BONNEVILLE POWER ADMINISTRATION

Energy Efficiency Action Plan 2022-2027

Executive Summary

The Bonneville Power Administration (BPA) and its public power utility customers are leaders in promoting energy efficiency in the Pacific Northwest. In accordance with the Pacific Northwest Electric Power Planning and Conservation Act of 1980, or the Northwest Power Act, BPA acquires and encourages the development of energy conservation to maximize the value of the Federal Columbia River Power System and reduce the agency's need to acquire other resources to supply firm power to its customers. Since the early 1980s, BPA has acquired more than 2,500 average megawatts (aMW) in electricity savings through energy conservation efforts to help meet the agency's power resource needs.

The regional energy landscape has evolved significantly since the passage of the Northwest Power Act and energy conservation has proven to be a consistent and reliable resource for the agency, its customers and the region at large. BPA's Energy Efficiency Program, guided by this Action Plan, advances innovative energy solutions to enrich life in the Pacific Northwest.

The Action Plan

The BPA Energy Efficiency Action Plan serves as the agency's roadmap for meeting its energy conservation goal of 300 aMW from 2022 through 2027. This planning document creates an operational strategy for achieving the goals set forth by BPA Power Services' 2022 Resource Program and the Northwest Power and Conservation Council (the Council) 2021 Power Plan. BPA's Energy Efficiency Program provides a suite of measures utility customers can implement within their service territories. Various infrastructure programs facilitate the acquisition of high-priority energy savings, which help the agency meet its power resource needs.

Driving Factors Behind The Action Plan

Several factors external and internal to BPA influenced the creation of this Action Plan:

- **Global events and market challenges** – Though immediate concerns surrounding the COVID-19 pandemic are receding, its effects persist in terms of continuing financial hardship, supply chain issues, labor shortages and higher costs for raw materials and products.

- **Cost-effectiveness constraints** – The cost-effectiveness landscape has changed considerably since the Council released its Seventh Power Plan in 2016, leaving a smaller quantity of cost-effective energy efficiency. The costs of renewable generation have dropped dramatically, and state laws and other clean energy policies have started mandating the addition of renewables. Low and negative market prices resulting from the proliferation of renewables throughout the 2021 Power Plan period are also decreasing the cost-effectiveness of energy efficiency.

- **Changing resource needs** – The results of BPA's 2022 Resource Program are largely similar to the 2020 results, including monthly energy deficits in low-water conditions, surplus capacity in the winter and summer as well as the conclusion that the least-cost mix of resources for meeting BPA's expected energy needs continues to consist of energy efficiency and energy purchased from the market. One new component in the 2022 Resource Program is the inclusion of demand response in the least-cost mix of resources.

- **Declining energy efficiency potential** – The Council's 2021 Power Plan established a lower conservation target for the region and BPA, resulting in a more constrained set of cost-effective conservation measures. The Council recommended that BPA and the region acquire between 750 aMW to 1,000 aMW of cost-effective energy efficiency by the end of 2027, or 270 aMW to 360 aMW for BPA and its customer utilities. By comparison, in the Seventh Power Plan, the total regional six-year target was 1,400 aMW, with 581 aMW identified as BPA's portion.

- **Evolving power system** – Electrification and growing peak electric demand, early retirements of coal plants, greater investments in renewables at both the utility and residential levels, advances in energy storage technologies, a stronger emphasis on resource adequacy and an increased interest in demand response all have significant impacts on power and transmission system planning and operations.

- **Policy and legislation advances** – Significant clean energy policies and goals have been introduced throughout the region, including state clean energy policy mandates, utility commitments, community clean energy goals and other decarbonization efforts. All of these policies impact BPA, regional utilities and ratepayers.

- **Post-2028 contract negotiations and Provider of Choice** – The Provider of Choice process will influence many facets of BPA's relationship with its power customers, including how the agency acquires energy efficiency.

Strategic Priorities Across Sectors

BPA's energy conservation savings goal for this Action Plan period is 300 aMW. In line with the findings of both the Council's 2021 Power Plan and BPA Power Services' 2022 Resource Program, BPA identified a smaller total of efficiency acquisitions. To help address the greater cost and operational challenges associated with acquiring energy conservation, BPA will implement the following program changes:

Residential Sector

The Residential sector will focus on supporting measures that reduce residential heating and cooling loads and high-efficiency water heating measures. The sector will shift away from Performance Tested Comfort Systems program measures due to cost-effectiveness considerations and put more emphasis on heating, ventilation and air conditioning (HVAC) measures such as ductless heat pumps. The Home Energy Reports Program contributes significant savings and will shift to a greater proportion of the more affordable electronic reports in the latter years of the Action Plan forecast. Weatherization of low-income homes and exploring ways to improve the Low Income Program, including removing applicant registration barriers and simplifying implementation, are critical steps to future success.

Commercial Sector

The Commercial sector will add new measures in areas such as HVAC, refrigeration and energy management. Targeted incentive increases for priority HVAC and lighting measures, upgrades to the Online Lighting Calculator and exploration of midstream delivery mechanisms (which are focused on distributors and retailers rather than end-use customers) will be pursued.

Industrial Sector

The Industrial sector will continue to prioritize custom and lighting projects that contribute the majority of the sector's savings, monitor project costs and make targeted incentive increases as needed to combat inflation and promote participation in Strategic Energy Management and Energy Project Manager.

Agricultural Sector

The Agricultural sector will invest in demonstration projects to promote zonal variable-rate irrigation conversions and advanced water management irrigation scheduling and will develop a new agriculture energy audit measure to holistically identify potential energy efficiency improvements at agriculture producers' sites.

Federal Sector

The Federal sector will focus on streamlining operations, improving access to its programs and performing a market potential assessment to identify projects with higher benefit-cost ratios.

Distribution System Sector

The Utility Distribution sector will increase communication with utility management to promote the value of conservation voltage reduction measures and identify the small- and midsized utilities, which traditionally have not participated in the sector's offerings.

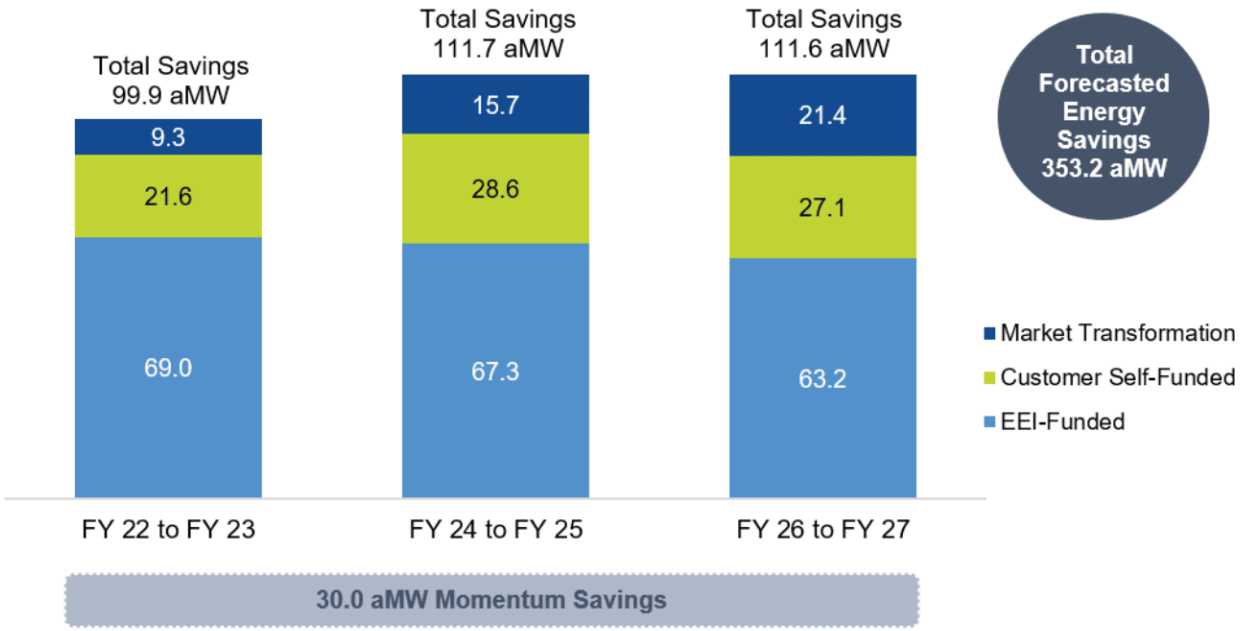
Demand Response

Demand response is a new selection in BPA's Resource Program and the Council's 2021 Power Plan. BPA will examine its ability to create load-reducing demand response products that support resource adequacy and are economically viable and feasible to be implemented by customers. BPA will perform targeted modeling on a new suite of energy-focused, frequently deployed, load-reducing demand response products to replace the use of standard peak-related, infrequently deployed demand response products.

Summary of Action Plan Energy Savings Forecasts

BPA's energy conservation goal for the Action Plan period is 300 aMW. Forecasted energy savings are higher, as shown in the figure below, at 353.2 aMW from 2022 through 2027.

BPA Energy Savings Forecast by Source and Rate Period



Note: Due to rounding, numbers may not add to the total.

Source: BPA analysis, 2022

BPA Energy Efficiency Program savings forecasts for each sector and Northwest Energy Efficiency Alliance market transformation are below.[1]

BPA Program and Market Transformation Energy Savings Forecast by Sector and Rate Period

Sector	FY 22 to FY 23 (aMW)	FY 24 to FY 25 (aMW)	FY 26 to FY 27 (aMW)	Total Forecasted Energy Savings (aMW)
Residential	14.3	17.5	20.4	52.3
Commercial	26.0	39.6	34.3	99.9
Industrial	24.0	29.4	26.4	79.7
Agricultural	2.4	2.8	2.7	7.9
Federal	5.0	5.5	5.8	16.4
Utility Distribution	0.4	0.6	0.6	1.6
Unallocated Savings	18.5	0.5	0.0	19.0
Market Transformation	9.3	15.7	21.4	46.4
Total Forecasted Energy Savings	**99.9**	**111.7**	**111.6**	**323.2**

Note: Does not include Momentum Savings because BPA did not break these out by fiscal year or rate period. Due to rounding, numbers may not add to the total.

Source: BPA analysis, 2022

BPA focused on lower-cost savings selected by the Council's 2021 Power Plan and BPA's 2022 Resource Program, prioritizing measures that deliver savings with a cost and shape best suited to meet BPA's system needs. The total forecast of 353.2 aMW for fiscal year (FY) 2022-2027 reflects the increasing difficulty in acquiring cost-effective energy efficiency savings. For reference, the forecast from BPA's 2016 Action Plan was 580.7 aMW over a six-year period.

[1] Utility customers will likely spend the remaining budget above the total cost estimate and generate additional savings, but it is uncertain in which sectors they will choose to invest. Consistent with its previous Action Plan, BPA refers to these as "unallocated savings." These savings are a part of program savings and are the direct result of the anticipated spending of the portion of BPA's budget that no sector identified.

Action Plan Development Process

The following guiding principles influenced the savings forecasts and program strategies set forth in the Action Plan:

Meeting BPA resource needs and Power Plan obligations

BPA develops savings acquisitions in response to the Council's 2021 Power Plan and BPA's 2022 Resource Program.

Meeting BPA customer needs

Customers have wide-ranging needs and priorities with respect to energy efficiency and demand response. A portfolio of diverse offerings helps ensure the equitable distribution of program benefits.

Considering value beyond energy savings

Energy efficiency delivers concrete value beyond energy savings. BPA considers economic and environmental benefits as well as improved resiliency, safety and comfort in establishing its conservation program.

Development of the 2022-2027 Energy Efficiency Action Plan began by assessing the Energy Efficiency Program's current offerings and evaluating its contributions towards meeting regional goals identified by the Council's 2021 Power Plan and BPA's 2022 Resource Program.

BPA consulted with customers to solicit information about the value of its efficiency programs and opportunities for improvement. The agency created the portfolio with an emphasis on equity and the unique needs of small, rural and residential utilities. Market research, emerging technology study results and BPA's two-year rate period budgets also influenced savings goals.

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1 Introduction

Every six years, the Bonneville Power Administration (BPA) publishes an Energy Efficiency Action Plan, which is a roadmap for meeting the agency's energy conservation goals. In partnership with its customers, BPA has promoted energy efficiency in the Pacific Northwest for four decades. Since 1982, BPA and its customers have achieved an estimated 2,505 average megawatts (aMW) of energy savings.[2] BPA is proud of the region's significant energy efficiency savings and remains committed to advancing innovative energy solutions to enrich life in the Pacific Northwest.

The 2022-2027 Energy Efficiency Action Plan reflects BPA's obligations under the Pacific Northwest Electric Power Planning and Conservation Act of 1980, also known as the Northwest Power Act, which directs the Northwest Power and Conservation Council (the Council) to develop a "regional conservation and electric power plan" and to review the plan no less than every five years.[3] The 2021 Northwest Power Plan,[4] published in 2022, provides guidance for BPA and the region's utilities to develop a resource strategy that encompasses future demand for electricity and ensures an adequate, economic, affordable

[2] Bonneville Power Administration. *Energy Conservation Annual Review 2021*. www.bpa.gov/-/media/Aep/energy-efficiency/policy/bpa-energy-conservation-annual-review-fy2021.pdf

[3] For more on the "statement of basis and purpose" described in Section 553 of the Federal Administrative Procedures Act to accompany agency decisions on final rules and information on how the Council considered and responded to the comments received during development of the 2021 Power Plan, see Northwest Power and Conservation Council. (2022, May). *2021 Northwest Power Plan: Statement of Basis and Purpose for the 2021 Power Plan and Response to Comment on the Draft 2021 Power Plan.* www.nwcouncil.org/fs/17766/statement_of_basis_and_purpose_2021powerplan.pdf

[4] Northwest Power and Conservation Council. (2022, March). *2021 Power Plan.* www.nwcouncil.org/2021-northwest-power-plan

and reliable power supply. It also identifies regional and BPA-specific energy efficiency goals and qualitative recommendations.

BPA conducts its own study, the Resource Program, which provides analysis and insight into long-term, least-cost power resource acquisition strategies to ensure the agency meets its future power obligations. The Resource Program considers uncertainty in loads, water supply, resource availability, natural gas prices and electricity market prices. BPA completed its most recent Resource Program study in 2022. The Resource Program informs BPA's Energy Efficiency Program strategy and Integrated Program Review, a process that establishes agency program spending proposals and feeds into the applicable Rate Case, which sets power rates over a two-year period.

BPA used the outcomes of the 2021 Power Plan and BPA's 2022 Resource Program results to set the quantitative parameters – Energy Efficiency Program savings goals and associated costs – of the energy efficiency forecasts. The 2021 Power Plan calls for the region to acquire between 750 aMW and 1,000 aMW of cost-effective energy efficiency by the end of 2027. The BPA portion of the regional goal is between 270 aMW and 360 aMW. The Resource Program's least-cost portfolio selected 299 aMW of energy efficiency by 2027, which is within the Council's target range for BPA.[5]

When creating sector forecasts and planning program strategies, BPA considers customer needs and assesses the following:

- Which energy efficiency technologies are critical to utility customer success.
- How to ensure programs equally distribute benefits to all customers, including small, rural and residential utilities.
- Which technologies offer benefits beyond energy savings, such as weatherization and increased resiliency, or localized capacity benefits.
- Where technologies are on the market transformation curve and what role BPA can play to influence product advancement.
- How program offerings complement environmental policy goals, including decarbonization and greenhouse gas reductions.

BPA is committed to delivering an adequate, efficient, economical and reliable power supply to its customers and the Northwest. A robust, cost-effective conservation program helps utility customers temper the cost of power for their customers and the communities they serve. BPA and its customers'

[5] The 2022 Resource Program forecast energy efficiency acquisitions for 2024-2027, using anticipated energy efficiency savings in 2022 and 2023.

energy-savings achievements are an important contribution to meeting the region's clean energy goals, which are expected to become more rigorous in the future.

Over the past six years from 2016 through 2021, BPA invested over $652 million in energy conservation, as shown in Table 1. The agency intends to maintain the necessary funding levels to support its energy efficiency commitments.

Table 1. Historical BPA Spending on Energy Efficiency: 2016 - 2021

Budget Category	Amount Spent
Conservation Purchases (EEI-funded)	$421.5 million
Conservation Infrastructure	$129.3 million
Low Income and Tribal Support	$30.5 million
Market Transformation	$71.4 million
Total	**$652.7 million**

Note: Rows may not sum to total due to rounding.

The next sections define Action Plan objectives, highlight guiding principles, explain the development methodology, summarize past successes and provide an overview of the energy landscape drivers influencing BPA and its customers' energy efficiency efforts.

1.1 Action Plan Objectives

The primary Action Plan objectives are to:

- Acquire energy efficiency savings that provide the greatest power resource benefits, by aligning BPA's Energy Efficiency Program portfolio with 2022 Resource Program selections.[6]
- Meet BPA's share of the energy efficiency goals established in the 2021 Power Plan and prioritize cost-effective measures.
- Offer a portfolio that all BPA customers can implement specifically supporting small, rural and residential utilities in meeting their customers' needs.

[6] BPA conducts the Resource Program study to identify long-term, least-cost power resource acquisition strategies to ensure the agency meets its future power obligations. Bonneville Power Administration. (2022, June 28). *2022 BPA Resource Program.* www.bpa.gov/-/media/Aep/power/resource-program/resource-program-workshop-20220628-2.pdf

1.2 Guiding Principles

The Long-Term Regional Dialogue Policy states: "BPA will pursue conservation equivalent to all cost-effective conservation in the service territories of those public utilities served by BPA and will accomplish this in partnership with public utilities at the lowest cost to BPA."[7] Though this was an overarching principle for this Action Plan, several others influenced its development, including:

- **Meeting BPA Resource Needs and Northwest Power Act Obligations** – BPA's Energy Efficiency Program is an important part of the agency's commitment to delivering an adequate, efficient, economical and reliable power supply to its customers and the Northwest. Maximizing the value of the Federal Columbia River Power System (FCRPS) reduces BPA's need to acquire other resources to supply firm power, or the power guaranteed to be available under contractual commitment, to its utility customers.
- **Meeting BPA Customer Needs** – BPA customers are important partners in the implementation of the agency's Energy Efficiency Program, and they have a wide range of needs and priorities with respect to energy efficiency and demand response. BPA considered various implementation strategies with the intent of providing customers with an equitable portfolio of energy efficiency measures, minimizing delivery and reporting complexity, and maximizing uptake.
- **Considering Value beyond Energy Savings** – Energy efficiency delivers value beyond first-year energy savings. These values include economic, environmental and resiliency benefits. Energy efficiency helps to reduce customers' energy burden, increases resilience in the face of extreme weather and provides other non-energy benefits such as better health, greater safety and increased comfort. Energy efficiency also helps customers meet environmental policy goals at the federal, state and local levels, including reductions in greenhouse gas emissions and clean energy.

1.3 Action Plan Development Process

Planning for BPA's Energy Efficiency Program for the 2022-2027 period began with the agency assessing current portfolio offerings and their contributions to the regional goals set by the Council. Shortly after the Council published its 2021 Power Plan, BPA released its 2022 Resource Program. The timing allowed

[7] Bonneville Power Administration. (2007, July). *Bonneville Power Administration Long-Term Regional Dialogue Final Policy.* www.bpa.gov/-/media/Aep/power/regional-dialogue/07-19-07-rd-policy.pdf

BPA to consider the results for both the Power Plan and the Resource Program in developing this Action Plan. BPA conducted the following activities to inform Action Plan strategies:

- Compared the current portfolio with the cost-effective energy efficiency and demand response identified by the Council's 2021 Power Plan.
- Reviewed Resource Program results, specifically the energy efficiency and demand response selections in the lowest-cost power acquisition portfolios, and compared them with the agency's current portfolio.
- Met with customer representatives to seek input on the value of BPA's efficiency programs and areas for improvement. BPA evaluated the equity impacts of various portfolio designs to ensure program accessibility for all customers. In practice, this means that BPA avoided making changes to the portfolio that would have disproportionately harmed small, rural or residential customer utilities.
- Compared energy savings potential with ongoing energy efficiency programs, historical achievements and current market conditions to understand the level of effort and funding required to implement the BPA Energy Efficiency Program.

BPA's knowledge of the current energy efficiency program landscape informed the energy savings forecasts. The agency understands that every forecasting exercise has its limitations and intends for this Action Plan to be a living document, adapted to respond to dynamics that may influence planning assumptions and implementation strategies.

1.4 Summary of Past Action Plan Success

The 2021 Annual Review discusses the achievements of BPA and its customers toward the Seventh Power Plan six-year target (2016-2021).[8] This document is the best reference to understand the agency's comprehensive energy efficiency accomplishments of the past six years.

BPA and its customers delivered 537.5 aMW of energy savings over the Seventh Power Plan, nearly meeting the plan's overall goal of 580.7 aMW. The COVID-19 pandemic and the inability of regional utilities to fully utilize their energy efficiency incentive (EEI) funding affected the savings achievement. Program savings totaling 332.7 aMW came from BPA and its customers' energy efficiency efforts. BPA is proud of its hard-won efforts to advance energy efficiency in the region and serve its customers despite the unprecedented global challenges of recent years.

[8] See pages 16-18 for highlights of Seventh Plan accomplishments. Bonneville Power Administration. *Energy Conservation Annual Review 2021.* www.bpa.gov/-/media/Aep/energy-efficiency/policy/bpa-energy-conservation-annual-review-fy2021.pdf

1.5 Energy Landscape Drivers, Challenges and Opportunities

Evolution in the energy landscape significantly shaped energy conservation initiatives since the publication of the 2016 Action Plan and the 2019 Action Plan Update.[9,10] Some changes are global phenomena, others are more specific to BPA, but the agency considered all in developing this Action Plan's forecasts and conservation goals.

Global Events and Market Challenges

The past three years brought unforeseen challenges with the COVID-19 pandemic hampering achievement of BPA's Energy Efficiency Program goals. Lockdowns, safety protocols and supply chain constraints disrupted normal business operations. Though immediate concerns surrounding the COVID-19 pandemic are receding, its effects persist in terms of continuing supply chain issues, labor shortages, higher costs for raw materials and products and financial hardship. These effects have particularly adversely impacted ratepayers living on the economic margins. A large and growing population of Northwest residents and businesses struggle to make ends meet, and their energy burdens have increased. The need to serve these populations with robust conservation program offerings has grown substantially.

The cumulative near-term economic impacts affect both BPA's costs and its customer utilities' ability to invest in energy efficiency. Higher inflation means BPA incentives no longer cover as much of the cost of products as they once did, making them less attractive to consumers. Longer-term impacts of the pandemic remain to be seen, and the potential effects on BPA's ability to achieve its conservation goals are unknown. Together, these challenges make for a difficult situation for energy efficiency today and in the foreseeable future.

Cost-Effectiveness Constraints

The Northwest Power Act urges BPA to pursue cost-effective energy efficiency; however, the cost-effectiveness landscape has changed considerably since the beginning of the Seventh Power Plan. For the last three Power Plans (the Fifth, published in 2005; the Sixth in 2010; and the Seventh in 2016),

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[9] Bonneville Power Administration. (2017, March). *Bonneville Power Administration 2016-2021 Energy Efficiency Action Plan.* www.bpa.gov/-/media/Aep/energy-efficiency/energy-efficiency-action-plan/2016-2021-bpa-ee-action-plan.pdf

[10] Bonneville Power Administration. *2016-2021 Energy Efficiency Action Plan Update.* www.bpa.gov/-/media/Aep/energy-efficiency/energy-efficiency-action-plan/2016-21-bpa-ee-action-plan-update.pdf

gas-fired generating plants were the lowest-cost generating resource against which the Council compared the costs of energy efficiency.[11,12]

Since the Council published the Seventh Power Plan, the costs of renewable generation, including solar and wind, have dropped dramatically. At the same time, state laws and other clean energy policies have started mandating the addition of renewables. In the 2021 Power Plan, the Council forecasted a large addition of renewables, predicting that the Western electric grid would add 400 gigawatts of nameplate capacity by 2041.[13] As a result, utility-scale renewable resources are now the lowest-cost generating resource in the 2021 Power Plan period, and the 2021 Power Plan's resource strategy assumes a significant addition of renewable resources in the Northwest and the West.

Low and negative energy market prices can result from the widespread use of certain types of renewables throughout the 2021 Power Plan period, thereby decreasing or eliminating the ability for energy efficiency to compete. Gas generation costs have also dropped considerably, but not to the same degree as renewables, and there are policy and other obstacles that will limit the addition of new gas plants other than in isolated cases.

