ROCKY MOUNTAIN POWER

POWERING YOUR GREATNESS

2022 Utah Energy Efficiency and Peak Reduction Annual Report

Issued June 1, 2023

Rocky Mountain Power
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Salt Lake City, UT 84116

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 1,008,081 customers in Utah and 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.[1] 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.[2] 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.[3]

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.[4]

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, 2022, through December 31, 2022. Rocky Mountain Power on behalf of its customers, invested $68 million in energy efficiency and peak reduction resource acquisitions during the reporting period. The investment yielded approximately 305,731 megawatt hours ("MWh") in first-year energy savings,[5] 3,251,218 MWh of lifetime savings from 2022 energy efficiency acquisition,[6] and maximum realized reductions associated with peak management activities of approximately 289 megawatts. Net benefits based on the projected value of the energy savings over the life of the individual measures is estimated at $133 million.[7]

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

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

[3] 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.

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

[5] Reported ex-ante savings are gross at generation.

[6] Estimated lifetime savings of 2022 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 10.6 years.

[7] See cost effectiveness Appendix B. Portfolio Utility Cost Test Net Benefits. Avoided costs were adjusted to reflect the 2021 IRP.

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.[8] Cost-effectiveness results are provided in Table 13 and Appendix B.

In 2022, 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
  - Wattsmart Business Demand Response[9]

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 2022 on various matters and held formal meetings on the following matters:

March 2, 2022 – DSM Steering Committee

- Provided updates on the Wattsmart Battery and Wattsmart Business Demand Response programs.
- Reviewed the communications plan and customer data.
- Discussed demand response resources.

June 1, 2022 – DSM Steering Committee

- Reviewed the semi-annual DSM report.
- Provided various program updates.
- Discussed the 2021 IRP Update.
- Reviewed residential program targets.
- Discussed the Federal Infrastructure Act and DOE Connected Communities.

[8] Cost effectiveness results include realization rates and Net-to-Gross ("NTG") ratios.
[9] Program began in July 2022, and had no savings associated with it. All costs incurred in 2022 were start-up costs.

June 1, 2022 – DSM Advisory Group

- Reviewed the 2021 DSM Annual Report.
- Provided a grid modernization update.

September 20, 2022 – DSM Steering Committee

- Discussed Home Energy Reports.
- Reviewed the 2022-2023 spend and savings forecast.
- Discussed DSM staffing and training.
- Provided a Wattsmart Battery Demand Response update.

September 20, 2022 – DSM Advisory Group

- Discussed Home Energy Report deemed savings value, avoided cost, cost effectiveness, and incremental savings versus first-year savings.
- Reviewed program evaluations for Home Energy Reports and Wattsmart Business.

October 27, 2022 – DSM Steering Committee

- Discussed the 2023 forecast and accounting for DSM.
- Provided updates for the Wattsmart Homes and Wattsmart Business programs.

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:

- Newly Constructed 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 1.66 for 2022.

Program Performance and Major Achievements in 2022

- The Wattsmart Homes program achieved 42,021,063 kWh gross savings at site.
- Disbursed $13 million in incentives.
- The Wattsmart Homes program changed from a climate zone structure to a tiered structure based on efficiency ratings for dual fuel and air source heat pumps incentives.
- The Wattsmart Homes program added incentives for supplemental ductless heat pumps for newly constructed homes.
- The Wattsmart Homes program made changes to incentives offered for whole house fans, evaporative coolers, heat pumps and heat pump water heaters.
- The Wattsmart Homes program went through the Request for Proposal (RFP) process and contracted with Evergreen Consulting for existing homes, Resource Innovations for new homes, and ICAST for multifamily homes. Contracts were executed, and transition work started in the 3rd quarter in preparation for implementation to begin January 1, 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_23.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 6.94 for 2022

Program Performance and Major Achievements in 2022

- The Home Energy Reports program achieved 94,620,000 kWh gross savings at site.
- The program sends reports to all residential customers with email. Paper reports will be sent to approximately 50,000 customers without email who have high kWh usage.
- In 2022 reports were initially provided to approximately 389,000, which was expanded to 572,000 customers in 2022.

- Report highlights
    - Individual recommendations to save energy
    - 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
- In 2022, only 0.16% of customers (1446 customers) have requested to be removed from the program.
- Online portal is continually evolving to provide greater insights for all residential customers.

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_23.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 2.62 for 2022.

Program Performance and Major Achievements in 2022

- In 2022, the program achieved 249,655 kWh gross savings at site.
- Number of homes served was 226.

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_23.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
- New Construction/Major Renovation incentives

In 2022 Wattsmart Business program passed the UCT with a cost benefit analysis of 1.74

Program Performance and Major Achievements in 2022

- In 2022, the program achieved 151,722,967 kWh gross savings.
- Disbursed incentives of $19m and $2,217,569 in bill credits.

- As some of the post pandemic surge of lighting projects completed, it became apparent that participation was once again starting to slow. Working as quickly as possible, the program updated program requirements to waive alternative eligibility for large customers and allow projects without lighting controls to participate in the program. This one change resulted in a measurable increase in submitted lighting savings, but it did not result in enough savings to help meet the program savings goal. To address this issue in the future, the team worked on a simplified and improved lighting offer that would take effect in 2023 to drive additional savings.
- Advanced Rooftop Control (ARC) incentives continued to be the most productive measure in 2022 for non-lighting and HVAC vendors in the UT the market. Labor challenges and supply chain issues continued in 2022, impacting program participants throughout the year. Many vendors have resorted to seeking additional or alternative suppliers to keep projects from stagnating. In some cases, these issues caused customers to delay or even cancel projects.
- The program launched the Wattsmart Business New Construction/Major Remodel offer in 2022. This offer considers all interactive aspects of a building and provides higher incentives for projects that have the program as part of their early planning process as compared to projects where the program is brought in later. The offer had a strong start to forming relationships and bringing in projects that were slated to be completed in late 2022 and in 2023.
- Participating Wattsmart Business vendors continued receiving feedback on their performance with ongoing efforts to 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. There are eleven Premium vendors in Utah.
- Global supply chain challenges began affecting large industrial customers in 2021. Equipment planned for energy efficiency projects and facility upgrades continues to be delayed, resulting in delays in kWh savings entering 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 Wattsmart Business program administration:
https://www.pacificorp.com/content/dam/pcorp/documents/en/pacificorp/environment/dsm/utah/Utah_Program_Administration_NonResidential_23.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 2022, 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 2022, the program was available May 1st through September 30th 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 2022.

Program Performance and Major Achievements in 2022

- Maximum potential and realized at generation were 12 MW and 5 MW, respectively.
- There were eight mandatory and nine voluntary load control events initiated in 2022. (Voluntary load control events were called after August 19th through September 30th)

- 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 provides a 4-hour notification
- Total customers participating in the program are 30, participation sites are 130.

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/pcorp/documents/en/pacificorp/environment/dsm/utah/Utah_Program_Administration_Irrigation_Load_Control_23.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 pro-rated 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 2022.

Program Performance and Major Achievements in 2022

- Maximum potential and realized at generation were 300 MW and 266 MW, respectively.
- 40 control events were initiated during the 2022 program season.
- System firmware upgraded to currently supported levels.
- 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_23.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 did not pass the UCT cost tests for 2022.

Program Performance and Major Achievements in 2022

The Wattsmart Battery Program became available in December 2020 and applications for new battery/solar systems were continually submitted throughout 2022.

The program continues to be popular among customers and is being actively promoted by solar/battery contractors throughout the state. During 2022, there were 1,100 new batteries added to the program. Below are highlights and operational functionality of the program.

- Maximum potential generation was 12 MW.
- 31 frequency events were called during 2022 program year.
- SolarEdge batteries were approved for the program
- Commercial batteries became qualified for the program. Commercial batteries were installed and incentivized during 2022
- 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 gird

Program enrollment information can be found on the Company's website:
www.rockymountainpower.net/battery

WATTSMART BUSINESS DEMAND RESPONSE

Program Description

The Wattsmart Business Demand Response Program is designed to provide financial incentives to commercial and industrial (C&I non-residential) customers who curtail load during Company initiated events. The Program may be utilized to provide peak load reduction, contingency reserves, frequency response, and other grid services to assist with effectively managing the overall electric grid. The Program design will work with large commercial and industrial customers who have curtailable loads greater than 500 kW that can be curtailed with no advance notice or limited advance notice (7-minutes). An automated dispatch without advanced notice and a total response time within 50 seconds is considered a real-time event, and a dispatch event with an advanced notice and response within 7 minutes is considered an advanced notice event.

