

June 7, 2022

***VIA ELECTRONIC FILING***

Public Service Commission of Utah  
Heber M. Wells Building, 4<sup>th</sup> Floor  
160 East 300 South  
Salt Lake City, UT 84114

Attention: Gary Widerburg  
Commission Secretary

RE: In the Matter of Rocky Mountain Power's Demand Side Management 2021 Annual Energy Efficiency and Peak Load Reduction Report – Docket No. 22-035-27

Dear Mr. Widerburg:

Pursuant to the Commission order dated February 16, 2017, in Docket No. 17-035-04, Rocky Mountain Power (“Company”) hereby submits for filing its Demand Side Management 2021 Annual Energy Efficiency and Peak Load Reduction Report (“2021 Report”). Appendix C to the 2021 Report is confidential in its entirety and is provided in accordance with the Utah Public Service Commission Rule 746-1-601.

In addition to the 2021 Report materials, enclosed with this letter is the Confidential Information Certificate the Company desires parties in this docket to execute prior to obtaining access to confidential information.

It is respectfully requested that all formal correspondence and staff requests regarding this matter be addressed to:

By E-mail (preferred): [datarequest@pacificorp.com](mailto:datarequest@pacificorp.com)  
[michael.snow@pacificorp.com](mailto:michael.snow@pacificorp.com)

By regular mail: Data Request Response Center  
PacifiCorp  
825 NE Multnomah St., Suite 2000  
Portland, OR 97232

Informal inquiries may be directed to me at (801) 220-4214.

Sincerely,



Michael S. Snow  
Manager, Regulatory Affairs

Enclosures



# 2021 Utah Energy Efficiency and Peak Reduction Annual Report

*Issued June 7, 2022*

Rocky Mountain Power  
1407 West North Temple  
Salt Lake City, UT 84116

[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 983,418 customers in Utah. Rocky Mountain Power acquires energy efficiency and peak reduction resources as cost-effective alternatives to the acquisition of supply-side resources. These resources assist in efficiently addressing load growth and contribute to the ability to meet system peak requirements.

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

Rocky Mountain Power employs external implementers to administer its programs.<sup>2</sup> Evaluations for each of the programs are performed by independent external evaluators to validate energy savings derived from Rocky Mountain Power's energy efficiency programs.<sup>3</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 customer on the availability of programs, services, and incentives.<sup>4</sup>

This report provides details on program results, activities, and expenditures of the DSM Cost Adjustment Tariff Rider ("Schedule 193") as of the reporting period from January 1, 2021, through December 31, 2021. Rocky Mountain Power on behalf of its customers, invested \$62 million in energy efficiency and peak reduction resource acquisitions during the reporting period. The investment yielded approximately 347,024 megawatt hours ("MWh") in first-year energy savings,<sup>5</sup> 4,255,237 MWh of lifetime savings from 2021 energy efficiency acquisition,<sup>6</sup> and maximum realized reductions associated with peak management activities of approximately 290

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

<sup>3</sup> Program Evaluation information for each program can be found at the following address: <https://www.pacificorp.com/environment/demand-side-management.html> under the "Reports and program evaluations by state" section.

<sup>4</sup> Communications, Outreach and Education can be found at <https://www.pacificorp.com/environment/demand-side-management.html> under the "Communications and Outreach" section.

<sup>5</sup> Reported ex-ante savings are gross at generation.

<sup>6</sup> Estimated lifetime savings of 2021 Energy Efficiency Acquisitions was calculated by multiplying First Year Acquisitions (ex-ante, measured at the generator) by the weighted average measure life of the portfolio of 12.2 years.

megawatts. Net benefits based on the projected value of the energy savings over the life of the individual measures is estimated at \$215 million.<sup>7</sup>

The Demand-side Management (“DSM”) portfolio was cost effective based on the Utility/Program Administrator Cost Test (UCT), which is the primary cost benefit test observed in Utah.<sup>8</sup> Cost-effectiveness results are provided in Table 11 and Appendix B.

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

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

## ADVISORY GROUP AND STEERING COMMITTEE ACTIVITIES

Consistent with the discussion in Docket No. 12-035-69, the Company seeks input regarding its energy efficiency programs from both the Utah DSM Steering Committee and the Utah DSM Advisory Group. Both groups include representatives from a variety of constituent organizations. Members of the Steering Committee, who are not already governed by Commission confidentiality rules, signed Confidentiality Agreements with the Company to provide input on issues involving sensitive, confidential, or proprietary information

The Company consulted with the DSM Steering Committee and DSM Advisory Group throughout 2021 on various matters and held formal meetings on the following matters:

### March 23, 2021 – DSM Steering Committee

- Discussed the planned redesign of Wattsmart Business New Construction offerings.
- Provided updates on the Wattsmart Homes and Irrigation Load Control programs; and
- Held an open discussion regarding inter-utility agreements.

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<sup>7</sup> See cost effectiveness Appendix B. Portfolio Utility Cost Test Net Benefits. Avoided costs were adjusted to reflect the 2021 IRP.

<sup>8</sup> Cost effectiveness results include realization rates and Net-to-Gross (“NTG”) ratios.

### **June 30, 2021 – DSM Steering Committee**

- Reviewed the semi-annual DSM report.
- Reviewed Schedule 193 rates and the balancing account.
- Provided updates on New Construction, Lighting Controls, Heat Pump offerings, as well as the Energy Independence and Security Act.
- Provided an update on demand response programs; and
- Discussed energy efficiency demand response pairing concepts with whole building energy use intensity targets.

### **June 30, 2021 – DSM Advisory Group**

- Reviewed the 2020 DSM Annual Report; and
- Discussed updates to report formats.

### **September 16, 2021 – DSM Steering Committee**

- Reviewed the 2021 Integrated Resource Plan results.
- Discussed the energy project manager co-funding guidelines.
- Provided an update on the Wattsmart Batteries program.
- Provided an update on the conceptual commercial and industrial demand response program.

### **September 16, 2021 – DSM Advisory Group**

- Reviewed the 2021 Integrated Resource Plan preferred portfolio: and
- Reviewed the new evaluation dashboard for DSM programs.

### **October 20, 2020 – DSM Steering Committee**

- Discussed the 2022 forecast and accounting for DSM.
- Reviewed upcoming filing changes for the Wattsmart Business program.
- Provided an update on the status of the upcoming commercial and industrial demand response program.

## **PORTFOLIO OF PROGRAMS**

### **RESIDENTIAL 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, 2, or 3. Landlords who own property where the tenant is billed under Electric Service Schedules 1, 2, or 3 also qualify.

The Wattsmart Homes program passed the UCT cost tests with a benefit cost ratio of 2.51 for 2021.

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

- The Wattsmart Homes program achieved 61,643,606 kWh gross savings at site.
- Disbursed \$11.9 million in incentives.
- The Wattsmart Homes program discontinued incentives for LED bulbs and LED fixtures effective August 15, 2021, due to market adoption and changes in market baselines.
- The Wattsmart Homes program added incentives for ductless heat pumps for new construction homes.
- The Wattsmart Homes program made changes to incentives offered in the multifamily program. The changes included incentives based on measure category for retrofit projects and reduced incentives for new construction projects.
- Request for Proposal (RFP) for the Wattsmart Homes program was issued in November 2021 in preparation for program delivery beginning in 2023.

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/utah/Utah\\_Program\\_Administration\\_Wattsmart\\_Homes.pdf](https://www.pacificorp.com/content/dam/pcorp/documents/en/pacificorp/environment/dsm/utah/Utah_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 participant with tips to decrease their energy usage.

The Home Energy Reports program passed the UCT with a cost benefit ratio of 12.93 for 2021

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

- The Home Energy Reports program achieved 99,934,969 kWh gross savings at site.
- Reports were initially provided to approximately 493,000 customers in 2021.
- Program sends reports to all residential customer with email. Paper reports will be sent to approximately 50,000 customers without email who have high kWh usage.
- Online portal is continually evolving to provide greater insights for all residential customers.
- In 2021, only 0.26% of customers (1,584 customers) have requested to be removed from the program.

Additional information on Home Energy Reports is located at the following link:

<https://www.rockymountainpower.net/savings-energy-choices/home/usage-insights-home-energy-reports.html>

Direct Link to Home Energy Reports program administration:

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

## **LOW INCOME WEATHERIZATION**

### ***Program Description***

The Low-Income Weatherization program provides energy efficiency services to income-eligible households through a partnership with the Utah Department of Workforce Services, Housing and Community Development Division (“HCD”). Services are provided at no cost to the program participants.

Rocky Mountain Power currently has a contract in place with HCD to provide services through the Low-Income Weatherization program. The state agency receives federal funds and subcontracts with seven non-profit agencies that install energy efficiency measures in the homes of income eligible households throughout the Company’s service area. Company funding of 50 percent of the cost of approved measures is leveraged by HCD with the federal funding they receive, allowing more homes to be served each year.

The Low-Income Weatherization program passed the UCT with a cost benefit ratio of 2.35 for 2021.



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

- In 2021, the program achieved 296,812 kWh gross savings at site.
- Number of homes served was 256.

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/utah/Utah Program Administration Low Income.pdf>

## **NON-RESIDENTIAL ENERGY EFFICIENCY PROGRAMS**

### **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 electricity usage through the installation of energy efficiency measures and adoption of improved energy management protocols. Qualifying measures include those which, when implemented in an eligible facility, produce verifiable electric energy efficiency improvements.

Incentives and services offered through Wattsmart Business include.