Changing Resource Needs

The BPA Resource Program released in October 2022 examined uncertainty in loads, water supply, resource availability, natural gas prices and electricity market prices. It also provided analysis and insight into long-term, least-cost power resource acquisition strategies to ensure BPA meets its future power obligations. For the first time, the agency was able to review these results alongside a new Power Plan to inform its latest Action Plan.

One notable change from the 2020 Resource Program was the inclusion of a new scenario that helps BPA understand how changes in key assumptions such as loads, candidate resource costs and market prices may impact results. The results yield a vision of BPA's needs and offer low-cost resource strategies across a range of future market conditions and policy environments.

Results of the 2022 Resource Program show many similarities to the 2020 results, including monthly energy deficits in low-water conditions, surplus capacity in the winter and summer as well as the conclusion that the least-cost mix of resources to meet BPA's expected energy needs continues to

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[11] Northwest Power and Conservation Council. *Cost Effective Conservation Recommendation Summary.* www.nwcouncil.org/2021powerplan_cost_effective_conservation_recommendation_summary/

[12] Past Northwest Power Plans are available on the Council's website: www.nwcouncil.org/

[13] Northwest Power and Conservation Council. *2021 Northwest Power Plan*. Pp 50-51. www.nwcouncil.org/fs/17680/2021powerplan_2022-3.pdf

consist of energy efficiency and energy purchased from the market. New in the 2022 Resource Program was the inclusion of demand response in the least-cost mix of resources.

In creating this Action Plan, BPA primarily consulted the energy efficiency and demand response selections in the Resource Program's Portfolio 1. This scenario presents the least-cost solution to meeting the agency's energy needs over the Resource Program's 10-year planning horizon, subject to market costs, market reliance limits and resource constraints. Portfolio 1 showed a preference for the following technologies:

- Water heating, weatherization and heating, ventilation and air conditioning (HVAC) energy-saving measures in the Residential sector. These measures deliver savings when BPA needs them, with ramps in the morning and evening during heavy load hours in the winter and late summer.
- Lighting measures in the Commercial sector. These measures have been a key component of BPA's efficiency program for many years. Given their low cost, the Resource Program heavily selected these measures.
- Process load, whole-building/meter level and lighting measures in the Industrial sector. These savings shapes are flatter due to more continuous energy usage in the industrial sector, but they come at a low cost.

While there is significant alignment among measures selected by the 2021 Power Plan and the 2022 Resource Program, there are some differences. Both studies favor low-cost efficiency measures; however, the 2022 Resource Program is more inclusive of measures that provide higher value to BPA during times of greatest system needs. As a result, BPA's Resource Program included several residential HVAC measures that were not sufficiently cost-effective for selection by the 2021 Power Plan. The Council recommended that BPA continue to invest in weatherization programs targeting homes that are leaky or have insufficient insulation, even though weatherization as a whole was not cost-effective.

BPA's 2024 Resource Program will examine how variation in loads, resources, market availability and other uncertainties interact in identifying a least-cost portfolio of resources that meets the agency's expected future needs. The impact to BPA's firm obligations from regional electrification and other sources of customer load growth are key areas of focus for BPA.

Declining Energy Efficiency Potential

In addition to the proliferation of low-cost renewables, less low-cost energy efficiency is available to pursue in the region. Successful market adoption of efficient technologies and the gradual incorporation

of energy efficiency into codes and standards has caused a significant decline in energy efficiency potential over the past several years.[14]

Over the last decade, the success of regional midstream retail lighting programs along with new federal standards that have increased equipment baselines have affected residential lighting programs. Residential lighting has been a primary source for energy efficiency savings across the region since 2010, but residential lighting savings have decreased with the steady adoption of light emitting diodes (LEDs) and increasing baseline efficiency every year. In addition, final rules adopted by the U.S. Department of Energy in May 2022 updated definitions for general service lamps and general service incandescent lamps and established LEDs as the baseline technology for all screw-based lighting starting in July 2023.

No viable new technologies have emerged to replace the lost savings from market evolution. Persistently high costs, inconsistent performance and slowed market adoption have hindered many new and emerging electric energy-saving measures. The Council set a lower conservation target in the 2021 Power Plan and a more constrained set of cost-effective conservation measures. The Council recommended that the region acquire between 750 aMW and 1,000 aMW of cost-effective energy efficiency by the end of 2027 and that BPA and its customer utilities acquire between 270 aMW and 360 aMW. By comparison, in the Seventh Power Plan, the total regional six-year target was 1,400 aMW, with 581 aMW identified as BPA's portion.

Evolution in the Power System

While energy efficiency potential is declining, the potential for peak electric demand is rapidly growing. Technologies such as electric vehicles (EVs); the environmental imperative to electrify buildings; the growth of indoor agriculture; and data-heavy digital devices, cryptocurrencies and server farms have contributed to intensifying electric demand across the region. These trends increase the load on the power system and put additional pressure on electric utilities along with the growing expectation that load is served by carbon-free resources.[15]

Sufficient resource capacity to meet current and future energy demands is a key issue facing BPA and the region. Early retirements of coal plants have affected the availability of power in the wholesale electricity market and spurred greater investments in renewable resources, especially solar and energy

[14] Bonneville Power Administration. (2021, July). *Conservation Potential Assessment 2022-2043*. www.bpa.gov/-/media/Aep/energy-efficiency/policy/BPA-Conservation-Potential-Assessment-2022-2043.pdf

[15] BPA's current system sales are about 95 percent carbon-free on average.

storage technologies. These investments are transforming the region's energy profile and will change utilities' energy and capacity needs.

Stronger emphasis on resource adequacy is visible through the ongoing effort to develop the Western Resource Adequacy Program (WRAP) to ensure utilities plan and bring enough power to meet their own needs and help the region avoid energy shortfalls.[16] The Northwest, especially BPA, has been and continues to be capacity-rich, but other utilities in the region may experience capacity constraints as they retire baseload coal-fueled generating plants. Their emerging capacity needs may change the nature of future resource decisions and impact energy efficiency and demand response choices.

BPA's approach to offering energy efficiency and demand response resources to its customers is evolving to better meet system needs. Other utilities may also change their use of energy efficiency. For example, advocates have traditionally focused on the energy benefits that energy efficiency provides to the system, while utilities may increasingly call on it to reduce capacity constraints. Similarly, though demand response has not played a role in BPA's conservation portfolio in the past, the agency may implement it to reduce pressures on the grid or respond to price signals at key times. BPA discusses its demand response strategy in the *Demand Response* section of this Action Plan.

Though BPA wrote this Action Plan from the perspective of its Power Services organization, changes in the power system impact the transmission system operations as well.

Policy and Legislation Advances

As demand for electricity grows, some states in BPA's service territory are motivated to reduce carbon emissions from electricity production. Since publication of the Seventh Power Plan, significant clean energy policies and goals have been introduced throughout the region, including state clean energy policy mandates, utility commitments, community clean energy goals and other decarbonization efforts.

The State of Washington passed two sets of legislation that are changing the demand of state utilities for certain resources in the future. The Clean Energy Transformation Act (CETA), signed into law in 2019, requires utilities to phase out coal-fired electricity from their Washington portfolios by 2025. By 2030, their portfolios must be greenhouse gas emissions-neutral, which means they may use limited amounts of electricity generated from natural gas if they offset it by other actions. By 2045, utilities must supply their Washington customers with electricity that is 100 percent renewable or non-emitting, with no provision for

[16] Bonneville Power Administration. (2022, July). *Provider of Choice Concept Paper*. www.bpa.gov/energy-and-services/power/provider-of-choice

offsets. CETA applies to all electric utilities serving retail customers in Washington and sets specific milestones to reach the required 100 percent clean electricity supply.[17]

The Climate Commitment Act caps and reduces greenhouse gas emissions from Washington's largest emitting sources and industries, allowing businesses to find the most efficient path to lower carbon emissions. The Climate Commitment Act works alongside other climate policies to help Washington achieve its commitment to reducing greenhouse gas emissions by 95 percent by 2050.[18] BPA recognizes that, currently, it makes over 63 percent of its long-term power sales to Washington customers who will be seeking ways to support utilities in meeting these regulations.[19]

In 2021, Oregon Governor Kate Brown signed House Bill 2021, mandating a 100 percent clean electricity supply by 2040 for investor-owned utilities and electricity service suppliers. The bill phases in greenhouse gas reductions below baseline emissions (average 2010-2012 emissions) of 80 percent by 2030, 90 percent by 2035 and 100 percent by 2040. It also precludes new fossil-fuel projects from being sited in Oregon.[20]

Also in 2021, President Biden signed an executive order to reduce emissions across federal operations to accelerate the nation's progress toward achieving a carbon pollution-free electricity sector by 2035. The policy mandated net-zero emissions from overall federal operations by 2050, including a 65 percent emissions reduction by 2030.

In 2022, the Biden administration passed the Inflation Reduction Act (IRA), H.R. 5376,[21] a wide-ranging law that represents the largest U.S. investment to address climate change in history. The IRA provides financial benefits to help decarbonize energy systems, improve the efficiency and comfort of homes and businesses, accelerate the adoption of renewable energy resources and reduce the energy burden for lower-income Americans.

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[17] Washington State Department of Commerce. *Clean Energy Transformation Act.* www.commerce.wa.gov/growing-the-economy/energy/ceta/

[18] Washington State Department of Ecology. *Climate Commitment Act (CCA).* www.ecology.wa.gov/Air-Climate/Climate-Commitment-Act

[19] Bonneville Power Administration. (2022, July). *Provider of Choice Concept Paper*. www.bpa.gov/energy-and-services/power/provider-of-choice

[20] Northwest Power and Conservation Council. *Existing Policies - Clean Policy Analysis.* Accessed December 2022. www.nwcouncil.org/2021powerplan_existing-policies_clean-policy-analysis/

[21] U.S. Congress. (2022, January 3). *The Inflation Reduction Act H.R. 5376.* www.congress.gov/117/bills/hr5376/BILLS-117hr5376enr.pdf

The IRA relies on two primary mechanisms to achieve its goals: tax credits and grants for state energy offices.[22]

- **Tax Credits** – IRA tax credits will be available to consumers who install a range of renewable energy systems, energy efficiency measures, electrical improvements and commercial building efficiency improvements and who build new single-family and multifamily homes that meet ENERGY STAR or Zero Energy Ready Home program qualifications. Tax credits will be available for 10 years beginning in 2023 and are expected to supplement BPA's program incentives for applicable projects and possibly to boost program uptake.
- **State and Tribal Energy Office Grants** – The IRA includes $4.3 billion in grants for state and tribal energy offices to implement rebate programs for whole-home retrofits (single-family and multifamily), with the rebates doubled for qualifying low- and moderate-income residents. The IRA also earmarks grants for efficient home electrification measures in existing and new construction applications for low- and moderate-income residents and installers. There is also $4.5 billion allocated to home electrification rebates under the U.S. Department of Energy's Home Energy Rebates Program. These funds will go to low- and moderate-income households to purchase high-efficiency electric equipment, including heat pump water heaters and heat pumps. The Department of Energy has not yet established program rules, so it remains unknown if funds will complement BPA's conservation programs (possibly allowing end users to "stack" rebates) and if program administrators will be required to claim savings, conduct third-party evaluation or adhere to regional cost-effectiveness or other regulatory rules.

Though BPA expects the IRA to provide added benefits to end users who invest in energy-efficient upgrades, it also recognizes that the implementation plans for federal policies are not yet finalized and their impacts on the power system are not yet clear. It is not also clear if consumers will adopt these incentives or if the incentives will have an impact on energy efficiency behaviors in the region. Energy efficiency savings will likely increase during the IRA program implementation period, which may introduce new market disruptions, spur demand for energy-efficient equipment in a challenged supply chain or even compete with BPA's conservation programs. The Action Plan is flexible enough to adapt to the changing landscape, and BPA will update this document at least once during the 2021 Plan period.

BPA will monitor federal and state program development under the IRA to ensure the agency's programs maximize benefits for customer utilities. BPA is working with Northwest Energy Efficiency Alliance (NEEA) to create a regional working group around federal funding opportunities, including the IRA and the

[22] American Council for an Energy Efficient Economy (ACEEE). (2022, September). *Policy Brief: Home Energy Upgrade Incentives.* www.aceee.org/sites/default/files/pdfs/home_energy_upgrade_incentives_9-27-22.pdf

Infrastructure Investment and Jobs Act (IIJA). The working group will be a NEEA Regional Portfolio Advisory Committee (RPAC) subcommittee.

BPA's efficiency programs better enable customers to respond to electrification, decarbonization and other landscape changes as they occur. Making electric loads more efficient directly supports regional electrification and decarbonization goals. The agency may modify existing programs to maintain their usefulness and to complement the federal programs. Changes could include raising or lowering incentives and amending measure offerings. BPA recognizes that other local, state or federal government carbon regulations are likely to emerge over the next decade, which may also require changes from customers or the agency. BPA will be tracking upcoming legislation and its effects closely over this Action Plan period.

Post-2028 Contract Negotiations and Provider of Choice

BPA is actively engaged in Provider of Choice, a multiyear process focused on establishing long-term power sales policy and agreements that will take effect October 1, 2028, following the expiration of 20-year Regional Dialogue contracts. BPA is in public discussion with regional utilities to better understand their needs and interests for BPA's future contract offering.

The Provider of Choice process has the potential to influence many facets of BPA's relationship with its firm power customers, including the means by which customers acquire energy conservation. With emerging regional capacity constraints under certain conditions and in specific geographic areas, a rapid transition to a renewable-focused system and a changing policy landscape, energy efficiency could become an even more critical focus for utilities. BPA remains committed to energy efficiency as a cost-effective resource and intends to maintain compatibility between its long-term power sale agreements and its Energy Efficiency Program. The agency will conduct a program review ahead of new contracts to ensure it identifies any necessary changes.

Conservation has been a central focus in Provider of Choice policy discussions, as BPA and stakeholders consider the potential interplay of historic conservation achievements with future access to BPA's lowest-priced power. Many customers have stressed the value they place on the interaction of conservation with power resources and costs, recognizing that conservation forestalls their need for incremental resources and postpones their exposure to new resource costs.

Irrespective of the final Provider of Choice policy decision on historic utility conservation achievements, BPA is committed to ensuring its power sales and Energy Efficiency Program work together to deliver energy efficiency as the resource of choice to meet agency and regional needs.

2 Forecasted Energy Savings and Costs

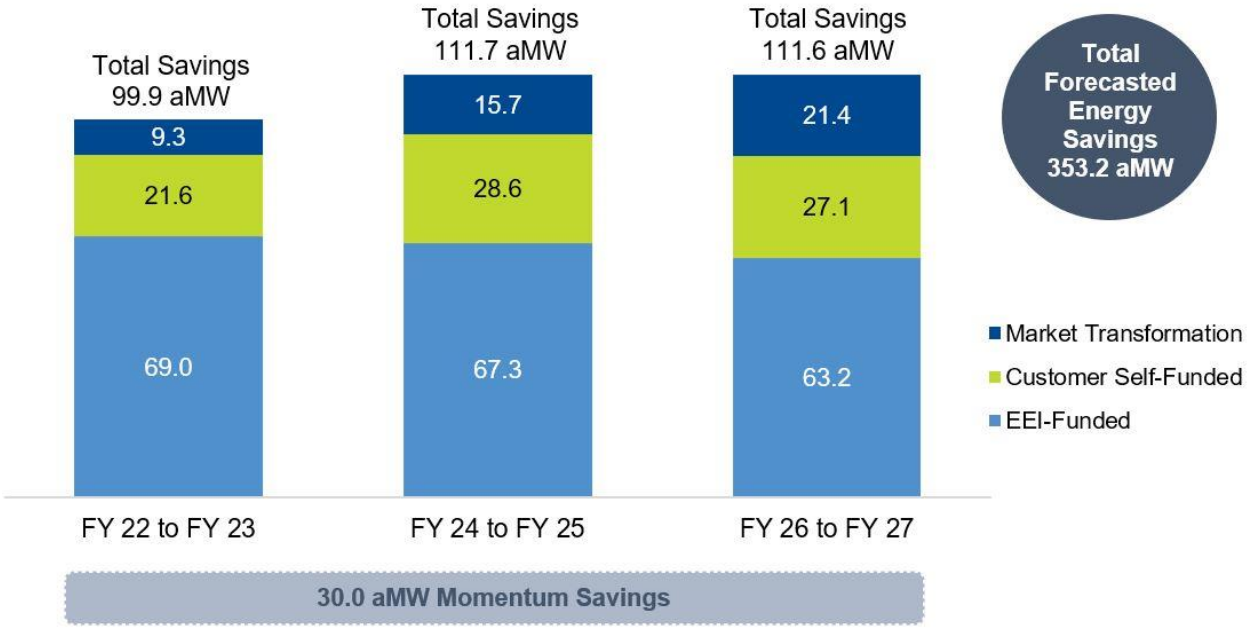
This section covers BPA's Energy Efficiency Program savings forecasts, budget and estimated costs.

2.1 Savings Forecasts

BPA achieves savings through three mechanisms: energy savings acquired in collaboration with utility customers, market transformation savings achieved through the Northwest Energy Efficiency Alliance (NEEA) and momentum savings documented through market research. BPA acknowledges uncertainty is inherent in any forecast of savings but strives to develop the most accurate forecast possible.

Figure 1 shows a combined savings forecast of 353.2 aMW from 2022 through 2027, including acquisitions from programs, market transformation and momentum savings. BPA estimates that program savings, which include energy efficiency incentive-funded and self-funded savings, will account for 276.8 aMW.

Figure 1. BPA Energy Savings Forecast by Source and Rate Period



Notes: Due to rounding, numbers may not add to the total. Market transformation savings did not include adjustments for line losses.
Source: BPA analysis, 2022

BPA categorizes program savings by funding source. BPA estimates acquiring 199.5 aMW from power customers under Energy Conservation Agreements. Under these agreements, customers have a defined amount of energy efficiency incentive (EEI) funds available to expend on developing and achieving cost-effective energy-saving measures. The agency estimates customer self-funded savings to be 77.3 aMW. Customer self-funded savings meet BPA program requirements, but customers do not seek reimbursement from BPA; instead, customers report these savings and BPA claims them.[23]

In addition to program savings, BPA forecasts 30.0 aMW of Momentum Savings and 46.4 aMW of market transformation savings.

Program Energy Savings

Program activities are the largest source of BPA's energy savings forecast. Total program savings of 257.8 aMW is estimated during this Action Plan (2022-2027). BPA and its customers achieve these

[23] BPA estimates that utilities will self-fund approximately 30 percent of the energy savings acquired through energy efficiency programs, which is consistent with past self-funding proportions.

savings through a mix of unit energy savings (UES), calculated measures, custom projects and third-party programs.

In developing its forecasts, BPA considered outcomes of the 2021 Power Plan and 2022 Resource Program, input from its customers, BPA's 2022-2025 Integrated Program Review, recent program achievements, expected market conditions and portfolio equity.[24]

The total program savings forecast required fewer expenditures in the near term than the allocated program budget for Conservation Purchases (EEI). BPA's customers will likely spend the remaining budget above the total cost estimate and generate additional savings, but it is uncertain in which sectors they will choose to invest. Consistent with its previous Action Plan, BPA refers to these savings as "unallocated savings." They are the direct result of anticipated spending of the portion of BPA's budget not utilized in any particular sector forecast.

BPA expects to achieve the majority of its forecasted program savings from the commercial, industrial and residential sectors, with smaller contributions from the agricultural, federal and utility distribution sectors. Table 2 shows the breakdown of program savings by sector and rate period.

[24] NEEA's forecast of market transformation and BPA's Momentum Savings forecast ensure that program savings are not double-counted. Further discussion on the development of Momentum Savings forecasts is in the *Momentum Savings* section below.

Table 2. BPA Program and Market Transformation Energy Savings Forecast by Sector and Rate Period

Sector	FY 22 to FY 23 (aMW)	FY 24 to FY 25 (aMW)	FY 26 to FY 27 (aMW)	Total Forecasted Energy Savings (aMW)
Residential	14.3	17.5	20.4	52.3
Commercial	26.0	39.6	34.3	99.9
Industrial	24.0	29.4	26.4	79.7
Agricultural	2.4	2.8	2.7	7.9
Federal	5.0	5.5	5.8	16.4
Utility Distribution	0.4	0.6	0.6	1.6
Unallocated Savings	18.5	0.5	0.0	19.0
Market Transformation	9.3	15.7	21.4	46.4
Total Forecasted Energy Savings	**99.9**	**111.7**	**111.6**	**323.2**

Note: Unallocated savings are part of program savings and are the direct result of the anticipated spending of the portion of BPA's budget that no sector forecast identified. See the *Program Energy Savings* section above for further discussion. The table does not include BPA Momentum Savings because these savings are not broken out by fiscal year or rate period. Due to rounding, numbers may not add to the total.
Source: BPA analysis, 2022

Throughout the Action Plan period, BPA will monitor its performance against the goal and adaptively manage its portfolio to address changing conditions. Corrective actions could include:

- **Shifting portfolio offerings** – BPA may refine its Energy Efficiency Program offerings and redirect program investments to pursue savings from lagging measures. This could include adding new measures to the portfolio and refocusing programmatic infrastructure to pursue high volume and high savings measures. The first phase of this work is already underway as BPA prepares for the FY 2024-2025 rate period, but BPA may take additional steps should current actions prove insufficient to meet the Action Plan goal.
- **Offering special promotions** – BPA may increase incentives for targeted measures and offer contractor sales incentives for midstream offerings like Residential Comfort Ready Homes or the Commercial Trade Ally Network NW. Additionally, BPA may use programs like the direct funding demonstration pilot to enable conservation, which would not be possible with existing incentive budgets.
- **Making updates to Integrated Program Review budget** – In 2024 BPA will begin the budget setting process for the FY 2026-2027 rate period through the Integrated Program Review

process. The agency will consider progress toward achieving its energy savings goals as it establishes budgets for the last rate period of the Action Plan.

Market Transformation

NEEA comprises more than 140 Northwest utilities and energy efficiency organizations working to accelerate the innovation and adoption of energy-efficient products, services and practices in the Northwest. Since 1997, BPA and NEEA have partnered to deliver energy savings through market transformation and to achieve as much cost-effective energy efficiency as possible. NEEA supports BPA customers by pooling regional resources to identify and validate emerging technologies, find and remove barriers to energy efficiency, and deliver tools and resources to encourage customers to adopt more energy-efficient technology. One example of NEEA's complementarity to BPA's energy efficiency efforts is the ENERGY STAR® Retail Products Platform program. This platform works directly with national retailers to provide midstream incentives on qualified energy-efficient products that are not suited for BPA's portfolio (for example, when the incentive BPA is able to offer does not cover enough of the product cost to influence purchasing behavior).

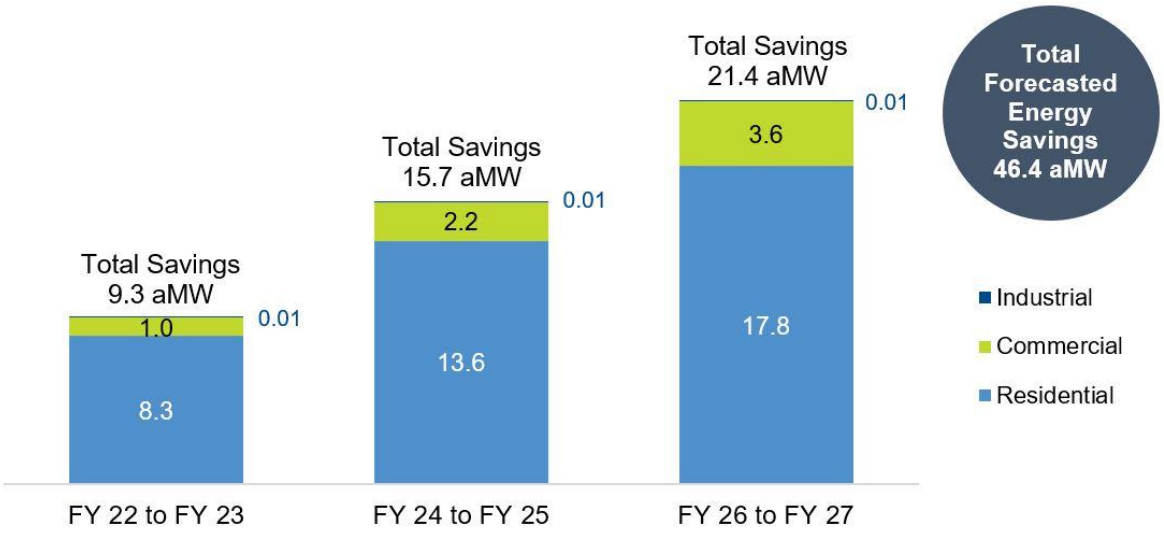
Over this Action Plan period, NEEA predicts it will achieve 42 aMW to 62 aMW of market transformation savings for BPA and its utility customers. In forecasts for this Action Plan, BPA used 46.4 aMW, which reflects NEEA's best estimate within this range. NEEA's range is less than its contribution during the 2016-2021 Action Plan due to the reset of its baseline in the 2021 Power Plan.