Program Performance and Major Achievements in 2022

Rocky Mountain Power has offered demand response programs in Utah for several decades. Demand response for non-residential customers is a new offering and is taking time develop and market to potential customers. The program was approved in July 2022 and outreach and marketing started immediately.

Company representatives and its consultants are meeting with large commercial and industrial customers to identify opportunities for participation. The Company and consultant are

developing site-specific demand response strategies for potential participating customers and their facilities. Due to the complexity associated with these large customers and the significant amount of load being curtailed the timeline for enrollment typically takes 6-9 months.

Program enrollment information can be found on the Company's website:
https://www.rockymountainpower.net/savings-energy-choices/business/demand-response.html

EXPENDITURES

TOTAL PORTFOLIO BUDGET AND EXPENDITURES

Table 1: Forecast to Actual Savings Comparison

Utah 2022 DSM Programs	2021 IRP for 2022 (Gross - at Gen)		2022 Forecast (Gross - at Gen)		2022 Actual (Gross - at Gen)	
	MWH	MW	MWH	MW	MWH	MW*[10]
Class 1 - Load Control Programs						
A/C Load Control		124		248		283
Irrigation Load Control		20		20		12
Wattsmart Batteries Program		2		15		13
C&I Load Control Program		53		20		0
Total Class 1		**199**		**303**		**308**
Class 2 - Residential Programs						
Low Income	N/A	N/A	178	0	266	0
Home Energy Reports	N/A	N/A	95,257	14	100,635	15
Wattsmart Homes	N/A	N/A	59,555	9	44,692[11]	6
Total Residential Class 2	**N/A**	**N/A**	**154,990**	**23**	**145,593**	**21**
Class 2 - Non-Residential Programs						
Wattsmart Business	N/A	N/A	194,904	29	160,138[12]	23
Total Class 2	**257,465** [13]	**38.81**	**349,894**	**53**	**305,731**	**44**
Total Class 2 Forecast Estimated Savings Range with Home Energy Reports First Year Savings			**304,216 – 336,239**			
Total Class 2 with Home Energy Reports Incremental Savings			**241,902 – 267,369**	**38**	**205,096**	**30**

[10] Energy efficiency MW is the estimated savings during system peak.
[11] DSM programs at utilities throughout the nation underachieved in 2022 due to extraordinary market conditions, including unprecedented global supply chain challenges, drastically increasing interest rates and recessionary fears. These challenges are expected to persist into program year 2023.
[12] See footnote 11.
[13] While the IRP accounts for incremental Home Energy Report (HER) savings only, which is the increase in savings first year savings year-over-year, the 2022 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, 2022 – December 31, 2022[14]

Load Management Programs	MW/Yr. Savings (at site)	MW/Yr. Savings (at gen)	Program Expenditures
Cool Keeper	266	283	$ 6,812,393
Irrigation Load Control	11	12	$ 145,096
Wattsmart Batteries	11.7	12	$ 3,123,245
C&I Demand Response[15]	0	0	$ 495,342.07
Total Load Management	**289**	**307**	**$ 10,576,076.07**
Energy Efficiency Programs	**kWh/Yr. Savings (at site)**	**kWh/Yr. Savings (at gen)**	**Program Expenditures**
Low Income Weatherization	249,655	265,525	$ 97,656
Home Energy Reporting	94,620,000	100,634,993	$ 944,013
Wattsmart Homes	42,021,063	44,692,342	$ 20,885,998
Total Residential	**136,890,717**	**145,592,860**	**$ 21 927 667**
Total *Watt*smart Business	**151,722,967**	**160,137,858**	**$ 33,757,208**
Total Energy Efficiency	**288,613,684**	**305,730,718**	**$ 55,684,875**
Other Portfolio Expenditures			
Outreach and Communications			$ 1,192,107
Portfolio - EM&V Non-Residential			$ 532,445
Portfolio - EM&V Residential			$ 152,338
Portfolio – DSM Central			$ 160,063
Portfolio Potential Study			$ 111,195
Portfolio TRL			$ 20,276
Total Utah Program Expenditures			$ 67,975 881

SAVINGS BY PROGRAM

Table 3: 2022 Program Performance by Measure Category Savings for Wattsmart Homes

Measure Category	Total kWh (at Site)	Total Incentive	Total Measure Quantity
Appliances	38,463	$ 8,520	51
Building Shell	613,914	$ 387,569	1,860,687 sq ft
Energy Kits	387,456	$ 23,086	4,618
HVAC	24,549,296	$ 8,569,784	21,875
Lighting	493,867	$ 55,721	189
Water Heating	71,431	$ 22,100	2,449
Whole Building	10,809,574	$ 2,232,098	118
Transportation	124,952	$ 8,200	82
Electronics	2,353	$ 690	69
New Homes	4,929,758	$ 1,671,425	7,373
Grand Total	**42,021,063**	**$ 12,979,192**	

[14] The reported savings are gross and ex-ante. The values at generation include line losses between the customer site and the generation source.

[15] C&I Demand Response was a new program effective July 2022. All 2022 costs incurred were start-up costs. No events were called in 2022 due to the program still ramping up.

Table 4: Wattsmart Homes New Construction Single Family Participation

New Construction Measures	Total kWh (at Site)	Total Incentives
Single Family		
Central Air Conditioner	5,253	$ 3,700
Smart Thermostat	268,954	$ 105,250
ENERGY STAR certification	36,520	$ 17,075
Heat Pumps	2,507,563	$ 548,500
Water Heater	33,218	$ 9,300
HERS index <=62	734,677	$ 316,175
HERS index 56-62	202,592	$ 85,225
HERS index 49-55	1,060,083	$ 548,700
HERS index <=48	80,898	$ 37,500
Total Single Family	**4,929,758**	**$ 1,671,425**

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

Custom Multifamily	Total kWh (at Site)	Total Incentives
Low Income	**10,327,040**	**$ 3,542,461**
New Construction	752,323	$ 225,697
Retrofit	9,574,717	$ 3,316,765
Market Rate	**10,605,526**	**$ 2,132,880**
New Construction	10,158,240	$ 2,031,648
Retrofit	447,286	$ 101,232
Grand Total	**20,743,199**	**$ 5,675,341**

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

Measure Type	Installed
Insulation	113
Crisis Heating & Cooling Repair and/or Replacement	13
Furnace Fan	74
Energy Education	215
Double Glass Replacement	1
Evaporative Cooler Replacement	0
LED Bulbs	188
Weatherization	80
Refrigerator Replacement	14
Refrigerator Replacement Test	6
Total Number of Homes Served	**225**
Total kWh Savings @ Site	**249,655**

Table 7: 2022 Program Performance by Measure Category Savings for Wattsmart Business

Measure Category	Total kWh (at Site)	Total Incentive	Bill Credits	Total Projects
Additional Measures	15,303,584	$ 1,401,182	$ 698,708	28
Building Shell	1,109,510	$ 265,941	$ -	60
Compressed Air	4,668,468	$ 580,919	$ 98,562	31
Direct Install	5,602,648	$ 1,350,968	$ -	658
Energy Management	12,026,396	$ 240,528	$ -	54
Food Service	217,605	$ 20,075	$ -	27
HVAC	38,680,056	$ 5,901,468	$ 812,155	627
Lighting	53,815,960	$ 6,582,592	$ -	7334
Motors	11,028,412	$ 1,175,539	$ 762,430	74
Refrigeration	4,162,536	$ 484,788	$ 145,715	32
Electronics	1,591	$ 60	$ -	1
Whole Building	3,848,082	$ 498,426	$ -	23
Water Heating	1,243	$ 800	$ -	1
Irrigation	1,256,875	$ 169,934	$ -	63
Energy Project Manager Co-fund	-	$ 568,500	$ -	12
Grand Total	**151,722,967**	**$ 19,241,720**	**$ 2,517,569**	**9,025**

