PACIFIC POWER
A DIVISION OF PACIFICORP

2021 Washington Annual Report on Conservation Acquisition

Revised – June 20, 2022

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

TABLE OF CONTENTS

EXECUTIVE SUMMARY

PacifiCorp is a multi-jurisdictional electric utility providing retail service to customers in Washington, California, Idaho, Oregon, Utah, and Wyoming. PacifiCorp dba Pacific Power & Light Company ("Pacific Power or Company") serves approximately 134,317 customers in Washington. The Company works with its customers to reduce the need for investment in supply side resources and infrastructure by reducing energy consumption and peak demand through cost effective energy efficiency programs.

PacifiCorp is required to comply with the requirements of the Energy Independence Act (I-937) codified in RCW19.285 and WAC 480-109. This report outlines the activities and expenditures related to pursuing all conservation in accordance with the I-937 framework, including Washington Utilities and Transportation Commission ("Commission") orders and administrative rules.

In 2021, the Company offered four energy efficiency programs in Washington and received energy savings and market transformation benefits through its affiliation with the Northwest Energy Efficiency Alliance (NEEA). In addition to the energy efficiency programs, the Company, on behalf of customers, invested in outreach and education for the purpose of promoting the efficient use of electricity and improving program performance. The Company recovers expenditures associated with these programs through the System Benefits Charge Adjustment, Schedule 191.

Pacific Power uses outsourced program delivery implementers for its programs.[1] Evaluations for each of the programs are performed by independent external evaluators to validate energy savings derived from Pacific Power's energy efficiency programs.[2]

Pacific 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.[3]

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

[2] 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.

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

This report provides details on program results, activities, expenditures, and System Benefits Charge ("Schedule 191") revenue as of the reporting period January 1, 2021, through December 31, 2021. Pacific Power, on behalf of its customers, invested $12 million in energy efficiency and peak reduction resource acquisitions during the reporting period. The investment yielded approximately 32M kilowatt-hours hours ("kWh") in first-year energy savings,[4] and approximately 4.4 gross megawatts ("MW') of savings from 2021 energy efficiency acquisition.

Several prevalent challenges persisted in 2021 due to the COVID-19 pandemic. Outlined below are some of the issues that caused disruptions across the global supply/demand chain and contributed to lower than expected energy savings results:

- **Competing priorities –** Customers were challenged with new safety protocols and COVID related challenges in addition to their ongoing business challenges which often leave little time to attend to energy efficiency opportunities. Many businesses were struggling to survive.
- **Price Increases** – Raw material and commodity price increases were seen across multiple sectors including insulation, plastic, lumber, steel, and other raw materials. This inflation caused manufacturers to have passed along these increases to contractors and customers.
- **Labor Shortages** – Many Trade Allies did not have enough staff to take on additional projects. Demand for skilled trade jobs outpaced the supply of qualified workers.
- **Delayed Shipments** -There was also a worker shortage in transportation, limiting the number of trucks on the road and trains hauling HVAC replacement parts. Even the blockage of the Suez Canal in March of 2021 put a dent in the ability to obtain HVAC parts.
- **Product Availability** – Shortage of microprocessor chips caused additional equipment shortages.
- **General Uncertainty** – Customer uncertainty around the COVID pandemic caused delays in project implementation.

In addition, Northwest Energy Efficiency Alliance documented 2021 supply chain challenges. Their memo is attached as an Appendix B to this report.

The Demand-side Management ("DSM") portfolio was cost effective based on the Utility/Program Administrator Cost Test (UCT), and PacifiCorp Total Resource Cost Test (PTRC) which are the primary Cost Effectiveness tests used in Washington.[5] Cost-effectiveness results are provided in table 13, and Appendix A.

In 2021, Pacific Power's portfolio included the following programs:

- **Energy Efficiency Programs:**
  - Home Energy Savings (Schedule 118)
  - Home Energy Reports

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

[5] Cost-effectiveness results include realization rates and Net-to-Gross (NTG) ratios.

- Low Income Weatherization (Schedule 114)
- Wattsmart Business (Schedule 140)

REGULATORY AND COMPLIANCE

An external conservation advisory group of stakeholders is required to be maintained and used by the Company to advise it about conservation issues including program designs, incentive levels, third party evaluations, program marketing, and pilots. WAC 480-109-110 provides the scope of issues for the advisory group. The Company refers to its conservation advisory group as the Washington DSM Advisory Group. Due to the COVID-19 pandemic, 2021 advisory group meetings were virtual only and are listed below with meeting dates and summary of topics discussed.

In compliance with I-937, the Company continuously reviews and updates, as appropriate, the conservation programs and portfolio to adapt to changing market conditions. Steps taken to adaptively manage the conservation programs during 2021 are included within program specific sections of this report.

Pilot projects are implemented when appropriate and are expected to be cost effective within the current or immediately subsequent biennium if the overall portfolio remains cost effective. The Company, after consultation with its DSM Advisory Group, offers initiatives or offers within two programs: *Home Energy Savings* and *Wattsmart Business*. This focus is administratively efficient and uses existing program awareness—both important considerations in the Company's rural territory. To further leverage other efforts, the Company has linked its pilot efforts with regional work supported by NEEA whenever possible. Pilot projects and 2021 results are outlined in the section, Pilot Projects.

April 28, 2021 – DSM Advisory Group meeting #1 – 2021 results and 2021 forecast with comparison to two-year target showing projected shortfall, adaptive management to help close current biennial period shortfall, 2022-2023 planning/target setting (non-energy impact – DNVGL, approaches for Home Energy Reports), System Benefits Charge review.

May 20, 2021 - exemption for PacifiCorp from the annual requirement to file a revision to its Schedule 191, System Benefits Charge Adjustment, under Washington Administrative Code (WAC) 480-109- 130(2) and Condition 11(d) in Order 01 in Docket UE-190908. PacifiCorp proposed no change to the current Schedule 191 System Benefits Charge collection rate. (Docket 210352)

June 1, 2021 – Washington Annual Report on Conservation Acquisition for 2020 (Docket UE 190908). The report provides details on program results and activities.

June 1, 2021 – 2020-2021 Conservation Report to Department of Commerce (Docket UE-190908). The report detailed the Company's progress in meeting the targets established in RCW 19.285.070 and WAC 194-37-060 (EIA requirements). Revised report provided June 30, 2021.

June 17, 2021 – DSM Advisory Group meeting #2 – 2022-2023 planning/target setting (NEEA, Production Efficiency, Distribution Efficiency, High efficiency co-generation), 2020-2021 conditions list (3f, 9a, 10a), program tariff updates, return to in-home activities, Clean Buildings (HB 1257) updates (accounting treatment, new web page).

July 2, 2021 – PacifiCorp's Motion to Amend Order 01 (Docket 190908) - proposed to revise delivery dates for providing the DSM Advisory Group with a draft ten-year conservation potential and two-year target from August 2, 2021, to September 2, 2021, and draft program details including budgets from September 1, 2021, to September 15, 2021. An extension was needed given the issues the Company encountered regarding its 2021 IRP.

July 22, 2021 – DSM Advisory Group meeting #3 – review of and feedback on draft Customer Benefits Indicators, initial look at 2021 IRP CETA compliant draft portfolio energy efficiency selections, non-energy impact (NEI) update, 2020 results and 2021 forecast with comparison to two-year target showing shortfall, Home Energy Reports follow-ups from April meeting, Distribution Efficiency 2022-2023 plan follow-ups from April meeting.

October 12, 2021 – DSM Advisory Group meeting #4 – walk through specific items in the biennial conservation plan (non-energy impacts, competitive procurement framework, Clean Energy Implementation Plan utility actions/program changes), 2020 results and 2021 forecast with comparison to two-year target showing shortfall, CETA/CEIP.

November 1, 2021 – Pacific Power's 2022-2023 Biennial Conservation Plan in Docket UE-210830.

December 21, 2021 – Advice 21-13 (Docket 210973) to make changes to the energy efficiency program tariffs, Schedules 114, 118 and 140 including changes needed to implement utility actions in the Clean Energy Implementation Plan.

In addition to the above DSM regulatory activity, there were Equity Advisory Group meetings and Clean Energy Transformation Act (CETA) filings in 2021.

The Company formed an Equity Advisory Group made up of key local community members to help inform and advise the Company and met with them seven times in 2021 to develop Customer Benefit Indicators and to inform the Company's Clean Energy Implementation Plan filed in December 2021. Input from the Equity Advisory Group informed the utility energy efficiency actions in the Company's 2022-2023 DSM Business Plan (the same actions are also in the Clean Energy Implementation Plan) and equity-related program changes for 2022.

PORTFOLIO OF PROGRAMS

The portfolio of Company programs (excluding Low Income Weatherization and without NEEA or NEIs) passed the PTRC with a benefit cost ratio of 1.75 and the UCT with a benefit cost ratio of 1.92. Information by program is available below followed by pilot results, a full set of tables and cost-effectiveness.

RESIDENTIAL ENERGY EFFICIENCY PROGRAM

HOME ENERGY SAVINGS

Program Description

The Home Energy Saving program is designed to provide access and incentives for more efficient products and services installed or received in the following home types.

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

Measures eligible for incentives in 2021 included appliances, HVAC, water heating, weatherization, and retail lighting. Sectors served included single family, new construction, manufactured homes and multifamily.

The Home Energy Savings Program did not pass the PTRC with a benefit cost ratio of 0.80 or UCT with a benefit cost ratio of 0.82 (with NEIs) or PTRC of 0.73 or UCT of 0.82 (without NEIs).

Program Performance and Major Achievements in 2021

- The Home Energy Saving Program achieved 2,957,392 kWh gross savings at site.
- Disbursed $1.6M in incentives.
- Program changes:
    - Planned changes went into effect January 1, 2021, and the following changes were made:
        - Remove mail-by-request Wattsmart Starter Kits from the program as the result of Regional Technical Forum (RTF) deactivating the showerhead measure.
        - Align with the latest unit energy savings (UES) from the RTF.
        - Remove measures with deemed savings recently deactivated by the RTF.
        - Remove $50/heat pump water heater incentive for addition of CTA 2045 capability since the latest NEEA specification requires CTA 2045 or

equivalent demand response capability for equipment designated as Tier 3 or higher.

- Add measure for multifamily new construction.
- Add NEEM+ new manufactured homes to the program offering.
- Add heat pump measure for new manufactured homes.

Adaptive Management

In coordination with Pacific Power, program administrator Resource Innovations implemented the following key initiatives in 2021 to adaptively manage the Home Energy Savings program:

1. **Continued implementing and adaptively managing COVID-19 protocols** for in-person assessments, inspections, and direct install work to keep customers and program team members safe and compliant with State and County COVID-19 guidelines. This allowed the program to safely continue making offerings available to Pacific Power customers. Pacific Power focused on promoting retail and self-install measures in the first half of 2021 given customers could purchase and install these measures with minimal COVID exposure risk.
2. **Temporary Incentive Increase in Response to COVID-19 Pandemic** – Given the COVID-19 pandemic, incentives were increased by approximately 25% effective August 1, 2020. With ongoing supply chain issues and residential customer challenges implementing energy efficiency projects, this incentive increase was carried over and continued through December 31, 2021.
3. **Expanded and increased promotions for the new instant validation coupon offer**. The instant validation coupon offer allows eligible residential customers to receive an instant point-of-purchase discount on eligible equipment after the customer fills out an online application and receives a coupon code and scannable barcode that can be redeemed when they check out at select brick and mortar and online retailers. At the beginning of 2021, the coupon offer was available for smart thermostats at select brick and mortar retailers. The offer was expanded in 2021 to add online smart thermostats (in March), heat pump water heaters (in March), additional retailers (in June) and to add clothes washers (in November). The online retail coupon option enabled customers who were not comfortable shopping in brick-and-mortar stores to still participate in the offer. The coupon offer was promoted directly to customers via the following efforts and brought in approximately 52,000 kWh:
    a. eEarth Day-themed Utility bill insert for residential customers focusing on smart thermostats and the instant coupon associated with it.

b. Google Ads campaign in late Q4 focused on the coupon promotion. While the initial click-thru-rates upon launching were lower than hoped (2%), there was a significant increase in coupon traffic.
c. NEEA electric hybrid water heater (a.k.a. heat pump water heaters) campaign in May.
d. Email sent to customers who did not use their smart thermostat coupons in 2019 encouraging them to reapply – 69% open rate, 19% click-thru-rate.
e. Email for Earth Day promoting coupon and manufacturer discounts – 32% open rate, 4% click-thru-rate.
f. Pacific Power customer Connect newsletters.

4. **Added direct install lighting for multi-family renters and manufactured homes.** In June 2021, after developing new safety protocols and procedures, launched a new direct install lighting campaign focused on tenant spaces in multifamily buildings and added direct install lighting to the direct install duct sealing campaign for manufactured homes. The new direct install lighting offer resulted in over 450 LED bulbs installed in multifamily buildings and over 300 LED bulbs installed in manufactured homes. This direct install approach yielded more savings per bulb as compared to a retail upstream buy down approach because program staff confirmed existing bulb types and only installed bulbs in eligible spaces as determined by the RTF (i.e., kitchen, living and dining rooms). LED Direct installed bulbs accounted for approximately 48,000 additional kWh savings, in addition to 456,000 kWh savings for direct install duct sealing. Participants were also provided with targeted multifamily and manufactured home marketing collateral that explained other Pacific Power offerings. The direct install lighting approach helped offset a portion of lost kWh savings from measures removed due to decreasing RTF baselines in 2021 and from the energy kit offer that ended in 2020 due to low RTF kWh savings. In total, direct install lighting and duct sealing resulted in approximately 504,000 kWh savings.
5. **Increased frequency of in-person retailer visits once allowed given safety protocols.** Between June and December 2021, performed 380 in-person field visits to participating retail locations in Washington to review and replace point of purchase collateral and educate store staff and customers about Pacific Power offerings including smart thermostat, heat pump water heater, clothes washer and lighting incentives. Having good collateral in stores and well-educated store staff helps drive participation in Pacific Power's offerings.
6. **Continued focus on supporting contractors.** Recruited and maintained a network of over 80 Home Energy Savings Wattsmart Vendors who promoted Pacific Power offerings to residential customers. Worked with trade allies to clarify program information and submit applications. The way contractors were contacted was adaptively managed in that program staff met one-on-one via phone/zoom when they might otherwise have met in person. The continued effort to focus on and support

contractors resulted in the majority of the HVAC savings results of over 2 million kWh in savings.

