveness Test	Levelized \$/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.0335	\$118,384	\$224,157	\$105,773	1.89
Total Resource Cost Test (TRC) No Adder	\$0.0335	\$118,384	\$203,779	\$85,395	1.72
Utility Cost Test (UCT)	\$0.0224	\$79,183	\$203,779	\$124,595	2.57
Participant Cost Test (PCT)		\$88,938	\$539,860	\$450,922	6.07
Rate Impact Test (RIM)		\$594,130	\$203,779	-\$390,351	0.34
Lifecycle Revenue Impacts (\$/kWh)					\$0.0000278
Discounted Participant Payback (years)					2.01



Table 12: 2021 Water Heating Cost-Effectiveness Results (Without NEBs) - (Load Shape - Residential\_HPWH\_7P)

Cost-Effectiveness Test	Levelized \$/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.3470	\$32,989	\$5,339	-\$27,650	0.16
Total Resource Cost Test (TRC) No Adder	\$0.3470	\$32,989	\$4,854	-\$28,135	0.15
Utility Cost Test (UCT)	\$0.2725	\$25,911	\$4,854	-\$21,057	0.19
Participant Cost Test (PCT)		\$13,008	\$15,879	\$2,871	1.22
Rate Impact Test (RIM)		\$35,990	\$4,854	-\$31,136	0.13
Lifecycle Revenue Impacts (\$/kWh)					\$0.0000017
Discounted Participant Payback (years)					10.65

Table 13: 2021 Whole Home 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	\$2.7775	\$807,476	\$37,458	-\$770,018	0.05
Total Resource Cost Test (TRC) No Adder	\$2.7775	\$807,476	\$34,053	-\$773,423	0.04
Utility Cost Test (UCT)	\$0.1059	\$30,789	\$34,053	\$3,264	1.11
Participant Cost Test (PCT)		\$888,281	\$46,777	-\$841,503	0.05
Rate Impact Test (RIM)		\$72,566	\$34,053	-\$38,514	0.47
Lifecycle Revenue Impacts (\$/kWh)					\$0.0000019
Discounted Participant Payback (years)					854.53

Table 14: 2021 Whole Building 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	\$0.5992	\$175,055	\$38,195	-\$136,859	0.22
Total Resource Cost Test (TRC) No Adder	\$0.5992	\$175,055	\$34,723	-\$140,332	0.20
Utility Cost Test (UCT)	\$0.1123	\$32,808	\$34,723	\$1,915	1.06
Participant Cost Test (PCT)		\$160,395	\$44,766	-\$115,630	0.28
Rate Impact Test (RIM)		\$70,773	\$34,723	-\$36,050	0.49
Lifecycle Revenue Impacts (\$/kWh)					\$0.0000020
Discounted Participant Payback (years)					118.99





Table 15: 2021 Transportation Cost-Effectiveness Results (Without NEBs) - (Load Shape - ID\_Single\_Family\_Heating)

Cost-Effectiveness Test	Levelized \$/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.2092	\$6,067	\$1,327	-\$4,740	0.22
Total Resource Cost Test (TRC) No Adder	\$0.2092	\$6,067	\$1,206	-\$4,861	0.20
Utility Cost Test (UCT)	\$0.2092	\$6,067	\$1,206	-\$4,861	0.20
Participant Cost Test (PCT)		\$310	\$3,191	\$2,881	10.29
Rate Impact Test (RIM)		\$8,948	\$1,206	-\$7,742	0.13
Lifecycle Revenue Impacts (\$/kWh)					\$0.0000007
Discounted Participant Payback (years)					0.65

Table 16: 2021 Home Energy Savings NEBs by Measure

Measure Name	Total NEBs (\$/yr)	Quantity	Measure Life	Discount Rate	Total NPV Benefits
Appliances	\$156	29	14.0	6.92%	\$1,341
Energy Kits	\$5,333	328	10.1	6.92%	\$37,350

Table 17: 2021 HES Program Cost-Effectiveness Results (Including NEBs)

Cost-Effectiveness Test	Levelized \$/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.2885	\$1,658,687	\$569,995	-\$1,088,693	0.34
Total Resource Cost Test (TRC) No Adder	\$0.2885	\$1,658,687	\$521,694	-\$1,136,993	0.31
Utility Cost Test (UCT)	\$0.0852	\$489,854	\$483,004	-\$6,850	0.99
Participant Cost Test (PCT)		\$1,433,195	\$915,547	-\$517,647	0.64
Rate Impact Test (RIM)		\$1,271,358	\$483,004	-\$788,354	0.38
Lifecycle Revenue Impacts (\$/kWh)					\$0.0000338
Discounted Participant Payback (years)					17.96