Table 8: Wattsmart Business Savings by Sector

Sector	Total kWh (at Site)	Total Incentive	Bill Credit	Total Projects
Commercial	118,064,320	$ 16,208,086	$ 1,056,432	8642
Industrial	32,710,431	$ 2,909,999	$ 1,461,137	322
Irrigation	948,215	$ 123,635	$ -	61
Grand Total	**151,722,967**	**$ 19,241,720**	**$ 2,517,569**	**9025**

LOAD CONTROL EVENTS

Table 9: Irrigation Load Control Events

7/7/2022	19:00 MT - 21:00 MT	5
7/8/2022	17:00 MT - 21:00 MT	4
7/28/2022	17:00 MT - 21:00 MT	3
7/29/2022	17:00 MT - 20:00 MT	5
8/15/2022	17:00 MT - 21:00 MT	4
8/16/2022	19:00 MT - 21:00 MT	4
8/17/2022	19:00 MT - 21:00 MT	4
8/18/2022	19:00 MT - 21:00 MT	2
8/30/2022 - Voluntary	19:00 MT - 21:00 MT	0.31
8/31/2022 - Voluntary	18:00 MT - 21:00 MT	0.24
9/1/2022 - Voluntary	18:00 MT - 21:00 MT	3
9/2/2022 - Voluntary	18:00 MT - 21:00 MT	2
9/3/2022 - Voluntary	18:00 MT - 21:00 MT	2
9/4/2022 - Voluntary	18:00 MT - 21:00 MT	2
9/5/2022 - Voluntary	18:00 MT - 21:00 MT	3
9/6/2022 - Voluntary	18:00 MT - 21:00 MT	3
9/7/2022 - Voluntary	18:00 MT - 21:00 MT	2

Table 10: Irrigation Load Control Program Performance

Maximum Potential MW (at Site)	**11**
Maximum Potential MW (at Gen)	12
Average Realized load MW (at Site)	2
Maximum Realized load MW (at Site)	5
Total Customer Participation	30
Total Sites	130

Table 11: Cool Keeper Load Control Events

Date	Event Times (MST)	Utah Reductions (MW)
5/6/2022	2:28 PM to 2:33 PM	28
5/7/2022	1:52 AM to 1:57 AM	26
5/26/2022	11:14 PM to 11:19 PM	56
5/27/2022	1:12 PM to 1:17 PM	79
5/28/2022	11:10 PM to 11:15 PM	19
6/3/2022	3:22 AM to 3:27 AM	14
6/4/2022	10:58 PM to 11:19 PM	40
6/7/2022	11:32 AM to 11:37 AM	26
6/10/2022	1:23 PM to 1:28 PM	115
6/23/2022	9:06 PM to 9:20 PM	48
6/28/2022	1:20 PM to 1:36 PM	124
6/29/2022	3:30 PM to 3:36 PM	156
6/30/2022	8:38 PM to 8:43 PM	168
7/1/2022	7:36 Am to 7:41 AM	46
7/5/2022	2:51 AM to 2:56 AM	61
7/7/2022	10:56 Am to 11:06 AM	106
7/7/2022	11:21 AM to 11:28 AM	106
7/9/2022	5:21 AM to 5:30 AM	49
7/11/2022	4:27 PM to 4:38 PM	212
7/19/2022	6:08 to 6:31 PM	115
7/20/2022	3:58 PM to 4:20 PM	167
7/21/2022	2:27 AM to 3:11 AM	77
7/27/2022	6:47 PM to 6:58 PM	213
8/1/2022	7:41 PM to 8:00 PM	174
8/6/2022	3:43 AM to 4:28 AM	48
8/10/2022	1:57 PM to 2:01 PM	151
8/12/2022	5:17 PM to 5:57 PM	183
8/16/2022	4:24 PM to 4:38 PM	208
8/20/2022	11:48 PM to 12:09 AM	53
8/21/2022	3:54 PM to 4:06 PM	146
8/25/2022	4:52 PM to 4:57 PM	177
8/30/2022	2:11 PM to 2:40 PM	170
9/2/2022	5:08 PM to 5:13 PM	206
9/5/2022	4:51 PM to 5:03 PM	208
9/6/2022	7:13 AM to 7:30 AM	206
9/12/2022	12:50 AM to 1:14 AM	45
9/18/2022	12:07 PM to 12:12 PM	50
9/19/2022	1:09 PM to 1:29 PM	70
9/20/2022	2:24 PM to 2:30 PM	106
9/26/2022	2:53 PM to 3:15 PM	54

Table 12: Program Performance for Cool Keeper

Maximum Potential MW (at Site)	**266**
Maximum Potential MW (at Gen)	283
Average Realized Load MW (at Site)	101
Maximum Realized MW (at Site)	200
Total Participating Customers	94,799

Table 13
Battery Control Events

Event Date	Mountain Time Event Start/End Time	MW potential	Reason for Event
January 1, 2022	4:30 PM to 4:35PM	5	Frequency Response
January 11, 2022	6:58 PM to 7:03 PM	5	Frequency Response
January 28, 2022	3:41 PM to 3:46 PM	5	Frequency Response
February 25, 2022	11:26 AM to 11:31 PM	5	Frequency Response
February 27, 2022	6:06 PM to 6:11 PM	5	Frequency Response
March 3, 2022	9:57 PM to 10:02 PM	6	Frequency Response
March 9, 2022	7:03 PM to 7:08 PM	6	Frequency Response
March 25, 2022	2:54 AM to 2:59 AM	6	Frequency Response
March 27, 2022	7:32 PM to 7:37 PM	6	Frequency Response
April 4, 2022	8:07 AM to 8:12 AM	7	Frequency Response
April 4, 2022	2:05 PM to 2:10 PM	7	Frequency Response
April 6, 2022	4:06 PM to 4:11 PM	7	Frequency Response
April 9, 2022	12:43 PM to 12:48 PM	7	Frequency Response
April 26, 2022	1:19 AM to 1:24 AM	7	Frequency Response
May 6, 2022	2:28 PM to 2:33 PM	8	Frequency Response
May 7, 2022	1:52 AM to 1:57 AM	8	Frequency Response
May 26, 2022	11:14 PM to 11:19 PM	8	Frequency Response
May 27, 2022	1:12 PM to 1:17 PM	8	Frequency Response
May 28, 2022	11:10 PM to 11:15 PM	8	Frequency Response
June 3, 2022	3:22 AM to 3:27 AM	8	Frequency Response
June 10, 2022	1:23 PM to 1:28 PM	8	Frequency Response
June 30, 2022	8:38 PM to 8:43 PM	9	Frequency Response
July 1, 2022	7:36 AM to 7:41 AM	9	Frequency Response
July 5, 2022	2:51 AM to 2:56 AM	9	Frequency Response
August 22, 2022	5:29 PM to 5:34 PM	10	Frequency Response
August 25, 2022	4:52 PM to 4:57 PM	10	Frequency Response
September 2, 2022	5:08 PM to 5:13 PM	11	Frequency Response
September 18, 2022	12:07 PM to 12:12 PM	11	Frequency Response
September 20, 2022	2:25 PM to 2:30 PM	11	Frequency Response
October 10, 2022	9:16 AM to 9:21 AM	12	Frequency Response
October 29, 2022	9:24 PM to 9:29 PM	12	Frequency Response
October 31, 2022	9:52 PM to 9:57 PM	12	Frequency Response

Table 14: Program Performance for Wattsmart Batteries

Maximum Potential MW (at Site)	**12**
Maximum Potential MW (at Gen)	13
Total Participating Batteries	2,000

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: 2022 Cost Effectiveness Results by Program[16]

Program	Benefit/Cost Test				
	PTRC	TRC	UCT	PCT	RIM
DSM Portfolio	0.88	0.80	1.95	1.19	0.55
Energy Efficiency Portfolio	0.70	0.64	1.72	1.16	0.43
Non-Residential Energy Efficiency Portfolio	1.20	1.09	1.74	2.19	0.42
Residential Energy Efficiency Portfolio	0.46	0.41	1.90	0.66	0.48
Wattsmart Homes	0.38	0.35	1.66	0.58	0.45
Home Energy Reporting	7.63	6.94	6.94	n/a	0.64
Low Income Weatherization	22.46	20.41	2.62	n/a	0.63
Wattsmart Business	1.20	1.09	1.74	2.19	0.42
Irrigation Load Control Program[17]	Pass	Pass	Pass	n/a	Pass
AC Load Control Program[18]	Pass	Pass	Pass	n/a	Pass
Wattsmart Battery Program[19]	Fail	Fail	Fail	n/a	Fail
C&I Demand Response[20]	n/a	n/a	n/a	n/a	n/a

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.