7. **Completed retail store shelf surveys to keep a pulse on the shifting nature of the lighting market**. In 2021, three rounds of lighting shelf surveys were conducted within Pacific Power's territory at major retailers in March, June, and September 2021. More than 5,000 individual products were surveyed across the three reporting periods, which produced nearly 60,000 data points to be analyzed. Reports filed after each round of surveys summarized findings related to LED market saturation, average retail pricing, and ENERGY STAR saturation, as well as themes by retail chain and product type. The details of these surveys were used to recommend Pacific Power program adjustments and changes to adaptively managed the program throughout the 2021 calendar year, so that current program policy could keep in close step with quickly evolving market trends. These lighting shelf surveys informed the shift to focusing on specialty lighting at big box retail stores and general purpose lamps at stores serving lower income clients.
8. **Engaged with residential new construction, but faced challenges.** Engaged with three raters and four builders to promote single family and multifamily new construction projects. Developed a co-branded flyer for raters to promote the new multifamily incentive. Challenges impacting participation included a stricter Washington state energy code being in effect and continual supply chain issues, including high cost of lumber. There were only 12 single family new home construction projects, significantly less than previous years. Potential multifamily new construction projects were found to not meet the minimum 5% above code efficiency incentive eligibility requirement.

Program Performance Compared to the 2021 Annual Conservation Plan

Overall, 2021 Home Energy Savings energy savings results were 57% of plan. Measure groups with the highest energy savings in the 2021 Annual Conservation Plan were Lighting, Non-lighting (HVAC and Water Heating) and Whole Homes. Lighting savings results in 2021 were 53% of plan, HVAC savings were 71% of plan, Water Heating and Whole Homes were each 10% of plan. Total incentives per kWh in 2021 were $0.53/kWh compared to $0.43/kWh in the plan due to the different measure mix. In addition to the general factors described in the executive summary, contributing factors are outlined below.

- **Lighting:** The lighting goals were based on the original program forecast which did not take into consideration the following program changes that reduced lighting results:
    - Loss of all lighting buydowns at Costco (this retailer made up 30% of program lighting)
    - Removal of general-purpose A-lamp buydowns at Home Depot and Lowes (this channel made up 25% of program lighting savings)
    - Ending participation in BPA's Simple Steps program due to non-cost-effective savings

- Further context for ending the lighting program at Costco and removing general purpose lamps at Home Depot and Lowe's:
  - These changes were informed by the results of the Shelf Surveys showing that Costco only sold ENERGY STAR LED's and Home Depot and Lowe's pricing for LED's was very close to pricing of incandescent bulbs.
  - Pacific Power made the decision that these channels were considered "transformed" and ended the buydowns at these retailers.

- **Non-Lighting:** The pandemic greatly reduced the retail store traffic for the majority of 2021. It also kept field staff out of stores from March 2020 through June 2021, which did not allow the program to promote events, train retail staff in selling efficient products, staff point of sale events, or interact with customers which are large drivers of program participation.

- **Direct Install:** COVID delayed the launch of direct install initiatives, such as lighting and duct sealing. From March 2020 - June 2021, COVID restrictions did not allow program staff to enter customer homes.

- **New Single-Family Homes and Manufactured Homes:** Building material shortages and increased demand for new homes caused new home prices to soar and building of new homes slowed down. The National Association of Home Builders (NAHB) reported that newly constructed single-family home average price has increased by about $36,000 per home since April 2020.
  - Lumber Shortages: The "price per thousand board feet" went from $350 to over $1,400 in May 2021.
  - According to an article, "Pandemic Demand Causes Unprecedented Building Supply Shortage":
    A survey conducted in May 2021 by the NAHB found that more than 90% of builders reported shortages of appliances, 87% reported a shortage of windows and doors, and more than 50% of builders reported shortages of steel beams, insulation, roofing materials, vinyl siding, copper wiring, and plumber fixtures, among other materials. Since May 2020, the cost of steel mill products has risen over 75%, including a 59.4% increase in 2021 alone, and the cost of prepared asphalt and tar roofing and siding products has risen nearly 15%.
  - Manufactured home dealers reported that stock was extremely low.

- **Multifamily New Construction:** Several potential projects were reviewed at the beginning of 2021; however, none qualified as eligible based on not exceeding the energy code requirements.

Additional information on the program administration can be found on the Company's website under the Program administration section:
https://www.pacificorp.com/environment/demand-side-management.html

Direct Link to Home Energy Savings program administration:
https://www.pacificorp.com/content/dam/pcorp/documents/en/pacificorp/environment/dsm/washington/Washington_Program_Administration_Home_Energy_Savings.pdf

HOME ENERGY REPORTS

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 PTRC with a benefit cost ratio of 2.54 and the UCT with a benefit cost ratio of 2.31 for 2021.

Program Performance and Major Achievements in 2021

- Total savings for 2021 was 3,333,142 kWh savings at customer site
- In 2020-2021 the program was refreshed with a new treatment and control groups to address statistical significance issues defined in the last evaluation.
- More than 52% of the 7.3 million emails sent over the course of 2021 were opened by participating customers.
- Of the recipients that responded to the Like/Dislike voting mechanism embedded in emails, over 85% "Liked" the HER program.

Additional information on the program administration can be found on the Company's website under the Program administration section:
https://www.pacificorp.com/environment/demand-side-management.html

Direct Link to Home Energy Reporting (HER)program administration:
https://www.pacificorp.com/content/dam/pcorp/documents/en/pacificorp/environment/dsm/washington/Washington_Program_Administration_Home_Energy_Reports.pdf

LOW INCOME WEATHERIZATION

Program Description

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

These agencies include Blue Mountain Action Council located in Walla Walla, Northwest Community Action Center in Toppenish, and Opportunities Industrialization Center of Washington in Yakima. The Company entered into an agreement for these services with the Yakama Nation Housing Authority in July 2018.

The Low-Income Program did not pass the PTRC with a benefit cost ratio of 0.59 for 2021 (with NEIs) and 0.25 benefit cost ratio (without NEIs).

Program Performance and Major Achievements in 2021

- In 2021 the program achieved savings of 116,769 kWh at customer site
- Number of homes served was 57

Program Performance Compared to the 2021 Annual Conservation Plan

- The number of homes served in 2021 was lower than projected in the plan primarily due to the COVID-19 pandemic as safety precautions, physical distancing and lockdown measures were put in place to prevent the spread of COVID-19. Partner agencies resumed weatherization services at various timeframes in Q4 2020 based on their area's pandemic phase. Per guidance from Commerce, in March 2021, agencies paused weatherization activities in "high risk" homes – with vulnerable clients such as the elderly and those with existing health issues - and resumed at various times beginning in mid to late summer 2021 at the discretion of each agency depending on their safety plans, clients and agency resources.

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/washington/Washington_Program_Administration_Low_Income.pdf

NON-RESIDENTIAL ENERGY EFFICIENCY PROGRAM

WATTSMART BUSINESS

Program Description

The commercial, industrial, and irrigation energy efficiency program is consolidated into a Non-Residential Energy Efficiency program, Schedule A-140.[6] The Non-Residential Energy Efficiency program is promoted to the company's customers as Wattsmart Business.

Wattsmart Business is intended 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 included in Incentive Lists: Incentives for listed lighting, HVAC, irrigation, compressed air, and other equipment upgrades that increase electrical energy efficiency and exceed energy code requirements.
- Custom analysis: Offers energy analysis studies, services, and incentives for more complex projects.
- Energy Management: Provides expert facility and process analysis and incentives to help lower energy costs by optimizing customer's energy use.

[6] Program details such as incentive tables and program definitions are available on our website at https://www.pacificpower.net/content/dam/pcorp/documents/en/pacificpower/savings-energy-choices/wattsmart-business/california/CA_wattsmartBusiness_Definitions_Incentive_Tables_Information.pdf
The program brochure is available at https://www.pacificpower.net/content/dam/pcorp/documents/en/pacificpower/savings-energy-choices/wattsmart-business/california/CA_wattsmartBusiness_Brochure.pdf

- Enhanced incentives for small businesses: Provide enhanced incentives for lighting upgrades installed by an approved Wattsmart Small Business Vendor at an eligible existing small business customer facility.
- Midstream/Lighting Instant Incentive: Provides instant, point-of-purchase incentive for qualifying LED lamps sold through participating distributors. Customers purchasing lamps from non-participating suppliers can apply for incentives after purchase.
- Energy Project Manager Co-funding: Available to customers who commit to an annual goal of completing energy projects resulting in at least 1,000,000 kWh/year in energy savings
- Project Financing: PacifiCorp is teamed with National Energy Improvement Fund, an energy efficiency project financing firm, to provide customers with access to third party financing options for instances where funds for project implementation are not available from within the customer's organization.

The Wattsmart Business program passed the PTRC with a benefit cost ratio of 2.56 and the UCT with a benefit cost ratio of 2.85 (with NEIs) and PTRC of 2.55 and UCT of 2.85 (without NEIs).

Program Performance and Major Achievements in 2021

- In 2021, the program achieved 18,458,276 kWh gross savings at customer site.
- Disbursed incentives of $2.719M.
- Program changes effective January 1, 2021, were intended to:
    - Further adaptively manage the program in response to the pandemic by continuing the temporary incentive increases put in place effective 8/1/2020 and temporarily increasing the project cost incentive caps where project level incentive caps apply.
    - Added new incentive offerings to Small Business Lighting to expand measures available to customers.
    - Aligned with the 2018 Washington state energy code that become effective February 1, 2021.
    - Align the program's measure offerings and incentives with the latest unit energy savings (UES) and Standard Protocols from the Regional Technical Forum (RTF).
    - Removed general service lamp measures from the mid-market program to align with Washington's updated manufacturing standards.

Adaptive Management

The Company made substantial changes through an adaptive management approach and attempted to "leave no stone unturned" in terms of effort.

- **Introduced Vendor Incentives** for all lighting projects for the first time. Previously, vendor incentives were for targeted measures such as Advanced Networked Lighting Controls. The lighting vendor incentive introduced in April 2021 was intended to broadly increase lighting projects installed.

  The Pacific Power service area was hard hit by COVID-19; the Yakima region had some of the highest infection rates across the state and continued to feel the effects of shutdowns. COVID-19 also significantly impacted Wattsmart Business Vendors and their ability to sell projects. The pandemic led surrounding utilities (Energy Trust of Oregon and Puget Sound Energy) to increase their incentives which pulled some vendors from working in Pacific Power's service area. The vendor incentive for lighting projects was added in response to these challenges and intended to retain and attract vendors to propose more projects in Pacific Power's service area. See vendor incentives pilot for additional information and results.

- **Temporary Incentive Increase in Response to COVID-19 Pandemic –** Given the COVID-19 pandemic, incentives were increased by approximately 25% (before any project incentive caps are applied) effective August 1, 2020. With ongoing supply chain issues and customer challenges implementing energy efficiency projects, this incentive increase was carried over and continued through December 31, 2021.

- **Program-Specific Field Outreach including Diversity, Equity, Inclusion Efforts**
  - The outsourced delivery implementation team hired a Diversity & Community Outreach Coordinator with focus on in-person outreach to named community/Highly Impacted Community customers and vendors.
  - Reached out to non-participating vendors and minority-owned vendors to share program opportunities and encourage them to participate.
  - Attended Central Washington Hispanic Chamber of Commerce and Yakima Hispanic Chamber of Commerce events regularly (most events in 2021 were virtual). Presented at Central Washington Hispanic Chamber of Commerce March 2021 virtual Meet and Greet event.
  - Continued efforts to promote the Lighting Instant Incentive offer to distribution vendors by offering to meet in person, educate staff, and assist with program submittals.
  - Leveraged relationships with out-of-area vendors to increase the vendor network capacity. Two out of state vendors participated in 2021 and one more has become an approved vendor that is in the process of moving to the area.
  - Reached out to all Pacific Power area School Districts via email and phone calls including past participants.
  - Followed up on past prospects that we are aware of who have not moved forward with their efficiency upgrade opportunities.
  - Performed joint presentations with vendors and customers to help customers understand benefits and program opportunities.
  - Program outreach staff succeeded in cultivating one-on-one relationships with vendors of irrigation equipment, adaptive refrigeration controls, and fast acting doors through repeat calls and visits, subject to COVID restrictions. Although the focused attention resulted in a dozen

projects, uptake was slow in general in 2021. A special outreach effort in Q3 to dairy customers brought in a batch of dairy projects late in the year.

- **Small Business Lighting –** Recruited more vendors to offer Small Business Lighting incentives. Continued the postcard campaign that focused on hard-to-reach small business customers. Small Business Vendors who signed a non-disclosure agreement were provided with customer lists (containing business name, address, phone number only) to allow them to connect with customers who received a postcard from Pacific Power postcard containing an introduction to the program and an approved vendor. The intent is to improve efficiency of the approved vendors sales processes and boost small business participation. In addition, co-branded shirts are made available to vendors who participated in the postcard campaign. These shirts help in promoting vendor credibility with small business customers. Two Small Business Vendors, MH Electric and Conserve Energy, participated; postcard and conversions are listed below for 2021:
    - MH Electric: 39 postcards sent, 0 projects for customers who received postcards
    - Conserve Energy: 23 postcards sent, 1 project for customers who received postcards

  The low conversion rate was due to the ongoing COVID-19 supply shortages/delays. Some customers who received postcards in 2021 may still participate in 2022.

- **Strategic Energy Management Cohorts –** Pacific Power finalized participation in the Strategic Energy Management (SEM) Water Cohort that was initiated in 2019 and continued the SEM wastewater cohort that was initiated in late 2020 with four city entities in the Yakima Valley. These two SEM cohorts resulted in 1,387,951 kWh in energy savings in 2021 for the Pacific Power participating customers. Positive feedback and high customer participation in remote workshops informed Pacific Power to consider this delivery method for future workshops and energy focused trainings.

- **Energy Management –** In response to equipment shortages and capital constraints due to supply chain issues with the ongoing COVID pandemic, the team increased focus on energy management opportunities with compressed air. Cascade Energy, an implementer for the custom offering, purchased a Fluke leak detector and conducted 8 customer site assessments to identify leaks for customers with high consumption of compressed air. The Fluke detector allows for more accurate and faster leak detection and resulted in 67,184 kWh in completed leak repair projects in 2021 with another 1,079,205-kWh identified that are still in the process of being repaired.

- **Clean Buildings Performance Standard (HB 1257) –** The team reached out to large commercial customers to provide information regarding the Washington Clean Buildings Performance Standard administered by the Department of Commerce. These customers will be required to comply with energy use intensity targets as part of complying with the Clean Buildings Performance Standard. It is the intent that projects implemented to comply with

the Standard may also qualify for Pacific Power's Wattsmart Business program and receive incentives to help offset incremental costs. Pacific Power's project manager and implementors established monthly calls with large commercial customers as they begin to navigate the Clean Buildings Standard.