Table 18: 2021 Appliances Cost-Effectiveness Results (Including NEBs) - (Load Shape - Residential\_ERWH\_7P)

Cost-Effectiveness Test	Levelized \$/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$1.4410	\$28,131	\$2,519	-\$25,611	0.09
Total Resource Cost Test (TRC) No Adder	\$1.4410	\$28,131	\$2,412	-\$25,719	0.09
Utility Cost Test (UCT)	\$0.2253	\$4,399	\$1,071	-\$3,328	0.24
Participant Cost Test (PCT)		\$28,275	\$5,042	-\$23,233	0.18
Rate Impact Test (RIM)		\$6,767	\$1,071	-\$5,695	0.16
Lifecycle Revenue Impacts (\$/kWh)					\$0.0000003
Discounted Participant Payback (years)					78.60

Table 19: 2021 Home Energy Kits Cost-Effectiveness Results (Including NEBs) - (Load Shape - Residential\_LIGHTING\_7P)

Cost-Effectiveness Test	Levelized \$/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.0161	\$4,076	\$53,305	\$49,229	13.08
Total Resource Cost Test (TRC) No Adder	\$0.0161	\$4,076	\$51,855	\$47,779	12.72
Utility Cost Test (UCT)	\$0.0247	\$6,244	\$14,505	\$8,261	2.32
Participant Cost Test (PCT)		\$0	\$75,043	\$75,043	n/a
Rate Impact Test (RIM)		\$36,188	\$14,505	-\$21,683	0.40
Lifecycle Revenue Impacts (\$/kWh)					\$0.0000019
Discounted Participant Payback (years)					0.00



## MEMORANDUM

To: Alesha Pino, PacifiCorp  
From: Andrew Cottrell, Andy Hudson, Dylan Royalty, AEG  
Date: April 25, 2022  
Re: PacifiCorp Idaho Home Energy Reporting Cost-Effectiveness Results – PY2021

AEG estimated the cost-effectiveness of PacifiCorp's overall energy efficiency portfolio in the state of Idaho based on Program Year (PY) 2021 costs and savings estimates provided by PacifiCorp. This memo provides cost-effectiveness results for the Home Energy Reporting program. The program passes all cost effectiveness tests.

This memo provides analysis inputs and results in the following tables:

Table 1: Cost-Effectiveness Analysis Inputs

Table 2: Home Energy Reporting Annual Program Costs, Nominal - PY2021

Table 3: 2021 Home Energy Reporting kWh Savings by Measure Category

Table 4: 2021 Home Energy Reporting Program Cost-Effectiveness Results

The following assumptions were utilized in the analysis:

- **Avoided Costs:** Hourly values provided by PacifiCorp based on the 2021 Integrated Resource Plan (IRP) Preferred Portfolio, converted into annual values using Idaho load shapes from the same IRP.
- **Modeling Inputs:** 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 **Error! Reference source not found.** below.

Tables 1 and 2 below summarize cost-effectiveness assumptions for the Home Energy Reporting program. All costs and impacts are presented at the program level.



Table 1: Cost-Effectiveness Analysis Inputs

Parameter	PY2021
Discount Rate	6.92%
Residential Line Loss	8.59%
Residential Energy Rate (\$/kWh)	\$0.1013
Inflation Rate	2.28%

Table 2: Home Energy Reporting Annual Program Costs, Nominal - PY2021<sup>1</sup>

Measure Category	Program Delivery	Utility Admin	Program Development	Incentives	Total Utility Budget	Gross Customer Costs
Home Energy Reports	\$47,880	\$41,804	\$403	\$0	\$90,087	\$0
<b>Total</b>	<b>\$47,880</b>	<b>\$41,804</b>	<b>\$403</b>	<b>\$0</b>	<b>\$90,087</b>	<b>\$0</b>

Tables 3 and 4 present the savings and cost-effectiveness results at the program and measure category levels.