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,

[16] Cost effectiveness detail is provided in Appendix B.
[17] 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.
[18] 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.
[19] 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.
[20] Due to the entirety of 2022 costs being start-up with no events called, expenditures for the C&I Demand Response program were included at the portfolio level for cost effectiveness in lieu of running separate cost effectiveness for the individual program.

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 2022 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: 2022 Evaluation Activities

Evaluation	Responsible Consultant	Status	Published
Wattsmart Program Evaluation 2020	Cadmus	Completed	2022
Home Energy Reports Evaluation 2020-2021	ADM	Completed	2022
Low Income Weatherization Evaluation 2023	TBD	Upcoming	N/A
Wattsmart Homes Evaluation 2023	TBD	Upcoming	N/A
Wattsmart Business 2023	TBD	Upcoming	N/A

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Appendix A

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.

Requirement No.	Description	Report Reference
1.	The Company will file the Annual Report between May 1 and June 1.	See issuance date on Page 1
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 1st Deferred Account and Forecast Report.[1]	Table 1
3.	In the executive summary, include the lifetime megawatt-hour savings in addition to first year megawatt-hour savings.	Page 3
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 9-14
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, 12, and 14
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

[1] 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 1st 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 21
13.	Provide an explanation for any reported program savings that are significantly below the forecast savings targets from the applicable November 1st Deferred Account and Forecast Report.	Footnotes 11 and 12
14.	Explain the Home Energy Report incremental savings row within the 'Forecast to Actual Savings Comparison' table.	Footnote 13

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Appendix B

Cost Effectiveness

MEMORANDUM

To: Alesha Mander, PacifiCorp

From: Andrew Cottrell, Andy Hudson, Elizabeth Applegate, AEG

Date: May 30, 2023

Re: PacifiCorp Utah Portfolio and Sector Level Cost-Effectiveness Results – PY2022

AEG estimated the cost-effectiveness of PacifiCorp's overall energy efficiency portfolio in the state of Utah based on Program Year (PY) 2022 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 - PY2022
- Table 3: Benefit/Cost Ratios by Portfolio Type
- Table 4: 2022 Total Portfolio Cost-Effectiveness Results (Including Load Control Programs)
- Table 5: 2022 Total Portfolio Cost-Effectiveness Results (Without Load Control Programs)
- Table 6: 2022 C&I Energy Efficiency Sector Cost-Effectiveness Results
- Table 7: 2022 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	Value
Discount Rate	6.88%
Residential Line Loss	6.36%
Commercial Line Loss	5.86%
Industrial Line Loss	4.10%
Irrigation Line Loss	6.34%
Residential Energy Rate* ($/kWh)	$0.1063
Commercial Energy Rate* ($/kWh)	$0.0792
Industrial Energy Rate* ($/kWh)	$0.0603
Irrigation Energy Rate* ($/kWh)	$0.0722
Inflation Rate	2.16%

Table 2: Portfolio Level Costs, Nominal - PY2022[1]

Category	PY2022
Outreach and Communications	$1,192,107
Portfolio - EM&V Non-Residential	$532,445
Portfolio - EM&V Residential	$152,338
Portfolio - DSM Central	$160,063
Portfolio Potential Study	$111,195
Portfolio TRL	$20,276
C&I Demand Response	$495,342
Total	**$2,663,765**

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

Table 3: Benefit/Cost Ratios by Portfolio Type

Program	PTRC	TRC	UCT	PCT	RIM
Total Portfolio (Including Load Control Programs)	0.88	0.80	1.95	1.19	0.55
Total Portfolio	0.70	0.64	1.72	1.16	0.43
C&I	1.20	1.09	1.74	2.19	0.42
Residential	0.46	0.41	1.90	0.66	0.48

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

Table 4: 2022 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	$0.1129	$167,174,465	$146,706,068	($20,468,397)	0.88
Total Resource Cost Test (TRC) No Adder	$0.1129	$167,174,465	$133,369,153	($33,805,312)	0.80
Utility Cost Test (UCT)	$0.0462	$68,433,694	$133,369,153	$64,935,459	1.95
Participant Cost Test (PCT)		$177,469,550	$211,657,672	$34,188,122	1.19
Rate Impact Test (RIM)		$241,575,669	$133,369,153	-$108,206,516	0.55
Lifecycle Revenue Impacts ($/kWh)					$0.0006640
Discounted Participant Payback (years)					7.46

Table 5: 2022 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	$0.1061	$157,089,411	$110,453,282	($46,636,129)	0.70
Total Resource Cost Test (TRC) No Adder	$0.1061	$157,089,411	$100,412,075	-$56,677,337	0.64
Utility Cost Test (UCT)	$0.0394	$58,348,640	$100,412,075	$42,063,434	1.72
Participant Cost Test (PCT)		$177,469,550	$205,448,025	$27,978,475	1.16
Rate Impact Test (RIM)		$231,490,616	$100,412,075	-$131,078,541	0.43
Lifecycle Revenue Impacts ($/kWh)					$0.0006363
Discounted Participant Payback (years)					7.46

Table 6: 2022 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	$0.0526	$54,016,301	$64,734,461	$10,718,160	1.20
Total Resource Cost Test (TRC) No Adder	$0.0526	$54,016,301	$58,849,510	$4,833,209	1.09
Utility Cost Test (UCT)	$0.0329	$33,757,208	$58,849,510	$25,092,302	1.74
Participant Cost Test (PCT)		$57,783,500	$126,824,913	$69,041,413	2.19
Rate Impact Test (RIM)		$141,340,401	$58,849,510	-$82,490,891	0.42
Lifecycle Revenue Impacts ($/kWh)					$0.0005054
Discounted Participant Payback (years)					5.50

Table 7: 2022 Residential 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	$0.2219	$100,409,345	$45,718,821	-$54,690,524	0.46
Total Resource Cost Test (TRC) No Adder	$0.2219	$100,409,345	$41,562,565	-$58,846,781	0.41
Utility Cost Test (UCT)	$0.0485	$21,927,667	$41,562,565	$19,634,897	1.90
Participant Cost Test (PCT)		$119,686,050	$78,623,112	-$41,062,938	0.66
Rate Impact Test (RIM)		$87,486,450	$41,562,565	-$45,923,885	0.48
Lifecycle Revenue Impacts ($/kWh)					$0.0002405
Discounted Participant Payback (years)					9.01

MEMORANDUM

To: Alesha Mander, PacifiCorp

From: Andrew Cottrell, Andy Hudson, Elizabeth Applegate, AEG

Date: May 25, 2023

Re: PacifiCorp Utah Wattsmart Homes Cost-Effectiveness Results – PY2022

AEG estimated the cost-effectiveness of PacifiCorp's overall energy efficiency portfolio in the state of Utah based on Program Year (PY) 2022 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 - PY2022
- Table 3: 2022 Wattsmart Homes Savings kWh Savings by Measure Category
- Table 4: 2022 Benefit/Cost Ratios by Measure Category
- Table 5: 2022 Wattsmart Program Cost-Effectiveness Results
- Table 6: 2022 Appliances Cost-Effectiveness Results - (Load Shape - Residential_REFRIGERATOR_7P)
- Table 7: 2022 Building Shell Cost-Effectiveness Results - (Load Shape - UT_Single Family_Cooling)
- Table 8: 2022 Energy Kits Cost-Effectiveness Results - (Load Shape - Residential_LIGHTING_7P)
- Table 9: 2022 HVAC Cost-Effectiveness Results - (Load Shape - UT_Single Family_Cooling)
- Table 10: 2022 Lighting Cost-Effectiveness Results - (Load Shape - Residential_LIGHTING_7P)
- Table 11: 2022 Water Heating Cost-Effectiveness Results - (Load Shape - Residential_HPWH_7P)
- Table 12: 2022 Whole Building Cost-Effectiveness Results - (Load Shape - UT_Single Family_Cooling)
- Table 13: 2022 Transportation Cost-Effectiveness Results - (Load Shape - UT_Single_Family_Heating)