- Typical Upgrades
- Small Business Enhanced
- Small Business Direct Install
- Midstream/LED instant incentives
- Custom Analysis
- Energy Management
- Energy Project Manager Co-funding

In 2021 Wattsmart Business program passed the UCT with a cost benefit analysis of 2.30

## *Program Performance and Major Achievements in 2021*

- In 2021, the program achieved 165,527,021 kWh gross savings.
- Disbursed incentives of \$20.9 and \$831,705 in bill credits.
- In 2021 the Wattsmart Business program continued to implement many of the market evolving strategies it began in 2019-2020. There were no significant or large program changes as the strategic focus was on maturing technologies still relatively new to the non-residential market.
- Lighting controls continue to be a strong focus for the non-residential program, especially Advanced Networked Lighting Controls (ANLC), as they represent the next frontier of significant energy saving technologies in Utah's lighting market. Introduced in 2019, RMP's ANLC incentives are designed to genuinely accelerate the adoption of these cutting-edge technologies. ANLC manufacturers regularly point to RMP incentives as some of the most progressive in the country. RMP's ANLC incentives are customized to large, medium, and small sized customers. In 2020, the requirements for large and medium sized customers were adjusted to allow more qualifying ANLC configurations. We believe the market-moving foundation established in 2019, combined with adjustments in 2020, are genuinely transforming Utah's lighting market. Despite challenges caused by COVID-19, the number of ANLC projects in 2020 was 132 compared to 36 in 2019. The kWh delivery of ANLC projects was 25,840,537 in 2020 compared to 4,659,467 in 2019.
- RMP's Advanced Rooftop Control (ARC) incentives are designed to move the market and regularly receive recognition from ARC manufacturers as among the country's most effective.
- Participating Wattsmart Business vendors continued receiving quarterly vendor scorecards to provide timely feedback on their performance with customers and submittals and encourage vendors to reach "Premium" status. The enhanced status entitles qualifying vendors to improved search engine visibility on Wattsmart Business web pages and enhanced co-branding opportunities with the Rocky Mountain Power logo. The number of Premium vendors increased in 2021 to eleven.
- The managed accounts team continued engaging with municipal water and wastewater customers through the Strategic Energy Management (SEM) delivery model. These efforts on multi-year projects are expected to yield significant additional savings in future years.
- Through the Wattsmart Communities offering, Orem City, South Jordan City and Sandy City completed comprehensive Energy Action Plans to guide the next 3 to 5 years of energy efficiency improvements in partnership with RMP

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/utah/Utah\\_Program\\_Administration\\_NonResidential.pdf](https://www.pacificorp.com/content/dam/pcorp/documents/en/pacificorp/environment/dsm/utah/Utah_Program_Administration_NonResidential.pdf)

## PEAK REDUCTION PROGRAMS

Peak Reduction programs assist the Company in balancing the timing of customer energy requirements during heavy summer use hours. Peak reduction programs are intended to defer the need for higher cost investments in delivery infrastructure and peak generation resources that would otherwise be needed to serve those loads for a few select hours each year. These programs help the Company maximize the efficiency of the Company's existing electrical system and reduce costs for all customers.

Programs targeting capacity-related resources are often specific to end use loads most prevalent in each jurisdiction, such as the agricultural pumping and residential cooling loads in Utah. In 2021, the Company offered the *Irrigation Load Control* program (Schedule 105) for the agricultural sector and the *Cool Keeper* program (Schedule 114) for the residential and small commercial sectors.

The Wattsmart Batteries program (Schedule 114) was approved effective October 3, 2020. All customers are eligible to participate, however the technology is currently geared towards residential customers.

### 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 is set up with a dispatched two-way control system giving Rocky Mountain Power control over their loads. Participants are notified a day ahead of control events and have the choice to opt-out of a limited number of dispatch events per season.

In 2021, the program was available June 1<sup>st</sup> through August 20<sup>th</sup> from 2pm to 9pm Mountain Standard Time, Monday through Friday, and did not include holidays.

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

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

- Maximum potential and realized at generation were 12 MW and 4 MW, respectively.
- There were seven load control events initiated in 2021.
- The available load from the Irrigation Program can be utilized as reserve which provides value to the program and benefits the customer.
- Customers who participated in 100% of the program events were given a 20% incentive bonus.
- Program moved to a 4-hour notification
- Total customers participating in the program are 31, participation sites are 131.

Program enrollment information can be found on the Company's website:

<https://www.rockymountainpower.net/savings-energy-choices/business/irrigation-load-control.html>

Direct Link to Irrigation Load Control program administration:

[https://www.pacificorp.com/content/dam/pacorp/documents/en/pacificorp/environment/dsm/utah/Utah Program Administration Irrigation Load Control.pdf](https://www.pacificorp.com/content/dam/pacorp/documents/en/pacificorp/environment/dsm/utah/Utah%20Program%20Administration%20Irrigation%20Load%20Control.pdf)

## **COOL KEEPER**

### ***Program Description***

The Cool Keeper program is an air conditioner direct load management program targeting residential and commercial customers who cool their dwellings with electric central air conditioners. The program is called upon curtailment under varying circumstances. Due to the flexibility of the program and real-time dispatch capabilities the resources can be utilized for various smart grid application.

When there is a grid need, the Cool Keeper control equipment installed on a participating customer's cooling equipment is sent a signal to cycle the operation of the compressor "off and on" for brief periods each hour in coordination with other participating customers.

For their participation, customers receive a monthly bill credit. The maximum annual incentive for participation is \$30-\$60 depending on the size of the unit. The program is limited to 100

hours per program year, and events to four hours per day. In the event of a system emergency, Rocky Mountain Power may, at its discretion expand the dispatch parameters as noted in the tariff. For program participants who are not enrolled for the season, they will receive daily prorated credit for the days they participate.

The Cool Keeper load control system is operated through a two-way communication with a wireless mesh network for improved control, measurement, and verification of program performance.

The Cool Keeper control program passed the UCT cost tests for 2021.

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

- Maximum potential and realized at generation were 270 MW and 254 MW, respectively.
- 25 control events were initiated during the 2021 program season.
- System firmware upgraded to currently supported levels.
- Due to higher temperatures, there were more short frequency events called.
- For short events, the cycling was modified to 100% compared to 50% for longer events.
- The modified cycling strategy is allowing the program to curtail more load over shorter periods of time.
- The program can be called upon real-time which increases the value and flexibility, which allows the program to be utilized for frequency response and contingency reserve obligations.

Program enrollment information can be found on the Company's website:

<https://www.rockymountainpower.net/savings-energy-choices/home/cool-keeper.html#:~:text=Cool%20Keeper%20is%20available%20to,%2D800%2D357%2D9214.>

Direct Link to Cool Keeper program administration:

[https://www.pacificorp.com/content/dam/pcorp/documents/en/pacificorp/environment/dsm/utah/Utah\\_Program\\_Administration\\_Cool\\_Keeper.pdf](https://www.pacificorp.com/content/dam/pcorp/documents/en/pacificorp/environment/dsm/utah/Utah_Program_Administration_Cool_Keeper.pdf)

## **WATTSMART BATTERIES**

### ***Program Description***

The Wattsmart Batteries program promotes and incentivizes the installation of qualified individual batteries for system-wide integration and use for overall electric grid management. Leveraging batteries has created opportunity to maximize renewable energy for advancing a sustainable electric grid. The batteries are actively being used for frequency response, peak load management, transmission relief, daily load cycling, and other smart grid applications. Batteries

participating in the Wattsmart Battery Program are integrated within PacifiCorp's Energy Management System to provide real-time grid benefits

Eligible customers who participate in the program receive an enrollment incentive based on the kW size of their battery and participation commitment, and ongoing annual incentives for continued participation.

The Wattsmart Battery program passed the UCT cost tests for 2021.

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

The Wattsmart Battery Program became available in December 2020 and applications for new battery/solar systems were continually submitted throughout 2021.

Due to the popularity of the program and the number of applications received for new customer generation who were planning to enroll in the Wattsmart Battery Program incentive levels were reduced on September 1, 2021, to manage program budgets. The incentive was lowered for customers installing a new solar/battery system. For existing solar customer incentives for enrolling a battery will remain as originally filed.

- Maximum potential generation was 6 MW.
- 33 frequency events were called during 2021 program year.
- Program is available 24 hours a day 365 days a year
- Program can be called upon real-time which increases the value and flexibility, which allows the program to be utilized for frequency response and contingency reserve obligations.
- Daily load cycling to maximize solar energy
- Maximized renewable energy to benefit the grid

Program enrollment information can be found on the Company's website:

[www.rockymountainpower.net/battery](http://www.rockymountainpower.net/battery)

## EXPENDITURES

### TOTAL PORTFOLIO BUDGET AND EXPENDITURES

**Table 1: Forecast to Actual Savings Comparison**

Utah 2019 DSM Programs	2020 IRP for 2021		2021 Forecast		2021 Actual	
	(Gross - at Gen)		(Gross - at Gen)		(Gross - at Gen)	
	MWH	MW	MWH	MW	MWH	MW* <sup>9</sup>
<b>Class 1 - Load Control Programs</b>						
A/C Load Control		126		252		270
Wattsmart Batteries Program		N/A		2		6
Irrigation Load Control		20		20		14
<b>Total Class 1</b>		<b>146</b>		<b>274</b>		<b>290</b>
<b>Class 2 - Residential Programs</b>						
Low Income	N/A	N/A	178	0	316	0
Home Energy Reports	N/A	N/A	65,591	9	106,288	15
Wattsmart Homes	N/A	N/A	53,566	8	65,562	9
<b>Total Residential Class 2</b>	<b>N/A</b>	<b>N/A</b>	<b>119,335</b>	<b>17</b>	<b>172,166</b>	<b>25</b>
<b>Class 2 - Non-Residential Programs</b>						
Wattsmart Business	N/A	N/A	172,506	25	174,858	25
<b>Total Class 2</b>	<b>254,120<sup>10</sup></b>	<b>36.71</b>	<b>291,841</b>	<b>42</b>	<b>347,024</b>	<b>50</b>
<b>Total Class 2 Forecast Estimated Savings Range with Home Energy Reports First Year Savings</b>			<b>277,248 – 306,432</b>			
<b>Total Class 2 with Home Energy Reports Incremental Savings Only</b>			<b>241,414 - 266,826</b>	<b>32.68</b>	<b>275,112</b>	<b>35</b>

<sup>9</sup> Energy efficiency MW is the estimated savings during system peak.