Table 3: 2021 Home Energy Reporting kWh Savings by Measure Category

Measure Category	Gross kWh Savings at Site	Realization Rate	Adjusted Gross kWh Savings at Site	NTG Ratio	Net kWh Savings at Site	Measure Life
Home Energy Reports	4,238,790	95%	4,026,851	100%	4,026,851	1
<b>Total Program</b>	<b>4,238,790</b>	<b>95%</b>	<b>4,026,851</b>	<b>100%</b>	<b>4,026,851</b>	<b>1</b>

Table 4: 2021 Home Energy Reporting Program Cost-Effectiveness Results

Cost-Effectiveness Test	Levelized \$/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.0206	\$90,087	\$1,030,574	\$940,487	11.44
Total Resource Cost Test (TRC) No Adder	\$0.0206	\$90,087	\$936,885	\$846,798	10.40
Utility Cost Test (UCT)	\$0.0206	\$90,087	\$936,885	\$846,798	10.40
Participant Cost Test (PCT)		\$0	\$407,920	\$407,920	n/a
Rate Impact Test (RIM)		\$498,007	\$936,885	\$438,878	1.88
Lifecycle Revenue Impacts (\$/kWh)					\$0.0002207

<sup>1</sup> To align with annual budget expectations, cost-effectiveness inputs are presented in nominal dollars.



## MEMORANDUM

To: Alesha Pino, PacifiCorp  
From: Andrew Cottrell, Andy Hudson, Dylan Royalty, AEG  
Date: April 25, 2022  
Re: PacifiCorp Idaho Low Income Weatherization Cost-Effectiveness Results – PY2021

AEG estimated the cost-effectiveness of PacifiCorp's overall energy efficiency portfolio in the state of Idaho based on Program Year (PY) 2021 costs and savings estimates provided by PacifiCorp. This memo provides cost-effectiveness results for the Low Income Weatherization program. The program passes the PacifiCorp (PTRC) without NEBs, and the PTRC and Total Resource Cost Test (TRC) with NEBs.

This memo provides analysis inputs and results in the following tables:

- Table 1: Cost-Effectiveness Analysis Inputs
- Table 2: Low Income Weatherization Annual Program Costs, Nominal - PY2021
- Table 3: 2021 Low Income Weatherization kWh Savings by Measure Category
- Table 4: 2021 Low Income Weatherization Benefit/Cost Ratios by Measure Category
- Table 5: 2021 Low Income Weatherization Program Cost-Effectiveness Results (without NEBs)
- Table 6: 2021 Low Income Weatherization NEBs
- Table 7: 2021 Low Income Weatherization Program Cost-Effectiveness Results (Including NEBs)

The following assumptions were utilized in the analysis:

- **Avoided Costs:** Hourly values provided by PacifiCorp based on the 2021 Integrated Resource Plan (IRP) Preferred Portfolio, converted into annual values using Idaho load shapes from the same IRP.
- **Modeling Inputs:** 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 **Error! Reference source not found.** below.



Tables 1 and 2 below summarize cost-effectiveness assumptions for the Low Income Weatherization program. All costs and impacts are presented at the program and measure category level.

Table 1: Cost-Effectiveness Analysis Inputs

Parameter	PY2021
Discount Rate	6.92%
Residential Line Loss	8.59%
Residential Energy Rate (\$/kWh)	\$0.1013
Inflation Rate	2.28%

Table 2: Low Income Weatherization Annual Program Costs, Nominal - PY2021<sup>1</sup>

Measure Category	Program Delivery	Utility Admin	Program Development	Incentives	Total Utility Budget	Gross Customer Costs
Low Income Weatherization	\$5,940	\$4,580	\$25,933	\$119,019	\$155,472	\$119,019
<b>Total Program</b>	<b>\$5,940</b>	<b>\$4,580</b>	<b>\$25,933</b>	<b>\$119,019</b>	<b>\$155,472</b>	<b>\$119,019</b>

Tables 3 through 5 present the savings and cost-effectiveness results at the program and measure category levels. Tables 6 and 7 present the NEBs impacts for the Low Income Weatherization program and the cost-effectiveness results including NEBs at the program level.