- Table 14: 2022 Electronics Cost-Effectiveness Results - (Load Shape - UT_Single_Family_Plug)
- Table 15: 2022 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

Parameter	Value
Discount Rate	6.88%
Residential Line Loss	6.36%
Residential Energy Rate ($/kWh)	$0.1063
Inflation Rate	2.16%

Table 2: Wattsmart Homes Annual Program Costs, Nominal - PY2022[1]

Measure Category	Program Delivery	Utility Admin	Program Development	Incentives	Total Utility Budget	Gross Customer Costs
Appliances	$7,691	$303	$733	$8,520	$17,247	$1,392,179
Building Shell	$69,097	$2,719	$11,704	$387,569	$471,089	$9,098,568
Energy Kits	$12,160	$478	$7,387	$23,086	$43,111	$19,392
HVAC	$3,531,899	$138,963	$468,032	$8,569,784	$12,708,677	$23,796,254
Lighting	$70,171	$2,761	$9,416	$55,721	$138,069	$1,644,332
Water Heating	$11,024	$434	$1,362	$22,100	$34,920	$2,058,639
Whole Building	$2,246,067	$88,372	$206,084	$2,232,098	$4,772,620	$47,142,474
Transportation	$8,016	$315	$2,382	$8,200	$18,913	$18,849
Electronics	$151	$6	$45	$690	$892	$773
New Homes	$880,410	$34,640	$93,986	$1,671,425	$2,680,460	$6,374,547
Total Program	**$6,836,685**	**$268,990**	**$801,131**	**$12,979,192**	**$20,885,998**	**$91,546,007**

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

Table 3: 2022 Wattsmart Homes kWh Savings by Measure Category

Measure Category	Gross kWh Savings at Site	Realization Rate	Adjusted Gross kWh Savings at Site	Net to Gross Ratio	Net kWh Savings at Site	Measure Life
Appliances	38,463	100%	38,463	98%	37,733	16
Building Shell	613,914	95%	585,629	72%	423,218	37
Energy Kits	387,456	64%	247,972	84%	208,296	11
HVAC	24,549,296	100%	24,549,296	68%	16,693,521	16
Lighting	493,867	75%	370,400	68%	251,872	20
Water Heating	71,431	32%	22,521	99%	22,190	12
Whole Building	10,809,574	100%	10,809,574	80%	8,647,659	18
Transportation	124,952	100%	124,952	100%	124,952	9
Electronics	2,353	100%	2,353	80%	1,882	1
New Homes	4,929,758	100%	4,929,758	88%	4,362,316	31
Total Program	**42,021,063**	**99%**	**41,680,917**	**74%**	**30,773,640**	**18**

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

Table 4: 2022 Benefit/Cost Ratios by Measure Category

Measure Category	PTRC	TRC	UCT	PCT	RIM
Appliances	0.02	0.02	1.55	0.04	0.40
Building Shell	0.07	0.07	1.33	0.12	0.39
Energy Kits	2.91	2.65	2.42	11.12	0.38
HVAC	0.70	0.64	1.40	1.11	0.41
Lighting	0.12	0.11	1.41	0.24	0.29
Water Heating	0.01	0.01	0.30	0.02	0.18
Whole Building	0.22	0.20	2.06	0.28	0.51
Transportation	1.69	1.54	2.40	6.23	0.35
Electronics	0.26	0.23	0.25	1.22	0.16
New Homes	0.92	0.83	2.30	1.47	0.53
Total	**0.38**	**0.35**	**1.66**	**0.58**	**0.45**

Table 5: 2022 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	$0.2792	$99,452,813	$38,232,620	-$61,220,193	0.38
Total Resource Cost Test (TRC) No Adder	$0.2792	$99,452,813	$34,756,927	-$64,695,886	0.35
Utility Cost Test (UCT)	$0.0586	$20,885,998	$34,756,927	$13,870,929	1.66
Participant Cost Test (PCT)		$119,686,050	$68,873,733	-$50,812,317	0.58
Rate Impact Test (RIM)		$76,780,539	$34,756,927	-$42,023,611	0.45
Lifecycle Revenue Impacts ($/kWh)					$0.0002111
Discounted Participant Payback (years)					30.62

Table 6: 2022 Appliances Cost-Effectiveness Results- (Load Shape - Residential_REFRIGERATOR_7P)

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$3.3175	$1,400,906	$29,437	-$1,371,469	0.02
Total Resource Cost Test (TRC) No Adder	$3.3175	$1,400,906	$26,761	-$1,374,145	0.02
Utility Cost Test (UCT)	$0.0408	$17,247	$26,761	$9,514	1.55
Participant Cost Test (PCT)		$1,419,118	$58,126	-$1,360,992	0.04
Rate Impact Test (RIM)		$66,853	$26,761	-$40,092	0.40
Lifecycle Revenue Impacts ($/kWh)					$0.0000003
Discounted Participant Payback (years)					391.64

Table 7: 2022 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	$1.4355	$9,182,087	$686,929	-$8,495,158	0.07
Total Resource Cost Test (TRC) No Adder	$1.4355	$9,182,087	$624,481	-$8,557,606	0.07
Utility Cost Test (UCT)	$0.0737	$471,089	$624,481	$153,392	1.33
Participant Cost Test (PCT)		$12,590,165	$1,531,430	-$11,058,735	0.12
Rate Impact Test (RIM)		$1,614,950	$624,481	-$990,469	0.39
Lifecycle Revenue Impacts ($/kWh)					$0.0000044
Discounted Participant Payback (years)					300.69

Table 8: 2022 Energy Kits 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	$0.0221	$39,417	$114,777	$75,360	2.91
Total Resource Cost Test (TRC) No Adder	$0.0221	$39,417	$104,343	$64,925	2.65
Utility Cost Test (UCT)	$0.0241	$43,111	$104,343	$61,232	2.42
Participant Cost Test (PCT)		$23,086	$256,740	$233,654	11.12
Rate Impact Test (RIM)		$276,765	$104,343	-$172,423	0.38
Lifecycle Revenue Impacts ($/kWh)					$0.0000015
Discounted Participant Payback (years)					0.96

Table 9: 2022 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	$0.1546	$27,935,148	$19,525,596	-$8,409,552	0.70
Total Resource Cost Test (TRC) No Adder	$0.1546	$27,935,148	$17,750,541	-$10,184,606	0.64
Utility Cost Test (UCT)	$0.0703	$12,708,677	$17,750,541	$5,041,865	1.40
Participant Cost Test (PCT)		$34,994,492	$38,965,263	$3,970,771	1.11
Rate Impact Test (RIM)		$43,104,156	$17,750,541	-$25,353,614	0.41
Lifecycle Revenue Impacts ($/kWh)					$0.0001755
Discounted Participant Payback (years)					13.93

Table 10: 2022 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	$0.5640	$1,726,679	$214,380	-$1,512,299	0.12
Total Resource Cost Test (TRC) No Adder	$0.5640	$1,726,679	$194,891	-$1,531,788	0.11
Utility Cost Test (UCT)	$0.0451	$138,069	$194,891	$56,822	1.41
Participant Cost Test (PCT)		$2,418,135	$585,807	-$1,832,327	0.24
Rate Impact Test (RIM)		$668,154	$194,891	-$473,264	0.29
Lifecycle Revenue Impacts ($/kWh)					$0.0000024
Discounted Participant Payback (years)					82.09

Table 11: 2022 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	$10.2733	$2,071,459	$11,437	-$2,060,022	0.01
Total Resource Cost Test (TRC) No Adder	$10.2733	$2,071,459	$10,398	-$2,061,062	0.01
Utility Cost Test (UCT)	$0.1732	$34,920	$10,398	-$24,522	0.30
Participant Cost Test (PCT)		$2,089,411	$44,777	-$2,044,634	0.02
Rate Impact Test (RIM)		$57,597	$10,398	-$47,199	0.18
Lifecycle Revenue Impacts ($/kWh)					$0.0000003
Discounted Participant Payback (years)					552.06