- **Virtual Inspections –** As a result of the COVID-19 pandemic, the program adaptively managed inspection protocols starting in March 2020 and these protocols remained in place throughout 2021. In March 2020, the program made a policy decision to allow virtual inspections where possible in place of in-person on-site inspections. This allowed the team to keep the program open for business while complying with local/state/national health authority guidelines and mandates. The policy was further adaptively managed to provide the option to waive the requirement for inspection for Premium Vendors for low-risk projects up to a specific threshold. This inspection policy update was effective October 1, 2020, after consulting with the DSM Advisory Group.

- **Online Application Portal –** At the end of 2020, the online application platform using the iEnergy public user experience (PUX) technology in place for Home Energy Savings was expanded to include Wattsmart Business. Washington business customers and vendors can now view and apply for eligible incentives online. This online incentive center works directly with Pacific Power's database system allowing for a more streamlined application and processing path. Either a customer/participant or a Wattsmart Business vendor can apply, and the system is tailored to only show eligible measures available for each customer and vendor. Additionally, customers and vendors can track their incentive application status online in real time.

- An **eLearning Platform** with a variety of courses for participating vendors that cover available incentives, measure requirements, and resources for applying. The platform has a variety of courses that cover available incentives, measure requirements, and resources for applying. In 2021, continued to add courses to the eLearning Platform for participating vendors: Controlled Agriculture Environment, Smart Buildings – Foundation and Future, Lighting Tool Tutorial and Tips for a Challenging Markets. There are now a total of 22 courses available to Wattsmart Vendors through this platform.

Program Performance Compared to the 2021 Annual Conservation Plan

Overall, 2021 Wattsmart Business energy savings results were 59% of plan. Measure categories with the highest energy savings in the 2021 Annual Conservation Plan were Lighting, Refrigeration, Energy Management and Compressed Air. Lighting savings results in 2021 were 80% of plan, Refrigeration savings were 45% of plan, Energy Management savings (including Strategic Energy Management) was 40% of plan and Compressed Air was 36% of plan. Total incentives per kWh in 2021 were $0.15/kWh compared to $0.13/kWh in the plan. In addition to the general factors described in the executive summary, contributing factors are outlined below.

- The pandemic limited in-person opportunities for vendors to meet with customers and sell projects.
- Customers were wary about investing capital funds during an uncertain and unstable economic environment.
- Many businesses faced a multitude of pandemic related challenges. Staff shortages, shutdowns, and the extra work imposed by COVID precautions added pressure to already-scarce time availability for maintenance people and management.
- Customers had trouble not only with supply chain delays, but also had trouble getting shipping capacity lined up for exports.
- Vendors experienced labor shortages and supply chain shortages which limited their ability to sell and install upgrades, especially affecting lighting program performance.
- 2021 was a slow year for new construction in the fruit storage and associated industries, so there were fewer new construction participants in 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:[7]
https://www.pacificorp.com/content/dam/pcorp/documents/en/pacificorp/environment/dsm/washington/Washington_Program_Administration_NonResidential.pdf

NORTHWEST ENERGY EFFICIENCY ALLIANCE

Description

The Northwest Energy Efficiency Alliance (NEEA) is a non-profit corporation that works collaboratively with its funders and other strategic market partners to accelerate the innovation and adoption of energy-efficient products, services, and practices. NEEA is supported by BPA, Energy Trust of Oregon, and more than 100 Northwest utilities, including Pacific Power.

Program performance for 2021 is being reported based on NEEA's results for Pacific Power of 4,588 MWh (at site)[8]. Consistent with the reporting convention approved in Docket UE-132047

[7] The Wattsmart Business program is administered through a process that allows for program changes after any stakeholder comments are addressed. After consultation with Commission staff on the program changes, they are posted to the program website and become effective 45 days thereafter.
[8] NEEA savings provided by NEEA was revised to exclude Codes and Standards outside of the Conservation Potential Assessment potential consistent with the 2020-2021 Biennial Conservation Plan.

the savings represent Pacific Power's portion of Total Regional Savings less the Company's local program savings.

The Company has a representative on the NEEA board of directors as well as representatives on the coordinating committees.

PILOT PROJECTS

The Company offers pilot projects to residential and nonresidential sectors. This section briefly describes the pilots underway in the biennial period and key activities that occurred in 2021.

On-Bill Financing option for residential customers residing in manufactured homes

- **Purpose**: Reduce upfront cost barrier to participation in residential energy efficiency programs by offering on-bill financing. This offer is focused on customers who reside in manufactured homes located on rented land (i.e., manufactured home parks) and further complements the third-party financing in residential and business customers offered in 2018-2019 biennial period.
- **Costs**: Up to $20,000 in start-up costs. $200 per funded loan application. $300 per application underwriting fee (regardless of loan funding). Costs will be included as a residential program expense and recovered through the tariff rider. Pacific Power internal on-going loan administration costs will also be included as a program expense and recovered through the tariff rider. Pacific Power is not loaning its own funds and will not be receiving any interest income from loan payments.
- **Size**: The Company expects between 60-100 completed loans over the two-year period.
- **Implementation**: Build upon current experience utilizing Craft3 to operate as funder and loan administrator for on-bill financing for residential customers who participate in the Home Energy Savings program. Financing will be available for the net (after incentives) costs of equipment eligible for Home Energy Savings incentives.
- **Marketing**: Home must be in good condition and built after June 15, 1976 (the first HUD standard). The offer will be marketed primarily through installing contractors and the program administrator. Craft3 will work jointly to identify and train contractors. Marketing and screening will be in place to help ensure customers eligible for low-income services are directed to the community action agencies instead of participating in the loan offer. Individual loan offers are subject to both customer and home park screening by Craft3.
- **2021 activity**: individual training conducted with trade allies and Craft3 through digital communications and phone outreach. There were 205 applications received; 161 approved, (funded and billing), 33 applications declined (all referred to regional

community action agencies) and 27 applications withdrawn. Exploration of an offer for owned manufactured homes on rented space is on-going.

Manufactured Homes Targeted Delivery

- **Purpose:** Increase installation of energy efficiency measures within new and existing manufactured homes.
- **Costs:** Costs are included in the existing program delivery and incentive budgets for the biennial period.
- **Size:** The Program Administrator expects 500-1,000 manufactured home projects over the two-year period.
- **Implementation:** Program Administrator will use an RFP process to create a closed network of contractors who specialize in manufactured home measures. Build awareness and utilization of available customer incentives for manufactured home measures, including duct sealing, heat pumps, water heaters, evaporative coolers, central air, windows, and insulation.
- **Marketing:** Utilize geo-targeted analysis, marketing, outreach, and lead sharing methods to optimally reach customers, including customers in underserved areas or non-participating areas. Trade Allies will be trained on available financing options from nonprofit lender Craft3, who offers loans with affordable rates and convenient repayment directly on the Pacific Power utility bill.
- **2021 activity**: Due to the COVID-19 pandemic, this program launched in the summer of 2021. In July 2021, 8 vendors were contacted about a postcard campaign and two agreed to participate in the campaign and fifteen postcards were sent out on behalf of each of the participating vendors. These two vendors also received cobranded polo shirts for customer-facing staff to wear when following up in person on postcard leads. In August – October 2021, follow up calls & emails were sent out to vendors who had not yet responded.

CTA-2045 enabled heat pumps (water and space heating)

- **Purpose:** Increase deployment of CTA-2045 enabled heat pumps (water and space heating) ahead of the code/standards start date provided in HB 1444 which are applicable to water heating equipment. CTA-2045 technology allows utilities to manage energy loads of heat pump water heaters and space heaters. This new approach to demand response greatly reduces the cost of controlling water heaters and space heaters, while at the same time allowing daily control and improving the customer experience. The prior pilot would be continued to increase stocking, sales and incentive applications for heat pump water heaters within Pacific Power's service area. Equipment eligibility aligns with Northwest Energy Efficiency Alliance's (NEEA's) Qualified Products List (QPL). In 2020-2021, the pilot will also focus on increasing sales of CTA-2045 equipped units ahead of the standards start

date by providing an additional incentive of $50 for each heat pump water heating and $100 for each heat pump space heating unit purchased with CTA-2045 capability.

- **Costs:** Costs are included in the program delivery and incentive budgets for the biennial period.
- **Size:** Twenty to 45 units.
- **Implementation:** Home Energy Savings program team will leverage program administrator's existing relationships and Memorandum of Understandings (MOUs) with retailers in Pacific Power's service area. Program staff will build new relationships with heat pump water heater and heat pump space heating manufacturers and distributors to increase availability of models and push sales of CTA 2045 equipped units.
- **Marketing:** Continue sales training and enhanced outreach to retailer and manufacturers with existing MOUs. Promote the additional incentive for CTA-2045 ready models through direct outreach email and phone communications. Create cobranded materials with retailers and manufacturers to increase visibility.
- **2021 activity:** In 2020, NEEA revised the Advanced Water Heating Specification with the requirement that all heat pump water heaters be CTA 2045 equipped. As part of the January 1, 2021, program changes, the $50 incentive for CTA 2045 capability was removed from the program, essentially ending heat pump water heater pilot efforts.

Geo-Targeted Energy Efficiency

- **Purpose:** Focus on increasing participation in specific area(s) where additional value such as preventing or deferring possible infrastructure investments has been identified. This builds up work in targeted areas identified during prior biennial period which, while successful, did not eliminate or defer the traditional construction solution. In 2020, in alignment with the conditions list, the Company will determine if there are specific areas to target and, if so, begin that targeting. Based on prior experience, the focus will be on areas with longer construction/investment lead times.
- **Costs:** Costs are included in the existing program delivery and incentive budgets for the biennial period.
- **Size:** to be determined.
- **Implementation:** Determine if there are areas appropriate to target. Identify the scope, timing and characteristics of the need for these areas. Obtain customer lists for these areas.
- **Marketing:** Increase frequency of existing program incentives and outreach tactics including direct mail/email, trade ally engagement and personal selling.
- **2021 activity:** In 2020 and 2021, the primary focus was mitigating COVID impacts and safely continuing overall target acquisition in addition to identification of circuits that would benefit from volt/VAR optimization (presented to DSM AG in November and December 2020). In addition, there was not a set of clearly identified circuits that would benefit from increased energy efficiency (beyond the overall system value). As a result,

no geo-targeting activities were undertaken in 2020 or 2021. Note - two feeders were identified in late 2021 for geo-targeting in 2022.

Non-Residential Lighting Controls

- **Purpose:** Increase installation of lighting controls as part of business customer lighting retrofit projects.
- **Costs:** Included in existing program delivery budgets.
- **Size:** Up to 15 projects.
- **Implementation:** Leverage the Northwest Energy Efficiency Alliance's Luminaire Level Lighting Control (LLLC) initiative including vendor training support. Customer incentives are structured so that lighting upgrades combined with advanced networked lighting controls provide the highest incentive for lighting projects. Continue and evolve vendor incentives for lighting controls (see Vendor Incentive pilot below).
- **Marketing:** NXT Level training and good/better/best communications, continuing and improving lighting controls training for vendors, and providing outreach coordinator feedback to approved Wattsmart Business Vendors on lighting control opportunities in their projects.
- **2021 activity:**
  Contractor/Vendor Training:
  - Through continued promotion and outreach efforts, several Wattsmart vendors either maintained their NXT Level designation, achieved NXT Level 1 designation, or achieved NXT Level 1 designation. The complete list of additionally designated vendors in 2021:
    - Conserve Energy – NXT Level 2 (designated NXT Level 1 in 2020)
    - Platt Electric Supply – NXT Level 1
    - ecomodus – NXT Level 1
    - Stoneway Walla Walla – NXT Level 1
    - DL Lighting – NXT Level 2 (New Wattsmart Vendor)
    - CES Pasco – NXT Level 2
  - Due to COVID-19, the team had to adjust the annual in-person training plan and pivoted the training season to host a series of four webinars including Program Updates and Resource Training on February 5, Harvesting Low Hanging Fruit on March 19, Online Lighting Tool on March 26, and Facility Walk-Throughs on April 30.
  - On June 25, 2021, hosted a one-hour webinar (due to COVID-19 it could not be held in person) in partnership with NEEA to provide Wattsmart Business Vendors with continued ANLC training. The course was titled Provide Better Lighting with Luminaire Level Lighting Controls and had healthy vendor attendance. During the training, continued to promote the ANLC vendor incentives which can be stacked with the typical vendor incentives.

Contractor Incentive: In 2021, Pacific Power continued the $/fixture Contractor Incentive for advanced networked lighting controls that was promoted and offered throughout 2019 and 2020. Contractors face up-front costs of time and money to obtain manufacturer certification(s) to install advanced lighting controls products. A vendor incentive (focused on the vendor's first three projects) along with the vendor support provided by the program could boost participation.

Savings results: Lighting controls were present in approximately 32 completed projects; savings associated with controls totaled approximately 4.3 million kWh per year. There were seven projects with Advanced Exterior Dimming, and two projects with interior Advanced Network Lighting Controls. Vendors received the maximum $5,000 incentive for each of the projects with advanced controls.