Table 3: 2021 Low Income Weatherization kWh Savings by Measure Category

Measure Category	Gross kWh Savings at Site	Realization Rate	Adjusted Gross kWh Savings at Site	NTG Ratio	Net kWh Savings at Site	Measure Life
Low Income Weatherization	35,325	60%	21,195	100%	21,195	24
<b>Total Program</b>	<b>35,325</b>	<b>60%</b>	<b>21,195</b>	<b>100%</b>	<b>21,195</b>	<b>24</b>

Table 4: 2021 Low Income Weatherization Benefit/Cost Ratios by Measure Category

Measure Category	PTRC	TRC	UCT	PCT	RIM
Low Income Weatherization with NEBs	4.31	4.28	0.28	0.23	n/a
Low Income Weatherization	0.25	0.23	0.28	0.23	n/a

<sup>1</sup> To align with annual budget expectations, cost-effectiveness inputs are presented in nominal dollars.



Table 5: 2021 Low Income Weatherization Program Cost-Effectiveness Results (without NEBs)

Cost-Effectiveness Test	Levelized \$/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.5382	\$155,472	\$38,779	(\$116,693)	0.25
Total Resource Cost Test (TRC) No Adder	\$0.5382	\$155,472	\$35,254	(\$120,218)	0.23
Utility Cost Test (UCT)	\$0.5382	\$155,472	\$43,379	(\$112,093)	0.28
Participant Cost Test (PCT)		\$119,019	\$152,176	\$33,156	1.28
Rate Impact Test (RIM)		\$188,628	\$43,379	(\$145,249)	0.23
Lifecycle Revenue Impacts (\$/kWh)					\$0.0000061

Table 6: 2021 Low Income Weatherization NEBs

Non-Energy Benefit	Program Impact	Perspective Adjusted
Total NEBs	\$630,561	PTRC, TRC

Table 7: 2021 Low Income Weatherization Program Cost-Effectiveness Results (Including NEBs)

Cost-Effectiveness Test	Levelized \$/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.5382	\$155,472	\$669,341	\$513,869	4.31
Total Resource Cost Test (TRC) No Adder	\$0.5382	\$155,472	\$665,815	\$510,343	4.28
Utility Cost Test (UCT)	\$0.5382	\$155,472	\$43,379	(\$112,093)	0.28
Participant Cost Test (PCT)		\$119,019	\$671,307	\$552,288	5.64
Rate Impact Test (RIM)		\$188,628	\$43,379	(\$145,249)	0.23
Lifecycle Revenue Impacts (\$/kWh)					\$0.0000061



## MEMORANDUM

To: Alesha Pino, PacifiCorp  
From: Andrew Cottrell, Andy Hudson, Dylan Royalty, AEG  
Date: April 25, 2022  
Re: PacifiCorp Idaho Wattsmart Business Program Cost-Effectiveness Results – PY2021

AEG estimated the cost-effectiveness of PacifiCorp's overall energy efficiency portfolio in the state of Idaho based on Program Year (PY) 2021 costs and savings estimates provided by PacifiCorp. This memo provides cost-effectiveness results for the Wattsmart Business program. The program passes the following cost effectiveness tests: Total Resource Cost Test (TRC), the PacifiCorp Total Resource Cost Test (PTRC), the Utility Cost Test (UCT), and the Participant Cost Test (PCT).

This memo provides analysis inputs and results in the following tables:

Table 1: Cost-Effectiveness Analysis Inputs

Table 2: Wattsmart Business Annual Program Costs, Nominal - PY2021

Table 3: 2021 Wattsmart Business kWh Savings by Measure Category

Table 4: 2021 Benefit/Cost Ratios by Measure Category

Table 5: 2021 Wattsmart Business Program Cost-Effectiveness Results

Table 6: 2021 Building Shell Cost-Effectiveness Results - (Load Shape - ID\_Large\_Office\_Space\_Cool)

Table 7: 2021 Compressed Air Cost-Effectiveness Results - (Load Shape - ID\_Miscellaneous\_Mfg\_General)

Table 8: 2021 Energy Management Cost-Effectiveness Results - (Load Shape - ID\_Miscellaneous\_HVAC\_Aux)

Table 9: 2021 HVAC Cost-Effectiveness Results - (Load Shape - ID\_Miscellaneous\_HVAC\_Aux)

Table 10: 2021 Irrigation Cost-Effectiveness Results - (Load Shape - ID\_Irrigation\_General)

Table 11: 2021 Lighting Cost-Effectiveness Results - (Load Shape - ID\_Miscellaneous\_Lighting)





Table 12: 2021 Motors Cost-Effectiveness Results - (Load Shape - ID\_Irrigation\_General)