<sup>10</sup> While the IRP accounts for incremental Home Energy Report (HER) savings only (i.e. the increase in first year savings year-over-year), the forecast and actuals account for first-year savings. To provide greater clarity for comparison purposes, the last two rows in Table 1 show Class 2 with HER first-year savings versus Class 2 with HER incremental savings.

**Table 2: Program Results for January 1, 2021 – December 31, 2021<sup>11</sup>**

Load Management Programs	MW/Yr. Savings (at site)	MW/Yr. Savings (at gen)	Program Expenditures
Cool Keeper	253	270	\$ 5,634,080
Irrigation Load Control	13	14	\$ 55,812
Wattsmart Batteries	5.7	6	\$ 862,600
<b>Total Load Management</b>	<b>272</b>	<b>290</b>	<b>\$ 6,552,491</b>
Energy Efficiency Programs	kWh/Yr. Savings (at site)	kWh/Yr. Savings (at gen)	Program Expenditures
Low Income Weatherization	117,132	124,578	\$ 135,386
Home Energy Reporting	99,934,969	106,287,835	\$ 1,405,011
Wattsmart Homes	61,643,606	65,562,291	\$ 17,132,968
<b>Total Residential</b>	<b>161,695,707</b>	<b>172,165,806</b>	<b>\$ 18,673,365</b>
<b>Total Wattsmart Business</b>	<b>165,527,021</b>	<b>174,857,981</b>	<b>\$ 34,844,792</b>
<b>Total Energy Efficiency</b>	<b>327,402,409</b>	<b>347,023,787</b>	<b>\$ 53,518,157</b>
Other Portfolio Expenditures			
Outreach and Communications			\$ 1,246,711
Portfolio - EM&V Non-Residential			\$ 363,467
Portfolio - EM&V Residential			\$ 138,939
Portfolio – DSM Central			\$ 228,237
Portfolio Potential Study			\$ 5,990
Portfolio TRL			\$ 13,397
<b>Total Other Portfolio Expenditures</b>			<b>\$ 1,996,741</b>
<b>Total Utah Program Expenditures</b>			<b>\$ 62,067,389</b>

## SAVINGS BY PROGRAM

**Table 3: 2021 Program Performance by Measure Category Savings for Wattsmart Homes**

Measure Category	Total kWh (at Site)	Total Incentive	Total Measure Quantity
<b>Appliances</b>	1,522	\$ 570	84
Building Shell	300,513	\$ 169,349	1,230,452
Energy Kits	435,010	\$ 25,704	5,394
HVAC	22,467,498	\$ 5,571,398	27,834
Lighting	18,945,493	\$ 1,009,931	1,031,686
Water Heating	77,788	\$ 17,967	3,073
Whole Building	15,592,956	\$ 3,981,848	31,670
Transportation	13,060	\$ 1,000	10
Electronics	1,125	\$ 330	33
New Homes	3,808,641	\$ 1,209,525	5,147
<b>Grand Total</b>	<b>61,643,606</b>	<b>\$ 11,987,622</b>	

<sup>11</sup> The reported savings are gross and ex-ante. The values at generation include line losses between the customer site and the generation source.



**Table 4: Wattsmart Homes New Construction Single Family Participation**

New Construction Measures	Total kWh (at Site)	Total Incentives
<b>Single Family</b>		
Central Air Conditioner	9,873	\$ 4,650
Smart Thermostat	158,879	\$ 34,850
ENERGY STAR certification	48,720	\$ 15,225
Heat Pumps	997,542	\$ 179,000
Water Heater	18,596	\$ 7,200
HERS index <=62	2,240	\$ 3,450
HERS index 56-62	541,632	\$ 227,850
HERS index 49-55	1,845,651	\$ 666,300
HERS index <=48	185,408	\$ 71,000
<b>Total Single Family</b>	<b>3,808,641</b>	<b>\$ 1,209,525</b>

**Table 5: Wattsmart Homes Custom Multifamily Participation for Low Income and Market Rate Properties**

Custom Multifamily	Total kWh (at Site)	Total Incentives
<b>Low Income</b>	<b>4,517,266</b>	<b>\$ 1,347,221</b>
New Construction	2,302,171	\$ 690,651
Retrofit	2,215,095	\$ 656,569
<b>Market Rate</b>	<b>11,208,873</b>	<b>\$ 2,674,582</b>
New Construction	7,983,939	\$ 1,995,985
Retrofit	3,224,934	\$ 678,598
<b>Grand Total</b>	<b>15,726,139</b>	<b>\$ 4,021,803</b>

**Table 6: Low Income Weatherization Program Homes Served and Measures Installed**

Measure Type	Installed
Insulation	109
Crisis Heating & Cooling Repair and/or Replacement	24
Furnace Fan	81
Energy Education	230
Double Glass Replacement	4
Evaporative Cooler Replacement	1
LED Bulbs	219
Weatherization	88
Refrigerator Replacement	22
Refrigerator Replacement Test	6
<b>Total Number of Homes Served</b>	<b>256</b>
<b>Total kWh Savings @ Site</b>	<b>296,812</b>

**Table 7: 2021 Program Performance by Measure Category Savings for Wattsmart Business**

Measure Category	Total kWh (at Site)	Total Incentive	Bill Credits	Total Projects
Additional Measures	11,872,638	\$ 1,666,285	\$ 72,677	32
Agriculture	2,017,195	\$ 269,321		52
Building Shell	1,613,660	\$ 412,727		80
Compressed Air	11,227,772	\$ 909,045	\$ 260,365	32
Direct Install	6,024,972	\$ 1,484,318		686
Energy Management	18,928,849	\$ 378,577		93
Food Service	77,588	\$ 8,725		21
Food Service Equipment	6,911	\$ 725		3
HVAC	32,304,054	\$ 5,041,789	\$ 430,680	591
Irrigation	158,448	\$ 29,285		43
Lighting	68,624,365	\$ 8,589,005		7,479
Motors	7,509,588	\$ 691,596	\$ 67,983	54
Refrigeration	4,908,193	\$ 554,407		89
Electronics	112,983	\$ 6,160		21
Farm & Dairy	39,805	\$ 2,375		1
Energy Project Manager Co-fund	-	\$ 878,134		14
<b>Grand Total</b>	<b>165,527,021</b>	<b>\$ 20,922,474</b>	<b>\$ 831,705</b>	<b>9,291</b>

**Table 8: Wattsmart Business Savings by Sector**

Sector	Total kWh (at Site)	Total Incentive	Bill Credit	Total Projects
Commercial	136,544,313	\$ 18,263,712	\$ 430,680	8,783
Industrial	26,013,963	\$ 2,318,934	\$ 401,025	413
Irrigation	2,968,745	\$ 339,828	\$ 0	95
<b>Grand Total</b>	<b>165,527,021</b>	<b>\$ 22,922,474</b>	<b>\$ 831,705</b>	<b>9,291</b>

## LOAD CONTROL EVENTS

**Table 9: Irrigation Load Control Events**

Date	Event Times (MST)	Utah Reductions (MW)
6/14/2021	20:00 MDT - 21:00 MDT	3
6/16/2021	20:00 MDT - 21:00 MDT	3
7/7/2021	17:00 MDT - 21:00 MDT	3
7/12/2021	16:00 MDT - 20:00 MDT	3
7/21/2021	17:00 MDT - 21:00 MDT	3
7/28/2021	20:00 MDT - 21:00 MDT	4
7/29/2021	19:00 MDT - 21:00 MDT	3

**Table 10: Irrigation Load Control Program Performance**

Maximum Potential MW (at Site)	13
Maximum Potential MW (at Gen)	14
Average Realized load MW (at Site)	3
Maximum Realized load MW (at Site)	4
Total Customer Participation	31
Total Sites	131

**Table 11: Cool Keeper Load Control Events**

Date	Event Times (MST)	Utah Reductions (MW)
5/7/21	13:25 –13:30 MDT	16
5/19/21	16:14 - 16:19 MDT	9
6/14/21	18:34 - 18:45 MDT	211
7/13/21	10:04 - 10:09 MDT	82
7/17/21	12:25 - 12:44 MDT	120
7/18/21	17:17 - 17:22 MDT	220
7/25/21	19:49 - 19:54 MDT	188
7/27/21	12:24 - 13:09 MDT	103
8/2/21	13:56 - 14:01 MDT	40
8/8/21	18:39 - 18:42 MDT	174
8/9/21	16:05 - 16:21 MDT	135
8/10/21	3:04 - 3:29 MDT	30
8/12/21	16:21 - 16:24 MDT	191
8/13/21	17:47 - 17:52 MDT	215
8/20/21	2:37 - 2:42 MDT	6
8/21/21	00:24 - 00:55 MDT	21
8/24/21	14:45 - 14:50 MDT	101
8/25/21	15:15 - 15:20 MDT	123
8/25/21	15:29 - 15:34 MDT	0
8/28/21	18:03 - 18:14 MDT	117
9/4/21	10:31 - 10:53 MDT	18
9/5/21	15:46 - 16:01 MDT	96

Date	Event Times (MST)	Utah Reductions (MW)
9/13/21	13:18 - 13:23 MDT	79
9/21/21	14:58 - 15:22 MDT	13
9/28/21	15:18 - 15:23 MDT	22

**Table 12: Program Performance for Cool Keeper**

<b>Maximum Potential MW (at Site)</b>	<b>254</b>
<b>Maximum Potential MW (at Gen)</b>	270
<b>Average Realized Load MW (at Site)</b>	93
<b>Maximum Realized MW (at Site)</b>	220
<b>Total Participating Customers</b>	93,904

## 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 Utah is the UCT.

- 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.