Business Vendor Incentives

- **Purpose:** Increase energy savings of certain Wattsmart Business measure categories, hard-to-reach customer segments and geo-targeted locations by providing limited time incentives to specifically qualified vendors/contractors in addition to customer incentives. Vendor incentives can help address market barriers in Washington such as cost of learning a new technology, and competition for limited resources for promoting efficiency upgrades due to labor shortages.
- **Costs:** Costs are included in the program delivery and incentive budgets for the biennial period and include up to $150,000 for vendor incentives in 2020 and up to $250,000 for 2021.
- **Size:** Dependent on which measure categories are incentivized.
  - **Examples:**
    - Advanced Networked Lighting Controls: 5-10 projects
    - Advanced Rooftop Unit Controls (ARC): 20-30 rooftop units
    - Ductless Heat Pumps (e.g., replacing electric resistance heating): 5-10 units
- **Implementation**: Vendor incentives for Wattsmart Business will be "turned on" for a limited period to encourage specific measure, sector, or location participation. For lighting, the incentives will be offered to Premium Vendors to encourage project completion. For HVAC, the incentives will initially focus on increasing participation of the existing and expanded ARC measures. The strategies and outcomes of the 2020 vendor incentives will be evaluated before 2021 and adjusted as needed.
- **Marketing:** Utilize E-blasts to highlight vendor incentive offerings for the vendor network. Outreach Coordinators will work with vendors one-on-one to support the pilot.
- **2021 Activity:** Vendor incentives were available again for interior Advanced Networked Lighting Controls and Advanced Rooftop Unit Controls[9] in 2021. As a key part of the

[9] $100 Amazon gift card per ARC installed for first five units installed, limit of three gift cards per approved vendor.

adaptive management strategy to increase participation, vendor incentives were expanded in April 2021 to include a limited-time vendor incentive for lighting projects. Total vendor incentives paid by category are listed below

- Advanced Networked Lighting Controls, two projects, $10K in vendor incentives
- Advanced Rooftop Unit Controls, one project, no vendor incentive as the vendor did not meet the requirement to be a participating Wattsmart Business vendor.
- Lighting Vendor Incentives:
  - Listed Incentive, 35 projects, $92.5K vendor incentives and 3.68 million in kWh savings
  - Lighting Instant Incentive, seven projects, $3.8K vendor incentives and 75K in kWh savings
  - Small Business Lighting, 46 projects, $63K vendor incentives and 1.3 million in kWh savings

EXPENDITURES AND SAVINGS RESULTS

TOTAL PORTFOLIO BUDGET AND EXPENDITURES

Table 1: DSM Balancing Account[10]

Month	Expenditure[11]	S-191 Revenue[12]	Cash Basis Accumulative Balance[13]	Net Cost Accrual[14]	Accrual Basis Accumulative Balance[15]
20-Dec			$ (4,671,612.97)		
21-Jan	$ 789,851.81	$ (1,043,804.70)	$ (4,925,565.86)	$ (13,449.29)	$ (3,858,135.42)
21-Feb	$ 321,717.29	$ (961,785.14)	$ (5,565,633.71)	$ (136,492.21)	$ (4,634,695.48)
21-Mar	$ 1,022,703.30	$ (876,928.74)	$ (5,419,859.15)	$ (165,381.74)	$ (4,654,302.66)
21-Apr	$ 629,520.05	$ (773,083.32)	$ (5,563,422.42)	$ 406,495.43	$ (4,391,370.50)
21-May	$ 874,995.66	$ (725,479.52)	$ (5,413,906.28)	$ (31,470.42)	$ (4,273,324.78)

[10] The DSM balancing account is the mechanism used for managing the DSM Tariff Rider revenues and actual DSM-incurred expenditures.
[11] Monthly expenditures for approved energy efficiency programs.
[12] Revenue collected through the DSM Tariff Rider.
[13] Current balance of the account; a running total of account activities, excluding the accrued cost. A positive balance means cumulative expenditures exceeds cumulative revenue; a negative balance means cumulative revenue exceeds cumulative expenditures.
[14] Two accrual entries are made each month for expenditures of energy efficiency programs. One estimates the incurred cost not yet processed, and the other reverses the estimate from the previous month. The amount shown here is the net of the two entries. This accounting principle was applied to the balancing account but would not be included when calculating the carrying charges.
[15] Current balance of the account including accrued costs. A positive balance means cumulative expenditures exceeds cumulative revenue; a negative balance means cumulative revenue exceeds cumulative expenditures

Month	Expenditure[11]	S-191 Revenue[12]	Cash Basis Accumulative Balance[13]	Net Cost Accrual[14]	Accrual Basis Accumulative Balance[15]
21-Jun	$ 1,411,632.65	$ 1,411,632.65	$ (4,813,765.96)	$ (379,850.64)	$ (4,053,035.10)
21-Jul	$ 616,859.37	$ (1,043,367.90)	$ (5,240,274.49)	$ 132,735.79	$ (4,346,807.84)
21-Aug	$ 1,225,440.55	$ (1,045,887.18)	$ (5,060,721.12)	$ (29,329.83)	$ (4,196,584.30)
21-Sep	$ 1,229,730.50	$ (869,070.86)	$ (4,700,061.48)	$ 120,130.63	$ (3,715,794.03)
21-Oct	$ 219,831.12	$ (794,119.39)	$ (5,274,349.75)	$ 299,330.21	$ (3,990,752.09)
21-Nov	$ 1,511,644.93	$ (861,933.71)	$ (4,624,638.53)	$ (432,991.13)	$ (432,991.13)
21-Dec	$ 1,249,849.26	$ (980,973.02)	$ (4,355,762.29)	$ 189,619.96	$ (3,315,535.80)
2021 Total	**$11,103,776.49[16]**	**$ (10,787,925,81)**		**$ (40,653,24)**	

Table 2: Washington Results January 1, 2021 – December 31, 2021[17]

Energy Efficiency Program	kWh Savings (at site)	kWh Savings (at gen)	Estimated Systems Benefit Expenditures
Low Income Weatherization	116,769	125,732	$ 507,654
Home Energy Savings	2,957,392	3,184,402	$ 3,816,526
Home Energy Reports	3,333,142	3,588,994	$ 366,263
Total Residential Programs	**6,407,303**	**6,899,128**	**$ 4,690,443**
Wattsmart Business	**18,458,276**	**20,319,463**	**$ 5,848,068**
Northwest Energy Efficiency Alliance	4,587,658	4,937,868	$ 792,519
Total	**29,453,238**	**31,665,037**	**$ 11,333,030**
Be Wattsmart, Begin at Home			$ 48,700
Outreach and Communication			$ 245,986
Program Evaluations			$ 317,623
Potential Study			$ 45,383
System Support			$ 31,110
End Use Research			$ 12,620
Total Portfolio Level Expenditures			**$ 701,422**
Total PacifiCorp Conservation	**24,865,580**	**26,727,169**	**$ 11,241,933**
Total System Benefits Charge Conservation	**29,453,238**	**31,665,037**	**$ 12,034,452**

[16] December 2021 accrual.
[17] Gross Savings

Table 3: Washington Gross Results January 1, 2021 – December 31, 2021[18]

Energy Efficiency Program	2021 PacifiCorp Washington Annual Conservation Plan			2021 PacifiCorp Washington DSM Actual		
	kWh Savings (at site)	kWh Savings (at gen)	Estimated Systems Benefit Expenditures	kWh Savings (at site)	kWh Savings (at gen)	Estimated Systems Benefit Expenditures
Low Income Weatherization	145,860	157,056	$ 865,000	116,769	125,732	$ 507,654
Home Energy Savings	5,215,527	5,615,871	$ 4,285,623	2,957,392	3,184,402	$ 3,816,526
Home Energy Reports	1,155,000	1,243,658	$ 266,500	3,333,142	3,588,994	$ 366,263
Total Residential	**6,516,387**	**7,016,585**	**$ 5,417,123**	**6,407,303**	**6,899,128**	**$ 4,690,443**
Total Wattsmart Business	**31,183,794**	**33,496,235**	**$ 7,479,679**	**18,458,276**	**20,319,463**	**$ 5,850,068**
Northwest Energy Efficiency Alliance	3,023,217	3,253,636	$ 842,389	4,587,658	4,937,868	**$ 792,519**
TOTAL	**40,723,398**	**43,766,455**	**$ 13,739,191**	**29,453,238**	**31,665,037**	**$ 11,333,030**
Be Wattsmart, Begin at Home			$ 64,523			$ 48,700
Outreach and Communication			$ 259,662			$ 245,986
Program Evaluations			$ 95,368			$ 317,623
Potential Study			$ 85,500			$ 45,383
System Support			$ 148,543			$ 31,110
End Use Research			$ 250,000			$ 12,620
Total Portfolio Level Expenditures			**$ 903,596**			**$ 701,422**
Total PacifiCorp Conservation	**37,700,181**	**40,512,819**	**$ 13,800,398**	**24,865,580**	**26,727,169**	**$ 11,241,933**
Total System Benefits Charge Conservation	**40,723,398**	**43,766,455**	**$ 14,642,787**	**29,453,238**	**31,665,037**	**$ 12,034,452**

Table 4: Estimated Peak Contribution

Description	Value
First year Energy Efficiency program MWh savings acquired during 2021 (@ Generator)	32,156

[18] Consistent with requirements under WAC 480-109-120 (3)(b)(ii) and (iii), provides a comparison of the Company's business plan to actual program performance.

Conversion factor: Coincident MW/MWh	0.000137601
Estimated coincident peak MW contribution of 2020 Energy Efficiency acquisitions	4.42

Table 5: Direct Benefit to Customers[19]

Program or Initiative	Expenditures	Direct Benefits to Customers	% Direct Benefit to Customers
Low Income Weatherization[20]	$ 507,654	$ 426,783	84%
Home Energy Savings[21]	$ 3,816,526	$ 1,568,214	41%
Home Energy Reports	$ 366,263	$ -	0%
Total Residential	**$ 4,690,443**	**$ 1,994,998**	**43%**
Total Wattsmart Business[22]	**$ 5,850,068**	**$ 3,113,152**	**53%**
Northwest Energy Efficiency Alliance (NEEA)[23]	$ 792,519	$ 545,929	**69%**
Total	**$ 11,333,030**	**$ 5,654,079**	**50%**
Be Wattsmart, Begin at Home	$ 48,700		
Outreach and Communication	$ 245,986		
Program Evaluations	$ 317,623		
Potential Study	$ 45,383		
System Support	$ 31,110		
End Use Research	$ 12,620		
Total PacifiCorp Conservation	**$ 11,241,933**	**$ 5,108,150**	**45%**
Total System Benefit Charge Conservation	**$ 12,034,452**	**$ 5,654,079**	**47%**

[19] This additional metric to assess program impacts is consistent with conversations between Commission Staff and the Company that occurred during the preparation of prior conservation plan(s) and reports. Direct benefits are in addition to the benefits all customers receive through implementation of cost-effective energy efficiency resources, lower energy costs.

[20] Low Income Weatherization: Payments to community action agencies for measure installation were classified as incentives

[21] Home Energy Savings: Customer incentives, upstream, mid-stream and mail by request buy downs are included in the direct benefit to customer calculation.

[22] Wattsmart Business: Incentives ($2,719,330) and expenditures for customer site specific energy engineering ($393,822) are included in the direct benefit to customer calculation.

[23] NEEA: Company subtracted for NEEA program administration. Calculation utilized the assumption provided by WUTC staff that 70% of the NEEA expenditures are a direct benefit to customers.

GROSS SAVINGS BY MEASURE CATEGORY

Table 6: 2021 Annual Savings by Home Energy Savings

Measure Category	Total kWh (at Site)	Total Incentive	Total Measure Quantity
Appliances	16,307	$ 11,710	89
Building Shell	44,161	$ 38,140	106,925
Energy Kits	3,800	$ 188	25
HVAC	2,140,126	$ 1,189,444	1,380
Lighting	608,301	$ 251,365	169,766
Water Heating	26,881	$ 11,500	22
Whole Home	65,926	$ 56,850	22
Coupons	51,890	$ 9,018	96
Grand Total	**2,957,392**	**$ 1,568,214**	

Table 7: Participation by Manufactured Home Residents

Program	2015	2016	2017	2018	2019	2020	2021
Low Income Weatherization Homes	44	49	45	41	7	12	8
Home Energy Savings Participants	1,028	403	954	872	648	169	813
Appliances	10	10	4	8	2	11	6
Duct Sealing	187	12	795	492	488	9	618
Heat Pump	26	18	79	90	67	99	121
Heat Pump Water Heater	0	1	3	0	0	0	0
Kits	817	362	73	282	42	0	0
Lighting	17	1	0	0	0	0	244
Lighting Buy Down	86,318	54,508	50,953	33,936	34,791	19,400	0
Weatherization [FK3]	8	3	1	4	2	1	2
Whole Home	0	0	0	0	0	0	10

Table 8: Home Energy Reports Participation by Manufactured Home Residents[24]

[24] From the 2020-2021 Washington Home Energy Report; 11% of all customers surveyed have a multifamily housing type.

	Treatment	Control	Total
Groups	6,620	3,185	8,805

Table 9: Low Income Homes Served and Measures Installed

Measure Type	Installed
Air Sealed/Infiltration	54
Insulation	156
Attic Ventilation	33
Lighting CFL/LED	373
Weather Strip Doors	28
Duct Sealing and/or Insulation	22
Ductless Heat Pump	15
Thermal Doors and/or Window Replacement	65
Water Heater Replacement	10
Low Flow Shower Heads and Faucet Aerators	67
Ground Cover	33
Thermostat	5
Refrigerator Replacement	2
Total Number of Homes Served	**57**
Total kWh Savings @ Site	**116,769**

Table 11: Wattsmart Business Savings by Sector

Sector	Total kWh (at Site)	Total Incentive
Commercial	13,667,857	$ 1,902,018
Industrial	4,294,801	$ 731,155
Irrigation	495,618	$ 86,157
Grand Total	**18,458,276**	**$ 2,719,330**

Table 12: 2021 Annual Savings by Wattsmart Business

Measure Category	Total kWh (at Site)	Total Incentive	Total Projects
Additional Measures	566,747	$ 92,865	7
Compressed Air	1,002,536	$ 122,240	12
Energy Management	1,900,169	$ 46,463	15
Food Service Equipment	98,740	$ 7,460	14
HVAC	408,422	$ 63,827	48
Irrigation	573,413	$ 97,826	39
Lighting	11,015,522	$ 1,873,466	652
Motors	554,444	$ 84,653	14
Refrigeration	2,291,797	$ 275,988	16
Farm and Dairy	46,486	$ 8,367	1
Energy Project Manager Co-Funding	-	$ 46,175	1
Grand Total	**18,458,276**	**$ 2,719,330**	

COST EFFECTIVENESS

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 Pacific Power's programs is outlined below.

- 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.