Table 13: 2021 Refrigeration Cost-Effectiveness Results - (Load Shape - ID\_Miscellaneous\_Refrigeration)

Table 14: 2021 Energy Project Manager Co-Fund Cost-Effectiveness Results - (Load Shape - ID\_Miscellaneous\_Mfg\_General)

The following assumptions were utilized in the analysis:

- **Avoided Costs:** Hourly values provided by PacifiCorp based on the 2021 Integrated Resource Plan (IRP) Preferred Portfolio, converted into annual values using Idaho load shapes from the same IRP.
- **Modeling Inputs:** 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 **Error! Reference source not found.** below.

Tables 1 and 2 below summarize cost-effectiveness assumptions for the Wattsmart Business program. All costs and impacts are presented at the program and measure category level.

*Table 1: Cost-Effectiveness Analysis Inputs*

<b>Parameter</b>	<b>PY2021</b>
Discount Rate	6.92%
Commercial Line Loss	3.83%
Industrial Line Loss	9.05%
Irrigation Line Loss	9.06%
Commercial Energy Rate (\$/kWh)	\$0.0872
Industrial Energy Rate (\$/kWh)	\$0.0636
Irrigation Energy Rate (\$/kWh)	\$0.0907
Inflation Rate	2.28%



Table 2: Wattsmart Business Annual Program Costs, Nominal - PY2021<sup>1</sup>

Measure Category	Program Delivery	Utility Admin	Program Development	Incentives	Total Utility Budget	Gross Customer Costs
Building Shell	\$2,861	\$56	\$51	\$5,416	\$8,384	\$22,434
Compressed Air	\$1,227	\$55	\$41	\$2,340	\$3,664	\$5,229
Energy Management	\$41,320	\$911	\$656	\$5,007	\$47,894	\$5,704
HVAC	\$84,936	\$1,805	\$1,399	\$62,633	\$150,774	\$201,666
Irrigation	\$582,365	\$24,686	\$10,366	\$462,042	\$1,079,459	\$904,305
Lighting	\$587,996	\$12,170	\$10,925	\$511,087	\$1,122,179	\$1,540,235
Motors	\$439,946	\$9,713	\$6,996	\$368,873	\$825,527	\$962,192
Refrigeration	\$40,586	\$878	\$631	\$36,173	\$78,268	\$217,036
Energy Project Manager Co-Fund	\$32,801	\$0	\$0	\$43,895	\$76,696	\$0
<b>Total Program</b>	<b>\$1,814,040</b>	<b>\$50,273</b>	<b>\$31,066</b>	<b>\$1,497,466</b>	<b>\$3,392,844</b>	<b>\$3,858,801</b>

Tables 3 through 14 present the savings and cost-effectiveness results at the program and measure category levels.

Table 3: 2021 Wattsmart Business kWh Savings by Measure Category

Measure Category	Gross kWh Savings at Site	Realization Rate	Adjusted Gross kWh Savings at Site	NTG Ratio	Net kWh Savings at Site	Measure Life
Building Shell	19,560	100%	19,560	67%	13,105	15
Compressed Air	15,603	100%	15,603	84%	13,107	13
Energy Management	250,345	99%	248,843	89%	221,470	5
HVAC	534,434	81%	432,357	89%	384,798	15
Irrigation	3,958,599	100%	3,944,129	65%	2,574,908	12
Lighting	4,172,213	100%	4,172,213	100%	4,172,213	14
Motors	2,671,538	84%	2,246,763	89%	1,999,619	15
Refrigeration	241,152	83%	200,156	89%	178,139	15
Energy Project Manager Co-Fund	0	0%	0	0%	0	0
<b>Total Program</b>	<b>11,863,444</b>	<b>95%</b>	<b>11,279,624</b>	<b>85%</b>	<b>9,557,359</b>	<b>13</b>

<sup>1</sup> To align with annual budget expectations, cost-effectiveness inputs are presented in nominal dollars.