Cost effectiveness is tested using the decrement values from the IRP for all measure categories. The Company’s approach to determining an avoided cost for energy efficiency is to compare the system cost of the preferred portfolio with and without energy efficiency where the cost difference is the value of the “decrement” or system-wide energy efficiency savings. Risk reduction and T&D adders are then added to this decrement value to determine the total avoided cost. Essentially, an avoided cost is equal to the Decrement Value + Risk Reduction adder + T&D adder.

**Table 13: 2021 Cost Effectiveness Results by Program<sup>12</sup>**

Program	Benefit/Cost Test				
	PTRC	TRC	UCT	PCT	RIM
<b>DSM Portfolio</b>	2.55	2.32	2.70	3.01	1.04
<b>Energy Efficiency Portfolio</b>	1.56	1.42	2.55	2.73	0.55
<b>Non-Residential Energy Efficiency Portfolio</b>	1.30	1.18	2.30	2.51	0.51
<b>Residential Energy Efficiency Portfolio</b>	2.24	2.04	3.30	3.15	0.62
<b>Wattsmart Homes</b>	1.64	1.49	2.51	2.77	0.49
<b>Home Energy Reporting</b>	14.32	12.93	12.93	n/a <sup>13</sup>	1.50
<b>Low Income Weatherization</b>	19.21	17.47	2.35	n/a <sup>14</sup>	0.63
<b>Wattsmart Business</b>	1.30	1.18	2.30	2.51	0.51
<b>Irrigation Load Control Program<sup>15</sup></b>	Pass	Pass	Pass	n/a	Pass
<b>AC Load Control Program<sup>16</sup></b>	Pass	Pass	Pass	n/a	Pass
<b>Wattsmart Battery Program<sup>17</sup></b>	Pass	Pass	Pass	n/a	Pass

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.

<sup>12</sup> Cost effectiveness detail is provided in Appendix B.

<sup>13</sup> Participants in the Home Energy Reporting Program do not incur costs; therefore, N/A is appropriate for the PCT.

<sup>14</sup> Participants in the Low-Income Weatherization Program do not incur costs; therefore N/A is appropriate for the PCT.

<sup>15</sup> Avoided costs are considered confidential on load control programs. Cost effectiveness ratios and inputs will be available under a protective agreement. A “Pass” designation equates to a benefit cost ratio of 1.0 or better.

<sup>16</sup> Avoided costs are considered confidential on load control programs. Cost effectiveness ratios and inputs will be available under a protective agreement. A “Pass” designation equates to a benefit cost ratio of 1.0 or better.

<sup>17</sup> Avoided costs are considered confidential on load control programs. Cost effectiveness ratios and inputs will be available under a protective agreement. A “Pass” designation equates to a benefit cost ratio of 1.0 or better.

## EVALUATIONS

Evaluations are performed by independent external evaluators to validate energy and demand savings derived from the Company’s energy efficiency programs. Industry best practices are adopted by the Company with regards to principles of operation, methodologies, evaluation methods, and protocols including those outlined in the National Action Plan for Energy Efficiency Program Impact Evaluation and the California Evaluation Framework guides.

A component of the overall evaluation efforts is aimed at the reasonable verification of installations of energy efficient measures and associated documentation through review of documentation, surveys and/or ongoing onsite inspections.

Verification of the potential to achieve savings involves regular inspection and commissioning of equipment. The Company engages in programmatic verification activities, including inspections, quality assurance reviews, and tracking checks and balances as part of routine program implementation and may rely upon these practices in the verification of installation information for the purposes of savings verifications in advance of more formal impact evaluation results.

Evaluation, measurement, and verification tasks are segregated within the Company organization to ensure they are performed and managed by personnel who are not directly responsible for program management.

Information on evaluation activities completed or in progress during 2021 is summarized in the chart below. Completed evaluation reports are available at the following link, under the “Reports and program evaluations by state” section:

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

**Table 14: 2021 Evaluation Activities**

Evaluation	Responsible Consultant	Status	Published
2019-2020 Wattsmart Homes Evaluation	ADM	Completed	2021
2018-2019 Wattsmart Business Evaluation	Cadmus	Completed	2021
2020-2021 Wattsmart Business Evaluation	Cadmus	In-process	N/A
2020-2025 Residential Evaluation	ADM	In-Process	N/A



## Appendix A

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# Report Requirements

Report requirements were revised and approved pursuant to the Commission’s Order issued February 16, 2017, in Docket No. 17-035-04, effective February 17, 2017. Additional Report commitments were made in Docket No. 19-035-22 and agreed to be added to this Appendix in Docket No. 20-035-27.

<b>Requirement No.</b>	<b>Description</b>	<b>Report Reference</b>
1.	The Company will file the Annual Report between May 1 and June 1.	See issuance date on Page 1. Extension request submitted May 31.
2.	The Company shall report Class 1 capacity reduction, estimated Class 2 megawatt savings during system peak, and Class 2 megawatt-hour savings achieved, all compared against the Integrated Resource Plan targets and forecast targets submitted in the applicable DSM November 1 <sup>st</sup> Deferred Account and Forecast Report. <sup>1</sup>	Table 1
3.	In the executive summary, include the lifetime megawatt-hour savings in addition to first year megawatt-hour savings.	Pages 3-4
4.	The Company shall clearly state for each program and measure whether all reported savings are ex-post or ex-ante.	Referenced throughout report
5.	The Company shall accurately and clearly report all cost effectiveness test results at the portfolio and sector level in addition to the program and measure category levels.	Appendix B
6.	The Company shall perform cost effectiveness tests using avoided costs from planned assumptions.	Appendix B
7.	The Company shall provide cost effectiveness results with associated decrement values and program expenditures for the year’s performance of the Company’s Class 1 programs, subject to the confidentiality requirements of Utah Administrative Code R746-100-16.	Confidential Appendix C
8.	For Class 1 programs, capacity reduction will be reported in megawatts.	Peak Reduction section and Tables 1, 2, and 9-12
9.	The Company shall provide Class 1 program data regarding loads available for curtailment, actual curtailment achieved, and program expenditures.	Peak Reduction section and Tables 10 and 12
10.	The Company shall include published evaluations that have not previously been provided in an Annual Report, and also include a schedule of current and upcoming evaluations.	Evaluations section

<sup>1</sup> Pursuant to the Phase I Stipulation filed August 3, 2009, in Docket No. 09-035-T08, and approved in the order dated August 25, 2009, in the same, the Company must provide a forecast of expenditures for approved programs and their acquisition targets for the next calendar year by November 1<sup>st</sup> of each year.



11.	The Company shall submit process and impact evaluation and annual reporting costs at the sector level for the cost effectiveness tests.	Table 2
12.	Explain the relationship between decrement values and avoided costs used in cost-effectiveness, if applicable.	Cost Effectiveness section on page 19
13.	Provide an explanation for any reported program savings that are significantly below the forecast savings targets from the applicable November 1 <sup>st</sup> Deferred Account and Forecast Report.	N/A in 2021
14.	Explain the Home Energy Report incremental savings row within the 'Forecast to Actual Savings Comparison' table.	Footnote 10



## Appendix B

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### Cost Effectiveness



## MEMORANDUM

To: Alesha Mander, PacifiCorp  
From: Andrew Cottrell, Andy Hudson, Dylan Royalty, AEG  
Date: June 3, 2022  
Re: PacifiCorp Utah Portfolio and Sector Level Cost-Effectiveness Results – PY2021

AEG estimated the cost-effectiveness of PacifiCorp’s overall energy efficiency portfolio in the state of Utah 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 passes the following cost effectiveness tests: PacifiCorp Total Resource Cost Test (PTRC), Total Resource Cost Test (TRC), 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 Load Control Programs)

Table 5: 2021 Total Portfolio Cost-Effectiveness Results (Without Load Control Programs)

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

Table 7: 2021 Residential Energy Efficiency Sector 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 Utah 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 Table 1 below.

Tables 1 and 2 below summarize cost-effectiveness assumptions for the PacifiCorp Utah 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	5.86%
Commercial Line Loss	4.10%
Industrial Line Loss	6.34%
Irrigation Line Loss	6.36%
Residential Energy Rate* (\$/kWh)	\$0.1068
Commercial Energy Rate* (\$/kWh)	\$0.0809
Industrial Energy Rate* (\$/kWh)	\$0.0568
Irrigation Energy Rate* (\$/kWh)	\$0.0728
Inflation Rate	2.28%

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

Portfolio Level Expense	Cost
Outreach and Communications	\$1,246,711
Portfolio - EM&V Non-Residential	\$363,467
Portfolio - EM&V Residential	\$138,939
Portfolio - DSM Central	\$228,237
Portfolio Potential Study	\$5,990
Portfolio TRL	\$13,397
Portfolio Training	\$0
<b>Total</b>	<b>\$1,996,741</b>

Tables 3 through 7 present the cost-effectiveness results at the portfolio and sector levels.