All cost effectiveness calculations assume a net-to-gross (NTG) of 1.0, consistent with the Northwest Power and Conservation Council's methodology. Portfolio level cost effectiveness includes portfolio costs such as the Process and Impact Evaluations, Class 2 demand-side management (DSM) Potential Assessment, End Use Load Research, and the DSM system database. Consistent with the Northwest Power and Conservation Council's methodology, the Company includes quantifiable non-energy benefits at the portfolio and program level. *Low Income Weatherization* is not included in the portfolio or sector-level cost effectiveness analysis per WAC 480-109-100(10)(b). Appendix A provides 2021 cost effectiveness performance

Table 13: 2021 Cost-Effectiveness Results by Program

Program	Benefit/Cost Test				
	PTRC	TRC	UCT	PCT	RIM
Total Portfolio (not inc. NEI or NEEA)	1.75	1.60	1.92	3.17	0.76
Residential (not inc. NEI or NEEA)	0.86	0.78	0.95	1.87	0.55
Home Energy Savings (inc. NEI)	0.80	0.73	0.82	1.78	0.50
Home Energy Reporting	2.54	2.31	2.31	n/a	0.93
Low Income Weatherization (inc. NEI)	0.59	0.57	0.25	n/a	0.21
Wattsmart Business (inc. NEI)	2.56	2.32	2.85	3.97	0.87

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 are 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
Home Energy Savings 2019-2020	ADM	Completed	2021
Wattsmart Business Evaluation 2018-2019	Cadmus	Completed	2021
Wattsmart Business Evaluation 2020-2021	Cadmus	In Progress	N/A
Home Energy Savings 2021-2022	ADM	In Progress	N/A
Home Energy Reports 2020-2021	ADM	In Progress	N/A

APPENDIX A – COST-EFFECTIVENESS

APPENDIX B – NEEA SUPPLY CHAIN MEMO

APPENDIX

Appendix A: Cost-effectiveness Results[1]

[1] Cost-effectiveness results were generated by Applied Energy Group (AEG) using the approved Cost-effectiveness methodologies.

MEMORANDUM

To: Alesha Pino, PacifiCorp

From: Andrew Cottrell, Andy Hudson, Dylan Royalty, AEG

Date: April 27, 2022

Re: PacifiCorp Washington Portfolio and Sector Level Cost-Effectiveness Results – PY2021

AEG estimated the cost-effectiveness of PacifiCorp's overall energy efficiency portfolio in the state of Washington based on Program Year (PY) 2021 costs and savings[1] estimates provided by PacifiCorp. This memo provides cost-effectiveness results at the portfolio and sector levels. The portfolio passes the following cost effectiveness tests: Total Resource Cost Test (TRC), the PacifiCorp Total Resource Cost Test (PTRC), the Utility Cost Test (UCT), and the Participant Cost Test (PCT).

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

[1] The commercial line loss factor was used for all Wattsmart Business savings; commercial sector savings represent approximately 74% of total program savings.

The following assumptions were utilized in the analysis:

- Avoided Costs: derived from PacifiCorp's 2021 Integrated Resource Plan (IRP) Preferred Portfolio "P02-MM-CETA", converted into annual values using load shapes from the same IRP.
- Modeling Inputs: measure savings, costs, non-energy impacts (NEIs), measure lives, incentive levels, program delivery, and portfolio costs were based on estimates provided by PacifiCorp.
- Net-to-Gross (NTG): ratios are assumed to be 1.0, consistent with condition (8)(a) to Order 01 in Docket UE-152072.
- Retail Rates: 2021 rates provided by PacifiCorp and escalated by inflation for future years.

Tables 1 and 2 below summarize cost-effectiveness assumptions for the PacifiCorp Washington energy efficiency portfolio. All costs and impacts are presented at the portfolio level. Table 3 provides the savings and costs assumptions for NEEA.

Table 1: Cost-Effectiveness Analysis Inputs

Parameter	PY2021
Discount Rate	6.92%
Residential Line Loss	7.68%
Commercial Line Loss	7.60%
Residential Energy Rate ($/kWh)	$0.0828
Commercial Energy Rate ($/kWh)	$0.0809
Industrial Energy Rate ($/kWh)	$0.0666
Irrigation Energy Rate ($/kWh)	$0.0890
Inflation Rate	2.28%

Table 2: Portfolio Level Costs, Nominal - PY2021[2]

Portfolio Level Expense	Cost
Be Wattsmart, Begin at Home	$48,700
Outreach and Communication	$245,986
Program Evaluations	$317,623
Potential Study	$45,383
System Support	$31,110
End Use Research	$12,620
Total	**$701,422**

Table 3: NEEA Inputs - PY2021

Sector	Savings at Meter (kWh)	Expenses ($)
Residential	2,678,008	$422,550
Commercial	1,842,926	$361,356
Industrial	66,724	$8,614
Total	**4,587,659**	**$792,520**

Tables 4 through 16 present the cost-effectiveness results at the portfolio and sector levels. Tables 17 and 18 present the NEI impacts for the residential and commercial sectors by measure category.

Table 4: Benefit/Cost Ratios by Portfolio Type

Program	PTRC	TRC	UCT	PCT	RIM
Total Portfolio	1.75	1.60	1.92	3.17	0.76
Total Portfolio with NEEA	2.16	1.97	2.34	3.93	0.82
Total Portfolio with NEIs	1.78	1.62	1.92	3.23	0.76
Total Portfolio with NEEA and NEIs	2.19	1.99	2.34	3.98	0.82
Wattsmart Business	2.55	2.32	2.85	3.96	0.87
Wattsmart Business with NEEA	2.71	2.47	2.99	4.36	0.88
Wattsmart Business with NEIs	2.56	2.32	2.85	3.97	0.87
Wattsmart Business with NEEA and NEIs	2.72	2.47	2.99	4.37	0.88
Residential	0.86	0.78	0.95	1.87	0.55
Residential with NEEA	1.67	1.52	1.81	3.20	0.77
Residential with NEIs	0.92	0.85	0.95	2.00	0.55
Residential with NEEA and NEIs	1.73	1.58	1.81	3.34	0.77

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

Table 5: 2021 Total Portfolio Cost-Effectiveness Results

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0670	$12,921,531	$22,675,091	$9,753,560	1.75
Total Resource Cost Test (TRC) No Adder	$0.0670	$12,921,531	$20,613,719	$7,692,188	1.60
Utility Cost Test (UCT)	$0.0556	$10,721,659	$20,613,719	$9,892,060	1.92
Participant Cost Test (PCT)		$6,487,417	$20,578,515	$14,091,098	3.17
Rate Impact Test (RIM)		$27,012,629	$20,613,719	-$6,398,910	0.76
Lifecycle Revenue Impacts ($/kWh)					$0.0004720
Discounted Participant Payback (years)					3.04

Table 6: 2021 Total Portfolio Cost-Effectiveness Results (Including NEEA)

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0555	$13,714,051	$29,643,776	$15,929,725	2.16
Total Resource Cost Test (TRC) No Adder	$0.0555	$13,714,051	$26,948,888	$13,234,836	1.97
Utility Cost Test (UCT)	$0.0466	$11,514,179	$26,948,888	$15,434,709	2.34
Participant Cost Test (PCT)		$6,487,417	$25,469,618	$18,982,202	3.93
Rate Impact Test (RIM)		$32,696,253	$26,948,888	-$5,747,365	0.82
Lifecycle Revenue Impacts ($/kWh)					$0.0005713
Discounted Participant Payback (years)					2.71

Table 7: 2021 Total Portfolio Cost-Effectiveness Results (Including NEIs)

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0670	$12,921,531	$23,018,583	$10,097,052	1.78
Total Resource Cost Test (TRC) No Adder	$0.0670	$12,921,531	$20,957,211	$8,035,680	1.62
Utility Cost Test (UCT)	$0.0556	$10,721,659	$20,613,719	$9,892,060	1.92
Participant Cost Test (PCT)		$6,487,417	$20,922,007	$14,434,590	3.23
Rate Impact Test (RIM)		$27,012,629	$20,613,719	-$6,398,910	0.76
Lifecycle Revenue Impacts ($/kWh)					$0.0004720
Discounted Participant Payback (years)					3.04

Table 8: 2021 Total Portfolio Cost-Effectiveness Results (Including NEEA & NEIs)

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0555	$13,714,051	$29,987,269	$16,273,217	2.19
Total Resource Cost Test (TRC) No Adder	$0.0555	$13,714,051	$27,292,380	$13,578,329	1.99
Utility Cost Test (UCT)	$0.0466	$11,514,179	$26,948,888	$15,434,709	2.34
Participant Cost Test (PCT)		$6,487,417	$25,813,111	$19,325,694	3.98
Rate Impact Test (RIM)		$32,696,253	$26,948,888	-$5,747,365	0.82
Lifecycle Revenue Impacts ($/kWh)					$0.0005713
Discounted Participant Payback (years)					2.71

Table 9: 2021 Wattsmart Business 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	$0.0453	$7,172,675	$18,317,211	$11,144,536	2.55
Total Resource Cost Test (TRC) No Adder	$0.0453	$7,172,675	$16,652,010	$9,479,335	2.32
Utility Cost Test (UCT)	$0.0369	$5,850,068	$16,652,010	$10,801,942	2.85
Participant Cost Test (PCT)		$4,041,937	$16,010,995	$11,969,058	3.96
Rate Impact Test (RIM)		$19,141,733	$16,652,010	-$2,489,723	0.87
Lifecycle Revenue Impacts ($/kWh)					$0.0004668
Discounted Participant Payback (years)					2.67

Table 10: 2021 Wattsmart Business Energy Efficiency Sector Cost-Effectiveness Results (Including NEEA)

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0425	$7,542,645	$20,462,224	$12,919,579	2.71
Total Resource Cost Test (TRC) No Adder	$0.0425	$7,542,645	$18,602,022	$11,059,377	2.47
Utility Cost Test (UCT)	$0.0350	$6,220,038	$18,602,022	$12,381,984	2.99
Participant Cost Test (PCT)		$4,041,937	$17,634,220	$13,592,283	4.36
Rate Impact Test (RIM)		$21,134,928	$18,602,022	-$2,532,907	0.88
Lifecycle Revenue Impacts ($/kWh)					$0.0006107
Discounted Participant Payback (years)					2.48

Table 11: 2021 Wattsmart Business Energy Efficiency Sector Cost-Effectiveness Results (Including NEIs)

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0453	$7,172,675	$18,339,649	$11,166,974	2.56
Total Resource Cost Test (TRC) No Adder	$0.0453	$7,172,675	$16,674,448	$9,501,773	2.32
Utility Cost Test (UCT)	$0.0369	$5,850,068	$16,652,010	$10,801,942	2.85
Participant Cost Test (PCT)		$4,041,937	$16,033,433	$11,991,496	3.97
Rate Impact Test (RIM)		$19,141,733	$16,652,010	-$2,489,723	0.87
Lifecycle Revenue Impacts ($/kWh)					$0.0004668
Discounted Participant Payback (years)					2.67

Table 12: 2021 Wattsmart Business Energy Efficiency Sector Cost-Effectiveness Results (Including NEEA & NEIs)

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0425	$7,542,645	$20,484,662	$12,942,017	2.72
Total Resource Cost Test (TRC) No Adder	$0.0425	$7,542,645	$18,624,460	$11,081,815	2.47
Utility Cost Test (UCT)	$0.0350	$6,220,038	$18,602,022	$12,381,984	2.99
Participant Cost Test (PCT)		$4,041,937	$17,656,659	$13,614,722	4.37
Rate Impact Test (RIM)		$21,134,928	$18,602,022	-$2,532,907	0.88
Lifecycle Revenue Impacts ($/kWh)					$0.0006107
Discounted Participant Payback (years)					2.48

Table 13: 2021 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	$0.1464	$5,060,054	$4,357,880	-$702,174	0.86
Total Resource Cost Test (TRC) No Adder	$0.1464	$5,060,054	$3,961,709	-$1,098,345	0.78
Utility Cost Test (UCT)	$0.1210	$4,182,789	$3,961,709	-$221,080	0.95
Participant Cost Test (PCT)		$2,445,480	$4,567,521	$2,122,041	1.87
Rate Impact Test (RIM)		$7,182,095	$3,961,709	-$3,220,386	0.55
Lifecycle Revenue Impacts ($/kWh)					$0.0001255
Discounted Participant Payback (years)					3.92

Table 14: 2021 Residential Energy Efficiency Sector Cost-Effectiveness Results (Including NEEA)

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0788	$5,482,604	$9,181,552	$3,698,948	1.67
Total Resource Cost Test (TRC) No Adder	$0.0788	$5,482,604	$8,346,866	$2,864,262	1.52
Utility Cost Test (UCT)	$0.0662	$4,605,339	$8,346,866	$3,741,527	1.81
Participant Cost Test (PCT)		$2,445,480	$7,835,398	$5,389,918	3.20
Rate Impact Test (RIM)		$10,872,522	$8,346,866	-$2,525,656	0.77
Lifecycle Revenue Impacts ($/kWh)					$0.0003806
Discounted Participant Payback (years)					3.19

Table 15: 2021 Residential Energy Efficiency Sector Cost-Effectiveness Results (Including NEIs)

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.1464	$5,060,054	$4,678,934	-$381,121	0.92
Total Resource Cost Test (TRC) No Adder	$0.1464	$5,060,054	$4,282,763	-$777,292	0.85
Utility Cost Test (UCT)	$0.1210	$4,182,789	$3,961,709	-$221,080	0.95
Participant Cost Test (PCT)		$2,445,480	$4,888,574	$2,443,094	2.00
Rate Impact Test (RIM)		$7,182,095	$3,961,709	-$3,220,386	0.55
Lifecycle Revenue Impacts ($/kWh)					$0.0002514
Discounted Participant Payback (years)					3.92

Table 16: 2021 Residential Energy Efficiency Sector Cost-Effectiveness Results (Including NEEA & NEIs)

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0788	$5,482,604	$9,502,606	$4,020,002	1.73
Total Resource Cost Test (TRC) No Adder	$0.0788	$5,482,604	$8,667,920	$3,185,315	1.58
Utility Cost Test (UCT)	$0.0662	$4,605,339	$8,346,866	$3,741,527	1.81
Participant Cost Test (PCT)		$2,445,480	$8,156,452	$5,710,972	3.34
Rate Impact Test (RIM)		$10,872,522	$8,346,866	-$2,525,656	0.77
Lifecycle Revenue Impacts ($/kWh)					$0.0002989
Discounted Participant Payback (years)					3.19

Table 17: 2021 Residential Non-Energy Impacts by Measure Category

Measure	Annual NEIs	Quantity	Measure Life	Total Present Value NEIs
Appliances	$1,395	89	14	13,110
Building Shell	$195	106,925	45	2,867
Energy Kits	$19	25	9	133
HVAC	$15,133	1,380	17	158,848
Lighting	$32,980	169,766	4	144,894
Whole Home	$87	22	33	1,202
Total	**$49,810**	**278,207**	**15**	**$321,054**

Table 18: 2021 Wattsmart Business Non-Energy Impacts by Measure

Measure	Annual NEIs	Quantity	Measure Life	Total Present Value NEIs
Irrigation	$2,631	1,919	11	$22,439
Total	**$2,631**	**1,919**	**11**	**$22,439**

MEMORANDUM

To: Alesha Pino, PacifiCorp

From: Andrew Cottrell, Andy Hudson, Dylan Royalty, AEG

Date: April 27, 2022

Re: PacifiCorp Washington Home Energy Savings Cost-Effectiveness Results – PY2021

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

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

The following assumptions were utilized in the analysis:

- Avoided Costs: derived from PacifiCorp's 2021 Integrated Resource Plan (IRP) Preferred Portfolio "P02-MM-CETA", converted into annual values using load shapes from the same IRP.
- Modeling Inputs: measure savings, costs, non-energy impacts (NEIs), measure lives, incentive levels, program delivery, and portfolio costs were based on estimates provided by PacifiCorp.
- Net-to-Gross (NTG): ratios are assumed to be 1.0, consistent with condition (8)(a) to Order 01 in Docket UE-152072.
- Retail Rates: 2021 rates provided by PacifiCorp and escalated by inflation for future years.