NEEA does not provide savings forecasts for initiatives that have yet to reach the market development phase.[25] As NEEA moves new initiatives into market development, it updates its savings forecast accordingly. NEEA is currently in the process of business planning for its 2025-2029 funding cycle. Depending on funding levels and strategic direction, the next cycle could include up to six additional initiatives. In the Action Plan update, BPA will provide any new information on NEEA savings forecasts.

Figure 2 shows the market transformation savings forecast by sector and rate period for 2022-2027. NEEA does not expect market transformation savings in the Agricultural sector.

[25] During the market development phase of the market transformation process, NEEA develops comprehensive strategies to overcome identified market barriers through opportunities and leverage points. NEEA also prepares an implementation plan that identifies specific market interventions and appropriate market actors to implement these activities. NEEA ramps up its initiatives in the market development phase and is able to report energy savings at that point.

Figure 2. NEEA Market Transformation Savings Forecast by Sector and Rate Period



Note: Due to rounding, numbers may not add to the total.
Source: NEEA forecast, 2022

In addition to delivering market transformation savings, NEEA also conducts regional large-scale data collection projects that provide essential market intelligence to inform energy efficiency investments. NEEA's regional residential and commercial building stock assessments are periodic snapshots of the region's building characteristics, installed equipment and energy consumption. These critical inputs to load forecasting and energy efficiency potential assessments underpin the Power Plan and Resource Program. End-use load research also helps BPA and the region better understand energy loads and identify opportunities for and potential roadblocks to electrification.

NEEA also collects full-category sales data in several key markets such as HVAC and nonresidential lighting that help BPA keep pace with market changes and standard practice. NEEA's multiyear end-use load research project builds on these stock and sales data to better characterize the timing of energy use and savings, enabling BPA to prioritize conservation opportunities that provide the greatest value to the power system. NEEA also works with BPA on researching emerging technologies that provide a pipeline of future energy efficiency measures for programs to adopt.

BPA will collaborate with regional partners to identify pathways to increase the adoption of cost-effective energy efficiency measures. This includes ongoing support of NEEA's market transformation efforts to increase adoption of measures that do not lend themselves well to the agency's portfolio. The 2021 Power Plan also recognizes the value NEEA provides in its recommendations for the region. NEEA's work in market transformation, market research, stock assessments, emerging technology, and codes

and standards delivers tremendous value and the agency will continue its partnership with NEEA to ensure the delivery of complimentary market transformation savings.

Momentum Savings

Momentum Savings occur when an end user chooses an efficient equipment option without receiving a financial incentive directly from a utility.[26] Many factors may drive these choices, including the "momentum" generated by past efficiency programs, corporate sustainability policies and technology trends. Other utilities and program administrators characterize these savings as spillover or non-program savings. BPA defines Momentum Savings as energy savings that are:

- Above the Council's Power Plan baseline
- Cost-effective
- Not incented by utilities
- Outside of NEEA's reported energy savings

Momentum Savings are an integral piece of BPA's overall savings portfolio. They are embedded in the achievable energy savings potential used to develop the Council target and BPA Resource Program needs; they also help ensure cost-effective resource acquisition. BPA's research identifies energy savings occurring in the market that utilities do not need to purchase. Quantifying the total efficiency produced in a market helps BPA and the region account for cost-effective savings not acquired directly by program savings or NEEA.

BPA strategically chooses to quantify Momentum Savings for specific markets and focuses its market analysis efforts on tracking the total energy consumption of high-priority markets over time. BPA does not research and quantify Momentum Savings for every market and uses a screening process to determine which markets to analyze using these three overarching considerations:

- Resource potential assessment
- Research value assessment
- Modeling feasibility assessment[27]

[26] BPA formerly called Momentum Savings non-programmatic savings. The agency changed the name in 2014 but the definition remains the same.

[27] For more information about how BPA selects the markets for which it measures and models Momentum Savings, see the section "Principles of Our Work" in the *Momentum Savings & Market Research Purpose & Principles* publication beginning on Page 5: www.bpa.gov/-/media/Aep/energy-efficiency/momentum-savings/bpa-momentum-savings-market-research-purpose-and-principles.pdf

Further discussion of the markets BPA research is in the *Market Research* section below.[28]

Forecast

During the previous Action Plan period of 2016-2021, BPA quantified 68.8 aMW of Momentum Savings from nonresidential lighting, residential HVAC systems and nonresidential adjustable speed drives markets. For the 2022-2027 Action Plan period, BPA added commercial HVAC.

BPA forecasts 30.0 aMW of Momentum Savings across the four core markets, as shown in Table 3. The agency plans to investigate the feasibility of expanding the existing Momentum Savings models to cover nonresidential controls for lighting and HVAC as well as other sectors, applications and equipment types for adjustable speed drives on motor-driven systems.

Table 3. Momentum Savings Forecast

Momentum Savings Market	BPA Momentum Savings Forecast 2022-2027
Nonresidential lighting	**30.0 aMW**
Residential HVAC	
Nonresidential adjustable speed drives	
Commercial HVAC	

These are a few reasons for reducing the forecasted amount of Momentum Savings:

- The 2021 Power Plan recommends that BPA reduce the ratio of non-program savings in its total savings.[29]
- Forecasting Momentum Savings more conservatively mitigates the risk of underperformance in the core markets of study during the Action Plan period. This is something BPA has no direct control over and is a source of uncertainty, as discussed in the section below.
- Momentum Savings efforts show similar trends as the rest of the energy efficiency market; that is, the most easily available potential for savings is dwindling. As the region acquires more energy efficiency, it becomes more challenging to achieve the same magnitude of Momentum Savings as in past years.

[28] For more information about the Momentum Savings methodology, visit the BPA Momentum Savings and Market Research webpage: www.bpa.gov/energy-and-services/efficiency/market-research-and-momentum-savings

[29] The Council recommends that BPA acquire at least 243 aMW of energy efficiency from programmatic savings (savings funded by BPA's Energy Efficiency Incentive or utility self-funding contributions and NEEA market transformation savings).

Despite the more conservative forecast, Momentum Savings helps BPA cost-effectively meet its resource obligations, and the research informs program strategies. See *9.4 Momentum Savings* for more discussion of the considerations that informed the Momentum Savings forecast.

Managing Uncertainty

There is inherent uncertainty in forecasting Momentum Savings because such savings represent activity outside of programs. Many factors that affect Momentum Savings are beyond BPA's control and include global economics and supply chains, federal codes and standards, and market data availability.

In forecasting savings for this Action Plan, BPA carefully considered how to balance these uncertainties with finite resources. During the 2024 Integrated Program Review (IPR) process that sets budgets for 2026-2027, BPA will have an opportunity to adapt EEI resources in light of savings progress. In the meantime, BPA is implementing the following risk mitigation strategies to balance Momentum Savings and program savings:

- **Avoid overreliance on Momentum Savings to meet overall goals** – BPA is avoiding reliance on any type of savings category that has a high level of uncertainty. The agency has decreased the proportion of Momentum Savings contributing to the total forecast.
- **Develop interim Momentum Savings in 2024** – BPA will start building its Momentum Savings market models in early 2023 so that it has an updated six-year forecast by early 2024 before the IPR process sets 2026-2027 budgets. This gives BPA the opportunity to adjust its program savings budgets should a gap between savings and initial forecasts emerge due to a lower-than-expected Momentum Savings trajectory.
- **Plan for different possible outcomes early to allow time to change course in portfolio offerings** – BPA will evaluate needed risk mitigation actions if energy savings lag expected performance to meet the 2021 Power Plan goals or achieve 2022 Resource Program selections.

2.2 Energy Efficiency Budget and Costs

Budget

BPA establishes its budget based on forecasted energy efficiency costs and makes these costs available through the Integrated Program Review (IPR), a public process that occurs every two years when BPA sets rates to recover its costs. BPA's IPR budgets are set through 2025, and the Action Plan does not include anticipated budget outcomes of the future IPR 2026 and 2027 process.

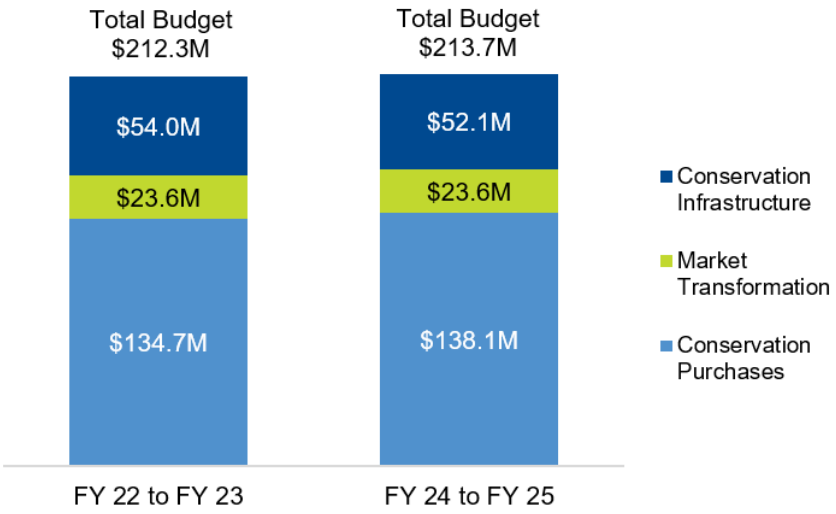
The IPR budget presented in this Action Plan represents four years of BPA's Energy Efficiency Program cost, from fiscal years 2022-2025, by the categories shown in Table 4.

Table 4. Energy Efficiency Program Budget Categories

Budget Category	Description
Conservation purchases (EEI-funded)	These are BPA program savings reimbursements and EEI funds for customer utilities, including performance payments and Energy Smart Reserved Power. This spending category is the primary focus of the Action Plan. BPA estimates that EEI funds will support 70% of program savings.
Conservation purchases (customer self-funded)	BPA estimates utilities self-fund approximately 30% of program savings, consistent with historical ratios of EEI-funded to self-funded savings.
Market transformation	This includes support for NEEA's market transformation initiatives designed to create lasting changes in market behavior. NEEA works to remove barriers to market adoption of energy efficiency and capitalizes on opportunities to accelerate adoption of cost-effective energy efficiency as a matter of standard practice. While this Action Plan does not cover BPA's market transformation budget in detail, BPA is maintaining its funding for NEEA's regional market transformation work, a recommendation from the 2021 Power Plan.
Conservation infrastructure	This includes support for programs and operations, including staff costs, third-party program implementation and contract support, market research, evaluation and emerging technologies. Conservation infrastructure costs are not included in program cost calculations in this document. BPA manages budgets for these costs separately from conservation incentives forecasts, although these costs do affect the ability of programs to deliver forecasted savings.

Figure 3 shows the total budget for each source for the FY 2022-2023 and FY 2024-2025 rate periods. For the FY 2022-2025 period, the total budget across conservation infrastructure, market transformation and energy efficiency incentive-funded savings is $426.1 million.

Figure 3. BPA Budget by Source and Rate Period



Note: Due to rounding, numbers may not add to the total.
Source: BPA Integrated Program Review, 2022

Cost Estimates

BPA evaluated historical and forecasted reimbursement levels to assess program delivery and administrative costs, including performance payments, program implementation, research, evaluation and contract support, and their ability to support programs and reimbursement levels when developing forecasts.[30]

Program costs estimates considered market conditions, historical program uptake, anticipated new opportunities and technological or other constraints, and compared these estimates to 2022-2025 IPR spending levels.

Table 5 shows the breakdown of these costs by sector and by rate period. Figure 4 shows average costs of acquisition of energy efficiency savings. Conservation infrastructure costs are not included in the program cost calculations. These show BPA's estimated cost for conservation purchases, or EEI-funded programs, only and exclude costs related to market transformation or conservation infrastructure. The total estimated cost to BPA is $265.9 million for Energy Efficiency Program activities, in terms of conservation purchases, from 2022 through 2025.

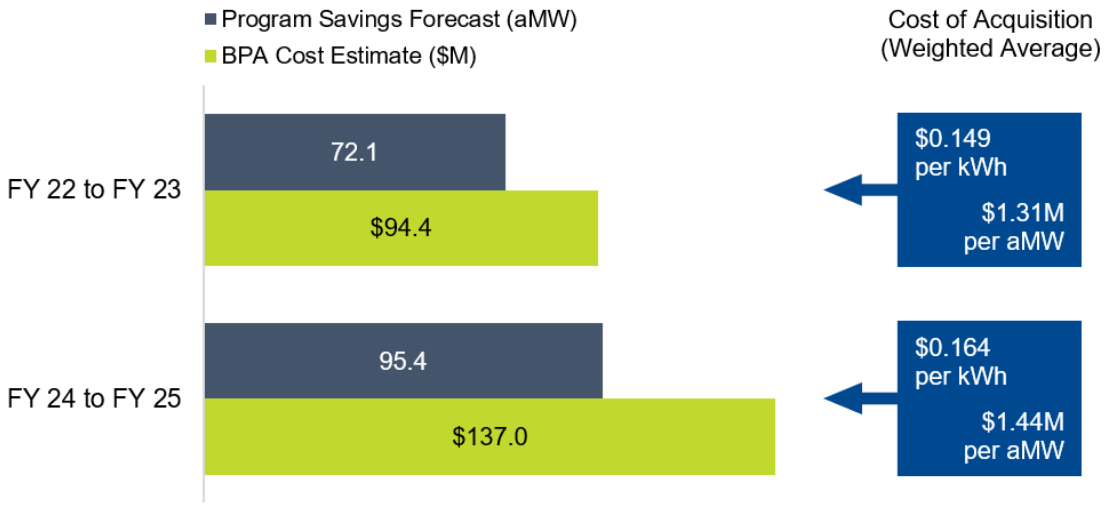
[30] Staff costs are separate and not included in this Action Plan.

Table 5. BPA Program Cost Estimates by Sector and Rate Period

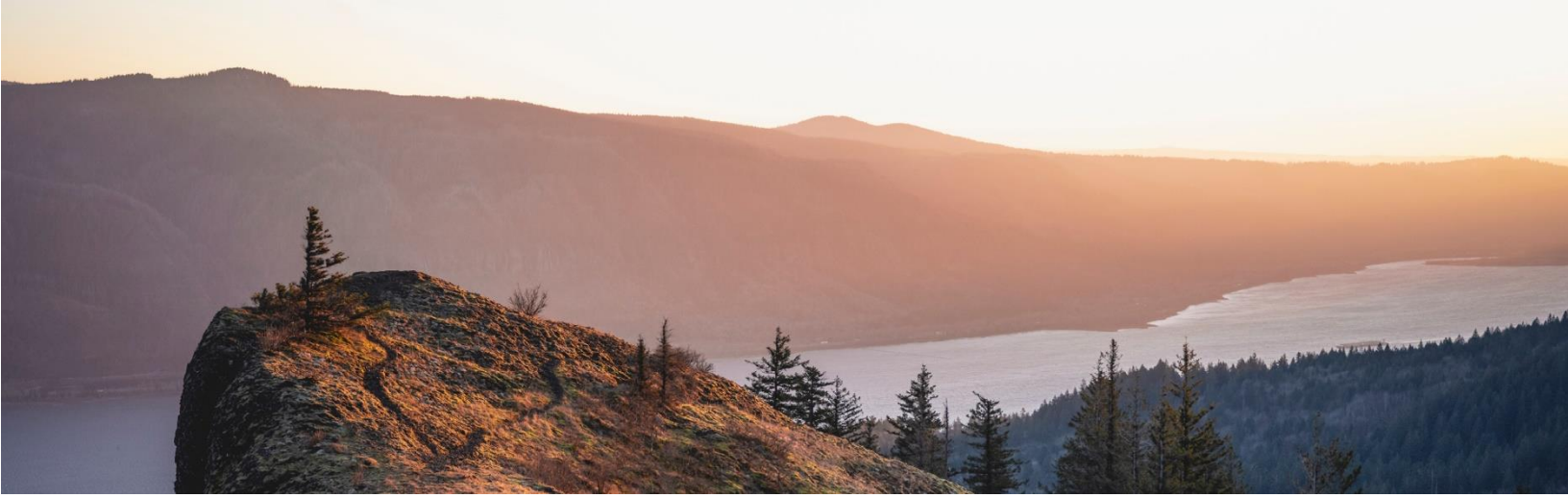
Sector	FY 22 to FY 23 ($ Millions)	FY 24 to FY 25 ($ Millions)
Residential	$31.8M	$39.7M
Commercial	$28.8M	$50.1M
Industrial	$25.1M	$35.0M
Agricultural	$4.2M	$5.2M
Federal	$3.8M	$6.0M
Utility Distribution	$0.8M	$1.1M
Unallocated Savings	$34.5M	$0.0M
Total Cost	**$128.9M**	**$137.0M**

Note: This table shows the predicted cost of the forecasted savings for the 2022-2025 Energy Efficiency Program, inclusive of rollovers between rate periods. Unallocated savings are part of program savings and are the direct result of the anticipated spending of the portion of BPA's budget that no sector forecast identified. See the *Program Energy Savings* section above for further discussion. Costs presented fall under the conservation purchases category (EEI-savings) and do not include conservation infrastructure or market transformation costs. Numbers may not add to the total due to rounding.
Source: BPA analysis, 2022

Figure 4. BPA Program Energy Savings and Cost Metrics by Rate Period



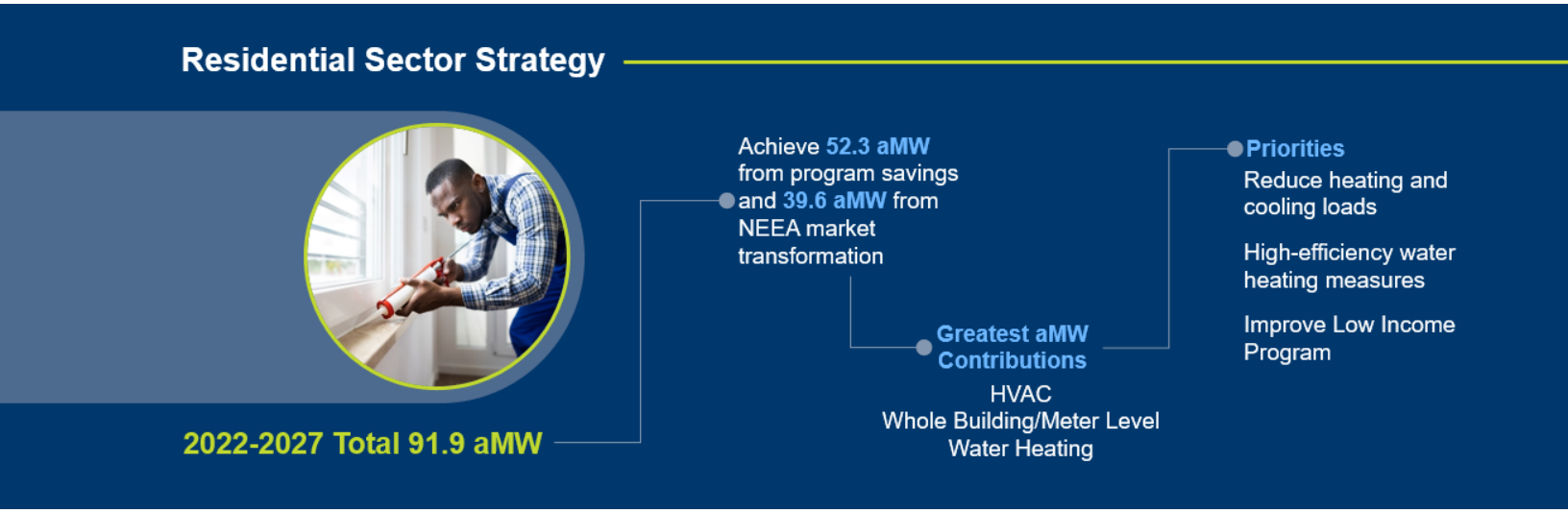
Note: Savings forecast includes BPA EEI-funded and customer self-funded savings, but no unallocated savings. Cost estimates include only BPA EEI-funded costs, but no unallocated costs. Numbers may not add to the total due to rounding. The cost metrics shown here and subsequently in the Action Plan are based on first-year savings and do not reflect the life of energy efficiency measures.
Source: BPA analysis, 2022



3 Sector Strategies

This section presents BPA's sector-level strategies to capture market potential, meet customer needs and achieve energy savings during the Action Plan period of 2022-2027. Each strategy provides an overview of the sector landscape, discusses the strategic opportunities existing in the market and describes BPA's approach to meeting the energy savings forecast. Savings estimates, budgets and metrics to gauge performance over the Action Plan period are also included.

3.1 Residential Sector Strategy



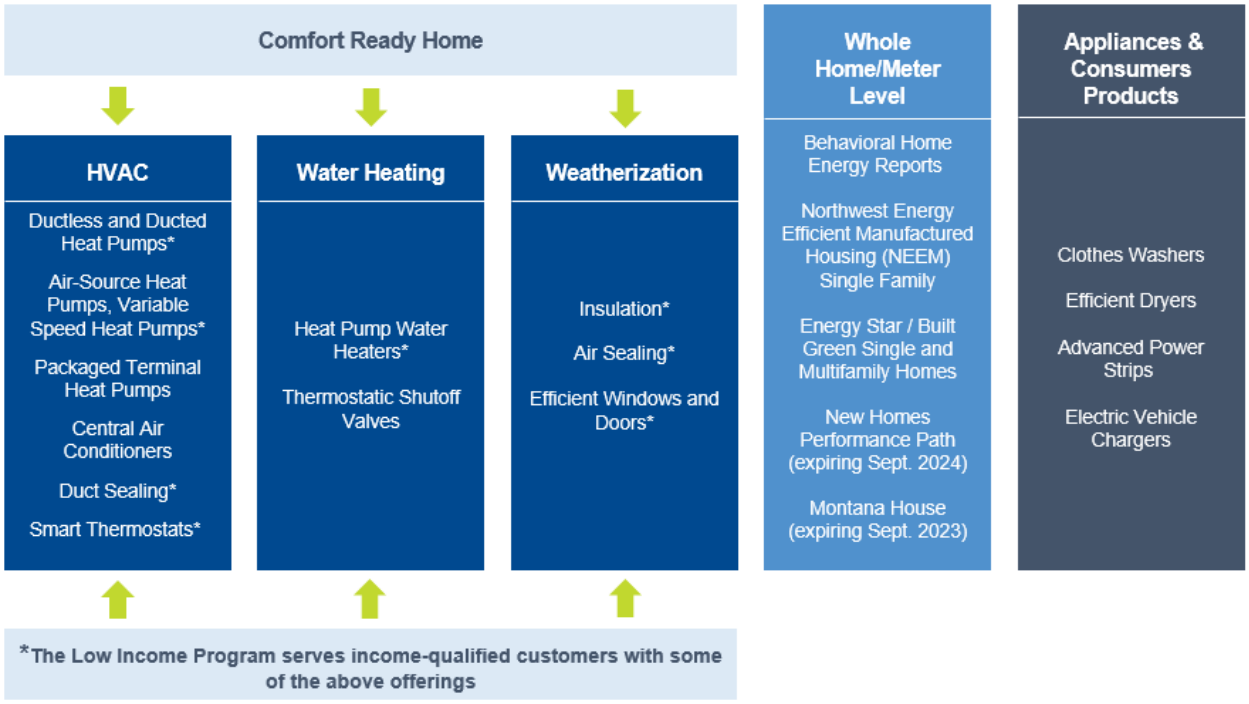
This section presents the strategies BPA's Residential sector programs will employ over the Action Plan period to meet the savings forecast of 52.3 aMW.

Residential Sector Overview

The Residential sector has the largest utility participation for achieving energy efficiency. BPA's hard-to-reach small, rural and residential utilities especially rely on Residential sector offerings. Key measure groups include HVAC systems, weatherization, water heating, appliances and whole-home/meter-level improvements. BPA also encourages energy efficiency in underserved communities through its low income state and tribal program offerings.

Figure 5 shows the major components of the Residential sector.