Table 3: Benefit/Cost Ratios by Portfolio Type

Cost-Effectiveness Test	PTRC	TRC	UCT	PCT	RIM
Total Portfolio (Including Load Control Programs)	2.55	2.32	2.70	3.01	1.04
Total Portfolio	1.56	1.42	2.55	2.73	0.55
C&I Programs	1.30	1.18	2.30	2.51	0.51
Residential Programs	2.24	2.04	3.30	3.15	0.62

<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 Load Control Programs)

Cost-Effectiveness Test	Levelized \$/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.0753	\$146,930,934	\$375,144,808	\$228,213,874	2.55
Total Resource Cost Test (TRC) No Adder	\$0.0753	\$146,930,934	\$341,040,735	\$194,109,801	2.32
Utility Cost Test (UCT)	\$0.0648	\$126,377,133	\$341,040,735	\$214,663,602	2.70
Participant Cost Test (PCT)		\$86,254,017	\$259,291,367	\$173,037,350	3.01
Rate Impact Test (RIM)		\$328,799,327	\$341,040,735	\$12,241,407	1.04
Lifecycle Revenue Impacts (\$/kWh)					\$0.0008768
Discounted Participant Payback (years)					3.14

Table 5: 2021 Total Portfolio Cost-Effectiveness Results (Without Load Control Programs)

Cost-Effectiveness Test	Levelized \$/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.0512	\$99,910,644	\$155,625,861	\$55,715,217	1.56
Total Resource Cost Test (TRC) No Adder	\$0.0512	\$99,910,644	\$141,478,055	\$41,567,411	1.42
Utility Cost Test (UCT)	\$0.0284	\$55,436,672	\$141,478,055	\$86,041,383	2.55
Participant Cost Test (PCT)		\$86,254,017	\$235,371,196	\$149,117,180	2.73
Rate Impact Test (RIM)		\$257,858,867	\$141,478,055	-\$116,380,812	0.55
Lifecycle Revenue Impacts (\$/kWh)					\$0.0006876
Discounted Participant Payback (years)					3.14

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	\$0.0486	\$67,687,467	\$87,938,422	\$20,250,955	1.30
Total Resource Cost Test (TRC) No Adder	\$0.0486	\$67,687,467	\$79,944,020	\$12,256,553	1.18
Utility Cost Test (UCT)	\$0.0250	\$34,766,566	\$79,944,020	\$45,177,454	2.30
Participant Cost Test (PCT)		\$56,621,217	\$141,986,708	\$85,365,492	2.51
Rate Impact Test (RIM)		\$155,909,026	\$79,944,020	-\$75,965,005	0.51
Lifecycle Revenue Impacts (\$/kWh)					\$0.0006204
Discounted Participant Payback (years)					5.01



Table 7: 2021 Residential Energy Efficiency Sector Cost-Effectiveness Results

<b>Cost-Effectiveness Test</b>	<b>Levelized \$/kWh</b>	<b>NPV Costs</b>	<b>NPV Benefits</b>	<b>Net Benefits</b>	<b>Benefit/Cost Ratio</b>
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.0545	\$30,226,436	\$67,687,438	\$37,461,002	2.24
Total Resource Cost Test (TRC) No Adder	\$0.0545	\$30,226,436	\$61,534,035	\$31,307,599	2.04
Utility Cost Test (UCT)	\$0.0337	\$18,673,365	\$61,534,035	\$42,860,670	3.30
Participant Cost Test (PCT)		\$29,632,800	\$93,384,488	\$63,751,688	3.15
Rate Impact Test (RIM)		\$99,953,100	\$61,534,035	-\$38,419,065	0.62
Lifecycle Revenue Impacts (\$/kWh)					\$0.0002665
Discounted Participant Payback (years)					1.83



## MEMORANDUM

To: Alesha Mander, PacifiCorp  
From: Andrew Cottrell, Andy Hudson, Dylan Royalty, AEG  
Date: June 3, 2022  
Re: PacifiCorp Utah Wattsmart Homes Cost-Effectiveness Results – PY2021

AEG estimated the cost-effectiveness of PacifiCorp's overall energy efficiency portfolio in the state of Utah based on Program Year (PY) 2021 costs and savings estimates provided by PacifiCorp. This memo provides cost-effectiveness results for the Wattsmart Homes program. The portfolio passes the following cost effectiveness tests: PacifiCorp Total Resource Cost Test (PTRC), Total Resource Cost Test (TRC), 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 Homes Annual Program Costs, Nominal - PY2021

Table 3: 2021 Wattsmart Homes Savings kWh Savings by Measure Category

Table 4: 2021 Benefit/Cost Ratios by Measure Category

Table 5: 2021 Wattsmart Program Cost-Effectiveness Results

Table 6: 2021 Appliances Cost-Effectiveness Results - (Load Shape - Residential\_ERWH\_7P)

Table 7: 2021 Building Shell Cost-Effectiveness Results - (Load Shape - UT\_Single Family\_Cooling)

Table 8: 2021 Energy Kits Cost-Effectiveness Results - (Load Shape - Residential\_ERWH\_7P)

Table 9: 2021 HVAC Cost-Effectiveness Results - (Load Shape - UT\_Single Family\_Cooling)

Table 10: 2021 Lighting Cost-Effectiveness Results - (Load Shape - Residential\_LIGHTING\_7P)

Table 11: 2021 Water Heating Cost-Effectiveness Results - (Load Shape - Residential\_HPWH\_7P)

Table 12: 2021 Whole Building Cost-Effectiveness Results - (Load Shape - UT\_Single Family\_Cooling)



Table 13: 2021 Transportation Cost-Effectiveness Results - (Load Shape - UT\_Single\_Family\_Heating)

Table 14: 2021 Electronics Cost-Effectiveness Results - (Load Shape - UT\_Single\_Family\_Plug)

Table 15: 2021 New Homes Cost-Effectiveness Results - (Load Shape - UT\_Single\_Family\_Cooling)

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 Utah 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 Table 1 below.

Tables 1 and 2 below summarize cost-effectiveness assumptions for the Wattsmart Homes 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%
Residential Line Loss	5.86%
Residential Energy Rate (\$/kWh)	\$0.1068
Inflation Rate	2.28%





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

Measure Category	Program Delivery	Utility Admin	Program Development	Incentives	Total Utility Budget	Gross Customer Costs
Appliances	\$244	\$5	\$0	\$570	\$819	\$1,448
Building Shell	\$49,725	\$993	\$41	\$169,349	\$220,108	\$1,021,658
Energy Kits	\$34,150	\$1,405	\$60	\$25,704	\$61,319	\$21,591
HVAC	\$124,629	\$73,343	\$3,074	\$5,571,398	\$5,772,444	\$5,613,835
Lighting	\$698,097	\$65,394	\$2,592	\$1,009,931	\$1,776,014	\$473,845
Water Heating	\$14,924	\$286	\$11	\$17,967	\$33,187	\$19,737
Whole Building	\$3,247,434	\$60,978	\$2,134	\$3,981,848	\$7,292,393	\$10,435,667
Transportation	\$2,090	\$42	\$2	\$1,000	\$3,134	\$1,881
Electronics	\$180	\$4	\$0	\$330	\$514	\$370
New Homes	\$750,691	\$12,298	\$521	\$1,209,525	\$1,973,035	\$6,067,792
<b>Total</b>	<b>\$4,922,165</b>	<b>\$214,747</b>	<b>\$8,435</b>	<b>\$11,987,622</b>	<b>\$17,132,968</b>	<b>\$23,657,824</b>

Tables 3 through 15 present the savings and cost-effectiveness results at the program and measure category levels.

Table 3: 2021 Wattsmart Homes 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	1,522	100%	1,522	75%	1,140	13
Building Shell	300,513	100%	300,513	75%	225,385	42
Energy Kits	435,010	63%	274,056	84%	230,207	11
HVAC	22,467,498	100%	22,467,498	67%	15,053,224	13
Lighting	18,945,493	75%	14,209,120	69%	9,804,293	13
Water Heating	77,788	33%	25,670	100%	25,670	11
Whole Building	15,592,956	100%	15,592,956	80%	12,474,364	16
Transportation	13,060	100%	13,060	100%	13,060	7
Electronics	1,125	100%	1,125	80%	900	5
New Homes	3,808,641	100%	3,808,641	99%	3,781,899	44
<b>Total Program</b>	<b>61,643,606</b>	<b>92%</b>	<b>56,694,161</b>	<b>73%</b>	<b>41,610,142</b>	<b>16</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	0.40	0.37	0.76	1.19	0.24
Building Shell	0.37	0.33	1.62	0.59	0.42
Energy Kits	2.06	1.88	1.75	11.13	0.33
HVAC	3.14	2.86	2.88	3.72	0.53
Lighting	4.98	4.53	3.16	25.03	0.31
Water Heating	0.37	0.34	0.36	2.23	0.20
Whole Building	1.15	1.04	1.96	1.80	0.53
Transportation	0.92	0.84	1.08	5.09	0.29
Electronics	0.44	0.40	0.43	1.91	0.21
New Homes	0.97	0.88	3.05	1.51	0.60
<b>Total</b>	<b>1.64</b>	<b>1.49</b>	<b>2.51</b>	<b>2.77</b>	<b>0.49</b>

Table 5: 2021 Wattsmart Homes 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	\$0.0646	\$28,803,171	\$47,358,838	\$18,555,667	1.64
Total Resource Cost Test (TRC) No Adder	\$0.0646	\$28,803,171	\$43,053,489	\$14,250,318	1.49
Utility Cost Test (UCT)	\$0.0384	\$17,132,968	\$43,053,489	\$25,920,521	2.51
Participant Cost Test (PCT)		\$29,632,800	\$82,223,291	\$52,590,491	2.77
Rate Impact Test (RIM)		\$87,368,638	\$43,053,489	-\$44,315,149	0.49
Lifecycle Revenue Impacts (\$/kWh)					\$0.0002330
Discounted Participant Payback (years)					5.42

Table 6: 2021 Appliances Cost-Effectiveness Results- (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	\$0.1497	\$1,696	\$682	-\$1,014	0.40
Total Resource Cost Test (TRC) No Adder	\$0.1497	\$1,696	\$620	-\$1,076	0.37
Utility Cost Test (UCT)	\$0.0722	\$819	\$620	-\$199	0.76
Participant Cost Test (PCT)		\$1,934	\$2,303	\$370	1.19
Rate Impact Test (RIM)		\$2,552	\$620	-\$1,932	0.24
Lifecycle Revenue Impacts (\$/kWh)					\$0.0000000
Discounted Participant Payback (years)					11.05