Tables 1 and 2 below summarize cost-effectiveness assumptions for the PacifiCorp Washington Home Energy Savings program. All costs and impacts are presented at the program level. Table 3 provides the annual savings for the program.

Table 1: Cost-Effectiveness Analysis Inputs

Parameter	PY2021
Discount Rate	6.92%
Residential Line Loss	7.68%
Residential Energy Rate ($/kWh)	$0.0828
Inflation Rate	2.28%
Net-to-Gross	100%
Realization Rate	100%
Energy-to-Capacity Conversion Factor	0.000178976

Table 2: Annual Program Level Costs, Nominal - PY2021[1]

Portfolio Level Expense	Program Delivery	Utility Admin	Program Development	Incentives	Total Utility Budget	Gross Customer Costs
Appliances	$12,697	$283	$76	$11,710	$24,765	$7,226
Building Shell	$34,384	$766	$205	$38,140	$73,495	$76,290
Energy Kits	$55,504	$66	$18	$188	$55,775	$0
HVAC	$1,666,309	$37,121	$9,945	$1,189,444	$2,902,819	$2,174,553
Lighting	$310,079	$10,551	$2,827	$251,365	$574,821	$108,081
Water Heating	$20,930	$466	$125	$11,500	$33,021	$31,495
Whole Home	$51,330	$1,143	$306	$56,850	$109,630	$17,807
Coupons	$32,040	$900	$241	$9,018	$42,199	$30,028
Total	**$2,183,272**	**$51,296**	**$13,743**	**$1,568,214**	**$3,816,526**	**$2,445,480**

Table 3: Annual Savings - PY2021

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	16,307	100%	16,307	100%	16,307	14
Building Shell	44,161	83%	36,653	100%	36,653	45
Energy Kits	3,800	94%	3,572	100%	3,572	9
HVAC	2,140,126	94%	2,011,719	100%	2,011,719	17
Lighting	608,301	93%	564,560	100%	564,560	4
Water Heating	26,881	100%	26,881	100%	26,881	13
Whole Home	65,926	91%	59,820	100%	59,820	33
Coupons	51,890	94%	48,777	100%	48,777	6
Total	**2,957,392**	**94%**	**2,768,289**	**100%**	**2,768,289**	**15**

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

Tables 4 through 13 present the cost-effectiveness results at the program and measure category levels. Tables 14 through 21 present the NEI impacts for the program and the cost-effectiveness results with NEIs at the program and measure category levels.

Table 4: 2021 Benefit/Cost Ratios by Measure Category

Program	PTRC	TRC	UCT	PCT	RIM
Appliances	0.92	0.83	0.68	3.61	0.43
Appliances (with NEIs)	1.56	1.48	0.68	5.43	0.43
Building Shell	0.84	0.76	1.16	1.29	0.64
Building Shell (with NEIs)	0.87	0.79	1.16	1.33	0.64
Energy Kits	0.06	0.05	0.05	0.00	0.05
Energy Kits (with NEIs)	0.06	0.05	0.05	0.00	0.05
HVAC	0.71	0.65	0.87	1.48	0.51
HVAC (with NEIs)	0.76	0.69	0.87	1.55	0.51
Lighting	0.77	0.70	0.53	4.31	0.38
Lighting (with NEIs)	1.11	1.04	0.53	5.65	0.38
Water Heating	0.52	0.47	0.76	1.08	0.45
Water Heating (with NEIs)	0.52	0.47	0.76	1.08	0.45
Whole Home	1.93	1.76	1.13	8.12	0.63
Whole Home (with NEIs)	1.95	1.77	1.13	8.19	0.63
Coupons	0.60	0.55	0.82	1.13	0.52
Coupons (with NEIs)	0.60	0.55	0.82	1.13	0.52
Total Program	**0.73**	**0.66**	**0.82**	**1.65**	**0.50**
Total Program (with NEIs)	**0.80**	**0.73**	**0.82**	**1.78**	**0.50**

Table 5: 2021 Home Energy Savings 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	$0.1699	$4,693,791	$3,429,079	-$1,264,713	0.73
Total Resource Cost Test (TRC) No Adder	$0.1699	$4,693,791	$3,117,344	-$1,576,447	0.66
Utility Cost Test (UCT)	$0.1381	$3,816,526	$3,117,344	-$699,182	0.82
Participant Cost Test (PCT)		$2,445,480	$4,027,529	$1,582,049	1.65
Rate Impact Test (RIM)		$6,275,840	$3,117,344	-$3,158,496	0.50
Lifecycle Revenue Impacts ($/kWh)					$0.0001097
Discounted Participant Payback (years)					6.90

Table 6: 2021 Home Energy Savings 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	$0.1229	$20,281	$18,609	-$1,672	0.92
Total Resource Cost Test (TRC) No Adder	$0.1229	$20,281	$16,917	-$3,364	0.83
Utility Cost Test (UCT)	$0.1501	$24,765	$16,917	-$7,848	0.68
Participant Cost Test (PCT)		$7,226	$26,105	$18,879	3.61
Rate Impact Test (RIM)		$39,160	$16,917	-$22,243	0.43
Lifecycle Revenue Impacts ($/kWh)					$0.0000010
Discounted Participant Payback (years)					2.49

Table 7: 2021 Home Energy Savings Building Shell Cost-Effectiveness Results (Load Shape - WA_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	$0.1926	$111,645	$93,741	-$17,904	0.84
Total Resource Cost Test (TRC) No Adder	$0.1926	$111,645	$85,219	-$26,426	0.76
Utility Cost Test (UCT)	$0.1268	$73,495	$85,219	$11,724	1.16
Participant Cost Test (PCT)		$76,290	$98,576	$22,286	1.29
Rate Impact Test (RIM)		$133,931	$85,219	-$48,712	0.64
Lifecycle Revenue Impacts ($/kWh)					$0.0000023
Discounted Participant Payback (years)					33.83

Table 8: 2021 Home Energy Savings Home Energy Kit 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	$2.0676	$55,587	$3,069	-$52,518	0.06
Total Resource Cost Test (TRC) No Adder	$2.0676	$55,587	$2,790	-$52,797	0.05
Utility Cost Test (UCT)	$2.0746	$55,775	$2,790	-$52,985	0.05
Participant Cost Test (PCT)		$0	$2,431	$2,431	n/a
Rate Impact Test (RIM)		$58,019	$2,790	-$55,228	0.05
Lifecycle Revenue Impacts ($/kWh)					$0.0000020
Discounted Participant Payback (years)					0.00

Table 9: 2021 Home Energy Savings HVAC Cost-Effectiveness Results (Load Shape - WA_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	$0.1710	$3,887,929	$2,779,440	-$1,108,489	0.71
Total Resource Cost Test (TRC) No Adder	$0.1710	$3,887,929	$2,526,763	-$1,361,166	0.65
Utility Cost Test (UCT)	$0.1277	$2,902,819	$2,526,763	-$376,056	0.87
Participant Cost Test (PCT)		$2,174,553	$3,222,319	$1,047,766	1.48
Rate Impact Test (RIM)		$4,935,695	$2,526,763	-$2,408,931	0.51
Lifecycle Revenue Impacts ($/kWh)					$0.0001165
Discounted Participant Payback (years)					10.84

Table 10: 2021 Home Energy Savings 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	$0.1616	$431,537	$332,328	-$99,209	0.77
Total Resource Cost Test (TRC) No Adder	$0.1616	$431,537	$302,116	-$129,421	0.70
Utility Cost Test (UCT)	$0.2152	$574,821	$302,116	-$272,705	0.53
Participant Cost Test (PCT)		$108,081	$465,668	$357,587	4.31
Rate Impact Test (RIM)		$789,125	$302,116	-$487,008	0.38
Lifecycle Revenue Impacts ($/kWh)					$0.0000429
Discounted Participant Payback (years)					0.79

Table 11: 2021 Home Energy Savings 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	$0.2040	$53,015	$27,441	-$25,574	0.52
Total Resource Cost Test (TRC) No Adder	$0.2040	$53,015	$24,947	-$28,069	0.47
Utility Cost Test (UCT)	$0.1271	$33,021	$24,947	-$8,074	0.76
Participant Cost Test (PCT)		$31,495	$33,979	$2,484	1.08
Rate Impact Test (RIM)		$55,500	$24,947	-$30,553	0.45
Lifecycle Revenue Impacts ($/kWh)					$0.0000015
Discounted Participant Payback (years)					12.05

Table 12: 2021 Home Energy Savings Whole Home Cost-Effectiveness Results (Load Shape - WA_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	$0.0797	$70,588	$136,390	$65,803	1.93
Total Resource Cost Test (TRC) No Adder	$0.0797	$70,588	$123,991	$53,404	1.76
Utility Cost Test (UCT)	$0.1238	$109,630	$123,991	$14,361	1.13
Participant Cost Test (PCT)		$17,807	$144,587	$126,780	8.12
Rate Impact Test (RIM)		$197,367	$123,991	-$73,376	0.63
Lifecycle Revenue Impacts ($/kWh)					$0.0000036
Discounted Participant Payback (years)					4.00

Table 13: 2021 Home Energy Savings Coupons Cost-Effectiveness Results (Load Shape - WA_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	$0.2083	$63,209	$38,061	-$25,148	0.60
Total Resource Cost Test (TRC) No Adder	$0.2083	$63,209	$34,601	-$28,608	0.55
Utility Cost Test (UCT)	$0.1390	$42,199	$34,601	-$7,598	0.82
Participant Cost Test (PCT)		$30,028	$33,863	$3,835	1.13
Rate Impact Test (RIM)		$67,044	$34,601	-$32,443	0.52
Lifecycle Revenue Impacts ($/kWh)					$0.0000028
Discounted Participant Payback (years)					5.74

Table 14: 2021 Home Energy Savings Non-Energy Impacts by Measure Category

Measure	Annual NEIs	Quantity	Measure Life	Total Present Value NEIs
Appliances	$1,395	89	14	$13,110
Building Shell	$195	106,925	45	$2,867
Energy Kits	$19	25	9	$133
HVAC	$15,133	1,380	17	$158,848
Lighting	$32,980	169,766	4	$144,894
Whole Home	$87	22	33	$1,202
Total	**$49,810**	**278,207**	**15**	**$321,054**

Table 15: 2021 Home Energy Savings Program Cost-Effectiveness Results (Including NEIs)

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.1699	$4,693,791	$3,750,132	-$943,659	0.80
Total Resource Cost Test (TRC) No Adder	$0.1699	$4,693,791	$3,438,398	-$1,255,393	0.73
Utility Cost Test (UCT)	$0.1381	$3,816,526	$3,117,344	-$699,182	0.82
Participant Cost Test (PCT)		$2,445,480	$4,348,583	$1,903,103	1.78
Rate Impact Test (RIM)		$6,275,840	$3,117,344	-$3,158,496	0.50
Lifecycle Revenue Impacts ($/kWh)					$0.0001097
Discounted Participant Payback (years)					6.90

Table 16: 2021 Home Energy Savings Appliances Cost-Effectiveness Results (Including NEIs) (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	$0.1229	$20,281	$31,719	$11,438	1.56
Total Resource Cost Test (TRC) No Adder	$0.1229	$20,281	$30,027	$9,746	1.48
Utility Cost Test (UCT)	$0.1501	$24,765	$16,917	-$7,848	0.68
Participant Cost Test (PCT)		$7,226	$39,215	$31,989	5.43
Rate Impact Test (RIM)		$39,160	$16,917	-$22,243	0.43
Lifecycle Revenue Impacts ($/kWh)					$0.0000010
Discounted Participant Payback (years)					2.49

Table 17: 2021 Home Energy Savings Building Shell Cost-Effectiveness Results (Including NEIs) (Load Shape - WA_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	$0.1926	$111,645	$96,608	-$15,037	0.87
Total Resource Cost Test (TRC) No Adder	$0.1926	$111,645	$88,086	-$23,559	0.79
Utility Cost Test (UCT)	$0.1268	$73,495	$85,219	$11,724	1.16
Participant Cost Test (PCT)		$76,290	$101,443	$25,153	1.33
Rate Impact Test (RIM)		$133,931	$85,219	-$48,712	0.64
Lifecycle Revenue Impacts ($/kWh)					$0.0000023
Discounted Participant Payback (years)					33.83

Table 18: 2021 Home Energy Savings Home Energy Kit Cost-Effectiveness Results (Including NEIs) (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	$2.0676	$55,587	$3,202	-$52,385	0.06
Total Resource Cost Test (TRC) No Adder	$2.0676	$55,587	$2,923	-$52,664	0.05
Utility Cost Test (UCT)	$2.0746	$55,775	$2,790	-$52,985	0.05
Participant Cost Test (PCT)		$0	$2,564	$2,564	n/a
Rate Impact Test (RIM)		$58,019	$2,790	-$55,228	0.05
Lifecycle Revenue Impacts ($/kWh)					$0.0000020
Discounted Participant Payback (years)					0.00

Table 19: 2021 Home Energy Savings HVAC Cost-Effectiveness Results (Including NEIs) (Load Shape - WA_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	$0.1710	$3,887,929	$2,938,288	-$949,641	0.76
Total Resource Cost Test (TRC) No Adder	$0.1710	$3,887,929	$2,685,611	-$1,202,317	0.69
Utility Cost Test (UCT)	$0.1277	$2,902,819	$2,526,763	-$376,056	0.87
Participant Cost Test (PCT)		$2,174,553	$3,381,167	$1,206,614	1.55
Rate Impact Test (RIM)		$4,935,695	$2,526,763	-$2,408,931	0.51
Lifecycle Revenue Impacts ($/kWh)					$0.0001165
Discounted Participant Payback (years)					10.84