Figure 5. Residential Sector Structure



Current Residential Landscape Assessment

BPA supports Residential sector HVAC projects through two major mechanisms: the Performance Tested Comfort Systems (PTCS) Program and non-PTCS stand-alone measures.[31] The comprehensive suite of offerings includes upgrades and conversions to ductless heat pumps (DHPs); ducted air-source heat pumps (ASHPs) and variable speed heat pumps (VSHPs); commissioning, controls and sizing (CC&S); and central air conditioning. BPA has achieved over 19 aMW of energy savings with this suite of offerings since 2018.

Demand for HVAC technologies continues to grow due to improved technologies, advancing codes and public sentiment around decarbonization and climate change. BPA views these as opportunities to adapt and evolve its HVAC offerings to continue to support customers and provide the region with substantial energy savings. In addition, the 2021 Power Plan's Model Conservation Standards encourage that if local jurisdictions do promote fuel switching they ensure newly installed equipment is energy efficient.

[31] Performance Tested Comfort Systems (PTCS) is a regional program for Northwest utilities to improve HVAC-system comfort and increase energy savings. The program promotes quality installations of high-efficiency heat pumps and the proper sealing of ducts. PTCS specifications help ensure heat pumps and duct sealing result in a more comfortable home and more reliable energy savings. The PTCS program also includes classroom, field and webinar training; third-party quality assurance inspections; and support for PTCS-certified contractor technicians.

Home weatherization measures are important complements to HVAC as they improve the effectiveness of all HVAC measures. Insulation, air sealing, and high-efficiency windows and doors help lock in the conditioned air produced by higher-efficiency HVAC systems and can contribute to resiliency and grid flexibility, two values recognized in the guiding principles for this Action Plan and the 2021 Power Plan. Weatherization improvements also contribute to the social and economic equity of the region, as income-qualified populations are more likely to live in poorly weatherized, and therefore more uncomfortable, unsafe and less resilient homes while paying more in energy bills. The 2021 Power Plan calls on BPA and the region to continue investments in weatherization, despite its limited cost-effectiveness in the 2021 Power Plan, targeting the homes that need it most. BPA supports weatherization efforts through the Comfort Ready Home Program.[32]

Water heating is expected to make up approximately 34 percent of the total cost-effective savings potential in the residential sector across the 2021 Power Plan's 2022-2027 period. Heat pump water heaters (HPWHs) are a technology with significant and growing potential for energy savings. Like HVAC technologies, energy-efficient water heaters will be an important tool in jurisdictions with decarbonization policy goals. BPA encourages the use of HPWHs, especially through the Comfort Ready Home Program.

To advance Residential sector goals and serve the widest range of potential participants, the residential sector consists of several key components, as shown in Table 6.

[32] The Comfort Ready Home Program invests in preparing the region's contractors with the tools and skills they need to install residential measures. Turnover in the weatherization contractor community is higher compared to plumbers and HVAC contractors, making access to weatherization training essential to increase the number of contractors and help them maintain their skills. The momentum created by these investments draws in additional contractors and helps utilities and residents leverage both BPA energy efficiency incentives and federal funding to cover the increasing cost of weatherization projects.

Table 6. Existing Efforts in the Residential Sector

Technology Category	Existing Efforts
HVAC	Delivered through the PTCS Program and stand-alone, non-PTCS measures.
Whole-home / meter level	Delivered through the Behavioral Home Energy Reports Program, Northwest Energy Efficient Manufactured Housing Program, Montana House, New Homes Performance Path and ENERGY STAR/Built Green single- and multifamily homes.
Weatherization	Delivered through stand-alone measures for insulation, air sealing and energy-efficient windows and doors with the support of the Comfort Ready Home Program.
Appliances and electronics	Delivered through product rebates and Home Energy Saver Kits.
Water heating	Delivered though product rebates and pipe insulation measures and assisted by the Comfort Ready Home Program.

Strategic Opportunities and Approach

This section explains BPA's approach to meeting Residential sector goals, new and planned efforts contributing to savings forecasts, challenges, opportunities, savings and costs.

New and Existing Efforts

This Action Plan includes the following new and planned efforts for the Residential sector:

- **Align measure offerings with Resource Program selections** – BPA is focusing infrastructure and program support on measures that reduce residential heating and cooling loads and on high-efficiency water heating measures. As an example, BPA will support demonstration projects, develop a new standard protocol for large-volume HPWHs for multifamily buildings and increase its focus on single-family HPWHs. Specifically, BPA is targeting Tier 3 and Tier 4 HPWHs, expecting growth in these higher efficiency levels and improvement to cost-effectiveness for the measure. The agency will also increase incentives for HPWHs and investments in training contractors to install HPWHs. These efforts, combined with the work of the Northwest Energy Efficiency Alliance (NEEA) to raise market awareness and enlarge regional stocks of HPWHs, seek to bolster their adoption.
- **Re-shape the HVAC offering** – Though the PTCS Program has been successful for over 20 years, challenges with cost-effectiveness and deactivation of several measures by the Regional Technical Forum has required BPA to shift its efforts and resources to non-PTCS measures. To adjust for the loss of PTCS measures, BPA is reconfiguring its HVAC offering to add more state-of-the-art technologies, such as cold climate heat pumps; leverage new industry developments,

such as tools to improve equipment sizing; and offer higher incentives for non-PTCS measures to address rising costs. BPA is also evaluating the efficacy of adding advanced controls to increase energy savings. The reconfigurations of the HVAC offering align with NEEA's Variable Speed Heat Pump Program, which drives the market transition to heat pumps and optimizes heat pump performance. BPA's portfolio does include some HVAC measures such as ductless and air source heat pumps, which are not cost-effective but support small, rural and residential customers and the achievement of regional decarbonization and electrification goals.

- **Expand into new measure categories and pursue low-cost delivery models** – BPA plans to update and expand its Behavioral Home Energy Report measure to provide a low-cost savings opportunity for utilities. The current measure provides a value for deemed unit energy savings per household that receives the quarterly report, based on weighted average kilowatt-hour (kWh) savings from regional evaluations. The agency plans to evaluate the performance of the measure and share its findings. BPA will also expand the Behavioral Home Energy Report measure to allow an electronic report option, which the agency expects to be less expensive than the current version in which end users receive physical mailed reports. The Behavioral Home Energy Report measure is currently not cost-effective, but BPA believes that with the addition of optional electronic reports, further analysis and review of measure assumptions this measure will become cost-effective during the Action Plan period.
- **Stay abreast of impacts from new federal funding streams** – The Comfort Ready Home Program will continue to support HVAC, weatherization and water-heating measures with greater focus on ongoing and anticipated challenges. BPA expects demand to increase due to advancements in residential code as well as tax credits and other funding for energy efficiency projects starting in 2023. The program will provide training support to address current shortages in qualified professionals and emergency and planned replacements of water heaters with more efficient HPWH technologies.
- **Continue working to increase participation in the residential Low Income utility energy efficiency incentive and grant programs** – BPA will continue investment in the Low Income program even when it is not cost-effective to do so. This aligns with the 2021 Power Plan's goal of investing in weatherization programs and improving home safety and livability. BPA will explore program improvement opportunities, including removing application registration barriers simplifying implementation, expanding outreach and increasing program uptake. BPA's enhancements to the Low Income program will enable increased uptake of various technologies, such as insulation and efficient windows, which increase end-user resilience during outages and extreme weather events. The agency will also encourage utilities to take advantage of additional federal funding opportunities that may become available in upcoming years.

Challenges and Opportunities

The Residential sector is considering several challenges and opportunities over the 2022-2027 period, as shown in Table 7.

Table 7. Challenges and Opportunities in the Residential Sector

Challenge or Opportunity	How BPA Will Address
Codes and standards change and erode savings potential, making it harder to achieve goal	BPA coordinates with ENERGY STAR and the Consortium for Energy Efficiency to stay informed of nationwide code and market changes and to develop higher standards to achieve energy savings.
Supply chain issues in HVAC market	BPA can do little to address industry slowdown due to supply chain issues in the short term. Longer term, BPA could work with industry partners to develop plans, such as suspending some program requirements, to enable uptake of less popular models.
High demand for technologies	Order backlogs and longer lead times are issues for HVAC technologies. Additional pressure on demand comes from advancing codes and federal tax credits. Warmer climates are driving more homeowners to add cooling, which adds further stress on market channels. Similar to supply chain issues, BPA could respond by suspending certain program requirements to alleviate backlogs.
Barriers to participation in the Low Income program	There are market barriers to the advancement of Low Income participation, including weatherization; the biggest is limitations in the workforce needed to implement measures. BPA will conduct a process evaluation of the Low Income program to identify opportunities for improvement. This includes reviewing existing research on low income programs, conducting interviews with utilities and Community Action Agencies, performing a demographic analysis, and identifying ways to support utilities with limited EEI budgets. BPA is also expanding Low Income program measures (including in the multifamily category), increasing EEI payment cost caps, increasing funding for high performance heat pump installations, allowing self-attestation of applicants' incomes, supporting workforce development, meeting with tribal staff regularly, and developing additional materials to help utilities understand the Low Income program, among other activities.
Measures not a good fit for BPA's portfolio	Measures such as clothes washers or residential lighting fixtures, though selected by the Power Plan, are not successful in BPA's portfolio. This can occur when the incentive BPA can offer does not cover a sufficient portion of the total product cost to influence purchasing behavior, more program infrastructure is required to achieve large volumes of savings, or the product lends itself better to a midstream rather than direct-to-consumer model. BPA relies on NEEA's market transformation initiatives, such as the ENERGY STAR® Retail Products Platform program, to more effectively achieve these savings.

Energy Savings and Costs

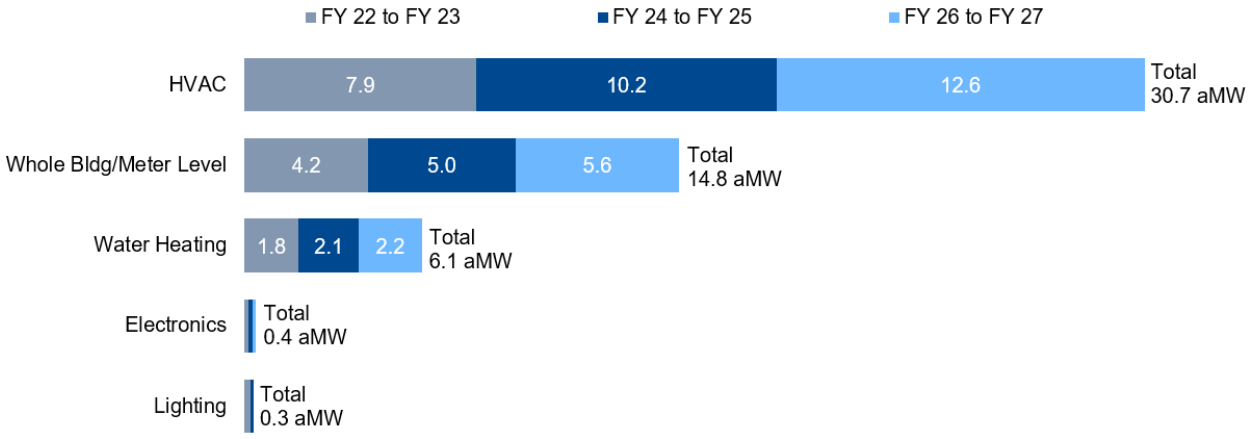
Figure 6 shows Residential sector program savings by source. From FY 2022-2027, BPA plans to achieve 52.3 aMW in savings from its residential programs, with another 39.6 aMW coming from NEEA's market transformation efforts.

Figure 6. Residential Program and NEEA Energy Savings Forecasts by Source

Residential Energy Savings Estimates

Figure 7 shows Residential sector program savings by end use and rate period for FY 2022-2027. The greatest total contribution of 30.7 aMW comes from the HVAC end use, which includes both equipment and weatherization measures, followed by whole-building/meter level, water heating, electronics and lighting.

Figure 7. Residential Program Energy Savings Forecast by End Use and Rate Period



Note: Savings include EEI-funded and customer self-funded.
Does not include NEEA, Momentum, or unallocated savings.

Residential Costs

Figure 8 shows Residential sector costs for FY 2022-2025 by end use and rate period. Total costs for the Residential sector are $31.8 million for FY 2022-2023 and $39.7 million for FY 2024-2025. The total for FY 2022-2025 is $71.4 million. Note, weatherization is included in the HVAC end use.

Figure 8. Residential BPA Cost Estimate by End Use and Rate Period

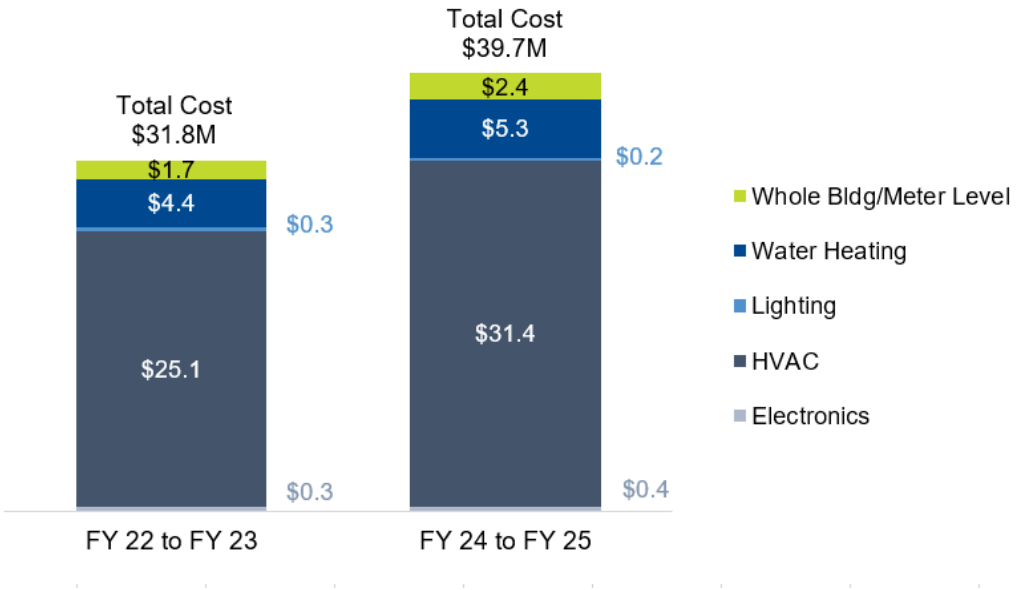
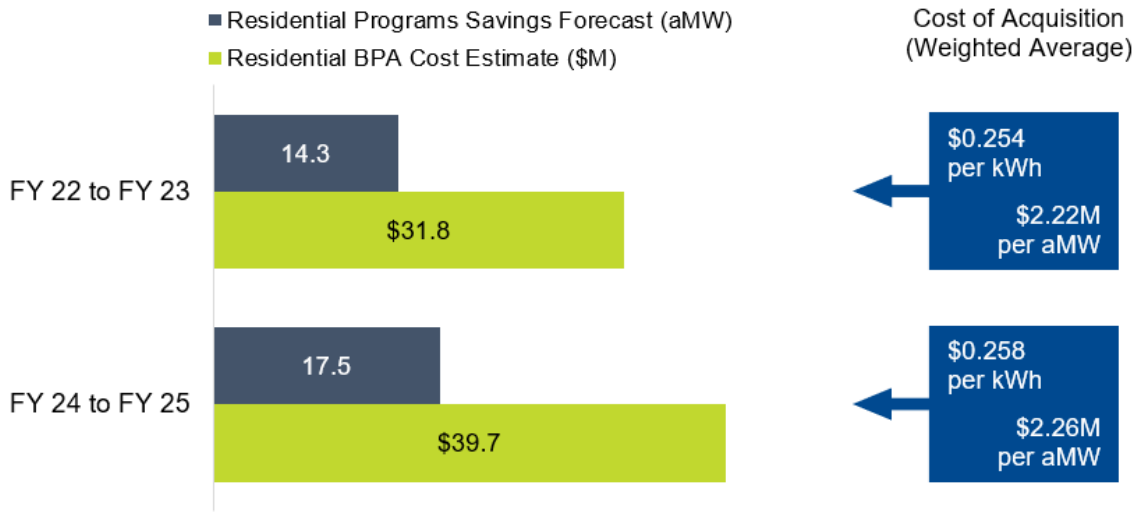


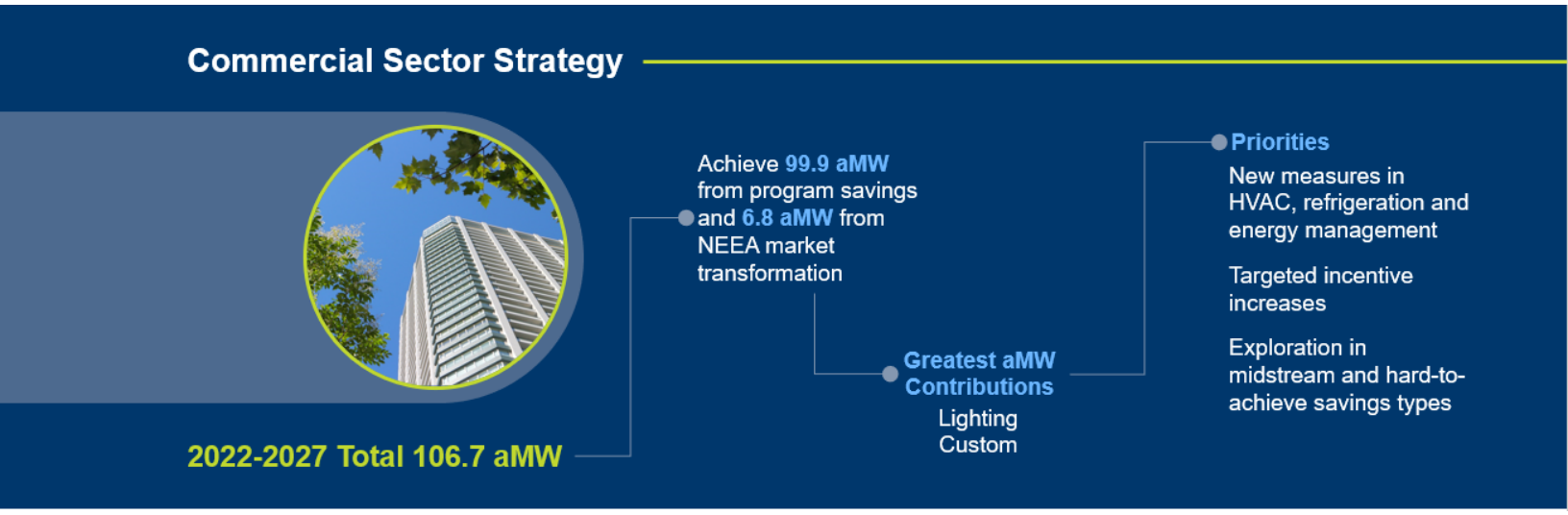
Figure 9 shows total program savings and total EEI-funded cost estimates as well as the average cost of acquisition for kWh and aMW.

Figure 9. Residential Program Energy Savings and Cost Metrics by Rate Period



Note: Savings forecast includes BPA EEI-funded and customer self-funded savings. Cost estimates include only BPA EEI-funded costs.

3.2 Commercial Sector Strategy



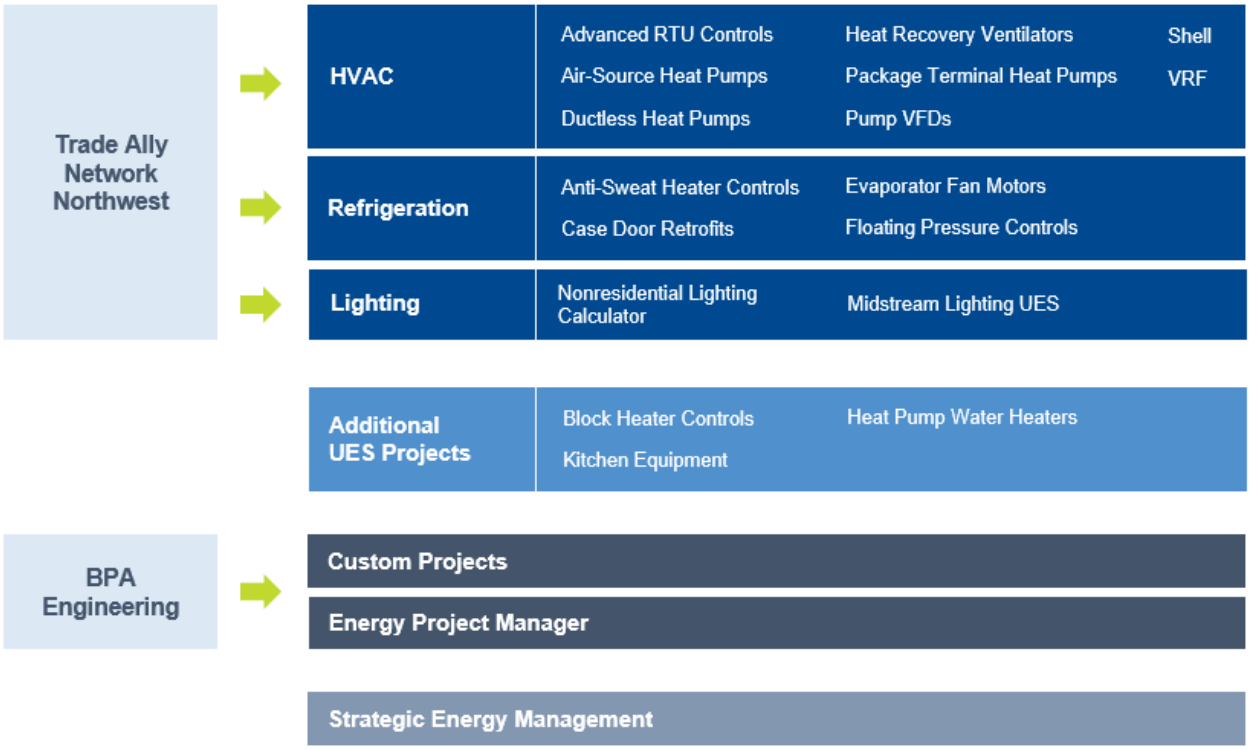
This section presents the Commercial sector program strategies BPA will employ over the Action Plan period to meet the agency's savings forecast of 99.9 aMW.

Commercial Sector Overview

The Commercial sector offers a range of programs and measure opportunities to help BPA customer utilities serve their commercial end-use customers and meet their conservation goals. From FY 2016-2021, offerings included calculated lighting projects, custom projects and unit energy savings (UES) measures.

Figure 10 shows the major components of the Commercial sector.

Figure 10. Commercial Sector Structure



Current Landscape Assessment

BPA supports calculated lighting projects and HVAC unit energy savings (UES) measures through the Trade Ally Network Northwest Program. Offerings include training, marketing and technical support for the trade ally community and utility staff. Regionally distributed field specialists primarily implement the program. A team of field engineers offers additional technical depth and outreach that target HVAC equipment distributors.

The Commercial sector has made significant progress in supporting the region's transition to LED lighting. A recent market analysis conducted by BPA's Momentum Savings Research team concluded that, as of 2021, roughly 50 percent of the nonresidential lighting stock used an LED light source. BPA anticipates that lighting retrofits and new construction projects exceeding code requirements will continue to be a primary contributor to the Commercial sector's savings achievements. However, lighting controls, especially networked and luminaire-level controls, appear in only a small fraction of the projects reported to BPA and represent a largely untapped opportunity in this sector. The main tool for calculating and reporting commercial lighting savings is the Microsoft Excel-based BPA Nonresidential Lighting Calculator. Though the tool has been widely adopted, regional stakeholders have expressed concerns regarding its ease of use and potential IT security risks.

Because of their considerable program focus, utility customers have increasingly adopted UES measures targeting HVAC end users in the last four years. However, annual savings for these measures are still below BPA's previous forecasts and 2021 Power Plan targets. During this period, BPA has made only minor adjustments to its portfolio of HVAC measures, which includes equipment upgrades and equipment and control retrofits.

Custom projects offer a unique path for projects that do not fit within BPA's lighting calculator or UES framework. BPA's customer service engineers support a considerable range of scope and size for custom projects. A 2021 internal BPA analysis of commercial custom projects showed that, over a five-year period, projects saving over 200,000 kWh/year contributed over 60 percent of the total commercial custom project savings while representing less than 15 percent of total projects.

Existing Efforts

To advance the Commercial sector program goals and serve the widest range of potential participants, this sector consists of several key components, as shown in Table 8.