Table 12: 2022 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	$0.4981	$49,682,997	$10,831,521	-$38,851,477	0.22
Total Resource Cost Test (TRC) No Adder	$0.4981	$49,682,997	$9,846,837	-$39,836,160	0.20
Utility Cost Test (UCT)	$0.0478	$4,772,620	$9,846,837	$5,074,217	2.06
Participant Cost Test (PCT)		$58,928,093	$16,705,992	-$42,222,101	0.28
Rate Impact Test (RIM)		$19,246,515	$9,846,837	-$9,399,678	0.51
Lifecycle Revenue Impacts ($/kWh)					$0.0000730
Discounted Participant Payback (years)					62.85

Table 13: 2022 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	$0.0295	$29,563	$50,026	$20,464	1.69
Total Resource Cost Test (TRC) No Adder	$0.0295	$29,563	$45,479	$15,916	1.54
Utility Cost Test (UCT)	$0.0189	$18,913	$45,479	$26,565	2.40
Participant Cost Test (PCT)		$18,849	$117,487	$98,637	6.23
Rate Impact Test (RIM)		$128,200	$45,479	-$82,721	0.35
Lifecycle Revenue Impacts ($/kWh)					$0.0000007
Discounted Participant Payback (years)					1.49

Table 14: 2022 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	$0.2515	$975	$249	-$726	0.26
Total Resource Cost Test (TRC) No Adder	$0.2515	$975	$226	-$748	0.23
Utility Cost Test (UCT)	$0.2301	$892	$226	-$666	0.25
Participant Cost Test (PCT)		$966	$1,179	$213	1.22
Rate Impact Test (RIM)		$1,381	$226	-$1,155	0.16
Lifecycle Revenue Impacts ($/kWh)					$0.0000000
Discounted Participant Payback (years)					1.20

Table 15: 2022 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	$0.1174	$7,383,582	$6,768,268	-$615,314	0.92
Total Resource Cost Test (TRC) No Adder	$0.1174	$7,383,582	$6,152,971	-$1,230,611	0.83
Utility Cost Test (UCT)	$0.0426	$2,680,460	$6,152,971	$3,472,511	2.30
Participant Cost Test (PCT)		$7,203,736	$10,606,932	$3,403,196	1.47
Rate Impact Test (RIM)		$11,615,967	$6,152,971	-$5,462,996	0.53
Lifecycle Revenue Impacts ($/kWh)					$0.0000339
Discounted Participant Payback (years)					20.96

MEMORANDUM

To: Alesha Mander, PacifiCorp

From: Andrew Cottrell, Andy Hudson, Elizabeth Applegate, AEG

Date: May 25, 2023

Re: PacifiCorp Utah Home Energy Reporting Cost-Effectiveness Results – PY2022

AEG estimated the cost-effectiveness of PacifiCorp's overall energy efficiency portfolio in the state of Utah based on Program Year (PY) 2022 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 - PY2022
- Table 3: 2022 Home Energy Reporting kWh Savings by Measure Category
- Table 4: 2022 Home Energy Reporting Program Cost-Effectiveness Results - (Load Shape - UT_Single_Family_Heat_pump)

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	Value
Discount Rate	6.88%
Residential Line Loss	6.36%
Residential Energy Rate ($/kWh)	$0.11
Inflation Rate	2.16%

Table 2: Home Energy Reporting Annual Program Costs, Nominal - PY2022[1]

Program Year	Program Delivery	Utility Admin	Engineering Costs	Program Development	Incentives	Total Utility Budget
Home Energy Reports	$905,401	$38,612	$0	$0	$0	$944,013
Total Program	**$905,401**	**$38,612**	**$0**	**$0**	**$0**	**$944,013**

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

Table 3: 2022 Home Energy Reporting kWh Savings by Measure Category

Program Year	Gross kWh Savings at Site	Realization Rate	Adjusted Gross kWh Savings at Site	Net to Gross Ratio	Net kWh Savings at Site	Measure Life
Home Energy Reports	94,620,000	93%	87,996,600	100%	87,996,600	1
Total Program	**94,620,000**	**93%**	**87,996,600**	**100%**	**87,996,600**	**1**

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

Table 4: 2022 Home Energy Reporting Program Cost-Effectiveness Results - (Load Shape - UT_Single_Family_Heat_pump)

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0101	$944,013	$7,205,080	$6,261,067	7.63
Total Resource Cost Test (TRC) No Adder	$0.0101	$944,013	$6,550,073	$5,606,060	6.94
Utility Cost Test (UCT)	$0.0101	$944,013	$6,550,073	$5,606,060	6.94
Participant Cost Test (PCT)		$0	$9,354,039	$9,354,039	n/a
Rate Impact Test (RIM)		$10,298,052	$6,550,073	($3,747,979)	0.64
Lifecycle Revenue Impacts ($/kWh)					$0.0004584

MEMORANDUM

To: Alesha Mander, PacifiCorp

From: Andrew Cottrell, Andy Hudson, Elizabeth Applegate, AEG

Date: May 30, 2023

Re: PacifiCorp Utah Low-Income Weatherization Cost-Effectiveness Results – PY2022

AEG estimated the cost-effectiveness of PacifiCorp's overall energy efficiency portfolio in the state of Utah based on Program Year (PY) 2022 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 - PY2022
- Table 3: 2022 Low-Income Weatherization kWh Savings by Measure Category
- Table 4: 2022 Low-Income Weatherization 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 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	Value
Discount Rate	6.88%
Residential Line Loss	6.36%
Residential Energy Rate ($/kWh)	$0.11
Inflation Rate	2.16%

Table 2: Low-Income Weatherization Annual Program Costs, Nominal - PY2022[1]

Program Year	Program Delivery	Utility Admin	Incentives	Total Utility Budget	Gross Customer Costs
Low Income Weatherization	$8,506	$4,012	$85,137	$97,656	$0
Total Program	**$8,506**	**$4,012**	**$85,137**	**$97,656**	**$0**

Table 3: 2022 Low-Income Weatherization kWh Savings by Measure Category

Program Year	Gross kWh Savings at Site	Realization Rate	Adjusted Gross kWh Savings at Site	Net to Gross Ratio	Net kWh Savings at Site	Measure Life
Low Income Weatherization	249,655	82%	204,717	100%	204,717	22
Total Program	**249,655**	**82%**	**204,717**	**100%**	**204,717**	**22**

Table 4: 2022 Low-Income Weatherization 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	$0.0048	$12,519	$281,121	$268,602	22.46
Total Resource Cost Test (TRC) No Adder	$0.0048	$12,519	$255,564	$243,046	20.41
Utility Cost Test (UCT)	$0.0376	$97,656	$255,564	$157,908	2.62
Participant Cost Test (PCT)		$0	$395,341	$395,341	n/a
Rate Impact Test (RIM)		$407,859	$255,564	($152,295)	0.63
Lifecycle Revenue Impacts ($/kWh)					$0.0000014

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

MEMORANDUM

To: Alesha Mander, PacifiCorp

From: Andrew Cottrell, Andy Hudson, Elizabeth Applegate, AEG

Date: May 25, 2023

Re: PacifiCorp Utah Wattsmart Business Program Cost-Effectiveness Results – PY2022

AEG estimated the cost-effectiveness of PacifiCorp's overall energy efficiency portfolio in the state of Utah based on Program Year (PY) 2022 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 - PY2022
- Table 3: 2022 Wattsmart Business kWh Savings by Measure Category
- Table 4: 2022 Benefit/Cost Ratios by Measure Category
- Table 5: 2022 Wattsmart Business Program Cost-Effectiveness Results
- Table 6: 2022 Additional Measures Cost-Effectiveness Results – (Load Shape - UT_Miscellaneous_Mfg_General)
- Table 7: 2022 Electronics Cost-Effectiveness Results – (Load Shape - UT_Miscellaneous_Plug_Load)
- Table 8: 2022 Building Shell Cost-Effectiveness Results – (Load Shape - UT_Miscellaneous_Space_Cool)
- Table 9: 2022 Compressed Air Cost-Effectiveness Results – (Load Shape - UT_Miscellaneous_Mfg_General)
- Table 10: 2022 Direct Install Cost-Effectiveness Results – (Load Shape - UT_Miscellaneous_Lighting)
- Table 11: 2022 Energy Management Cost-Effectiveness Results – (Load Shape - UT_Miscellaneous_HVAC_Aux)
- Table 12: 2022 Food Service Cost-Effectiveness Results – (Load Shape - UT_Restaurant_Cooking)