Table 20: 2021 Home Energy Savings Lighting Cost-Effectiveness Results (Including NEIs) (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	$0.1616	$431,537	$477,222	$45,684	1.11
Total Resource Cost Test (TRC) No Adder	$0.1616	$431,537	$447,010	$15,473	1.04
Utility Cost Test (UCT)	$0.2152	$574,821	$302,116	-$272,705	0.53
Participant Cost Test (PCT)		$108,081	$610,562	$502,481	5.65
Rate Impact Test (RIM)		$789,125	$302,116	-$487,008	0.38
Lifecycle Revenue Impacts ($/kWh)					$0.0000429
Discounted Participant Payback (years)					0.79

Table 21: 2021 Home Energy Savings Whole Home Cost-Effectiveness Results (Including NEIs) (Load Shape - WA_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	$0.0797	$70,588	$137,592	$67,005	1.95
Total Resource Cost Test (TRC) No Adder	$0.0797	$70,588	$125,193	$54,606	1.77
Utility Cost Test (UCT)	$0.1238	$109,630	$123,991	$14,361	1.13
Participant Cost Test (PCT)		$17,807	$145,789	$127,982	8.19
Rate Impact Test (RIM)		$197,367	$123,991	-$73,376	0.63
Lifecycle Revenue Impacts ($/kWh)					$0.0000036
Discounted Participant Payback (years)					4.00

MEMORANDUM

To: Alesha Pino, PacifiCorp

From: Andrew Cottrell, Andy Hudson, Dylan Royalty, AEG

Date: April 27, 2022

Re: PacifiCorp Washington Home Energy Reporting Program Cost-Effectiveness Results – PY2021

AEG estimated the cost-effectiveness of PacifiCorp's overall energy efficiency portfolio in the state of Washington 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 the Total Resource Cost Test (TRC), the PacifiCorp Total Resource Cost Test (PTRC), 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: Annual Program Level Costs, Nominal - PY2021

Table 3: Annual Savings - PY2021

Table 4: 2021 Home Energy Reports Cost-Effectiveness Results (Load Shape - WA_Single_Family_Heat_pump)

The following assumptions were utilized in the analysis:

- Avoided Costs: derived from PacifiCorp's 2021 Integrated Resource Plan (IRP) Preferred Portfolio "P02-MM-CETA", converted into annual values using load shapes from the same IRP.
- Modeling Inputs: measure savings, costs, non-energy impacts (NEIs), measure lives, incentive levels, program delivery, and portfolio costs were based on estimates provided by PacifiCorp.
- Net-to-Gross (NTG): ratios are assumed to be 1.0, consistent with condition (8)(a) to Order 01 in Docket UE-152072.
- Retail Rates: 2021 rates provided by PacifiCorp and escalated by inflation for future years.

Tables 1 and 2 below summarize cost-effectiveness assumptions for the PacifiCorp Washington Home Energy Reporting program. All costs and impacts are presented at the program level. Tables 3 and 4 provide the annual savings and cost effectiveness for the program.

Table 1: Cost-Effectiveness Analysis Inputs

Parameter	PY2021
Discount Rate	6.92%
Residential Line Loss	7.68%
Residential Energy Rate ($/kWh)	$0.0828
Inflation Rate	2.28%
Measure Life	2
NTG	100%
Realization Rate	100%

Table 2: Annual Program Level Costs, Nominal - PY2021[1]

Program Year	Program Delivery	Utility Admin	Engineering Costs	Program Development	Inspection Costs	Incentives	Total Utility Budget
2021	$338,856	$19,768	$0	$7,639	$0	$0	$366,263
Total	**$338,856**	**$19,768**	**$0**	**$7,639**	**$0**	**$0**	**$366,263**

Table 3: Annual Savings - PY2021

Program Year	Gross kWh Savings at Site	Realization Rate	Adjusted Gross kWh Savings at Site	NTG Ratio	Net kWh Savings at Site	Measure Life
2021	3,333,142	100%	3,333,142	100%	3,333,142	2
Total Program	**3,333,142**	**100%**	**3,333,142**	**100%**	**3,333,142**	**2**

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

Table 4: 2021 Home Energy Reports Cost-Effectiveness Results (Load Shape - WA_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	$0.0527	$366,263	$928,801	$562,538	2.54
Total Resource Cost Test (TRC) No Adder	$0.0527	$366,263	$844,365	$478,102	2.31
Utility Cost Test (UCT)	$0.0527	$366,263	$844,365	$478,102	2.31
Participant Cost Test (PCT)		$0	$539,991	$539,991	n/a
Rate Impact Test (RIM)		$906,254	$844,365	-$61,890	0.93
Lifecycle Revenue Impacts ($/kWh)					$0.0001125
Discounted Participant Payback (years)					0.00

MEMORANDUM

To: Alesha Pino, PacifiCorp

From: Andrew Cottrell, Andy Hudson, Dylan Royalty, AEG

Date: April 27, 2022

Re: PacifiCorp Washington Low Income Weatherization Program Cost-Effectiveness Results – PY2021

AEG estimated the cost-effectiveness of PacifiCorp's overall energy efficiency portfolio in the state of Washington 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.

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

The following assumptions were utilized in the analysis:

- Avoided Costs: derived from PacifiCorp's 2021 Integrated Resource Plan (IRP) Preferred Portfolio "P02-MM-CETA", converted into annual values using load shapes from the same IRP.
- Modeling Inputs: measure savings, costs, non-energy impacts (NEIs), measure lives, incentive levels, program delivery, and portfolio costs were based on estimates provided by PacifiCorp.
- Net-to-Gross (NTG): ratios are assumed to be 1.0, consistent with condition (8)(a) to Order 01 in Docket UE-152072.
- Retail Rates: 2021 rates provided by PacifiCorp and escalated by inflation for future years.

Tables 1 and 2 below summarize cost-effectiveness assumptions for the PacifiCorp Washington Low Income Weatherization program. All costs and impacts are presented at the program level. Table 3 provides the annual savings for the program.

Table 1: Cost-Effectiveness Analysis Inputs

Parameter	PY2021
Discount Rate	6.92%
Residential Line Loss	7.68%
Residential Energy Rate ($/kWh)	$0.0828
Inflation Rate[1]	2.28%
Net-to-Gross	100%
Realization Rate	59%

Table 2: Annual Program Level Costs, Nominal - PY2021[1]

Program Year	Program Delivery	Utility Admin	Engineering Costs	Program Development	Inspection Costs	Incentives	Total Utility Budget
2021	$69,523	$7,780	$0	$332	$3,236	$426,783	$507,654
Total	**$69,523**	**$7,780**	**$0**	**$332**	**$3,236**	**$426,783**	**$507,654**

Table 3: Annual Savings - PY2021

Program Year	Gross kWh Savings at Site	Realization Rate	Adjusted Gross kWh Savings at Site	NTG Ratio	Net kWh Savings at Site	Measure Life
2021	116,769	59%	68,894	100%	68,894	23
Total Program	**116,769**	**59%**	**68,894**	**100%**	**68,894**	**23**

Table 4 below present the cost-effectiveness results at the program level. Tables 5 and 6 present the NEI impacts for the program and the cost-effectiveness results with NEIs at the program level.

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

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	$0.5541	$507,654	$128,469	-$379,185	0.25
Total Resource Cost Test (TRC) No Adder	$0.5541	$507,654	$116,790	-$390,864	0.23
Utility Cost Test (UCT)	$0.5541	$507,654	$124,408	-$383,246	0.25
Participant Cost Test (PCT)		$0	$512,908	$512,908	n/a
Rate Impact Test (RIM)		$593,778	$124,408	-$469,371	0.21
Lifecycle Revenue Impacts ($/kWh)					$0.0000119
Discounted Participant Payback (years)					0.00

Table 5: 2021 Low Income Weatherization Program Non-Energy Impacts

Non-Energy Impact	Program Impact	Perspective Adjusted
Home Repair Costs paid by Company	$14,269	PTRC, TRC
Economic Benefit	$124,089	PTRC, TRC
Arrearage	$7,618	PTRC, TRC, UCT, RIM
Payment Assistance	$26,270	PTRC, TRC
Total	**$172,246**	**N/A**

Table 6: 2021 Low Income Weatherization Program Cost-Effectiveness Results (Including NEIs)

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.5541	$507,654	$300,715	-$206,939	0.59
Total Resource Cost Test (TRC) No Adder	$0.5541	$507,654	$289,036	-$218,618	0.57
Utility Cost Test (UCT)	$0.5541	$507,654	124,408	-$383,246	0.25
Participant Cost Test (PCT)		$0	$512,908	$512,908	n/a
Rate Impact Test (RIM)		$593,778	$124,408	-$469,371	0.21
Lifecycle Revenue Impacts ($/kWh)					$0.0000119
Discounted Participant Payback (years)					0.00

MEMORANDUM

To: Alesha Pino, PacifiCorp

From: Andrew Cottrell, Andy Hudson, Dylan Royalty, AEG

Date: April 27, 2022

Re: PacifiCorp Washington Wattsmart Business Program Cost-Effectiveness Results – PY2021

AEG estimated the cost-effectiveness of PacifiCorp's overall energy efficiency portfolio in the state of Washington based on Program Year (PY) 2021 costs and savings[1] estimates provided by PacifiCorp. This memo provides cost-effectiveness results for the Wattsmart Business program. The program passes the following cost effectiveness tests: Total Resource Cost Test (TRC), the PacifiCorp Total Resource Cost Test (PTRC), the Utility Cost Test (UCT), and the Participant Cost Test (PCT).

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

[1] The commercial line loss factor was used for all Wattsmart Business savings; commercial sector savings represent approximately 74% of total program savings.

The following assumptions were utilized in the analysis:

- Avoided Costs: derived from PacifiCorp's 2021 Integrated Resource Plan (IRP) Preferred Portfolio "P02-MM-CETA", converted into annual values using load shapes from the same IRP.
- Modeling Inputs: measure savings, costs, non-energy impacts (NEIs), measure lives, incentive levels, program delivery, and portfolio costs were based on estimates provided by PacifiCorp.
- Net-to-Gross (NTG): ratios are assumed to be 1.0, consistent with condition (8)(a) to Order 01 in Docket UE-152072.
- Retail Rates: 2021 rates provided by PacifiCorp and escalated by inflation for future years.

Tables 1 and 2 below summarize cost-effectiveness assumptions for the PacifiCorp Washington Wattsmart Business program. All costs and impacts are presented at the program level. Table 3 provides the annual savings for the program.

Table 1: Cost-Effectiveness Analysis Inputs

Parameter	PY2021
Discount Rate	6.92%
Commercial Line Loss	7.60%
Industrial Line Loss	6.82%
Irrigation Line Loss	7.68%
Commercial Energy Rate ($/kWh)	$0.0809
Industrial Energy Rate ($/kWh)	$0.0666
Irrigation Energy Rate ($/kWh)	$0.0890
Inflation Rate	2.28%

Table 2: Annual Program Level Costs, Nominal - PY2021[2]

Measure Category	Program Delivery	Utility Admin	Program Development	Incentives
Additional Measures	$51,366	$13,994	$3,689	$92,865
Compressed Air	$149,302	$9,135	$6,525	$122,240
Energy Management	$271,057	$41,130	$12,368	$46,463
Food Service Equipment	$10,772	$2,533	$643	$7,460
HVAC	$56,330	$10,478	$2,658	$63,827
Irrigation	$192,043	$9,426	$3,732	$97,826
Lighting	$1,414,010	$208,837	$71,697	$1,873,466
Motors	$72,189	$10,246	$3,609	$84,653
Refrigeration	$411,891	$56,849	$14,917	$275,988
Farm & Dairy	$17,819	$1,193	$303	$8,367
Energy Project Mgr Co-fund	$0	$0	$0	$46,175
Total	**$2,646,778**	**$363,820**	**$120,139**	**$2,719,330**

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

Table 3: Annual Savings - PY2021

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	566,747	95%	537,782	100%	537,782	15
Compressed Air	1,002,536	95%	950,404	100%	950,404	14
Energy Management	1,900,169	100%	1,898,086	100%	1,898,086	3
Food Service Equipment	98,740	99%	98,207	100%	98,207	13
HVAC	408,422	100%	408,422	100%	408,422	14
Irrigation	573,413	90%	514,925	100%	514,925	11
Lighting	11,015,522	100%	11,060,312	100%	11,060,312	11
Motors	554,444	99%	549,454	100%	549,454	15
Refrigeration	2,291,797	100%	2,291,797	100%	2,291,797	15
Farm & Dairy	46,486	100%	46,486	100%	46,486	15
Energy Project Mgr Co-fund	0	0%	0	0%	0	0
Total	**18,458,276**	**99%**	**18,355,875**	**100%**	**18,355,875**	11

Tables 4 through 16 present the cost-effectiveness results at the program and measure category levels. Tables 17 through 19 present the NEI impacts for the program and the cost-effectiveness results with NEIs at the program and measure category levels.