Table 8. Existing Efforts in the Commercial Sector

Delivery Channel	Existing Efforts
Prescriptive UES measures	Targeted HVAC UES measures are supported through Trade Ally Network Northwest outreach and training. Non-HVAC UES measures are largely supported by BPA customer service engineers and individual utility efforts.
Lighting	Delivered primarily through the BPA Nonresidential Lighting Calculator and supported via the Trade Ally Network Northwest.
Custom projects	Supported by BPA customer service engineers or utility engineering staff.
Strategic Energy Management	BPA supported several commercial Strategic Energy Management (SEM) pilots in 2020 and 2021 and launched a new measure in 2022.
Support and coordination through NEEA	BPA's coordination with NEEA supports luminaire-level lighting controls, dedicated outdoor air systems, heat recovery ventilation and secondary glazing systems.

Strategic Opportunities and Approach

This section describes BPA's approach to meeting Commercial sector goals and identifies the new and planned efforts contributing to savings forecasts.

New and Existing Efforts

This Action Plan includes the following new and planned efforts for the Commercial sector:

- **New measures** – BPA will add several measures to the energy efficiency portfolio.
  - New measures include several recently adopted by the Regional Technical Forum such as secondary glazing systems, refrigerator door retrofits, floating controls for multiplex refrigeration systems and efficient pumps. BPA has also developed a UES measure for efficient heat recovery ventilators (HRVs) which the agency will add during the next release of the implementation manual. The efficient pump and HRV measures align with NEEA market transformation activity, which greatly increases the likelihood of rapid uptake.

    After the completion of two successful pilots in 2020 and 2021, BPA has added a Strategic Energy Management (SEM) measure in the Commercial sector. Several utilities have already developed their own programs to deliver this measure, with BPA focusing on developing a consistent approach to reporting and evaluation. In 2024, BPA will increase its reimbursement rates for SEM in response to a 2022 evaluation finding that supports a longer measure life. BPA intends for this higher incentive to help offset the significant utility investments involved in delivering an SEM program. SEM programs targeting buildings in the Commercial sector may begin to utilize energy use intensity (EUI) data to identify and target buildings that have consumption levels significantly higher than other comparable buildings, as recommended in the 2021 Power Plan. Of particular interest are jurisdictions, such as the State of Washington, which have implemented building performance standards that put pressure on owners of high EUI buildings to reduce their EUI. Behavioral and operational savings such as those identified in SEM are often the lowest cost steps before considering capital upgrades.
  - BPA has added the Energy Project Manager measure to the Commercial sector offering. BPA expects Energy Project Manager to both support and benefit from the State of Washington's Clean Buildings Law. BPA's offering incentivizes building owners to provide utilities with Energy Management Plans, which the new law requires them to create. In the Industrial sector, Energy Project Manager improves pipeline growth and transparency by incentivizing end users to create multiyear comprehensive site plans and goals to guide their energy efficiency investments. BPA expects similar results for mid- to large- sized commercial end users.
- **Targeted incentive increases** – BPA is evaluating targeted incentive increases for priority HVAC and lighting measures, including air-source heat pump (ASHP) retrofits, advanced lighting controls and LED tubes types B/C.

- **Upgrade supporting tools –** BPA is investing resources in developing an online lighting calculator to replace and simplify the existing Microsoft Excel-based Nonresidential Lighting Calculator to allow trade allies, utility staff and BPA to input and access project data more efficiently and securely.

Challenges and Opportunities

The Commercial sector is considering several challenges and opportunities over the FY 2022-2027 period, as shown in Table 9.

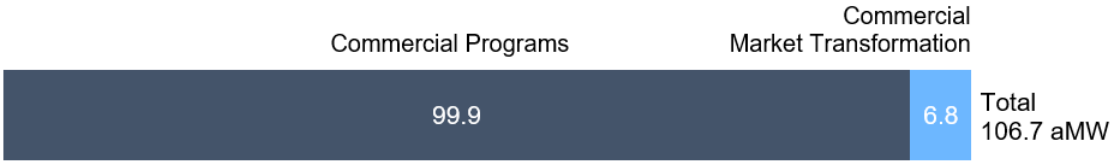
Table 9. Challenges and Opportunities in the Commercial Sector

Challenge or Opportunity	How BPA Will Address
BPA has observed a marked decline in commercial lighting savings.	BPA will adjust its approach to the commercial lighting market with a multipronged strategy that includes targeted incentive increases, investing in a streamlined reporting tool and investigating the opportunity to support midstream lighting measures. Momentum Savings market research will also continue to track and report changes in this market.
Utility incentives play a smaller role in investments in commercial HVAC equipment than other systems and end uses.	BPA will support the HVAC UES portfolio with a combination of incentives and trade ally engagement. Program marketing will focus on long-term energy savings and non-energy benefits rather than utility incentives. BPA will also coordinate efforts in this area with NEEA to help create consistent messaging for market actors, particularly those who specify and distribute HVAC equipment.
There is overlap in the equipment used in the commercial and residential markets, but the requirements to qualify for incentives do not always align.	BPA plans to align requirements and incentives for measures supported in multiple sectors. Where alignment is not possible, BPA will develop market-facing collateral that clearly differentiates the respective offerings.

Energy Savings and Costs

Figure 11 shows Commercial sector program savings by source. During FY 2022-2027, BPA plans to achieve 99.9 aMW in savings from its commercial programs, with another 6.8 aMW coming from NEEA's market transformation efforts.

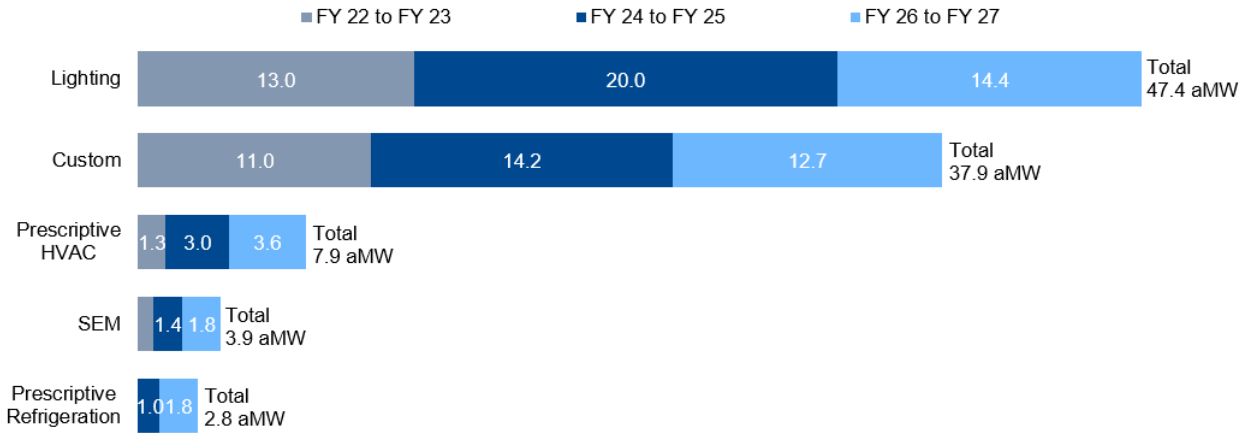
Figure 11. Commercial Program and NEEA Energy Savings Forecasts by Source



Commercial Energy Savings Estimates

Figure 12 shows Commercial sector program savings by channel and rate period for FY 2022-2027. The greatest total of 47.4 aMW comes from lighting, followed by custom, prescriptive HVAC and SEM.

Figure 12. Commercial Energy Savings Forecast by Channel and Rate Period



Commercial Costs

Figure 13 shows Commercial sector costs for FY 2022-2025 by channel and rate period. Total costs for the Commercial sector are $28.8 million during FY 2022-2023 and $50.1 million during FY 2024-2025. The total for FY 2022-2025 is $78.9 million.

Figure 13. Commercial BPA Cost Estimate by Channel and Rate Period

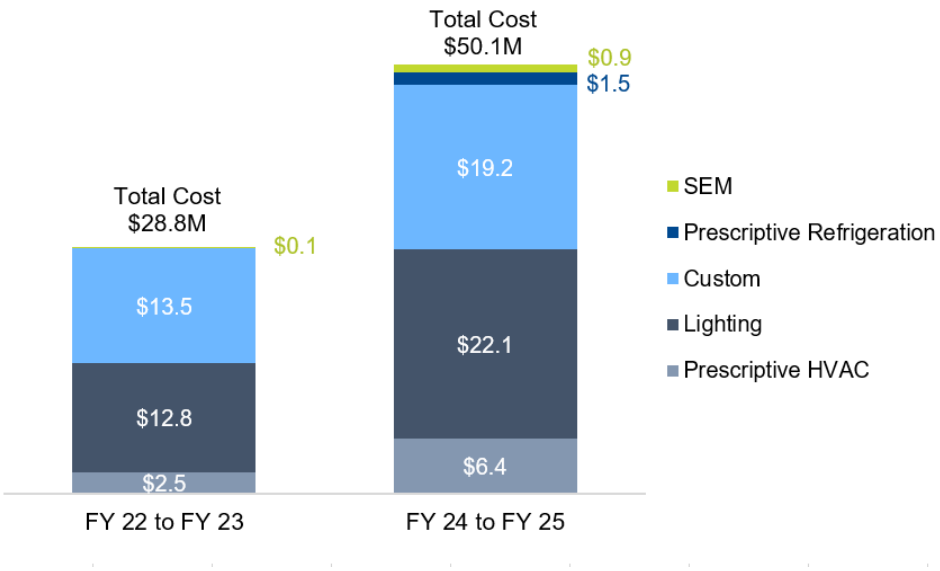
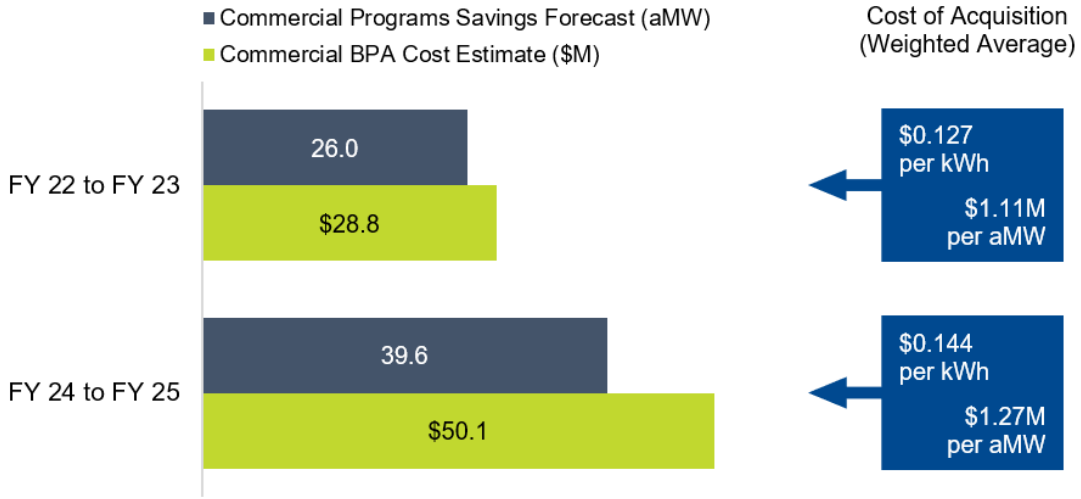


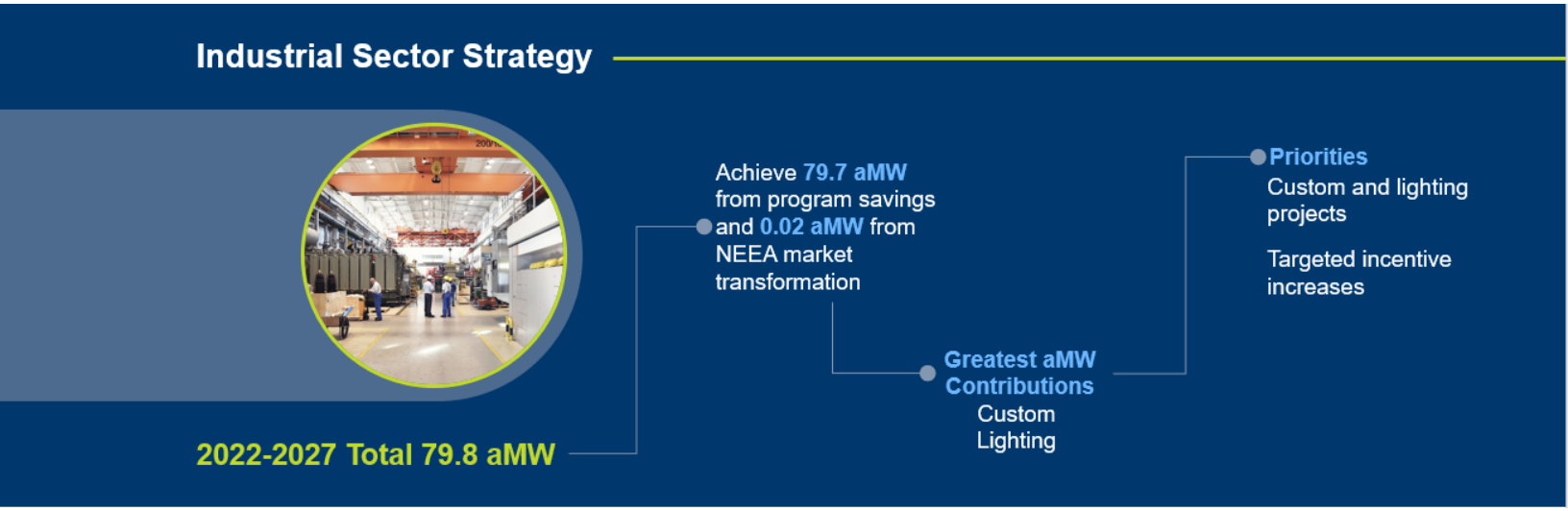
Figure 14 shows total program savings and total EEI-funded cost estimates as well as the average cost of acquisition for kWh and aMW.

Figure 14. Commercial Program Energy Savings and Cost Metrics by Rate Period



Note: Savings forecast includes BPA EEI-funded and customer self-funded savings. Cost estimates include only BPA EEI-funded costs.

3.3 Industrial Sector Strategy



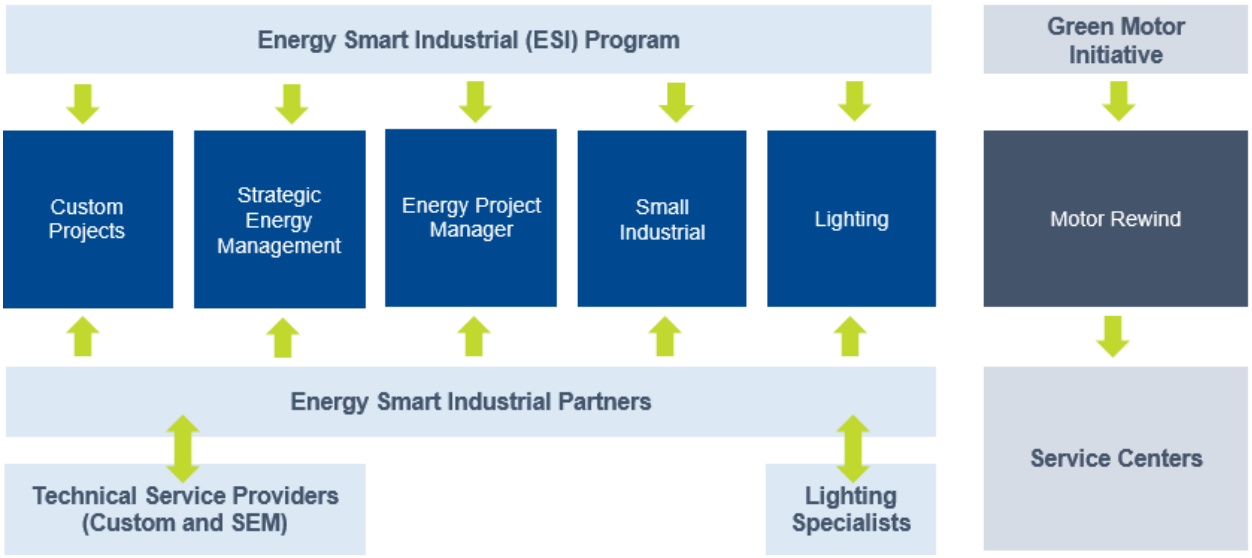
This section presents the strategies the Industrial sector program will employ over the Action Plan period to meet its savings forecast of 79.7 aMW.

Industrial Sector Overview

Since 2009, BPA and its customers have offered industrial end users a turnkey implementation program to assist with acquiring Industrial sector savings. The Energy Smart Industrial (ESI) Program includes a complete portfolio of complementary offerings targeted at diverse industrial facilities, project types and sizes and technologies. Offerings include Strategic Energy Management (SEM), Energy Project Manager, custom projects, small industrial projects, lighting and green motor rewinds. BPA primarily delivers the ESI Program through energy smart industrial partners (ESIPs) and provides innovative tools, resources and technical expertise to streamline end-user participation.

Figure 15 shows the major components of the Industrial sector.

Figure 15. Industrial Sector Structure



Current Landscape Assessment

The ESI Program has a healthy projected pipeline of 25 aMW in projects for FY 2022-2027. 2022 was a challenging year, with the program achieving approximately 10 aMW in savings. Supply chain issues and resulting project delays were key culprits for lower-than-expected savings. ESI accounts for these delayed projects in the pipeline of projects moving forward.

Economic fluctuations and resulting market uncertainties impact how much capital industrial facilities are willing to invest in energy efficiency. In planning for a post-pandemic economy, BPA is aware that some uncertainties may influence energy efficiency implementation in the region. For example, some industries may be experiencing disruptions to core business processes from various supply chain issues and labor shortages, causing negative impacts to their margins. However, not all industries across the region are similarly impacted, and these uncertainties do not necessarily have a negative effect on the uptake of energy efficiency.

Many Pacific Northwest industries are embracing sustainability, even though their underlying reasons may differ, and it is common today for companies to publicly share corporate responsibility reports. Some industries are leaning into sustainability to eliminate waste and reduce costs to offset economic uncertainties, and these efforts increase demand in offerings such as SEM. The ESI Program has observed that many industries are leveraging corporate sustainability initiatives to update their processes and equipment; maintain their competitiveness; and improve their triple bottom line of people, planet and profit.

Changes in policy, such as new mandates around decarbonization, may also affect how quickly industrial facilities make the transition to efficient technologies. Each state in BPA's service territory takes a different stance on decarbonization and is pursuing different tactics to achieve planned targets. Electrification is one strategy industries are pursuing to lower their carbon emissions. This presents an opportunity for the ESI Program to help industrial facilities make efficiency improvements while electrifying equipment in order to maintain competitiveness, modernize their facilities and meet regulatory requirements. Efforts are underway to better understand emerging technologies and baselines as industries electrify their equipment.

The ESIPs help coordinate program resources by serving as a single point of contact for utilities. ESI embeds ESIPs strategically throughout BPA's service territory to ensure there is sufficient focus on rural utilities and their retail consumers. Participating utilities define how the ESIP interacts with their end users. Figure 15 above illustrates the ESIP's role in delivering ESI Program offerings and establishing program partnerships to utility customers and their end users. To help deliver the program, a network of technical service providers (TSPs) and lighting specialists are available to ESIPs and utilities. TSPs support custom and SEM projects, and their engagement varies by the end user's needs and requirements. Typical TSP services include SEM planning and coaching activities, custom project scoping assessments, custom project assessments and measurement and verification activities, where appropriate.

Existing Efforts

To advance the Industrial sector program goals and serve the widest range of potential participants, the ESI Program offers six components as shown in Table 10.

Table 10. Existing Efforts in the Industrial Sector

Program Offerings	Existing Efforts
Energy Project Manager	A structured process helps customers overcome resource barriers to identify energy efficiency projects through co-funding and additional assistance. Eligible projects are SEM, custom, small industrial measures or lighting.
Strategic Energy Management	SEM helps industries reduce energy intensity by providing organizational training, technical support for operations and maintenance improvements, energy monitoring and reporting tools. Other benefits include additional funding for performance tracking systems.
Small industrial measures	A streamlined process for small to midsized projects. Small industrial measures provide a cost-effective mechanism for supporting specific efficiency measures when energy savings for a project require a custom approach and applying the BPA measurement and verification engineering calculations with verification protocol is appropriate.

Program Offerings	Existing Efforts
Lighting	Industrial lighting specialists help assess and report lighting projects.
Green Motor Initiative	This program, implemented by a third party, rebuilds existing motors to regain efficiency. Financial aid is provided through service partners as a pass-through incentive, where the end user receives a credit on the service provider's final invoice.
Custom projects	This is a flexible pathway to capture savings from nonstandard or complex projects for large retrofits or new construction, which otherwise would not be captured in the other ESI Program offerings.

Strategic Opportunities and Approach

This section describes BPA's approach to meeting industrial energy efficiency program goals. It identifies new and planned efforts that will contribute to savings forecasts.

New and Existing Efforts

This Action Plan includes the following new and planned efforts for the Industrial sector:

- **Prioritization of custom projects and lighting** – Custom projects and lighting will continue to be the largest contributors, representing 65 percent of the forecasted savings. ESI will target a wide array of industries to diversify risks from uncertain economic trends, encompassing supply chain issues, inflation and labor shortages. From a strategic, long-term perspective, ESI will continue to work closely with water and wastewater facilities to identify opportunities and capture savings since their project lifecycles are long. Throughout the region, many facilities are undergoing rightsizing and resiliency efforts to prepare for the future, and the program can help facilities pair such efforts with energy efficiency improvements.
- **Monitor project costs and market conditions and adjust incentives as needed** – Due to rising project costs from inflation, ESI may need to adjust incentive rates to remain competitive and influence end users to pursue efficient options. ESI will update incentives for specific technologies.
- **Promote participation in Energy Project Manager and Strategic Energy Management offerings** – As foundational blocks to ESI, these offerings contribute to the pipeline of future projects. For instance, participation in SEM often leads to custom project referrals. ESI has made several changes to these components and will continue to refine them.
  - In 2022, ESI streamlined the Energy Project Manager offering by removing barriers to participation. In 2023, BPA will continue its education and outreach efforts.
  - SEM continues to adapt its hybrid delivery model of in-person and remote sessions to best accommodate industry and participant needs. Starting in 2024, BPA will also extend the

measure life of its SEM measure to align with 2022 SEM persistence evaluation results, which estimated an 8.5-year effective useful life for SEM program measures.[33]

- **Evaluate the current mix of small industrial measures** – BPA has developed tools and resources that make data collection and energy savings easy to calculate. Underperforming measures such as battery charger upgrades and welder upgrades are likely to retire. BPA will add new measures targeting variable speed pumps, informed by the regional data collected by NEEA and the agency.
- **Monitor industrial heat pump technology to better understand baselines** – This emerging technology is garnering interest among utilities and end users. BPA is currently monitoring the technology and its applications. The *Strategic Opportunities and Approach* section describes BPA's efforts around industrial heat pumps.

Challenges and Opportunities

The Industrial sector is considering several challenges and opportunities over the FY 2022-2027 period, as shown in Table 11.

Table 11. Challenges and Opportunities in the Industrial Sector

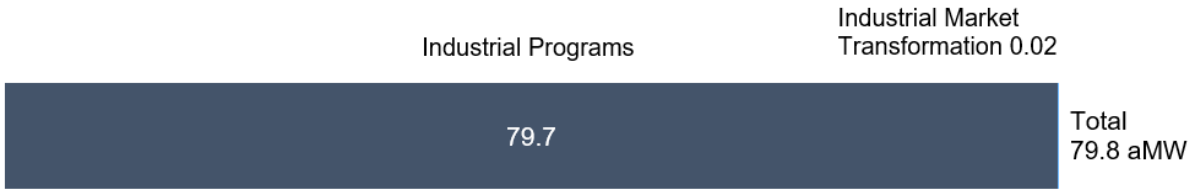
Challenge or Opportunity	How BPA Will Address
Economic factors such as supply chain issues, inflation and labor shortages have impacted industries differently and may influence their ability to invest in energy efficiency.	Energy Smart Industrial (ESI) Program will target an array of industries to reduce the risk of focusing on only select industries. BPA will monitor evolving economic conditions within industries and adjust outreach strategies accordingly.
Rising project costs from inflation may defer otherwise viable capital expenditure projects.	BPA will investigate cost impacts and may make adjustments to incentive rates to ensure they are competitive and able to influence energy efficiency improvements.
Accelerated decarbonization targets may expedite building electrification efforts.	The agency will monitor technologies that enable electrification, such as industrial heat pumps, to ensure energy-efficient solutions are viable.
ESI Program participation can be time-consuming and complex.	BPA will ensure program flexibility by promoting the SEM hybrid model to reduce travel and make in-person contact meaningful.
	The agency will streamline the process for prescriptive measures, which are commonly pursued technologies.