- Table 13: 2022 Water Heating Cost-Effectiveness Results – (Load Shape - UT_Miscellaneous_Water_Heat)
- Table 14: 2022 HVAC Cost-Effectiveness Results – (Load Shape - UT_Miscellaneous_HVAC_Aux)
- Table 15: 2022 Irrigation Cost-Effectiveness Results – (Load Shape - UT_Irrigation_General)
- Table 16: 2022 Lighting Cost-Effectiveness Results – (Load Shape - UT_Miscellaneous_Lighting)
- Table 17: 2022 Motors Cost-Effectiveness Results – (Load Shape - UT_Miscellaneous_Mfg_General)
- Table 18: 2022 Refrigeration Cost-Effectiveness Results – (Load Shape - UT_Grocery_Refrigeration)
- Table 19: 2022 Whole Building Cost-Effectiveness Results – (Load Shape - UT_Large_Retail_HVAC_Aux)
- Table 20: 2022 Energy Project Manager Co-Fund Cost-Effectiveness Results – (Load Shape - UT_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 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

Parameter	Value
Discount Rate	6.88%
Commercial Line Loss	5.86%
Industrial Line Loss	4.10%
Irrigation Line Loss	6.34%
Commercial Energy Rate ($/kWh)	$0.0792
Industrial Energy Rate ($/kWh)	$0.0603
Irrigation Energy Rate ($/kWh)	$0.0722
Inflation Rate	2.16%

Table 2: Wattsmart Business Annual Program Costs, Nominal - PY2022[1]

Measure Category	Program Delivery	Utility Admin	Bill Credits	Program Development	Incentives	Total Utility Budget	Gross Customer Costs
Additional Measures	$1,123,644	$62,310	$698,708	$30,973	$1,401,182	$3,316,816	$4,084,639
Building Shell	$81,464	$4,162	$0	$2,246	$265,941	$353,814	$1,100,934
Compressed Air	$342,776	$14,765	$98,562	$9,449	$580,919	$1,046,471	$1,569,301
Direct Install	$411,366	$32,111	$0	$11,339	$1,350,968	$1,805,785	$432,309
Electronics	$117	$14	$0	$3	$60	$195	$371
Energy Management	$883,021	$45,951	$0	$24,340	$240,528	$1,193,840	$174,957
Energy Project Manager Co-fund	$0	$13,772	$0	$0	$568,500	$582,272	$0
Food Service	$15,977	$785	$0	$440	$20,075	$37,278	$47,417
HVAC	$2,840,028	$113,459	$812,155	$78,285	$5,901,468	$9,745,395	$10,140,736
Irrigation	$92,284	$5,902	$0	$2,544	$169,934	$270,665	$243,498
Lighting	$3,951,361	$182,785	$0	$108,918	$6,582,592	$10,825,655	$17,383,880
Motors	$809,746	$53,155	$762,430	$22,320	$1,175,539	$2,823,190	$1,988,538
Refrigeration	$305,628	$10,068	$145,715	$8,425	$484,788	$954,623	$1,625,803
Water Heating	$91	$4	$0	$3	$800	$898	$1,470
Whole Building	$282,540	$11,559	$0	$7,788	$498,426	$800,313	$706,960
Total:	**$11,140,044**	**$550,802**	**$2,517,569**	**$307,072**	**$19,241,720**	**$33,757,208**	**$39,500,813**

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

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

Table 3: 2022 Wattsmart Business kWh Savings by Measure Category

Measure Category	Gross kWh Savings at Site	Realization Rate	Adjusted Gross kWh Savings at Site	Net to Gross Ratio	Net kWh Savings at Site	Measure Life
Additional Measures	15,304	92%	14,049	91%	12,784	11
Building Shell	1,110	92%	1,019	91%	927	18
Compressed Air	4,668	100%	4,668	100%	4,668	15
Direct Install	5,603	94%	5,278	96%	5,067	14
Electronics	2	92%	1	91%	1	4
Energy Management	12,026	99%	11,954	60%	7,173	4
Energy Project Manager Co-fund	0	0%	0	0%	0	0
Food Service	218	92%	200	91%	182	13
HVAC	38,680	83%	32,108	40%	12,971	15
Irrigation	1,257	87%	1,093	70%	765	15
Lighting	53,816	98%	52,632	100%	52,632	13
Motors	11,028	99%	10,918	46%	5,022	15
Refrigeration	4,163	92%	3,821	91%	3,477	14
Water Heating	1	92%	1	91%	1	15
Whole Building	3,848	92%	3,533	91%	3,215	20
Total:	**151,723**	**93%**	**141,275**	**77%**	**108,886**	13

Table 4: 2022 Benefit/Cost Ratios by Measure Category

Measure Category	PTRC	TRC	UCT	PCT	RIM
Additional Measures	1.22	1.11	2.00	2.21	0.56
Building Shell	0.73	0.67	2.24	1.04	0.59
Compressed Air	1.65	1.50	2.92	2.73	0.64
Direct Install	3.36	3.05	1.50	12.76	0.44
Electronics	0.57	0.52	1.36	0.96	0.50
Energy Management	1.91	1.74	1.64	14.18	0.39
Energy Project Manager Co-fund	0.00	0.00	0.00	0.00	0.00
Food Service	1.84	1.67	2.90	3.61	0.53
HVAC	0.66	0.60	0.86	1.40	0.21
Irrigation	1.80	1.64	2.08	3.08	0.48
Lighting	1.36	1.24	2.47	2.74	0.52
Motors	0.99	0.90	1.16	2.07	0.31
Refrigeration	1.15	1.04	2.29	2.16	0.51
Water Heating	0.40	0.36	0.63	1.12	0.30
Whole Building	2.73	2.49	3.13	5.42	0.56
Total Program	**1.20**	**1.09**	**1.74**	**2.19**	**0.42**

Table 5: 2022 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	$0.0526	$54,016,301	$64,734,461	$10,718,160	1.20
Total Resource Cost Test (TRC) No Adder	$0.0526	$54,016,301	$58,849,510	$4,833,209	1.09
Utility Cost Test (UCT)	$0.0329	$33,757,208	$58,849,510	$25,092,302	1.74
Participant Cost Test (PCT)		$57,783,500	$126,824,913	$69,041,413	2.19
Rate Impact Test (RIM)		$141,340,401	$58,849,510	($82,490,891)	0.42
Lifecycle Revenue Impacts ($/kWh)					$0.0005054

Table 6: 2022 Additional Measures Cost-Effectiveness Results – (Load Shape - UT_Miscellaneous_Mfg_General)

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0555	$6,000,273	$7,300,526	$1,300,253	1.22
Total Resource Cost Test (TRC) No Adder	$0.0555	$6,000,273	$6,636,842	$636,569	1.11
Utility Cost Test (UCT)	$0.0307	$3,316,816	$6,636,842	$3,320,026	2.00
Participant Cost Test (PCT)		$4,488,614	$9,935,764	$5,447,149	2.21
Rate Impact Test (RIM)		$11,851,398	$6,636,842	($5,214,556)	0.56
Lifecycle Revenue Impacts ($/kWh)					$0.0000621

Table 7: 2022 Electronics Cost-Effectiveness Results – (Load Shape - UT_Miscellaneous_Plug_Load)

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0000	$506	$290	($215)	0.57
Total Resource Cost Test (TRC) No Adder	$0.0000	$506	$264	($242)	0.52
Utility Cost Test (UCT)	$0.0000	$195	$264	$69	1.36
Participant Cost Test (PCT)		$408	$390	($18)	0.96
Rate Impact Test (RIM)		$524	$264	($260)	0.50
Lifecycle Revenue Impacts ($/kWh)					$0.0000000

Table 8: 2022 Building Shell Cost-Effectiveness Results – (Load Shape - UT_Miscellaneous_Space_Cool)

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0110	$1,188,806	$872,872	($315,935)	0.73
Total Resource Cost Test (TRC) No Adder	$0.0110	$1,188,806	$793,520	($395,287)	0.67
Utility Cost Test (UCT)	$0.0033	$353,814	$793,520	$439,706	2.24
Participant Cost Test (PCT)		$1,209,818	$1,258,097	$48,279	1.04
Rate Impact Test (RIM)		$1,345,969	$793,520	($552,449)	0.59
Lifecycle Revenue Impacts ($/kWh)					$0.0000051