Table 4: 2021 Benefit/Cost Ratios by Measure Category

Cost-Effectiveness Test	PTRC	TRC	UCT	PCT	RIM
Building Shell	0.48	0.44	1.33	0.76	0.39
Compressed Air	1.27	1.16	2.07	2.58	0.44
Energy Management	1.54	1.40	1.42	16.30	0.46
HVAC	0.93	0.85	1.63	2.14	0.43
Irrigation	1.38	1.26	1.77	2.84	0.42
Lighting	1.17	1.06	2.04	2.98	0.44
Motors	1.26	1.14	1.96	2.37	0.54
Refrigeration	0.46	0.42	1.39	0.95	0.40
Energy Project Manager Co-Fund	0.00	0.00	0.00	0.00	0.00
<b>Total Program</b>	<b>1.20</b>	<b>1.09</b>	<b>1.85</b>	<b>2.65</b>	<b>0.45</b>

Table 5: 2021 Wattsmart Business Program Cost-Effectiveness Results

Cost-Effectiveness Test	Levelized \$/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.0614	\$5,754,179	\$6,885,927	\$1,131,747	1.20
Total Resource Cost Test (TRC) No Adder	\$0.0614	\$5,754,179	\$6,259,933	\$505,754	1.09
Utility Cost Test (UCT)	\$0.0362	\$3,392,844	\$6,259,933	\$2,867,089	1.85
Participant Cost Test (PCT)		\$4,523,093	\$11,990,073	\$7,466,979	2.65
Rate Impact Test (RIM)		\$13,885,451	\$6,259,933	-\$7,625,517	0.45
Lifecycle Revenue Impacts (\$/kWh)					\$0.0005692
Discounted Participant Payback (years)					4.81

Table 6: 2021 Building Shell Cost-Effectiveness Results - (Load Shape - ID\_Large\_Office\_Space\_Cool)

Cost-Effectiveness Test	Levelized \$/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.1839	\$25,402	\$12,225	-\$13,178	0.48
Total Resource Cost Test (TRC) No Adder	\$0.1839	\$25,402	\$11,113	-\$14,289	0.44
Utility Cost Test (UCT)	\$0.0607	\$8,384	\$11,113	\$2,729	1.33
Participant Cost Test (PCT)		\$33,484	\$25,393	-\$8,090	0.76
Rate Impact Test (RIM)		\$28,361	\$11,113	-\$17,248	0.39
Lifecycle Revenue Impacts (\$/kWh)					\$0.0000012
Discounted Participant Payback (years)					19.87



Table 7: 2021 Compressed Air Cost-Effectiveness Results - (Load Shape - ID\_Miscellaneous\_Mfg\_General)

Cost-Effectiveness Test	Levelized \$/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.0536	\$6,552	\$8,334	\$1,782	1.27
Total Resource Cost Test (TRC) No Adder	\$0.0536	\$6,552	\$7,576	\$1,024	1.16
Utility Cost Test (UCT)	\$0.0300	\$3,664	\$7,576	\$3,913	2.07
Participant Cost Test (PCT)		\$6,225	\$16,082	\$9,857	2.58
Rate Impact Test (RIM)		\$17,405	\$7,576	-\$9,829	0.44
Lifecycle Revenue Impacts (\$/kWh)					\$0.0000008
Discounted Participant Payback (years)					5.03

Table 8: 2021 Energy Management Cost-Effectiveness Results - (Load Shape - ID\_Miscellaneous\_HVAC\_Aux)

Cost-Effectiveness Test	Levelized \$/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.0481	\$48,591	\$74,986	\$26,395	1.54
Total Resource Cost Test (TRC) No Adder	\$0.0481	\$48,591	\$68,169	\$19,578	1.40
Utility Cost Test (UCT)	\$0.0474	\$47,894	\$68,169	\$20,275	1.42
Participant Cost Test (PCT)		\$6,409	\$104,486	\$98,077	16.30
Rate Impact Test (RIM)		\$147,372	\$68,169	-\$79,203	0.46
Lifecycle Revenue Impacts (\$/kWh)					\$0.0000145
Discounted Participant Payback (years)					0.28

Table 9: 2021 HVAC Cost-Effectiveness Results - (Load Shape - ID\_Miscellaneous\_HVAC\_Aux)

Cost-Effectiveness Test	Levelized \$/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.0741	\$289,807	\$269,905	-\$19,902	0.93
Total Resource Cost Test (TRC) No Adder	\$0.0741	\$289,807	\$245,368	-\$44,439	0.85
Utility Cost Test (UCT)	\$0.0386	\$150,774	\$245,368	\$94,594	1.63
Participant Cost Test (PCT)		\$226,591	\$484,837	\$258,246	2.14
Rate Impact Test (RIM)		\$572,978	\$245,368	-\$327,610	0.43
Lifecycle Revenue Impacts (\$/kWh)					\$0.0000244
Discounted Participant Payback (years)					7.01