[33] Evergreen Economics. (2022, November). *Bonneville Power Administration Strategic Energy Management Persistence Evaluation – Final Report*. www.bpa.gov/-/media/Aep/energy-efficiency/evaluation-projects-studies/bpa-sem-persistence-study-report.pdf

Energy Savings and Costs

Figure 16 shows Industrial sector program savings by source. During FY 2022-2027, BPA plans to achieve 79.7 aMW in savings from its industrial programs, with another 0.02 aMW coming from NEEA's market transformation efforts.

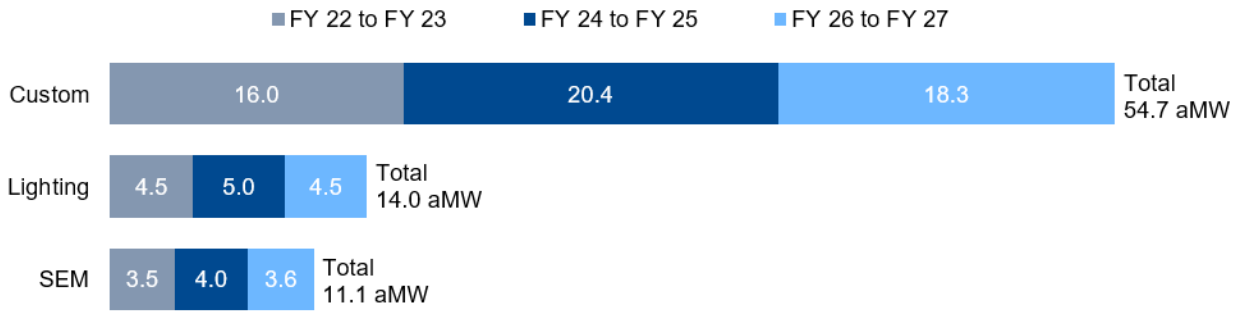
Figure 16. Industrial Program and NEEA Energy Savings Forecasts by Source



Industrial Energy Savings Estimates

Figure 17 shows Industrial sector program savings by channel and rate period for FY 2022-2027. The greatest total contribution of 54.7 aMW comes from custom projects, followed by lighting and SEM.

Figure 17. Industrial Energy Savings Forecast by Channel and Rate Period



Industrial Costs

Figure 18 shows Industrial sector costs for FY 2022-2025 by channel and rate period. Total costs for the Industrial sector are $25.1 million in FY 2022-2023 and $35 million in FY 2024-2025. The total for FY 2022-2025 is $60 million.

Figure 18. Industrial BPA Cost Estimate by Channel and Rate Period

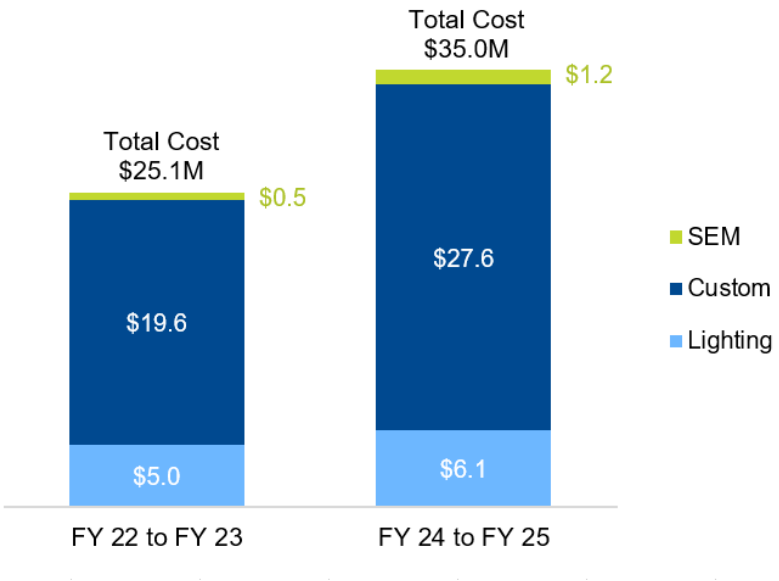
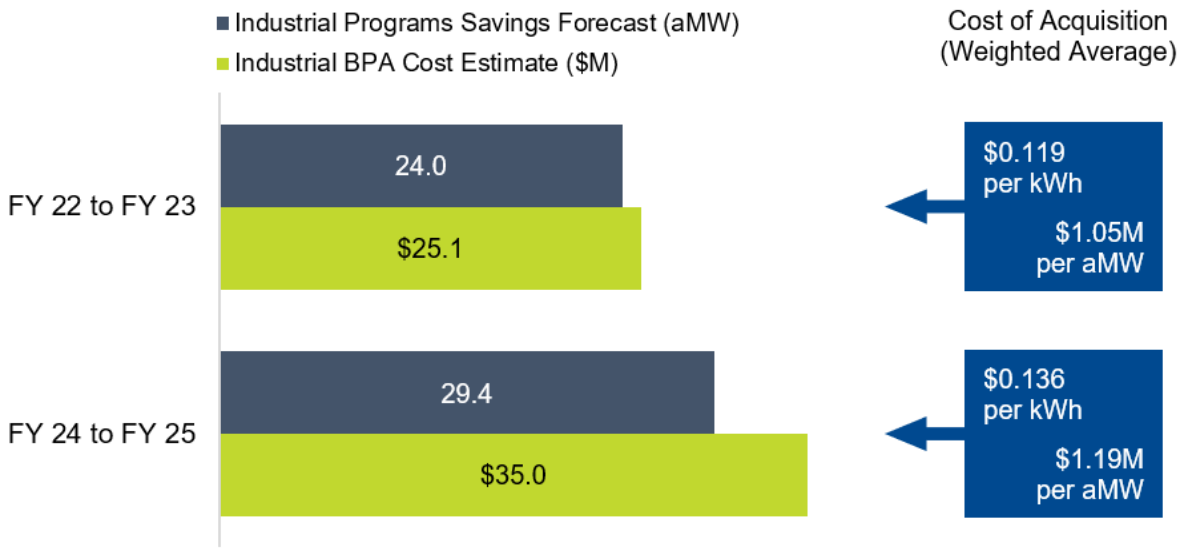


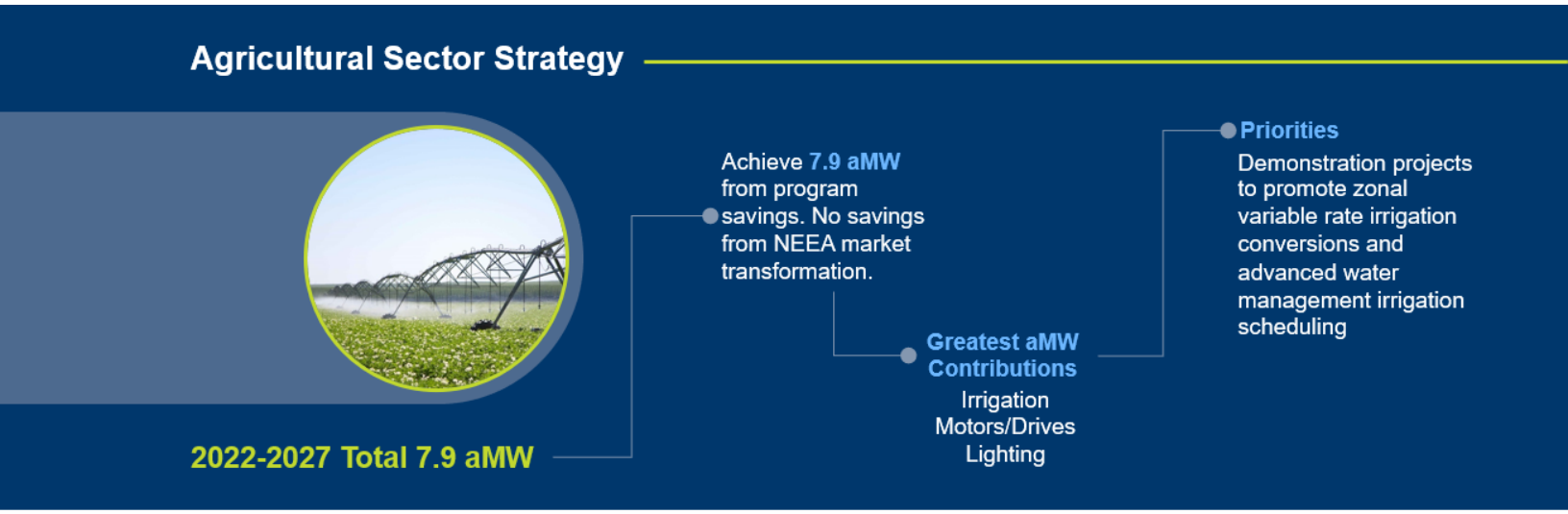
Figure 19 shows total program savings and total EEI-funded cost estimates as well as the average cost of acquisition in kWh and aMW.

Figure 19. Industrial Program Energy Savings and Cost Metrics by Rate Period



Note: Savings forecast includes BPA EEI-funded and customer self-funded savings. Cost estimates include only BPA EEI-funded costs.

3.4 Agricultural Sector Strategy



This section presents strategies the Agricultural sector will employ over the course of the Action Plan period to meet its savings forecast of 7.9 aMW.

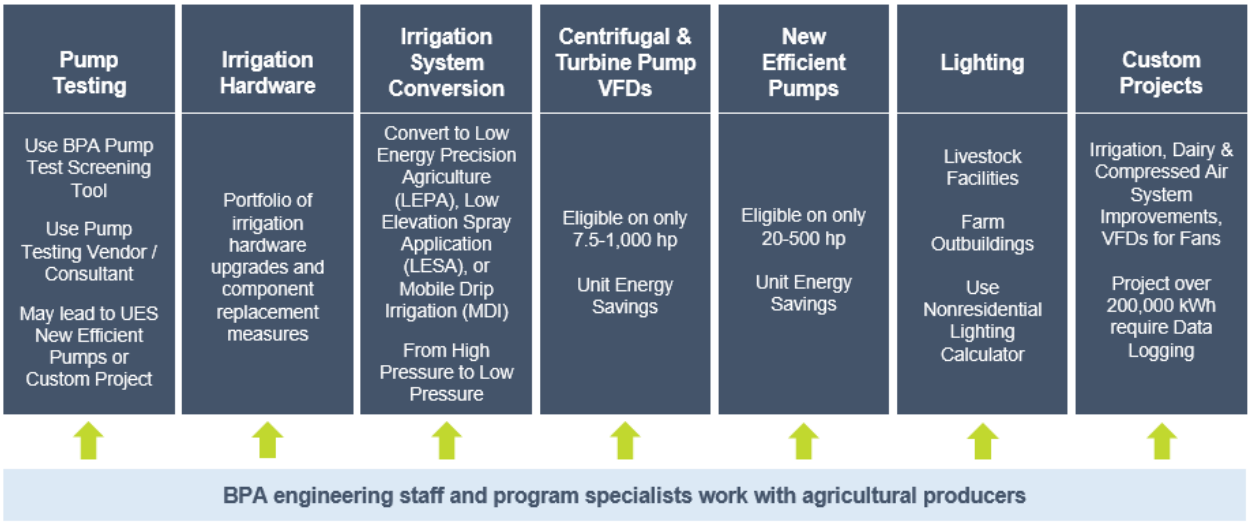
Agricultural Sector Overview

BPA's Agricultural sector offers a portfolio of measure opportunities for customer utilities to support agricultural producers' energy efficiency goals. These offerings include irrigation hardware upgrades, variable frequency drives (VFDs) for existing and new pumps, pump efficiency upgrades, zero energy freeze resistant stock tanks, thermostatically controlled electric receptacles, thermostatically controlled stock tank heaters, LED lighting and seasonal transformer de-energization. Custom project offerings include other irrigation system upgrades, dairy- and winery-related upgrades and compressed air system improvements. There is also an irrigation pump and system testing measure that does not deliver savings but that helps identify opportunities for pump efficiency and system upgrades and VFD measures on existing pumps.

While the Agricultural sector is a relatively small contributor of savings to the overall portfolio, it is crucial for the small and rural utilities that rely on its offerings and have fewer energy efficiency opportunities in other sectors. Continuing to offer measure offerings in this sector, even when not cost-effective, contributes to BPA's goal of distributing Energy Efficiency Program benefits as equitably as possible and aligns with the 2021 Power Plan's goal to provide support to small and rural utilities.

Figure 20 shows the major components of the Agricultural sector.

Figure 20. Agricultural Sector Structure



Current Landscape Assessment

According to the 2018 Irrigation and Water Management Survey from the U.S. Department of Agriculture (USDA),[34] approximately 6 million acres are irrigated in the Northwest. More than half of this USDA-reported acreage uses water- and energy-inefficient pivot or linear sprinkler systems. In BPA's service territory, the most intensively irrigated regions are in Washington State, Oregon's Columbia River Basin and Southern Idaho. These areas produce the most distinct cluster of irrigation-intensive, high-value crops including onions, sugar beets, barley, potatoes, tree fruit, vineyard grapes, vegetable varieties, tree fiber and alfalfa. Utilities in these areas are the most active participants in Agricultural sector programs.

Areas in the Northwest have experienced drought, ranging from moderate to extreme. Many aquifers are declining, making it more expensive or impossible to irrigate some crops, depending on particular irrigation needs and water availability. Since the variation in prices of commodities and inputs such as fertilizer and fuel affect the profitability of farming, decisions about crop planting can change from one year to the next. As sustainable practices and use of responsible resources becomes more important to consumers, agricultural producers have been working to optimize water use while maintaining yields. The Agricultural sector complements existing state programs through the USDA and National Resources Conservation Services, which focus on improving water and energy efficiency at agriculture production sites.

[34] U.S. Department of Agriculture, National Agricultural Statistics Service. (2019, November). *2017 Census of Agriculture 2018 Irrigation and Water Management Survey.* www.nass.usda.gov/Publications/AgCensus/2017/Online_Resources/Farm_and_Ranch_Irrigation_Survey/index.php

According to the Council's 2021 Power Plan, regional irrigation load is approximately 1,043 aMW and will continue to incrementally increase annually.[35] The largest source of energy efficiency potential is from irrigation system improvements. Half of that potential is from irrigation hardware upgrades. Energy savings associated with irrigation measures, such as pumping and irrigation systems, are beneficial to summer on-peak requirements. This may add urgency to energy efficiency initiatives in this sector.

The 2017 USDA Census of Agriculture indicates there are about 2,500 dairy farms in the region, comprising approximately 1 million head of cattle.[36] The expansion of dairy farms is increasing demand for silage and other agricultural feed products. Upgrade opportunities for dairy farms include lighting and controls, VFDs for vacuum pumps and fans, air compressors and refrigeration.

Existing Efforts

To advance the program goals and serve the widest range of potential participants, the Agricultural sector consists of several key components, as shown in Table 12.

Table 12. Existing Efforts in the Agricultural Sector

Delivery Channel	Existing Efforts
Unit Energy Savings measures	Prescriptive measures for LESA/LEPA/MESA/MDI,[a] irrigation system hardware upgrades, new pump efficiency upgrades, VFDs for new and existing pumps, thermostatically controlled pump house outlets and stock tanks, energy-free freeze resistant stock tanks, transformer de-energization.
Nonresidential Lighting Calculator and lighting upgrades	Lighting upgrades for livestock housing, farm outbuildings and interior and exterior lighting.
Custom projects	Additional irrigation system upgrades, piping to reduce friction loss, dairy system-related upgrades, livestock cooling and compressed air system upgrades.

[a] Low-elevation spray application (LESA), low-energy precision agriculture (LEPA), mid-elevation spray application (MESA) and mobile drip irrigation (MDI).

Strategic Opportunities and Approach

This section describes BPA's approach to meeting Agricultural sector goals. It identifies new and planned efforts to contribute to savings forecasts.

[35] Northwest Power and Conservation Council. (2022, March). *2021 Northwest Power Plan*. www.nwcouncil.org/fs/17680/2021powerplan_2022-3.pdf

[36] U.S. Department of Agriculture, National Agriculture Statistics Service. (2019). *2017 Census of Agriculture*. www.nass.usda.gov/Publications/AgCensus/2017/Full_Report/Census_by_State/index.php

New and Planned Efforts

This Action Plan includes the following new and planned efforts for the Agricultural sector:

- **Continue to engage with utilities and end users and improve offerings** – Opportunities for engagement and feedback include receiving program input from customer utilities through reoccurring Agriculture Utility Group meetings, performing regular outreach to irrigation and dairy equipment vendors and refining program offerings to meet end users' needs.
- **Promote new technologies and add new measures** – BPA will pursue the following new measures or activities:
  - Conduct zonal variable rate irrigation (VRI) conversion demonstration pilots with applicable customer utilities and their end users for the 2023 growing season. BPA will utilize pilot results to develop a zonal VRI unit energy savings (UES) measure.
  - Complete a demonstration pilot or custom project on the next generation of irrigation scheduling known as advanced water management (AWM) and offer it to eligible agriculture producers.
  - Develop and deploy agriculture energy and water efficiency audit measures.
- **Improvements to existing offerings** – BPA will make improvements to several existing offerings.
  - Refine pump testing measure requirements and adjust the measure incentive to align with market costs to promote uptake, which should also drive uptake in the pump efficiency and VFDs for pumps measures.
  - Assess irrigation-related measures and determine targeted incentive adjustments to increase applicable measure uptake.
  - Ensure design engineers maximize energy efficiency in the design process for controlled environment agriculture. BPA will also develop HVAC and lighting baseline methodology for the custom project process.
  - Utilize the Sales Person Incentive Fund Program to encourage vendors and contractors to report irrigation hardware replacements and upgrades at end-user sites.

Challenges and Opportunities

The Agricultural sector is considering several challenges and opportunities over the FY 2022-2027 Action Plan period, as shown in Table 13.

Table 13. Challenges and Opportunities in the Agricultural Sector

Challenge or Risk	How BPA Will Address
Investigating improvements is not a priority for producers	For end users served by BPA, the agency will fund 25% of energy and water efficiency audits for Oregon producers and fund 100% of energy and water efficiency audits for agricultural producers in other states in BPA territory. In 2023, the Oregon Department of Energy will fund 75% of the audit cost. Agricultural energy and water efficiency audits will identify all improvement opportunities and provide business case for those improvements.
Agricultural production improvements will not reduce costs enough to cover installation costs	BPA will increase incentives on irrigation-related measures and other agricultural measures to better align with installation costs.
Physical field/crop condition limit irrigation system improvements	BPA will increase incentives and promote LESA/LEPA/MESA/MDI irrigation hardware upgrades. The agency will also complete a zonal VRI demonstration pilot. Based on results, BPA may promote the pilot as a UES measure.
Producers' perceived risk of reduced yield or decreased crop quality	BPA will collaborate with states' agricultural extension offices and the USDA to educate producers on the merits of upgrading irrigation hardware/systems. This effort includes leveraging case studies and existing research.
Agricultural producers cannot finance improvements	BPA will identify funding such as low-interest loans and grants available for agricultural producers to complement the Agricultural sector program's incentive offering.
Landowner will not share in cost	As producers often lease irrigated land, BPA will increase incentives, so landlord cost share is not a factor in implementing energy efficiency upgrades.
Uncertainty about future availability of water	BPA will promote improvements as a resiliency strategy to encourage irrigation hardware/system upgrades to enable water conservation to possibly insulate the agricultural producer from future water shortages.
Program no longer has a scientific irrigation scheduling measure. A 2016 BPA-sponsored study determined there was little to no energy savings compared to sites that did not use the measure.	BPA will research and complete a demonstration pilot or custom project on the next generation of irrigation scheduling, advanced water management. BPA will offer this as a qualified measure to eligible agriculture producers.

Challenge or Risk	How BPA Will Address
Controlled environment agriculture, also known as indoor agriculture grow, can consume 1 MWh to 10 MWh but may have many energy efficiency opportunities such as lighting, lighting controls, HVAC and controls, and VFDs for pumps. Lighting and HVAC baselines for a typical small and large controlled environment agriculture site are not certain.	BPA will research future controlled environment agriculture site developments in its service territory. If possible, the agency will identify the facility's design firm and, in collaboration with the customer utility, inform them of energy efficiency opportunities and available incentives. BPA will develop lighting and HVAC baseline methodology for a typical small and large controlled environment agriculture site.

[a] Low-elevation spray application (LESA), low-energy precision agriculture (LEPA), mid-elevation spray application (MESA) and mobile drip irrigation (MDI).

Energy Savings and Costs

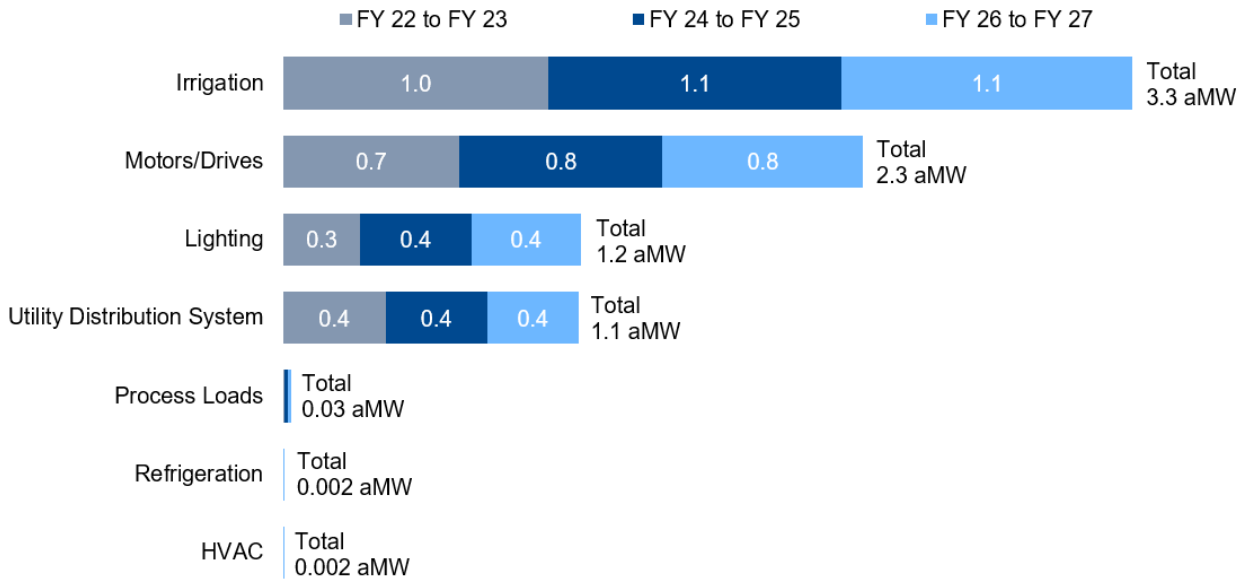
Figure 21 shows Agricultural sector savings by source. From FY 2022-2027, BPA plans to achieve 7.9 aMW in savings from its agricultural programs. There are no NEEA market transformation savings for this sector.

Figure 21. Agricultural Program Energy Savings Forecast by Source

Agricultural Energy Savings Estimates

Figure 22 shows Agricultural sector program savings by end use and rate period for FY 2022-2027. The greatest total contribution of 3.3 aMW comes from irrigation end use, followed by motors and drives, lighting and utility distribution systems, which includes the de-energization of transformers.

Figure 22. Agricultural Energy Savings Forecast by End Use and Rate Period



Agricultural Costs

Figure 23 shows Agricultural sector costs for FY 2022-2025 by end use and rate period. Total costs for the Agricultural sector are $4.2 million in FY 2022-2023 and $5.2 million in FY 2024-2025. The total for FY 2022-2025 is $9.4 million.