Table 7: 2021 Building Shell Cost-Effectiveness Results - (Load Shape - UT\_Single Family\_Cooling)

Cost-Effectiveness Test	Levelized \$/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.3083	\$1,072,418	\$392,860	-\$679,557	0.37
Total Resource Cost Test (TRC) No Adder	\$0.3083	\$1,072,418	\$357,146	-\$715,272	0.33
Utility Cost Test (UCT)	\$0.0633	\$220,108	\$357,146	\$137,037	1.62
Participant Cost Test (PCT)		\$1,362,210	\$799,153	-\$563,057	0.59
Rate Impact Test (RIM)		\$849,913	\$357,146	-\$492,767	0.42
Lifecycle Revenue Impacts (\$/kWh)					\$0.0000023
Discounted Participant Payback (years)					71.93

Table 8: 2021 Energy Kits Cost-Effectiveness Results - (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	\$0.0292	\$57,206	\$118,057	\$60,851	2.06
Total Resource Cost Test (TRC) No Adder	\$0.0292	\$57,206	\$107,324	\$50,119	1.88
Utility Cost Test (UCT)	\$0.0313	\$61,319	\$107,324	\$46,006	1.75
Participant Cost Test (PCT)		\$25,704	\$286,157	\$260,453	11.13
Rate Impact Test (RIM)		\$321,771	\$107,324	-\$214,447	0.33
Lifecycle Revenue Impacts (\$/kWh)					\$0.0000017
Discounted Participant Payback (years)					0.97

Table 9: 2021 HVAC Cost-Effectiveness Results - (Load Shape - UT\_Single Family\_Cooling)

Cost-Effectiveness Test	Levelized \$/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.0388	\$5,814,881	\$18,281,302	\$12,466,420	3.14
Total Resource Cost Test (TRC) No Adder	\$0.0388	\$5,814,881	\$16,619,365	\$10,804,484	2.86
Utility Cost Test (UCT)	\$0.0386	\$5,772,444	\$16,619,365	\$10,846,921	2.88
Participant Cost Test (PCT)		\$8,378,858	\$31,153,369	\$22,774,511	3.72
Rate Impact Test (RIM)		\$31,354,415	\$16,619,365	-\$14,735,050	0.53
Lifecycle Revenue Impacts (\$/kWh)					\$0.0001409
Discounted Participant Payback (years)					3.53



Table 10: 2021 Lighting Cost-Effectiveness Results - (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	\$0.0127	\$1,239,928	\$6,180,431	\$4,940,504	4.98
Total Resource Cost Test (TRC) No Adder	\$0.0127	\$1,239,928	\$5,618,574	\$4,378,646	4.53
Utility Cost Test (UCT)	\$0.0182	\$1,776,014	\$5,618,574	\$3,842,560	3.16
Participant Cost Test (PCT)		\$686,731	\$17,188,737	\$16,502,006	25.03
Rate Impact Test (RIM)		\$17,954,820	\$5,618,574	-\$12,336,246	0.31
Lifecycle Revenue Impacts (\$/kWh)					\$0.0000807
Discounted Participant Payback (years)					0.52

Table 11: 2021 Water Heating Cost-Effectiveness Results - (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	\$0.1508	\$34,958	\$12,984	-\$21,973	0.37
Total Resource Cost Test (TRC) No Adder	\$0.1508	\$34,958	\$11,804	-\$23,154	0.34
Utility Cost Test (UCT)	\$0.1432	\$33,187	\$11,804	-\$21,383	0.36
Participant Cost Test (PCT)		\$19,737	\$44,046	\$24,308	2.23
Rate Impact Test (RIM)		\$59,266	\$11,804	-\$47,462	0.20
Lifecycle Revenue Impacts (\$/kWh)					\$0.0000003
Discounted Participant Payback (years)					5.07

Table 12: 2021 Whole Building Cost-Effectiveness Results - (Load Shape - UT\_Single\_Family\_Cooling)

Cost-Effectiveness Test	Levelized \$/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.1025	\$13,746,213	\$15,753,146	\$2,006,934	1.15
Total Resource Cost Test (TRC) No Adder	\$0.1025	\$13,746,213	\$14,321,042	\$574,829	1.04
Utility Cost Test (UCT)	\$0.0544	\$7,292,393	\$14,321,042	\$7,028,649	1.96
Participant Cost Test (PCT)		\$13,044,584	\$23,487,161	\$10,442,577	1.80
Rate Impact Test (RIM)		\$26,797,707	\$14,321,042	-\$12,476,665	0.53
Lifecycle Revenue Impacts (\$/kWh)					\$0.0001106
Discounted Participant Payback (years)					8.63



Table 13: 2021 Transportation Cost-Effectiveness Results - (Load Shape - UT\_Single\_Family\_Heating)

Cost-Effectiveness Test	Levelized \$/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.0503	\$4,016	\$3,707	-\$309	0.92
Total Resource Cost Test (TRC) No Adder	\$0.0503	\$4,016	\$3,370	-\$646	0.84
Utility Cost Test (UCT)	\$0.0392	\$3,134	\$3,370	\$235	1.08
Participant Cost Test (PCT)		\$1,881	\$9,581	\$7,699	5.09
Rate Impact Test (RIM)		\$11,715	\$3,370	-\$8,345	0.29
Lifecycle Revenue Impacts (\$/kWh)					\$0.0000001
Discounted Participant Payback (years)					1.37

Table 14: 2021 Electronics Cost-Effectiveness Results - (Load Shape - UT\_Single\_Family\_Plug)

Cost-Effectiveness Test	Levelized \$/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.1322	\$554	\$242	-\$311	0.44
Total Resource Cost Test (TRC) No Adder	\$0.1322	\$554	\$220	-\$333	0.40
Utility Cost Test (UCT)	\$0.1227	\$514	\$220	-\$293	0.43
Participant Cost Test (PCT)		\$462	\$881	\$419	1.91
Rate Impact Test (RIM)		\$1,065	\$220	-\$844	0.21
Lifecycle Revenue Impacts (\$/kWh)					\$0.0000000
Discounted Participant Payback (years)					2.62

Table 15: 2021 New Homes Cost-Effectiveness Results - (Load Shape - UT\_Single\_Family\_Cooling)

Cost-Effectiveness Test	Levelized \$/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.1166	\$6,831,302	\$6,615,426	-\$215,876	0.97
Total Resource Cost Test (TRC) No Adder	\$0.1166	\$6,831,302	\$6,014,024	-\$817,278	0.88
Utility Cost Test (UCT)	\$0.0337	\$1,973,035	\$6,014,024	\$4,040,989	3.05
Participant Cost Test (PCT)		\$6,110,698	\$9,251,904	\$3,141,206	1.51
Rate Impact Test (RIM)		\$10,015,414	\$6,014,024	-\$4,001,390	0.60
Lifecycle Revenue Impacts (\$/kWh)					\$0.0000267
Discounted Participant Payback (years)					29.02



## MEMORANDUM

To: Alesha Mander, PacifiCorp  
From: Andrew Cottrell, Andy Hudson, Dylan Royalty, AEG  
Date: June 3, 2022  
Re: PacifiCorp Utah Home Energy Reporting Cost-Effectiveness Results – PY2021

AEG estimated the cost-effectiveness of PacifiCorp's overall energy efficiency portfolio in the state of Utah 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 - (Load Shape - UT\_Single\_Family\_Cooling)

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 Utah 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 Table 1 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	5.86%
Residential Energy Rate (\$/kWh)	\$0.1068
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
Home Energy Reports	\$855,000	\$386,234	\$163,777	\$0	\$1,405,011
<b>Total</b>	<b>\$855,000</b>	<b>\$386,234</b>	<b>\$163,777</b>	<b>\$0</b>	<b>\$1,405,011</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	99,934,969	100%	99,934,969	100%	99,934,969	1
<b>Total Program</b>	<b>99,934,969</b>	<b>100%</b>	<b>99,934,969</b>	<b>100%</b>	<b>99,934,969</b>	<b>1</b>

Table 4: 2021 Home Energy Reporting Program Cost-Effectiveness Results - (Load Shape - UT\_Single\_Family\_Cooling)

Cost-Effectiveness Test	Levelized \$/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.0133	\$1,405,011	\$19,977,885	\$18,572,874	14.22
Total Resource Cost Test (TRC) No Adder	\$0.0133	\$1,405,011	\$18,161,714	\$16,756,703	12.93
Utility Cost Test (UCT)	\$0.0133	\$1,405,011	\$18,161,714	\$16,756,703	12.93
Participant Cost Test (PCT)		\$0	\$10,673,055	\$10,673,055	n/a
Rate Impact Test (RIM)		\$12,078,065	\$18,161,714	\$6,083,648	1.50
Lifecycle Revenue Impacts (\$/kWh)					\$0.0005442

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



## MEMORANDUM

To: Alesha Mander, PacifiCorp  
From: Andrew Cottrell, Andy Hudson, Dylan Royalty, AEG  
Date: June 3, 2022  
Re: PacifiCorp Utah Low-Income Weatherization Cost-Effectiveness Results – PY2021

AEG estimated the cost-effectiveness of PacifiCorp's overall energy efficiency portfolio in the state of Utah 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 Total Resource Cost Test (PTRC), the Total Resource Cost Test (TRC), and the Utility Cost Test (UCT).

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 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 Utah 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 Table 1 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. Tables 3 and 4 present the savings and cost-effectiveness results at the program and measure category levels.