Table 4: 2021 Benefit/Cost Ratios by Measure Category

Program	PTRC	TRC	UCT	PCT	RIM
Additional Measures	2.14	1.95	3.66	2.47	0.91
Compressed Air	3.20	2.91	3.65	5.05	0.91
Energy Management	1.93	1.75	1.78	9.40	0.81
Food Service Equipment	3.21	2.92	3.41	7.92	0.72
HVAC	2.14	1.94	4.72	1.64	1.30
Irrigation	1.56	1.42	2.05	2.12	0.89
Lighting	2.54	2.31	2.70	3.98	0.83
Motors	2.97	2.70	3.55	4.21	0.91
Refrigeration	3.29	2.99	3.63	5.60	0.94
Farm & Dairy	1.61	1.46	1.85	3.22	0.73
Energy Project Mgr Co-fund	0.00	0.00	0.00	0.00	0.00
Total Program	**2.55**	**2.32**	**2.85**	**3.96**	**0.87**
Total Program (with NEIs)	**2.56**	**2.32**	**2.85**	**3.97**	**0.87**

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	$0.0453	$7,172,675	$18,317,211	$11,144,536	2.55
Total Resource Cost Test (TRC) No Adder	$0.0453	$7,172,675	$16,652,010	$9,479,335	2.32
Utility Cost Test (UCT)	$0.0369	$5,850,068	$16,652,010	$10,801,942	2.85
Participant Cost Test (PCT)		$4,041,937	$16,010,995	$11,969,058	3.96
Rate Impact Test (RIM)		$19,141,733	$16,652,010	-$2,489,723	0.87
Lifecycle Revenue Impacts ($/kWh)					$0.0004668
Discounted Participant Payback (years)					2.67

Table 6: 2021 Wattsmart Business Additional Measures Cost-Effectiveness Results (Load Shape - WA_Industrial_Machinery_General)

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0536	$303,790	$651,606	$347,816	2.14
Total Resource Cost Test (TRC) No Adder	$0.0536	$303,790	$592,369	$288,579	1.95
Utility Cost Test (UCT)	$0.0286	$161,913	$592,369	$430,456	3.66
Participant Cost Test (PCT)		$234,742	$580,078	$345,335	2.47
Rate Impact Test (RIM)		$649,125	$592,369	-$56,756	0.91
Lifecycle Revenue Impacts ($/kWh)					$0.0000164
Discounted Participant Payback (years)					6.07

Table 7: 2021 Wattsmart Business Compressed Air Cost-Effectiveness Results (Load Shape - WA_Industrial_Machinery_General)

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0359	$359,647	$1,151,561	$791,914	3.20
Total Resource Cost Test (TRC) No Adder	$0.0359	$359,647	$1,046,874	$687,227	2.91
Utility Cost Test (UCT)	$0.0287	$287,201	$1,046,874	$759,672	3.65
Participant Cost Test (PCT)		$194,685	$983,273	$788,588	5.05
Rate Impact Test (RIM)		$1,148,235	$1,046,874	-$101,361	0.91
Lifecycle Revenue Impacts ($/kWh)					$0.0000290
Discounted Participant Payback (years)					2.86

Table 8: 2021 Wattsmart Business Energy Management Cost-Effectiveness Results (Load Shape - WA_Miscellaneous_Mfg_General)

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0656	$376,386	$724,602	$348,217	1.93
Total Resource Cost Test (TRC) No Adder	$0.0656	$376,386	$658,729	$282,344	1.75
Utility Cost Test (UCT)	$0.0646	$371,017	$658,729	$287,713	1.78
Participant Cost Test (PCT)		$51,832	$487,426	$435,594	9.40
Rate Impact Test (RIM)		$811,980	$658,729	-$153,251	0.81
Lifecycle Revenue Impacts ($/kWh)					$0.0000693
Discounted Participant Payback (years)					0.32

Table 9: 2021 Wattsmart Business Food Service Equipment Cost-Effectiveness Results (Load Shape - WA_School_Cooking)

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0264	$25,019	$80,272	$55,253	3.21
Total Resource Cost Test (TRC) No Adder	$0.0264	$25,019	$72,974	$47,955	2.92
Utility Cost Test (UCT)	$0.0226	$21,408	$72,974	$51,566	3.41
Participant Cost Test (PCT)		$11,071	$87,700	$76,629	7.92
Rate Impact Test (RIM)		$101,648	$72,974	-$28,674	0.72
Lifecycle Revenue Impacts ($/kWh)					$0.0000028
Discounted Participant Payback (years)					1.61

Table 10: 2021 Wattsmart Business HVAC Cost-Effectiveness Results (Load Shape - WA_Large_Retail_Space_Cool)

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0784	$323,673	$691,873	$368,200	2.14
Total Resource Cost Test (TRC) No Adder	$0.0784	$323,673	$628,975	$305,303	1.94
Utility Cost Test (UCT)	$0.0323	$133,293	$628,975	$495,682	4.72
Participant Cost Test (PCT)		$254,207	$416,089	$161,883	1.64
Rate Impact Test (RIM)		$485,555	$628,975	$143,420	1.30
Lifecycle Revenue Impacts ($/kWh)					$0.0000128
Discounted Participant Payback (years)					8.50

Table 11: 2021 Wattsmart Business Irrigation Cost-Effectiveness Results (Load Shape - WA_Irrigation_General)

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0928	$438,680	$683,707	$245,027	1.56
Total Resource Cost Test (TRC) No Adder	$0.0928	$438,680	$621,552	$182,872	1.42
Utility Cost Test (UCT)	$0.0641	$303,027	$621,552	$318,525	2.05
Participant Cost Test (PCT)		$233,479	$494,085	$260,607	2.12
Rate Impact Test (RIM)		$699,287	$621,552	-$77,735	0.89
Lifecycle Revenue Impacts ($/kWh)					$0.0000202
Discounted Participant Payback (years)					4.98

Table 12: 2021 Wattsmart Business Lighting Cost-Effectiveness Results (Load Shape - WA_Miscellaneous_Lighting)

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0435	$4,165,169	$10,580,953	$6,415,784	2.54
Total Resource Cost Test (TRC) No Adder	$0.0435	$4,165,169	$9,619,048	$5,453,879	2.31
Utility Cost Test (UCT)	$0.0372	$3,568,010	$9,619,048	$6,051,038	2.70
Participant Cost Test (PCT)		$2,470,625	$9,835,669	$7,365,044	3.98
Rate Impact Test (RIM)		$11,530,213	$9,619,048	-$1,911,165	0.83
Lifecycle Revenue Impacts ($/kWh)					$0.0003523
Discounted Participant Payback (years)					2.73

Table 13: 2021 Wattsmart Business Motors Cost-Effectiveness Results (Load Shape - WA_Industrial_Machinery_General)

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0388	$224,482	$665,748	$441,266	2.97
Total Resource Cost Test (TRC) No Adder	$0.0388	$224,482	$605,225	$380,744	2.70
Utility Cost Test (UCT)	$0.0295	$170,696	$605,225	$434,529	3.55
Participant Cost Test (PCT)		$138,438	$582,439	$444,001	4.21
Rate Impact Test (RIM)		$668,482	$605,225	-$63,257	0.91
Lifecycle Revenue Impacts ($/kWh)					$0.0000169
Discounted Participant Payback (years)					3.46

Table 14: 2021 Wattsmart Business Refrigeration Cost-Effectiveness Results (Load Shape - WA_Warehouse_Refrigeration)

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0368	$920,819	$3,030,564	$2,109,746	3.29
Total Resource Cost Test (TRC) No Adder	$0.0368	$920,819	$2,755,059	$1,834,240	2.99
Utility Cost Test (UCT)	$0.0303	$759,645	$2,755,059	$1,995,414	3.63
Participant Cost Test (PCT)		$437,162	$2,447,578	$2,010,417	5.60
Rate Impact Test (RIM)		$2,931,235	$2,755,059	-$176,177	0.94
Lifecycle Revenue Impacts ($/kWh)					$0.0000715
Discounted Participant Payback (years)					2.69

Table 15: 2021 Wattsmart Business Farm & Dairy Cost-Effectiveness Results (Load Shape - WA_Industrial_Machinery_General)

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0715	$35,012	$56,325	$21,313	1.61
Total Resource Cost Test (TRC) No Adder	$0.0715	$35,012	$51,204	$16,193	1.46
Utility Cost Test (UCT)	$0.0565	$27,682	$51,204	$23,523	1.85
Participant Cost Test (PCT)		$15,697	$50,482	$34,785	3.22
Rate Impact Test (RIM)		$69,797	$51,204	-$18,592	0.73
Lifecycle Revenue Impacts ($/kWh)					$0.0000018
Discounted Participant Payback (years)					4.66

Table 16: 2021 Wattsmart Business Energy Project Mgr Co-Fund Cost-Effectiveness Results (Load Shape - WA_Miscellaneous_Mfg_General)

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0000	$0	$0	$0	n/a
Total Resource Cost Test (TRC) No Adder	$0.0000	$0	$0	$0	n/a
Utility Cost Test (UCT)	$0.0000	$46,175	$0	-$46,175	0.00
Participant Cost Test (PCT)		$0	$46,175	$46,175	n/a
Rate Impact Test (RIM)		$46,175	$0	-$46,175	0.00
Lifecycle Revenue Impacts ($/kWh)					$0.0000000
Discounted Participant Payback (years)					0.00

Table 17: 2021 Wattsmart Business Non-Energy Impacts by Measure Category

Measure	Annual NEIs	Quantity	Measure Life	Total Present Value NEIs
Irrigation	$2,631	1,919	11	$22,439
Total	**$2,631**	**1,919**	**11**	**$22,439**

Table 18: 2021 Wattsmart Business Program Cost-Effectiveness Results (Including NEIs)

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0453	$7,172,675	$18,339,649	$11,166,974	2.56
Total Resource Cost Test (TRC) No Adder	$0.0453	$7,172,675	$16,674,448	$9,501,773	2.32
Utility Cost Test (UCT)	$0.0369	$5,850,068	$16,652,010	$10,801,942	2.85
Participant Cost Test (PCT)		$4,041,937	$16,033,433	$11,991,496	3.97
Rate Impact Test (RIM)		$19,141,733	$16,652,010	-$2,489,723	0.87
Lifecycle Revenue Impacts ($/kWh)					$0.0004668
Discounted Participant Payback (years)					2.67

Table 19: 2021 Wattsmart Business Irrigation Cost-Effectiveness Results (Including NEIs) (Load Shape - WA_Irrigation_General)

Cost-Effectiveness Test	Levelized $/kWh	NPV Costs	NPV Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	$0.0928	$438,680	$706,146	$267,465	1.61
Total Resource Cost Test (TRC) No Adder	$0.0928	$438,680	$643,990	$205,310	1.47
Utility Cost Test (UCT)	$0.0641	$303,027	$621,552	$318,525	2.05
Participant Cost Test (PCT)		$233,479	$516,524	$283,045	2.21
Rate Impact Test (RIM)		$699,287	$621,552	-$77,735	0.89
Lifecycle Revenue Impacts ($/kWh)					$0.0000202
Discounted Participant Payback (years)					4.98

APPENDIX

Appendix B: NEEA Supply Chain Memo

Memorandum

December 21, 2021

TO: NEEA Coordinating and Advisory Committee Members

FROM: Jon Clark, Market Channel Manager

SUBJECT: 2021 Supply Chain Challenges: Market Evidence & Impact on Energy Efficiency Technologies

Brief Context:

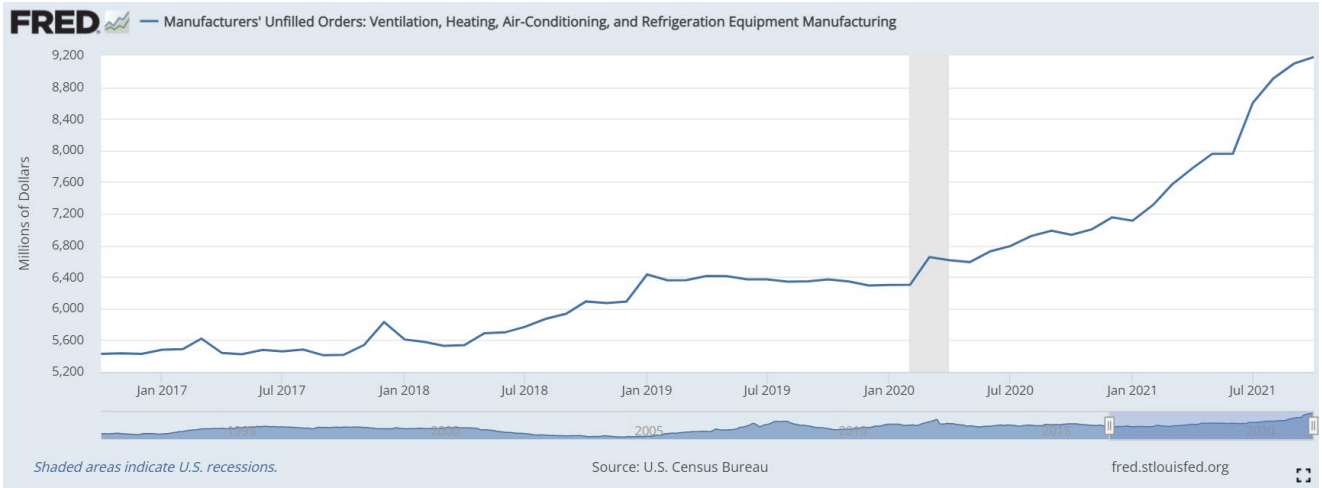
The Covid-19 pandemic has caused disruptions across every link in the global supply/demand chain resulting in product shortages and increasing prices in many industries. An example of this disruption occurred in early 2020 when panic-buying depleted the supply of toilet paper. Similar disruptions are being felt in product categories that are often part of utility energy-efficiency programs including HVAC, water heaters, and consumer electronics/appliances, resulting in increasing prices and limited availability.

Overview:

NEEA market partners involved in the manufacture and distribution of HVAC, water heaters, and consumer electronics/appliances have all indicated that they are experiencing supply chain disruptions. While the disruptions vary across industries – a shortage of microchips used in electronics/appliances; a shortage of compressors used in HVAC; a shortage of steel used in the manufacture of water heaters – the result of these disruptions are similar - higher prices, reduced selection, delayed shipments, and overall reduced product availability.

NEEA partners involved in the sale of these products have indicated that they have had to pass along the price increases to purchasers and that availability issues are causing a shift in what is being purchased. Oddly, increased prices and limited availability haven't reduced sales as many of these partners are reporting record sales volumes in 2021.

The results of reduced availability from suppliers and increased sales can be seen in this Federal Reserve graph of manufacturers of HVAC and refrigeration equipment that shows unfulfilled orders at a 5-year high.



Impact Example:

The water heater industry is being impacted by many of the global disruptions. AOSmith, the largest manufacturer of water heaters in the U.S., recently reported that they have passed along five price increases in 2021 primarily due to increases in the price of steel and logistics. AOSmith's heat pump water heater (HPWH) business is being further interrupted due to a shortage of microprocessor chips that are required for general control of the unit, and for CTA-2045 connectivity significantly reducing the number of units that can be manufactured. This is happening at the same time that states like Washington are implementing administrative codes that require electric storage water heaters to be CTA-2045 enabled.

Wholesalers of HPWHs that work with NEEA indicate that their builder customers aren't slowing construction, and due to the lack of product, they are asking for alternative products including tankless water heaters. Wholesalers are concerned because it has taken a great deal of effort, in some cases years, to get their customers used to and comfortable with HPWHs. While product shortages have the potential to impact near-term HPWH unit goals, the shortages may have longer-term impacts on the view of HPWHs in the market resulting in challenges in achieving energy-efficiency goals.

In an effort to keep HPWHs top of mind, NEEA worked with water heater manufacturers that represent over 90% of unit sales to provide comments to the State of Washington supporting a delay on CTA2045 implementation requirements (click HERE to read the comments letter). While the document outlines how supply chain disruptions are impacting our work in the HPWH arena, they can easily be applied to our collective HVAC and consumer electronics/appliance energy-efficiency efforts.

Please contact **Jon Clark** (JClark@neea.org) or **Jeff Mitchell** (JMitchell@neea.org) if you have questions about this memo.