Figure 23. Agricultural BPA Cost Estimate by End Use and Rate Period

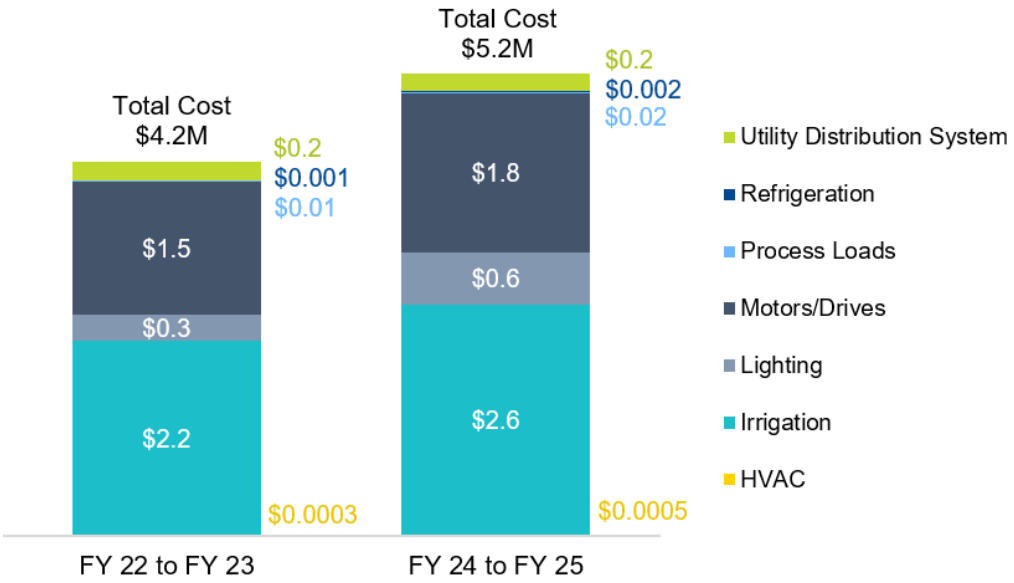
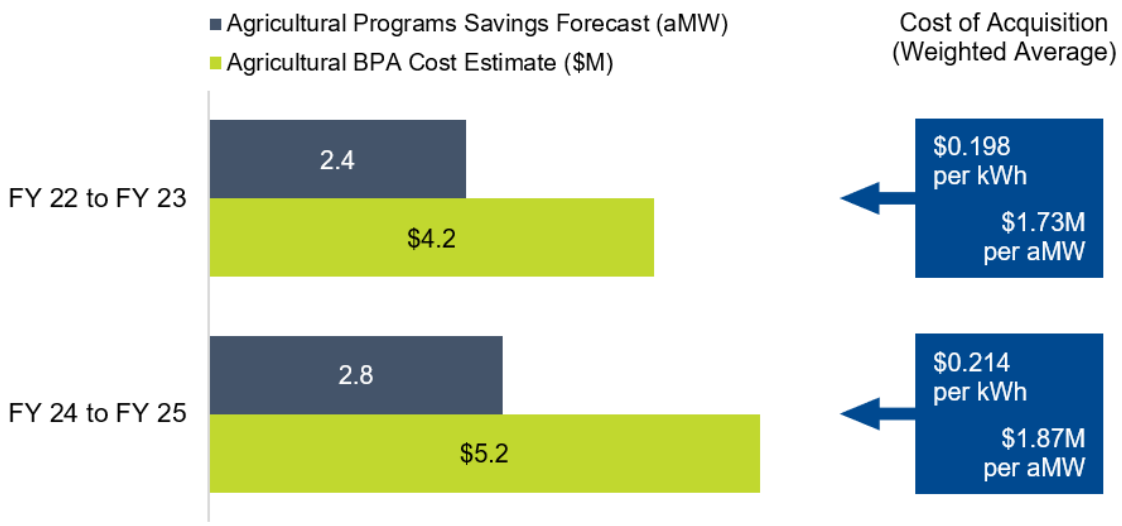


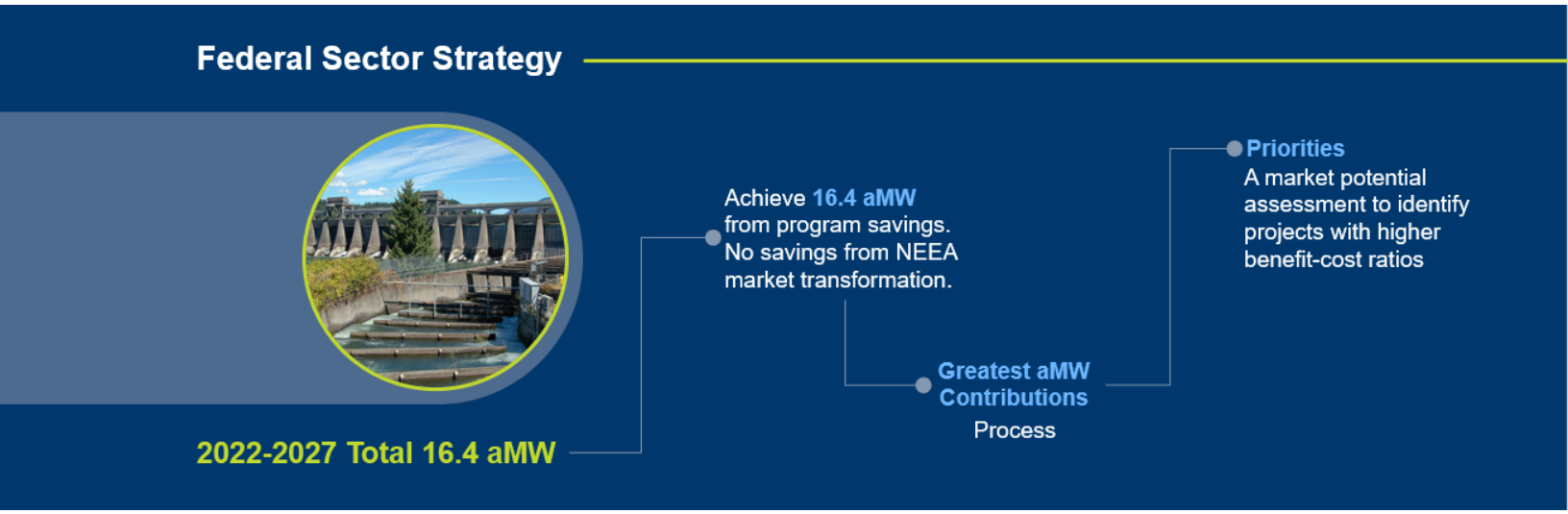
Figure 24 shows total program savings and total EEI-funded cost estimates as well as the average cost of acquisition in kWh and aMW.

Figure 24. Agricultural Program Energy Savings and Cost Metrics by Rate Period



Note: Savings forecast includes BPA EEI-funded and customer self-funded savings. Cost estimates include only BPA EEI-funded costs.

3.5 Federal Sector Strategy



This section presents the strategies the Federal sector will employ during the Action Plan to meet its savings forecast of 16.4 aMW.

Federal Sector Programs Overview

BPA's Federal sector comprises the Federal Energy Efficiency Advisor Program (FEEAP) and the Energy Smart Reserved Power (ESRP) Program. The goal of these programs is to influence and encourage energy efficiency implementation at federal and federally chartered facilities. About 5 percent of BPA's total electric supply goes to power federal facilities throughout the Pacific Northwest, ranging from large military bases to small rural post offices, courthouses, office buildings and other facilities.

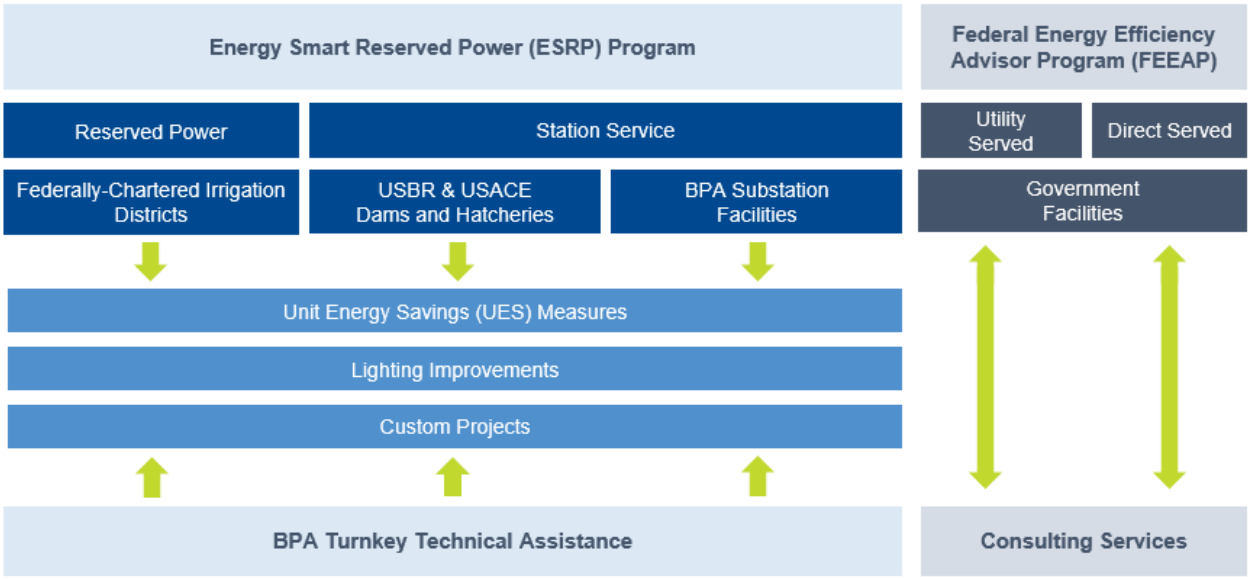
FEEAP is an advisor-based program for Utility Served Federal Sites and Direct Served Federal Sites. The program provides resources such as technical assistance, coordination with local utilities and energy efficiency expertise throughout a federal project's development and implementation process. The Residential, Commercial and Industrial sectors capture energy savings through FEEAP. All energy savings in the Federal sector result from the ESRP Program and directly contribute to BPA's energy savings goals.

The ESRP Program is a BPA-operated direct acquisition incentive program that provides financial incentives for pursuing qualified energy efficiency projects. The program serves three distinct market

channels, which entail 28 federally charted irrigation districts with Reserved Power,[37] U.S. Army Corps of Engineers (USACE) and U.S. Bureau of Reclamation (USBR) hydroelectric and hatchery facilities, and BPA's transmission assets that rely on Station Service.[38] All savings achieved from these market channels result in a net increase in the output of power from Federal Columbia River Power System (FCRPS) sites to BPA's transmission grid. ESRP Program energy efficiency projects are unique in that added generation from water conservation efforts are reportable savings.[39] Though captured for reporting purposes, the program does not provide incentives for the added generation portion of the energy efficiency project.

Figure 25 shows the major components of the Federal sector.

Figure 25. Federal Sector Structure



[37] Reserved Power is power designated to supply federally charted irrigation districts. It is implemented in partnership with the U.S. Bureau of Reclamation (USBR) and was developed in conjunction with the formation of the irrigation projects through the enabling legislation for the federal hydro project. The USBR determines irrigation district rates by the using BPA's wholesale rates and may include wheeling charges for transmission infrastructure not owned and operated by BPA.

[38] Station service represents electrical loads consumed directly by the Federal Columbia River Power System (FCRPS). Transmission substation assets served by a local retail utility do not qualify for Energy Smart Reserved Power (ESRP) Program incentives.

[39] Added generation is the amount of electricity, represented as kWh, that is incremental to the grid system from water conservation efforts upstream of the hydro project. Thus, added generation savings depend on the location in the FCRPS and include assumptions from BPA's Resource Program, such as spill requirements to maintain adequate flows for fish and wildlife.

Current Landscape Assessment

The ESRP Program has not significantly changed since the approximately 29 percent of the eligible irrigation districts participated in the 2016-2021 Energy Efficiency Action Plan period. During this Action Plan, BPA developed structured communication plans to provide better program outreach across all eligible irrigation districts. As of 2022, 75 percent of all eligible irrigation districts have participated in the program at least once. BPA continues to perform analyses and gather customer feedback to determine areas of success and opportunities to ensure it meets customer needs and the program continues to see sustainable growth.

Existing Efforts

To advance the Federal sector program goals and serve the widest range of potential participants, the ESRP Program consists of several key components, as shown in Table 14. This table highlights commonly pursued measures categorized by market channel and identifies measures with expected growth.

Table 14. Existing Efforts in the ESRP Program

Market Channel	Existing Measure Efforts
Federally chartered irrigation districts	Irrigation System Controls and canal improvements [a] Pumps and VFDs Other energy savings measures
USBR and USACE dams and hatcheries	Lighting Pumping improvements [b]
BPA transmission assets, i.e., substations	Lighting HVAC [b]

[a] Pump VFDS, water delivery controls and canal leakage reduction improvements are the primary contributors of added generation.
[b] Additional targeted measures since last Energy Efficiency Action Plan.

BPA has made operational enhancements to streamline participation or improve use of resources and tools. The ESRP Program structure illustrated above in Figure 25 highlights how the three measure categories, unit energy savings (UES), lighting improvements and custom projects, interact with program design.

Lighting is the primary energy-saving measure for dams and hatcheries and BPA's transmission assets, that is, substations, but represents a relatively small share of the measure portfolio. Historically, the ESRP Program derives about 90 percent of total energy savings from the federally chartered irrigation districts, primarily from custom measures such as VFDs, canal flow controls and canal leak reduction

improvements. Though added generation is a notable contributor to custom savings, water conservation efforts significantly reduce on-site pumping loads throughout the water delivery system. UES measures such as pump replacements are prevalent in the program portfolio, but pump replacements are a low contributor to energy savings.

The ESRP Program uses a multisector approach for the types of measures it pursues due to the diversity of loads served through reserved power. The loads served are primarily industrial from water system delivery, but federally chartered irrigation districts may also have residential and commercial loads from worker housing and office spaces. Where the water system is "energized" to provide pressurized water to end users, on-farm improvements and water conservation measures reduce the load from pumping. Due to this load diversity, BPA tailors measures across the energy efficiency portfolio to meet the needs of customers.

Overall, the ESRP Program has low overhead with the majority of its expenditures going directly to customers as financial incentives. The Federal sector has the lowest acquisition costs for energy savings in the whole portfolio.

Strategic Opportunities and Approach

This section describes BPA's approach to meeting the Federal sector's energy efficiency program goals. The section identifies new and planned efforts and the challenges and opportunities in support of the Federal sector savings forecast.

New and Planned Efforts

This Action Plan includes the following new and planned efforts for the Federal sector:

- **Continue to make customer-centric program design changes to streamline operations and improve ease of use of the ESRP Program** –The solicitation cycle is moving from summer to early spring. Currently, the open season window occurs during the irrigation district's busy season and addresses only the projects customers will complete in the next fiscal year. Moving the solicitation cycle will enable customers to fast-track larger capital expenditure projects with significant energy savings that are difficult to approve. In turn, this will contribute to a more robust program pipeline that extends beyond one-year increments.
- **Perform a market potential assessment to develop targeted approaches to increase overall participation and identify projects with higher benefit-cost ratios** – Based on historic participation, energy efficiency projects with added generation can considerably improve the project's benefit-cost ratio and are desirable not only for their low acquisition costs but also for their ancillary benefits such as river health. The market assessment will specifically investigate the source of the water, the energy required to lift the water and the current state of water delivery

systems for each participant based on distinct factors. This assessment will ascertain which irrigation districts have higher savings potential, helping BPA formalize account plans and outreach strategies.

- **Closely monitor market trends in pricing, technology and participation** – These efforts will include:
  - Tracking improvements to canal projects, such as piping open laterals. These are a significant source of savings to the ESRP Program and afford substantial benefits to irrigation districts as leaks decrease and operation and maintenance expenses fall. Monitoring the costs of raw materials, such as rising costs for polyvinyl chloride (PVC), to ensure incentives are competitive can positively influence project implementation. The program may offer special promotions with enhanced incentive rates to better meet the market.
  - Monitoring water system delivery controls. The agency expects this relatively new technology for the Northwest to increase in adoption over the next decade. Irrigation districts will not benefit equally from controls strategies due to variations in their water delivery systems; however, product adoption will likely lead to notable energy savings. To promote adoption, the Federal sector program will share success stories of effective control deployment strategies with other participants. Irrigation districts that use the existing but outdated Supervisory Control and Data Acquisition (SCADA) systems could benefit from new and rapidly evolving hardware solutions. BPA will be an active partner in planning water system capital projects and investigate solutions, such as feasibility studies, to overcome upfront investments. The agency will also share results with irrigation districts at joint district meetings.

Challenges and Opportunities

The Federal sector is considering several challenges and opportunities over the FY 2022-2027 period, as shown in Table 15. These prioritized challenges or risks focus on federally charted irrigation districts because this market channel represents nearly 90 percent of forecast savings. The ESRP Program will also continue working with other market channels, the USACE and USBR hydroelectric and hatchery facilities and BPA's transmission assets that rely on station service, to maintain consistent participation through lighting projects and by broadening participation through new measures such as HVAC and pumping improvements.

Table 15. Challenges and Opportunities in the Federal Sector

Challenge or Risk	How BPA Will Address
The solicitation cycle to reserve funding for the next fiscal year is misaligned with irrigation district's operations. Many priorities compete during the start of the irrigation season, which interfere with completing application.	ESRP Program will move the solicitation window from June to early spring to accommodate the start of irrigation season in May. This change will also move up the deadline for letters of intent, which will improve fiscal planning efforts with the irrigation district's board of directors.
Large capital investments with significant energy savings need incentive commitments beyond an annual solicitation cycle due to supply chain issues and project approval from the board of directors.	ESRP Program will investigate mechanisms to allow incentive commitments to extend beyond one-year agreements, while also maintaining visibility into its own annual budgeting efforts.
Due to the unique construct of reserved power and station service, market potential for energy efficiency projects is not well established.	ESRP Program will perform a market potential assessment and customer action plan as a means to develop targeted approaches for each participant and/or facility.
Inflation has greatly increased the costs of PVC for canal improvements and other materials.	ESRP Program will monitor cost trends of the materials required to implement typical energy efficiency projects and will adjust incentive levels to ensure alignment with market trends.
Federal grant programs compete with ESRP Program projects, with federal matching limited to 50 percent of the project's costs.	ESRP Program will coordinate with other federal agencies and participants on a project basis to ensure the program captures savings regardless of funding source. BPA staff will work with ESRP Program participants prior to the application process to establish incentive potential.
SCADA systems are outdated across the portfolio and hardware solutions for controls are evolving at a fast pace.	ESRP Program will be an active partner in planning for these capital projects and investigate solutions to overcome upfront investments, such as with feasibility studies. ESRP Program will also work with the districts to share their success stories of effective control deployment strategies with other participants.

Energy Savings and Costs

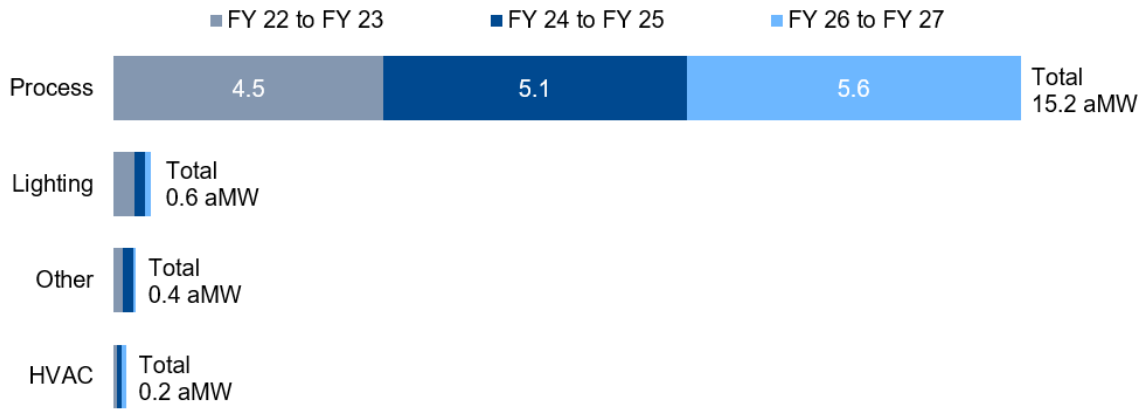
Figure 26 shows Federal sector program savings by source. From FY 2022-2027, BPA plans to achieve 16.4 aMW in savings from its federal programs.

Figure 26. Federal Program Energy Savings Forecast by Source

Federal Energy Savings Estimates

Figure 27 shows Federal sector program savings by end use and rate period for FY 2022-2027. The greatest total contribution of 15.2 aMW comes from the process end use, which includes improvements at federal reserved powered irrigation districts, followed by lighting, other end uses and HVAC.

Figure 27. Federal Energy Savings Forecast by End Use and Rate Period



Federal Costs

Figure 28 shows Federal sector costs for FY 2022-2025 by end use and rate period. Total costs for the Federal sector are $3.8 million in FY 2022-2023 and $6 million in FY 2024-2025. The total for FY 2022-2025 is $9.8 million.

Figure 28. Federal BPA Cost Estimate by End Use and Rate Period

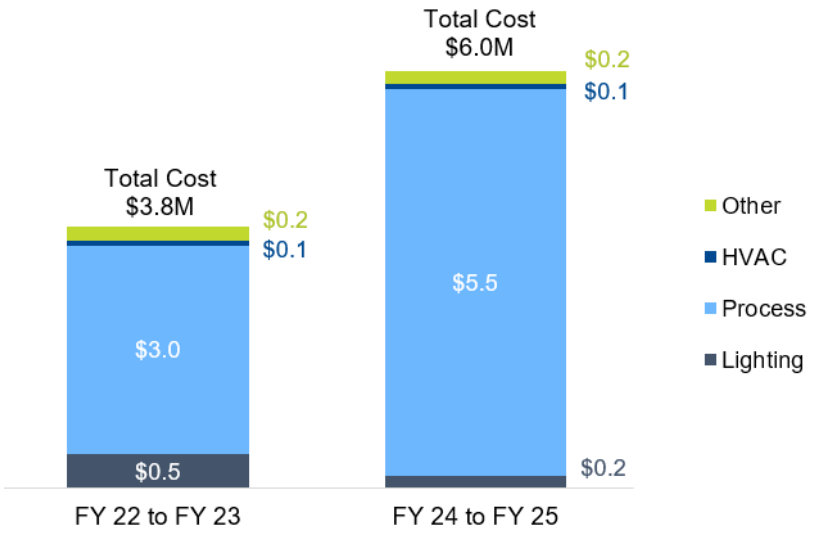
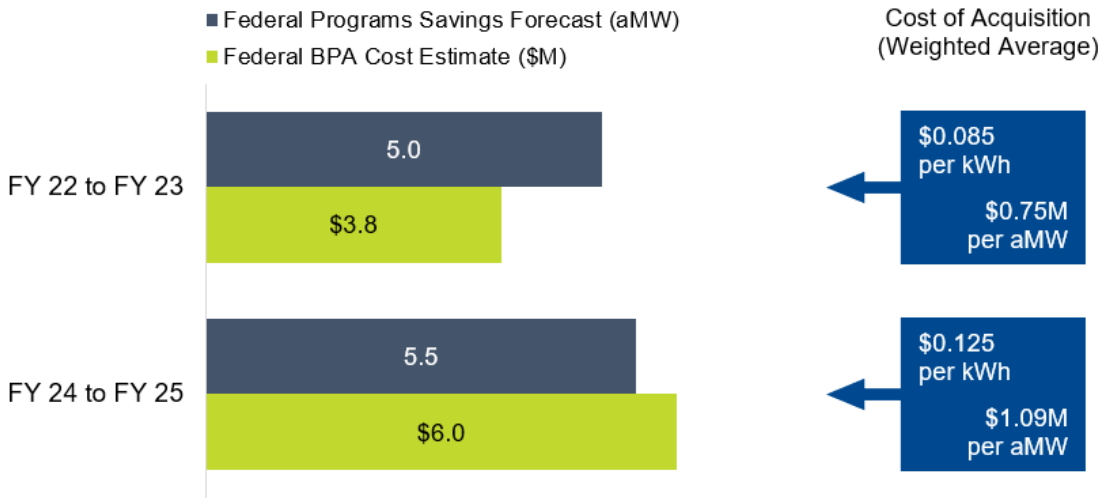


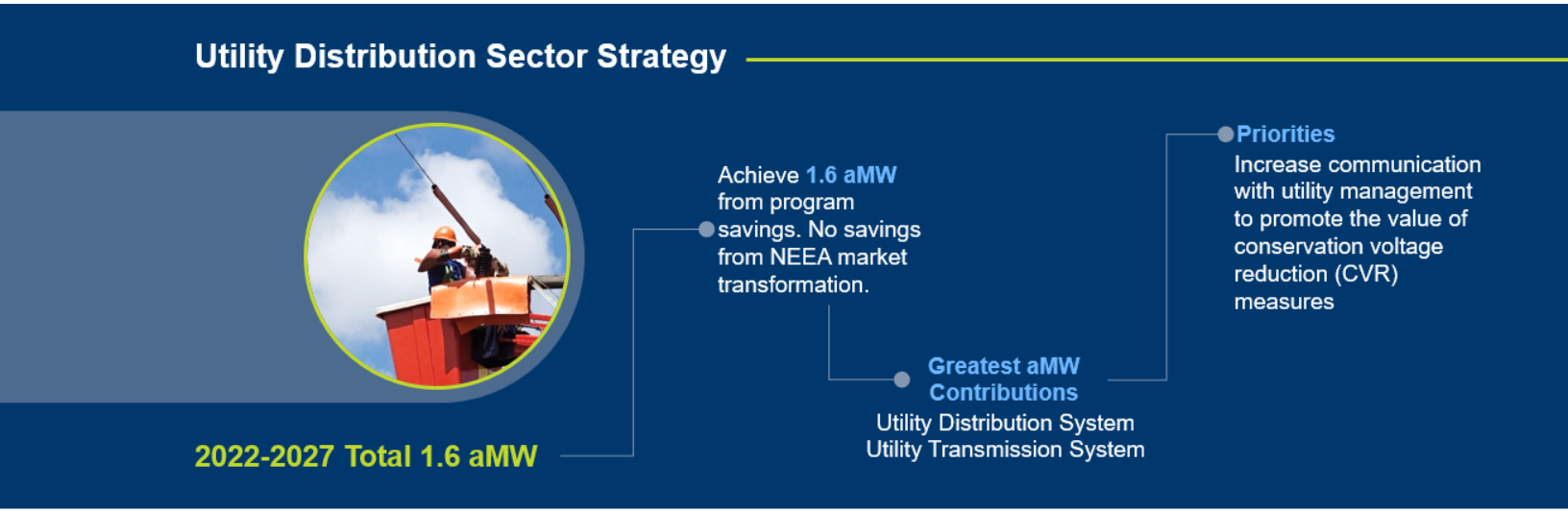
Figure 29 shows total program savings and total cost estimates as well as the average cost of acquisition in kWh and aMW.