Table 9: 2022 Compressed Air Cost-Effectiveness Results – (Load Shape - UT_Miscellaneous_Mfg_General)

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0188	$2,034,853	$3,356,417	$1,321,564	1.65
Total Resource Cost Test (TRC) No Adder	$0.0188	$2,034,853	$3,051,288	$1,016,435	1.50
Utility Cost Test (UCT)	$0.0097	$1,046,471	$3,051,288	$2,004,817	2.92
Participant Cost Test (PCT)		$1,569,301	$4,278,645	$2,709,344	2.73
Rate Impact Test (RIM)		$4,744,197	$3,051,288	($1,692,909)	0.64
Lifecycle Revenue Impacts ($/kWh)					$0.0000201

Table 10: 2022 Direct Install Cost-Effectiveness Results – (Load Shape - UT_Miscellaneous_Lighting)

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0082	$887,126	$2,977,490	$2,090,364	3.36
Total Resource Cost Test (TRC) No Adder	$0.0082	$887,126	$2,706,809	$1,819,683	3.05
Utility Cost Test (UCT)	$0.0167	$1,805,785	$2,706,809	$901,024	1.50
Participant Cost Test (PCT)		$450,322	$5,745,408	$5,295,086	12.76
Rate Impact Test (RIM)		$6,200,225	$2,706,809	($3,493,416)	0.44
Lifecycle Revenue Impacts ($/kWh)					$0.0000275

Table 11: 2022 Energy Management Cost-Effectiveness Results – (Load Shape - UT_Miscellaneous_HVAC_Aux)

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0104	$1,128,269	$2,156,755	$1,028,486	1.91
Total Resource Cost Test (TRC) No Adder	$0.0104	$1,128,269	$1,960,686	$832,417	1.74
Utility Cost Test (UCT)	$0.0110	$1,193,840	$1,960,686	$766,846	1.64
Participant Cost Test (PCT)		$291,595	$4,133,628	$3,842,033	14.18
Rate Impact Test (RIM)		$5,086,940	$1,960,686	($3,126,254)	0.39
Lifecycle Revenue Impacts ($/kWh)					$0.0000503

Table 12: 2022 Food Service Cost-Effectiveness Results – (Load Shape - UT_Restaurant_Cooking)

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0006	$64,620	$118,905	$54,286	1.84
Total Resource Cost Test (TRC) No Adder	$0.0006	$64,620	$108,096	$43,476	1.67
Utility Cost Test (UCT)	$0.0003	$37,278	$108,096	$70,818	2.90
Participant Cost Test (PCT)		$52,107	$187,922	$135,816	3.61
Rate Impact Test (RIM)		$205,125	$108,096	($97,029)	0.53
Lifecycle Revenue Impacts ($/kWh)					$0.0000009

Table 13: 2022 Water Heating Cost-Effectiveness Results – (Load Shape - UT_Miscellaneous_Water_Heat)

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0000	$1,567	$625	($943)	0.40
Total Resource Cost Test (TRC) No Adder	$0.0000	$1,567	$568	($1,000)	0.36
Utility Cost Test (UCT)	$0.0000	$898	$568	($330)	0.63
Participant Cost Test (PCT)		$1,615	$1,807	$192	1.12
Rate Impact Test (RIM)		$1,905	$568	($1,337)	0.30
Lifecycle Revenue Impacts ($/kWh)					$0.0000000

Table 14: 2022 HVAC Cost-Effectiveness Results– (Load Shape - UT_Miscellaneous_HVAC_Aux)

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.1294	$13,984,663	$9,176,428	($4,808,235)	0.66
Total Resource Cost Test (TRC) No Adder	$0.1294	$13,984,663	$8,342,207	($5,642,456)	0.60
Utility Cost Test (UCT)	$0.0902	$9,745,395	$8,342,207	($1,403,188)	0.86
Participant Cost Test (PCT)		$25,101,601	$35,049,777	$9,948,176	1.40
Rate Impact Test (RIM)		$38,893,704	$8,342,207	($30,551,497)	0.21
Lifecycle Revenue Impacts ($/kWh)					$0.0001584

Table 15: 2022 Irrigation Cost-Effectiveness Results– (Load Shape - UT_Irrigation_General)

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0032	$344,228	$619,151	$274,923	1.80
Total Resource Cost Test (TRC) No Adder	$0.0032	$344,228	$562,865	$218,637	1.64
Utility Cost Test (UCT)	$0.0025	$270,665	$562,865	$292,200	2.08
Participant Cost Test (PCT)		$347,854	$1,070,378	$722,524	3.08
Rate Impact Test (RIM)		$1,171,108	$562,865	($608,244)	0.48
Lifecycle Revenue Impacts ($/kWh)					$0.0000050

Table 16: 2022 Lighting Cost-Effectiveness Results – (Load Shape - UT_Miscellaneous_Lighting)

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.2001	$21,626,944	$29,401,983	$7,775,040	1.36
Total Resource Cost Test (TRC) No Adder	$0.2001	$21,626,944	$26,729,076	$5,102,132	1.24
Utility Cost Test (UCT)	$0.1002	$10,825,655	$26,729,076	$15,903,421	2.47
Participant Cost Test (PCT)		$17,383,880	$47,588,732	$30,204,851	2.74
Rate Impact Test (RIM)		$51,831,795	$26,729,076	($25,102,719)	0.52
Lifecycle Revenue Impacts ($/kWh)					$0.0002416

Table 17: 2022 Motors Cost-Effectiveness Results – (Load Shape - UT_Miscellaneous_Mfg_General)

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0336	$3,636,189	$3,587,624	($48,565)	0.99
Total Resource Cost Test (TRC) No Adder	$0.0336	$3,636,189	$3,261,476	($374,712)	0.90
Utility Cost Test (UCT)	$0.0261	$2,823,190	$3,261,476	$438,287	1.16
Participant Cost Test (PCT)		$4,322,909	$8,939,985	$4,617,076	2.07
Rate Impact Test (RIM)		$10,587,636	$3,261,476	($7,326,159)	0.31
Lifecycle Revenue Impacts ($/kWh)					$0.0000449

Table 18: 2022 Refrigeration Cost-Effectiveness Results – (Load Shape - UT_Grocery_Refrigeration)

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0194	$2,095,638	$2,406,465	$310,826	1.15
Total Resource Cost Test (TRC) No Adder	$0.0194	$2,095,638	$2,187,695	$92,057	1.04
Utility Cost Test (UCT)	$0.0088	$954,623	$2,187,695	$1,233,072	2.29
Participant Cost Test (PCT)		$1,786,596	$3,856,222	$2,069,626	2.16
Rate Impact Test (RIM)		$4,326,057	$2,187,695	($2,138,362)	0.51
Lifecycle Revenue Impacts ($/kWh)					$0.0000183

Table 19: Whole Building Cost-Effectiveness Results – (Load Shape - UT_Large_Retail_HVAC_Aux)

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0093	$1,008,847	$2,758,930	$1,750,083	2.73
Total Resource Cost Test (TRC) No Adder	$0.0093	$1,008,847	$2,508,119	$1,499,272	2.49
Utility Cost Test (UCT)	$0.0074	$800,313	$2,508,119	$1,707,806	3.13
Participant Cost Test (PCT)		$776,879	$4,209,659	$3,432,780	5.42
Rate Impact Test (RIM)		$4,511,547	$2,508,119	($2,003,428)	0.56
Lifecycle Revenue Impacts ($/kWh)					$0.0000161

Table 20: 2022 Energy Project Manager Co-fund Cost-Effectiveness Results – (Load Shape - UT_Miscellaneous_Mfg_General)

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0001	$13,772	$0	($13,772)	n/a
Total Resource Cost Test (TRC) No Adder	$0.0001	$13,772	$0	($13,772)	n/a
Utility Cost Test (UCT)	$0.0054	$582,272	$0	($582,272)	0.00
Participant Cost Test (PCT)		$0	$568,500	$568,500	n/a
Rate Impact Test (RIM)		$582,272	$0	($582,272)	0.00
Lifecycle Revenue Impacts ($/kWh)					n/a