Table 10: 2021 Irrigation Cost-Effectiveness Results - (Load Shape - ID\_Irrigation\_General)

Cost-Effectiveness Test	Levelized \$/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.0634	\$1,521,722	\$2,103,785	\$582,063	1.38
Total Resource Cost Test (TRC) No Adder	\$0.0634	\$1,521,722	\$1,912,532	\$390,809	1.26
Utility Cost Test (UCT)	\$0.0450	\$1,079,459	\$1,912,532	\$833,073	1.77
Participant Cost Test (PCT)		\$1,385,174	\$3,935,556	\$2,550,382	2.84
Rate Impact Test (RIM)		\$4,552,973	\$1,912,532	-\$2,640,441	0.42
Lifecycle Revenue Impacts (\$/kWh)					\$0.0002130
Discounted Participant Payback (years)					4.24

Table 11: 2021 Lighting Cost-Effectiveness Results - (Load Shape - ID\_Miscellaneous\_Lighting)

Cost-Effectiveness Test	Levelized \$/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.0507	\$2,151,326	\$2,515,929	\$364,602	1.17
Total Resource Cost Test (TRC) No Adder	\$0.0507	\$2,151,326	\$2,287,208	\$135,882	1.06
Utility Cost Test (UCT)	\$0.0265	\$1,122,179	\$2,287,208	\$1,165,029	2.04
Participant Cost Test (PCT)		\$1,540,235	\$4,585,322	\$3,045,087	2.98
Rate Impact Test (RIM)		\$5,196,413	\$2,287,208	-\$2,909,205	0.44
Lifecycle Revenue Impacts (\$/kWh)					\$0.0002216
Discounted Participant Payback (years)					4.73

Table 12: 2021 Motors Cost-Effectiveness Results - (Load Shape - ID\_Irrigation\_General)

Cost-Effectiveness Test	Levelized \$/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.0698	\$1,418,847	\$1,781,215	\$362,368	1.26
Total Resource Cost Test (TRC) No Adder	\$0.0698	\$1,418,847	\$1,619,287	\$200,440	1.14
Utility Cost Test (UCT)	\$0.0406	\$825,527	\$1,619,287	\$793,759	1.96
Participant Cost Test (PCT)		\$1,081,115	\$2,562,874	\$1,481,759	2.37
Rate Impact Test (RIM)		\$3,019,529	\$1,619,287	-\$1,400,242	0.54
Lifecycle Revenue Impacts (\$/kWh)					\$0.0001288
Discounted Participant Payback (years)					6.33



Table 13: 2021 Refrigeration Cost-Effectiveness Results - (Load Shape - ID\_Miscellaneous\_Refrigeration)

Cost-Effectiveness Test	Levelized \$/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.1431	\$259,131	\$119,548	-\$139,583	0.46
Total Resource Cost Test (TRC) No Adder	\$0.1431	\$259,131	\$108,680	-\$150,451	0.42
Utility Cost Test (UCT)	\$0.0432	\$78,268	\$108,680	\$30,413	1.39
Participant Cost Test (PCT)		\$243,861	\$231,629	-\$12,232	0.95
Rate Impact Test (RIM)		\$273,724	\$108,680	-\$165,043	0.40
Lifecycle Revenue Impacts (\$/kWh)					\$0.0000117
Discounted Participant Payback (years)					15.79

Table 14: 2021 Energy Project Manager Co-Fund Cost-Effectiveness Results - (Load Shape - ID\_Miscellaneous\_Mfg\_General)

Cost-Effectiveness Test	Levelized \$/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.0000	\$32,801	\$0	-\$32,801	0.00
Total Resource Cost Test (TRC) No Adder	\$0.0000	\$32,801	\$0	-\$32,801	0.00
Utility Cost Test (UCT)	\$0.0000	\$76,696	\$0	-\$76,696	0.00
Participant Cost Test (PCT)		\$0	\$43,895	\$43,895	n/a
Rate Impact Test (RIM)		\$76,696	\$0	-\$76,696	0.00
Lifecycle Revenue Impacts (\$/kWh)					\$0.0000000
Discounted Participant Payback (years)					0.00