Table 1: Cost-Effectiveness Analysis Inputs

Parameter	PY2021
Discount Rate	6.92%
Residential Line Loss	5.86%
Residential Energy Rate (\$/kWh)	\$0.1068
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	\$12,385	\$5,133	\$737	\$117,132	\$135,386	\$0
<b>Total Program</b>	<b>\$12,385</b>	<b>\$5,133</b>	<b>\$737</b>	<b>\$117,132</b>	<b>\$135,386</b>	<b>\$0</b>

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	296,812	82%	<b>241,902</b>	<b>100%</b>	<b>241,902</b>	21
<b>Total Program</b>	<b>296,812</b>	<b>82%</b>	<b>241,902</b>	<b>100%</b>	<b>241,902</b>	<b>21</b>

Table 4: 2021 Low-Income Weatherization 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	\$0.0060	\$18,254	\$350,715	\$332,461	19.21
Total Resource Cost Test (TRC) No Adder	\$0.0060	\$18,254	\$318,832	\$300,578	17.47
Utility Cost Test (UCT)	\$0.0444	\$135,386	\$318,832	\$183,446	2.35
Participant Cost Test (PCT)		\$0	\$488,142	\$488,142	n/a
Rate Impact Test (RIM)		\$506,396	\$318,832	(\$187,564)	0.63
Lifecycle Revenue Impacts (\$/kWh)					\$0.0000017

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



## MEMORANDUM

To: Alesha Mander, PacifiCorp  
From: Andrew Cottrell, Andy Hudson, Dylan Royalty, AEG  
Date: June 3, 2022  
Re: PacifiCorp Utah Wattsmart Business Program Cost-Effectiveness Results – PY2021

AEG estimated the cost-effectiveness of PacifiCorp’s overall energy efficiency portfolio in the state of Utah 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: PacifiCorp Total Resource Cost Test (PTRC), Total Resource Cost Test (TRC), 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
- Table 7: 2021 Compressed Air Cost-Effectiveness Results
- Table 8: 2021 Energy Management Cost-Effectiveness Results
- Table 9: 2021 HVAC Cost-Effectiveness Results
- Table 10: 2021 Irrigation Cost-Effectiveness Results
- Table 11: 2021 Lighting Cost-Effectiveness Results
- Table 12: 2021 Motors Cost-Effectiveness Results



Table 13: 2021 Refrigeration Cost-Effectiveness Results

Table 14: 2021 Energy Project Manager Co-Fund Cost-Effectiveness Results

Table 15: 2021 Irrigation Cost-Effectiveness Results

Table 16: 2021 Lighting Cost-Effectiveness Results

Table 17: 2021 Motors Cost-Effectiveness Results

Table 18: 2021 Refrigeration Cost-Effectiveness Results

Table 19: 2021 Farm & Dairy Cost-Effectiveness Results

Table 20: 2021 Energy Project Manager Co-fund 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 Utah 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 Table 1 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	4.10%
Industrial Line Loss	6.34%
Irrigation Line Loss	6.36%
Commercial Energy Rate (\$/kWh)	\$0.0809
Industrial Energy Rate (\$/kWh)	\$0.0568
Irrigation Energy Rate (\$/kWh)	\$0.0728
Inflation Rate	2.28%



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

Measure Category	Program Delivery	Utility Admin	Bill Credits	Program Development	Incentives	Total Utility Budget	Gross Customer Costs
Additional Measures	\$876,900	\$43,956	\$72,677	\$21,541	\$1,666,285	\$2,681,359	\$3,368,262
Agriculture	\$263,503	\$25	\$0	\$3,511	\$255,960	\$522,999	\$571,939
Building Shell	\$134,135	\$5,500	\$0	\$2,928	\$412,727	\$555,289	\$1,383,838
Compressed Air	\$838,210	\$57,592	\$260,365	\$20,371	\$909,045	\$2,085,583	\$1,930,424
Direct Install	\$112,063	\$17,600	\$0	\$10,931	\$1,484,318	\$1,624,913	\$445,295
Energy Management	\$1,355,741	\$73,700	\$0	\$34,343	\$378,577	\$1,842,361	\$472,949
Food Service	\$8,746	\$236	\$0	\$141	\$8,725	\$17,848	\$26,959
Food Service Equipment	\$680	\$22	\$0	\$13	\$725	\$1,440	\$305
HVAC	\$2,538,886	\$109,902	\$430,680	\$58,610	\$5,041,789	\$8,179,867	\$13,450,611
Irrigation	\$30,376	\$7,740	\$0	\$469	\$29,285	\$67,869	\$77,279
Lighting	\$5,061,469	\$225,826	\$0	\$123,201	\$8,524,140	\$13,934,636	\$27,853,234
Motors	\$561,970	\$37,313	\$67,983	\$13,625	\$691,596	\$1,372,487	\$1,990,310
Refrigeration	\$399,487	\$16,669	\$0	\$8,905	\$554,407	\$979,469	\$2,175,265
Electronics	\$8,309	\$400	\$0	\$205	\$6,160	\$15,074	\$13,622
Farm & Dairy	\$4,678	\$113	\$0	\$72	\$2,375	\$7,239	\$4,859
Energy Project Manager Co-fund	\$0	\$0	\$0	\$0	\$878,134	\$878,134	\$0
<b>Total:</b>	<b>\$12,195,155</b>	<b>\$596,594</b>	<b>\$831,705</b>	<b>\$298,863</b>	<b>\$20,844,249</b>	<b>\$34,766,566</b>	<b>\$53,765,150</b>

Tables 3 through 20 present the savings and cost-effectiveness results at the program and measure category levels.

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



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
Additional Measures	11,873	87%	10,329	87%	8,986	13
Agriculture	1,935	100%	1,935	100%	1,935	15
Building Shell	1,614	87%	1,405	87%	1,224	17
Compressed Air	11,228	100%	11,228	100%	11,228	13
Direct Install	6,025	90%	5,422	90%	4,880	14
Energy Management	18,929	98%	18,475	98%	18,031	4
Food Service	78	88%	68	88%	60	13
Food Service Equipment	7	87%	6	87%	5	9
HVAC	32,304	87%	28,160	87%	24,548	14
Irrigation	258	100%	258	100%	258	11
Lighting	67,905	100%	67,899	100%	67,892	14
Motors	7,510	100%	7,480	100%	7,450	15
Refrigeration	4,908	96%	4,711	96%	4,521	15
Electronics	113	93%	105	93%	97	5
Farm & Dairy	40	93%	37	93%	34	15
Energy Project Manager Co-fund	0	0%	0	0%	0	0
<b>Total:</b>	<b>164,726</b>	<b>96%</b>	<b>157,518</b>	<b>96%</b>	<b>151,150</b>	<b>13</b>



Table 4: 2021 Benefit/Cost Ratios by Measure Category

Cost-Effectiveness Test	PTRC	TRC	UCT	PCT	RIM
Additional Measures	1.27	1.15	1.89	2.66	0.45
Agriculture	1.85	1.68	2.69	3.21	0.67
Building Shell	0.73	0.67	1.83	1.13	0.53
Compressed Air	2.46	2.24	3.34	4.25	0.74
Direct Install	4.82	4.38	1.58	12.35	0.41
Energy Management	2.30	2.09	2.20	11.66	0.57
Food Service	1.07	0.97	1.97	2.15	0.47
Food Service Equipment	2.29	2.08	1.47	12.61	0.41
HVAC	1.02	0.93	1.88	1.96	0.46
Irrigation	1.42	1.29	2.20	2.57	0.63
Lighting	1.18	1.07	2.56	2.36	0.50
Motors	1.99	1.81	3.52	3.00	0.72
Refrigeration	1.17	1.06	2.82	2.09	0.54
Electronics	1.16	1.05	1.58	3.05	0.44
Farm & Dairy	2.38	2.16	2.91	6.87	0.52
Energy Project Manager Co-fund	0.00	0.00	0.00	0.00	0.00
<b>Total Program</b>	<b>1.30</b>	<b>1.18</b>	<b>2.30</b>	<b>2.51</b>	<b>0.51</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	\$0.0486	\$67,687,467	\$87,938,422	\$20,250,955	1.30
Total Resource Cost Test (TRC) No Adder	\$0.0486	\$67,687,467	\$79,944,020	\$12,256,553	1.18
Utility Cost Test (UCT)	\$0.0250	\$34,766,566	\$79,944,020	\$45,177,454	2.30
Participant Cost Test (PCT)		\$56,621,217	\$141,986,708	\$85,365,492	2.51
Rate Impact Test (RIM)		\$155,909,026	\$79,944,020	(\$75,965,005)	0.51
Lifecycle Revenue Impacts (\$/kWh)					\$0.0006204



Table 6: 2021 Additional Measures Cost-Effectiveness Results

Cost-Effectiveness Test	Levelized \$/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.0498	\$4,383,336	\$5,565,814	\$1,182,478	1.27
Total Resource Cost Test (TRC) No Adder	\$0.0498	\$4,383,336	\$5,059,831	\$676,495	1.15
Utility Cost Test (UCT)	\$0.0304	\$2,681,359	\$5,059,831	\$2,378,471	1.89
Participant Cost Test (PCT)		\$3,871,566	\$10,305,626	\$6,434,060	2.66
Rate Impact Test (RIM)		\$11,320,700	\$5,059,831	(\$6,260,869)	0.45
Lifecycle Revenue Impacts (\$/kWh)					\$0.0000509

Table 7: 2021 Agriculture Cost-Effectiveness Results

Cost-Effectiveness Test	Levelized \$/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.0095	\$838,978	\$1,547,963	\$708,985	1.85
Total Resource Cost Test (TRC) No Adder	\$0.0095	\$838,978	\$1,407,239	\$568,261	1.68
Utility Cost Test (UCT)	\$0.0059	\$522,999	\$1,407,239	\$884,240	2.69
Participant Cost Test (PCT)		\$571,939	\$1,834,295	\$1,262,356	3.21
Rate Impact Test (RIM)		\$2,101,335	\$1,407,239	(\$694,096)	0.67
Lifecycle Revenue Impacts (\$/kWh)					\$0.0000090

Table 8: 2021 Building Shell Cost-Effectiveness Results

Cost-Effectiveness Test	Levelized \$/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.0173	\$1,526,400	\$1,119,705	(\$406,695)	0.73
Total Resource Cost Test (TRC) No Adder	\$0.0173	\$1,526,400	\$1,017,914	(\$508,487)	0.67
Utility Cost Test (UCT)	\$0.0063	\$555,289	\$1,017,914	\$462,624	1.83
Participant Cost Test (PCT)		\$1,589,074	\$1,791,534	\$202,460	1.13
Rate Impact Test (RIM)		\$1,934,096	\$1,017,914	(\$916,182)	0.53
Lifecycle Revenue Impacts (\$/kWh)					\$0.0000077



Table 9: 2021 Compressed Air Cost-Effectiveness Results

Cost-Effectiveness Test	Levelized \$/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.0353	\$3,106,961	\$7,651,591	\$4,544,630	2.46
Total Resource Cost Test (TRC) No Adder	\$0.0353	\$3,106,961	\$6,955,991	\$3,849,030	2.24
Utility Cost Test (UCT)	\$0.0237	\$2,085,583	\$6,955,991	\$4,870,409	3.34
Participant Cost Test (PCT)		\$1,930,424	\$8,197,868	\$6,267,445	4.25
Rate Impact Test (RIM)		\$9,374,406	\$6,955,991	(\$2,418,414)	0.74
Lifecycle Revenue Impacts (\$/kWh)					\$0.0000421

Table 10: 2021 Direct Install Cost-Effectiveness Results

Cost-Effectiveness Test	Levelized \$/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.0067	\$585,889	\$2,821,337	\$2,235,448	4.82
Total Resource Cost Test (TRC) No Adder	\$0.0067	\$585,889	\$2,564,852	\$1,978,963	4.38
Utility Cost Test (UCT)	\$0.0184	\$1,624,913	\$2,564,852	\$939,939	1.58
Participant Cost Test (PCT)		\$494,772	\$6,111,795	\$5,617,023	12.35
Rate Impact Test (RIM)		\$6,252,390	\$2,564,852	(\$3,687,537)	0.41
Lifecycle Revenue Impacts (\$/kWh)					\$0.0000281

Table 11: 2021 Energy Management Cost-Effectiveness Results

Cost-Effectiveness Test	Levelized \$/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.0220	\$1,936,733	\$4,450,420	\$2,513,687	2.30
Total Resource Cost Test (TRC) No Adder	\$0.0220	\$1,936,733	\$4,045,836	\$2,109,103	2.09
Utility Cost Test (UCT)	\$0.0209	\$1,842,361	\$4,045,836	\$2,203,475	2.20
Participant Cost Test (PCT)		\$484,579	\$5,652,567	\$5,167,989	11.66
Rate Impact Test (RIM)		\$7,116,351	\$4,045,836	(\$3,070,515)	0.57
Lifecycle Revenue Impacts (\$/kWh)					\$0.0000868





Table 12: 2021 Food Service Cost-Effectiveness Results

Cost-Effectiveness Test	Levelized \$/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.0004	\$36,081	\$38,606	\$2,525	1.07
Total Resource Cost Test (TRC) No Adder	\$0.0004	\$36,081	\$35,097	(\$985)	0.97
Utility Cost Test (UCT)	\$0.0002	\$17,848	\$35,097	\$17,249	1.97
Participant Cost Test (PCT)		\$30,635	\$65,943	\$35,309	2.15
Rate Impact Test (RIM)		\$75,066	\$35,097	(\$39,969)	0.47
Lifecycle Revenue Impacts (\$/kWh)					\$0.0000003

Table 13: 2021 Food Service Equipment Cost-Effectiveness Results

Cost-Effectiveness Test	Levelized \$/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.0000	\$1,019	\$2,335	\$1,315	2.29
Total Resource Cost Test (TRC) No Adder	\$0.0000	\$1,019	\$2,122	\$1,103	2.08
Utility Cost Test (UCT)	\$0.0000	\$1,440	\$2,122	\$683	1.47
Participant Cost Test (PCT)		\$350	\$4,415	\$4,065	12.61
Rate Impact Test (RIM)		\$5,130	\$2,122	(\$3,007)	0.41
Lifecycle Revenue Impacts (\$/kWh)					\$0.0000000

Table 14: 2021 HVAC Cost-Effectiveness Results

Cost-Effectiveness Test	Levelized \$/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.1883	\$16,588,689	\$16,888,002	\$299,313	1.02
Total Resource Cost Test (TRC) No Adder	\$0.1883	\$16,588,689	\$15,352,729	(\$1,235,960)	0.93
Utility Cost Test (UCT)	\$0.0929	\$8,179,867	\$15,352,729	\$7,172,863	1.88
Participant Cost Test (PCT)		\$15,429,966	\$30,294,975	\$14,865,009	1.96
Rate Impact Test (RIM)		\$33,433,053	\$15,352,729	(\$18,080,324)	0.46
Lifecycle Revenue Impacts (\$/kWh)					\$0.0001437



Table 15: 2021 Irrigation Cost-Effectiveness Results

Cost-Effectiveness Test	Levelized \$/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.0013	\$115,863	\$164,557	\$48,693	1.42
Total Resource Cost Test (TRC) No Adder	\$0.0013	\$115,863	\$149,597	\$33,734	1.29
Utility Cost Test (UCT)	\$0.0008	\$67,869	\$149,597	\$81,728	2.20
Participant Cost Test (PCT)		\$77,279	\$198,464	\$121,184	2.57
Rate Impact Test (RIM)		\$237,048	\$149,597	(\$87,451)	0.63
Lifecycle Revenue Impacts (\$/kWh)					\$0.0000013

Table 16: 2021 Lighting Cost-Effectiveness Results

Cost-Effectiveness Test	Levelized \$/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.3776	\$33,263,730	\$39,284,521	\$6,020,792	1.18
Total Resource Cost Test (TRC) No Adder	\$0.3776	\$33,263,730	\$35,713,201	\$2,449,471	1.07
Utility Cost Test (UCT)	\$0.1582	\$13,934,636	\$35,713,201	\$21,778,565	2.56
Participant Cost Test (PCT)		\$27,855,862	\$65,846,335	\$37,990,473	2.36
Rate Impact Test (RIM)		\$71,256,831	\$35,713,201	(\$35,543,630)	0.50
Lifecycle Revenue Impacts (\$/kWh)					\$0.0003203

Table 17: 2021 Motors Cost-Effectiveness Results

Cost-Effectiveness Test	Levelized \$/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.0303	\$2,671,201	\$5,311,585	\$2,640,385	1.99
Total Resource Cost Test (TRC) No Adder	\$0.0303	\$2,671,201	\$4,828,714	\$2,157,513	1.81
Utility Cost Test (UCT)	\$0.0156	\$1,372,487	\$4,828,714	\$3,456,227	3.52
Participant Cost Test (PCT)		\$1,998,304	\$5,989,383	\$3,991,079	3.00
Rate Impact Test (RIM)		\$6,670,273	\$4,828,714	(\$1,841,559)	0.72
Lifecycle Revenue Impacts (\$/kWh)					\$0.0000287



Table 18: 2021 Refrigeration Cost-Effectiveness Results

Cost-Effectiveness Test	Levelized \$/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.0295	\$2,600,327	\$3,042,713	\$442,387	1.17
Total Resource Cost Test (TRC) No Adder	\$0.0295	\$2,600,327	\$2,766,103	\$165,776	1.06
Utility Cost Test (UCT)	\$0.0111	\$979,469	\$2,766,103	\$1,786,634	2.82
Participant Cost Test (PCT)		\$2,266,523	\$4,734,527	\$2,468,003	2.09
Rate Impact Test (RIM)		\$5,159,588	\$2,766,103	(\$2,393,485)	0.54
Lifecycle Revenue Impacts (\$/kWh)					\$0.0000222

Table 19: 2021 Farm & Dairy Cost-Effectiveness Results

Cost-Effectiveness Test	Levelized \$/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.0001	\$9,723	\$23,136	\$13,413	2.38
Total Resource Cost Test (TRC) No Adder	\$0.0001	\$9,723	\$21,033	\$11,310	2.16
Utility Cost Test (UCT)	\$0.0001	\$7,239	\$21,033	\$13,794	2.91
Participant Cost Test (PCT)		\$5,225	\$35,913	\$30,688	6.87
Rate Impact Test (RIM)		\$40,777	\$21,033	(\$19,743)	0.52
Lifecycle Revenue Impacts (\$/kWh)					\$0.0000002

Table 20: 2021 Energy Project Manager Co-fund Cost-Effectiveness Results

Cost-Effectiveness Test	Levelized \$/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.0000	\$0	\$0	\$0	n/a
Total Resource Cost Test (TRC) No Adder	\$0.0000	\$0	\$0	\$0	n/a
Utility Cost Test (UCT)	\$0.0100	\$878,134	\$0	(\$878,134)	0.00
Participant Cost Test (PCT)		\$0	\$878,134	\$878,134	n/a
Rate Impact Test (RIM)		\$878,134	\$0	(\$878,134)	0.00
Lifecycle Revenue Impacts (\$/kWh)					n/a



## Appendix C

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Cost Effectiveness Demand Response Confidential

**THIS ATTACHMENT IS CONFIDENTIAL IN ITS  
ENTIRETY AND IS PROVIDED UNDER SEPARATE  
COVER**

**CONFIDENTIAL INFORMATION CERTIFICATE**

**IN DOCKET NO. 22-035-27**

I have reviewed the Public Service Commission of Utah Rule R746-1-603 and/or the Protective Order entered by the Public Service Commission of Utah in Docket No. 22-035-27 with respect to the review and use of confidential information and agree to comply with the terms and conditions of the rule and/or Protective Order.

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Signature

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Name (Type or Print)

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Employer or Firm

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Business Address

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Party Represented

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Date Signed