Figure 29. Federal Program Energy Savings and Cost Metrics by Rate Period



Note: Savings forecast includes BPA EEI-funded and customer self-funded savings. Cost estimates include only BPA EEI-funded costs.

3.6 Utility Distribution Sector Strategy



This section presents strategies the Utility Distribution sector will employ over the Action Plan period to meet its savings forecast of 1.6 aMW.

Utility Distribution Sector Overview

BPA's Utility Distribution sector offers a range of programs and measures to help BPA customers increase system performance and claim energy savings. Typically, these savings come in the form of service conductor replacements or substation power-transformer replacements. Other energy-saving measures include, but are not limited to, lower-loss distribution transformers, particularly those with amorphous core, voltage-class increase, power-factor correction and conservation voltage reduction (CVR), also referred to as voltage optimization (VO).

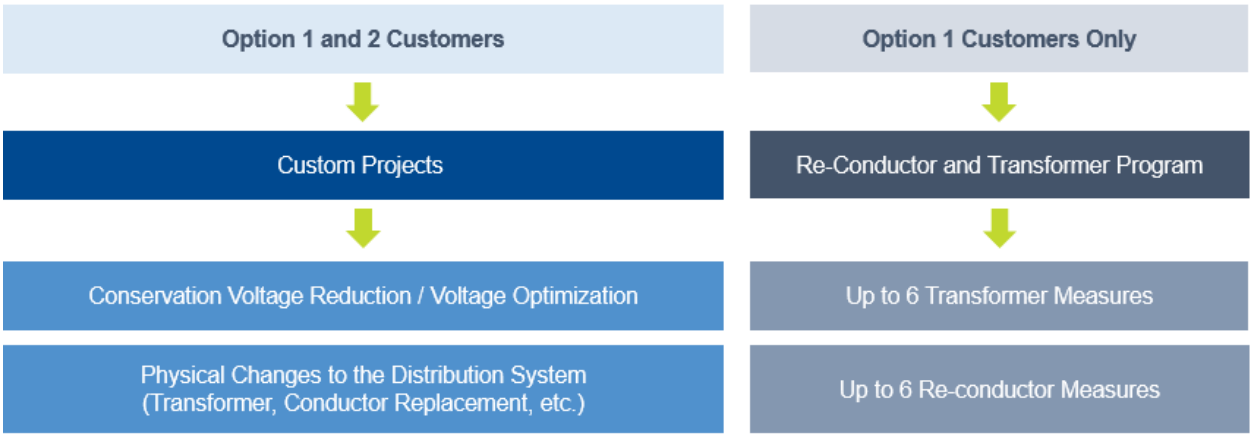
BPA groups measures for the Utility Distribution sector into two categories:

- **Physical changes to the distribution system itself** – Most commonly, these changes are re-conductoring, replacing substation power transformers and distribution transformers, installing capacitors to reduce electrical currents and other less frequent changes (such as adding a parallel feeder or increasing the distribution line's voltage class by, for example, bumping it up from 12.47 kilovolts [kV] to 25 kV). All energy savings produced by these measures reduce losses to the utility.
- **CVR/VO** – This measure entails operational changes to how a utility regulates voltage on any particular substation. It includes reducing the average voltage on the distribution feeders throughout the year to create a net effect of reducing voltage for all retail customers served by

that substation. Most of the energy savings from CVR occurs within the retail consumer premise; therefore, the utility incurs only a small portion of the energy savings cost.

Figure 30 shows the major components of the Utility Distribution sector.

Figure 30. Utility Distribution Sector Structure



Current Landscape Assessment

During the 2016-2021 Action Plan, energy efficiency representatives (EERs) promoted opportunities funded through the energy efficiency incentive (EEI) in the Utility Distribution sector. In particular, the EERs promoted the replacement of conductors and transformers. This marketing effort paid off with steady growth in the number of utilities that reported savings. BPA will continue to market to utilities that have not yet reported utility distribution savings.

Re-conductoring is the most commonly performed measure by utilities as part of ongoing upkeep. BPA is striving to attain up to 75 percent customer participation in reporting conductor and transformer replacement measures during this Action Plan period. The next most common measure is substation power transformer replacement. Participants can claim savings for both measures after installation. The key to this is interaction between the utility's distribution engineering and energy efficiency staff, so that the appropriate BPA technical support person can assist in the measure documentation and approval process.

Existing Efforts

To advance program goals and serve the widest range of potential participants, the Utility Distribution sector consists of several key components, as shown in Table 16.

Table 16. Existing Efforts in the Utility Distribution Sector

Delivery Channel	Existing Efforts
New Opportunities Guide	Ensure customers are aware of this sector's New Opportunities Guide, which provides an overview of available selectable measures that improve utility distribution systems, and of the recently created Re-conductor and Transformer Calculator.
Ongoing one-to-one touchpoints with utilities	Engage with and encourage utility customers to submit projects.
Customer roundtables	These short but dedicated annual presentations to groups of utilities promote distribution system efficiency projects and reporting. The roundtables are a unique opportunity for utilities to discuss their experience in moving projects forward and gaining management approval. These successful utility customers help pave the path to program participation for other utility customers.

Strategic Opportunities and Approach

This section describes BPA's approach to meeting Utility Distribution sector goals. It identifies new and planned efforts contributing to savings forecasts.

New and Existing Efforts

Currently, just two utilities plan to pursue CVR projects with BPA. Through this Action Plan, BPA plans to increase participation in the Utility Distribution sector in the following ways:

- **Raise utility management awareness** – Through direct conversation with a utility's general manager or power director, BPA will describe the easy savings opportunities available in the utility sector and encourage engagement between the utility's engineering and energy efficiency staff and BPA. This strategy addresses the separation that sometimes exists between these staff members, a key barrier to greater participation in distribution system efficiency projects. By pursuing this strategy in recent years, BPA has been able to generate several new projects.
- **Focus on small and midsized utilities and those that traditionally underspend their EEI** – BPA will provide technical support to small and midsized utilities that typically have small distribution engineering and energy efficiency teams, as these utilities may be unaware of savings opportunities and lack the resources to support them. BPA will encourage utilities that underspend their EEI to review their construction history to find projects they did not report. BPA will stress that the utility receives incentive payments, which can be significant.

- **Engage with Washington I-937 utilities** – Utilities that operate in the State of Washington are required to achieve conservation in accordance with the state's Energy Independence Act (I-937), and these projects typically cost more than their EEI can cover.

Challenges and Opportunities

The Utility Distribution sector is considering several challenges and opportunities over the FY 2022-2027 period, as shown in Table 17.

Table 17. Challenges and Opportunities in the Utility Distribution Sector

Challenge or Opportunity	How BPA Will Address
Lack of awareness among utility management	Focus on maintaining utility management's awareness of measures. Prioritize energy efficiency representative and/or power account executive engagement at utility board meetings or other gatherings.

Energy Savings and Costs

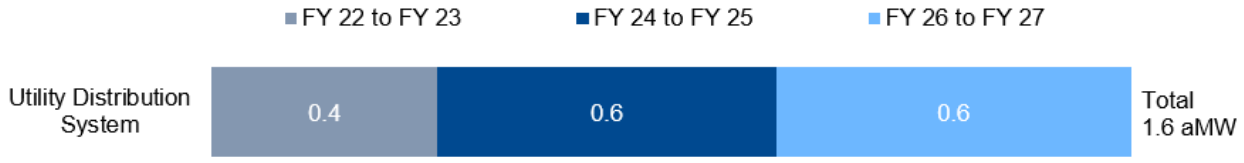
Figure 31 shows Utility Distribution sector program savings by source. From FY 2022-2027, BPA plans to achieve 1.6 aMW in savings from its Distribution Efficiency program.

Figure 31. Utility Distribution Program Energy Savings Forecast by Source

Utility Distribution Energy Savings Estimates

Figure 32 shows Utility Distribution sector program savings by end use and rate period for FY 2022-2027.

Figure 32. Utility Distribution Energy Savings Forecast by End Use and Rate Period



Utility Distribution Costs

Figure 33 shows Utility Distribution sector costs for FY 2022-2025 by end use and rate period. Total costs for the sector are $0.8 million in FY 2022-2023 and $1.1 million in FY 2024-2025. The total for FY 2022-2025 is $1.9 million.

Figure 33. Utility Distribution BPA Cost Estimate by End Use and Rate Period

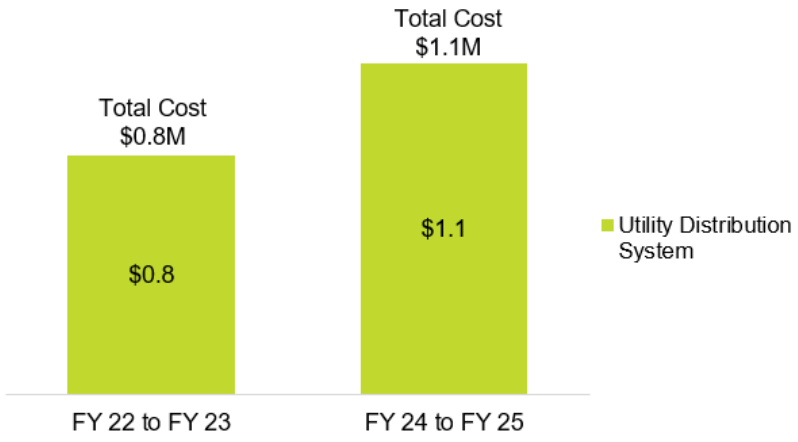
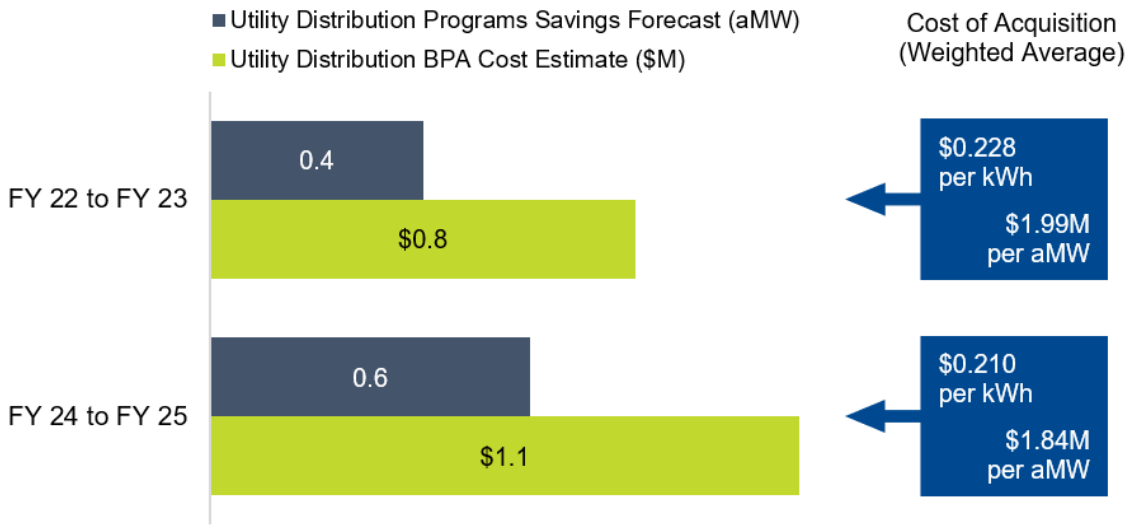


Figure 34 shows total program savings and total EEI-funded cost estimates as well as the average cost of acquisition ($/kWh and $/aMW).

Figure 34. Utility Distribution Program Energy Savings and Cost Metrics by Rate Period



Note: Savings forecast includes BPA EEI-funded and customer self-funded savings. Cost estimates include only BPA EEI-funded costs.

3.7 Performance Metrics

Sectors will use the metrics described in Table 18 to evaluate the success of program offerings.

Table 18. Sector Performance Metrics and Goals

Metric	Description	Goal
Residential Sector		
Program participation	Number of utilities participating in the program	90 utilities participate in Residential sector offerings during Action Plan period
Program savings	Reported program savings in kWh	Achieve Action Plan period savings goal of 52.3 aMW
Utility customer satisfaction	Percentage of utility customers satisfied with BPA	Achieve at least 90% utility customer satisfaction with program offerings during Action Plan period, as measured by customer survey results
Industrial Sector		
Program participation	Number of utilities participating in the program	80 utilities participate in ESI Program during Action Plan period
SEM participation	Number of cohorts delivered	Launch at least one cohort per year or six cohorts total during Action Plan period
Program savings	Reported program savings in kWh	Achieve Action Plan period savings goal of 79.7 aMW
Participant satisfaction	Percentage of utility customers satisfied with BPA	Achieve at least 90% satisfaction with utility customers during Action Plan, as measured by customer survey results
Commercial Sector		
Program participation	Number of utilities participating in the program	90 utilities participate in sector offerings during Action Plan period
Program savings	Reported program savings in kWh	Achieve Action Plan period savings goal of 99.9 aMW
Participant satisfaction	Percentage of utility customer utilities satisfied with the program	Achieve at least 90% satisfaction with utility customers during Action Plan period, as measured by customer survey results

Metric	Description	Goal
Agriculture Sector		
Program participation	Percentage of agriculture customer utilities participating in full portfolio of measures, where applicable	70% of agricultural customer utilities promote and participate in the full agricultural portfolio of measures
Measure diversity	Variety of measures captured	Increase measure portfolio uptake by 10% at customer utilities that have agricultural measure end-use potential
Program savings	Reported program savings in kWh	Achieve Action Plan period savings goal of 7.9 aMW
Participant satisfaction	Percentage of utility customer utilities satisfied with the program	Achieve at least 80% satisfaction with agricultural customer utilities during Action Plan period, as measured by customer surveys.
Federal Sector		
Program participation	Percentage of customers participating in ESRP Program at least one time during Action Plan	85% of customers participate in the program by the end of Action Plan period.
Measure diversity	Variety of measures captured	Increase measure diversity in comparison to last Action Plan
Program savings	Reported program savings in kWh	Achieve Action Plan period savings goal of 16.4 aMW
Utility Distribution Sector		
Program savings	Reported program savings in kWh	Achieve Action Plan period savings goal of 1.6 aMW
Program participation	Re-conductor and Transformer Calculator submittals and custom project submittals	75% of all BPA Power customers have reported utility distribution savings
Program participation	Number of new customers engaging in purchasing distribution transformers with lower losses than required by U.S. Department of Energy in 2016, and number of new customers participating in Targeted CVR Program	At least two new customer per year participate

4 Emerging Technologies

BPA's Energy Efficiency Program develops new energy conservation opportunities by maintaining a research pipeline of potential energy saving measures. BPA has a long and successful record of researching, developing and incorporating emerging technologies into program savings. The agency deploys a proven, disciplined approach that delivers cost-effective results. BPA works with manufacturers, national labs, universities and regional and national partners to shape emerging technologies to meet the Northwest's energy needs. These technologies can take several years to mature before BPA includes them in its energy efficiency programs.

4.1 Progress Made Since the Last Action Plan

Since the 2021 Power Plan and the last Action Plan, BPA and NEEA have developed an emerging technology database to track the progress of the region's research efforts and to advance technologies through the technology development pipeline.

BPA has brought new program measures for carbon dioxide split-water heating products to the residential and commercial markets in its service territory. Though popular overseas, these products have not become commonplace in U.S. markets. Such technologies create new low global warming potential and high coefficient of performance products for inclusion in the energy efficiency programs offered by BPA and the region's utilities.

4.2 Market Conditions

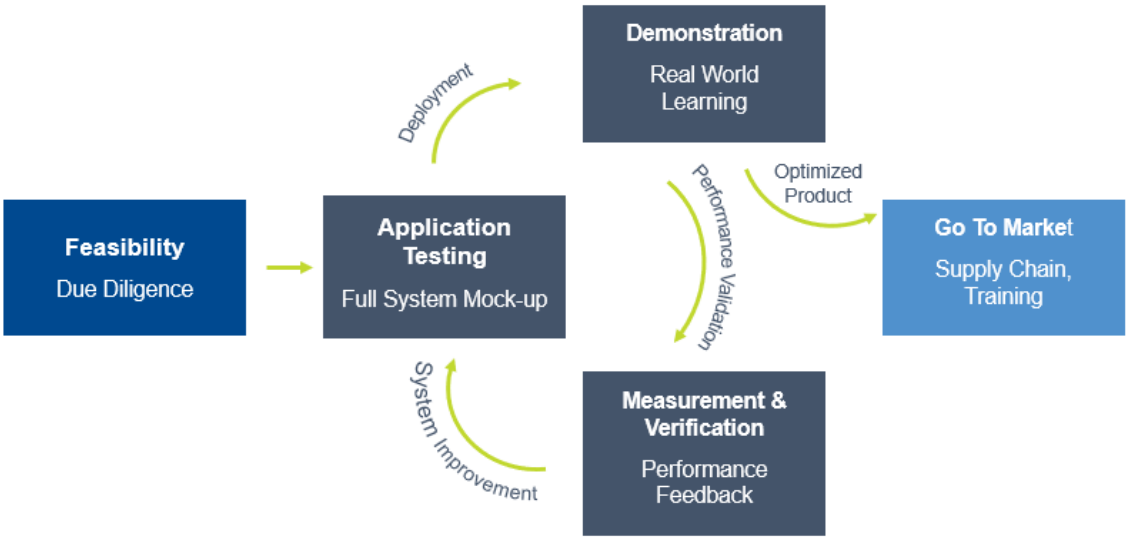
Climate change, decarbonization and electrification goals are rapidly changing the energy marketplace. Regional and national public policy is shifting resources from fossil fuels to low-cost, carbon-free and renewable electric power. This fuel-switching is placing greater pressure on regional loads and the grid. BPA's research into high-performing, energy-efficient electric technologies can offset this increase in utility loads and stretch the value of the federal hydropower system. Furthermore, ensuring that new technologies are grid-enabled also allows the region to plan for the capacity value of load-shifting. Highly efficient technologies with low global warming potential and grid connectivity offer a sustainable path to decarbonization while minimizing the impact on the region's system.

4.3 Strategic Opportunities and Approach

BPA collaborates with manufacturers and other organizations to develop products that meet Northwest performance requirements. BPA also works with NEEA to scan emerging technology opportunities through the Regional Emerging Technology Advisory Committee (RETAC). BPA may conduct primary research on technologies identified in RETAC, and NEEA may take research results and test market potential. BPA also coordinates regional interests across the nation and takes advantage of funding and findings from other organizations such as the U.S. Department of Energy National Labs, the Electric Power Research Institute and the American Council for an Energy Efficient Economy (ACEEE). BPA's extra-regional collaborations directly benefit Northwest utilities by applying value from national research investments.

BPA's centralized approach for bringing new technologies to the market, as shown in Figure 35, is fast and cost-effective. The approach provides manufacturers with the necessary engineering details to design and develop products that meet Northwest performance requirements. As these products move into field demonstration, they are more likely to be successful because specification and development occurred with the application in mind. This minimizes the risk of field failure and expedites adopting measures into energy efficiency programs.

Figure 35. BPA's Technology Innovation Model



2021 Power Plan Recommendation

The 2021 Power Plan recommends continued research of emerging technologies to introduce new efficiency opportunities, working with retailers and manufacturers to increase the availability of efficient products and investing in emerging technology research for efficiency measures. These efforts include scanning for emerging technologies, designing pilot studies to provide case studies for program opportunities and conducting field research to verify real-world savings. Figure 36 highlights the technologies BPA is focusing on for the 2022-2027 Action Plan period.

Figure 36. Sector-Specific Emerging Technologies

Residential

High Capacity Heat Pumps

Residential high-performance, high-capacity (HPHC) heat pumps are currently available in the marketplace. These heat pumps potentially have higher energy savings and performance across different heating and cooling zones and can provide additional value to the region. BPA seeks to demonstrate this value by conducting a leading-edge, multiyear study to field-test the performance of HPHC heat pumps for whole-home heating and cooling and to measure this equipment's additional capacity. BPA will also test this equipment's cold and hot weather energy performance as well as its capacity demand or load shifting values during the 2024 heating and cooling seasons. Results of this study will help the agency determine new incentives for cold climate heat pumps as well as capacity value and time-of-use savings for winter or summer peak seasons and events.

Commercial

Retro-Commissioning

Retro-commissioning can provide low cost, non-lighting savings, typically around 10 percent of the whole-building consumption, with a broad application for various building types and a measure life of 10 or more years. BPA's approach to retro-commissioning whole buildings aligns with the Regional Technical Forum's recent investigations regarding a whole-building measure and could contribute substantially to savings in the Commercial sector.

Currently, customers can implement retro-commissioning as a commercial custom project, for which BPA can easily quantify savings after one full year of measurement and verification at the whole-building level. However, challenges exist in acquiring opportunities for retro-commissioning projects. BPA plans to fund a small retro-commissioning pilot at a single site, such as a large and complex university campus or hospital, to explore techniques for overcoming market hurdles.

BPA has designed a multiphase process to deploy local commissioning agents to identify the lowest-cost opportunities for immediate implementation and will then make the transition to recommending more complex adjustments to the existing system. These adjustments can include balancing HVAC systems and repairing or replacing duct work. A further transition will aim at capital investments, such as replacing rooftop units with variable refrigerant flow and dedicated outdoor air systems with heat recovery ventilation. Normal program operations could capture these savings. Pilot results will aid the development of future commercial programs.

Commercial Large-Volume Heat Pump Water Heaters for Multifamily, Schools and Large Gyms

BPA is working on advancing incentive opportunities for large-volume HPWHs. This includes engaging with several HPWH manufacturers to bring products meeting Northwest requirements into BPA programs. Given this technology's significant capacity potential, the agency has supported the first U.S. demonstration of a low-global-warming potential, load-shifting HPWH in Seattle City Light's service territory. If successful, customers could deploy this equipment in a number of potential markets, such as hotels, commercial kitchens, groceries, laundromats, schools, fitness facilities, jails, fire stations, hospitals and any facility with a large hot water draw pattern.

Next steps are working with utilities to identify potential opportunities and assess the feasibility of installing large-volume HPWH systems to satisfy the domestic hot water load in non-multifamily buildings. The goal is to identify new market applications for HPWHs that offer significant energy and cost savings to building owners. BPA will apply lessons from the market transformation of large-volume HPWHs to other priority load shapes that have large hot water draw patterns in the region.

BPA is also developing a new standard protocol for new large-volume HPWHs for multifamily buildings. BPA and its collaborators are developing a new Regional Technical Forum measure for multifamily central heat pump water heating, the first measure in the region using large-volume HPWHs. To support this new measure, BPA worked with NEEA and others to develop a commercial advanced water heater specification, qualified product list and sizing tools such as Ecosizer.[40] BPA anticipates measure release in the second quarter of 2023.

Industrial

Industrial Heat Pumps

Process heat accounts for over 50 percent of the energy consumption in industry.[41] Low global warming potential of highly efficient electric industrial heat pumps are a major opportunity to reduce greenhouse gas emissions. Studies have shown that moderate national deployment of industrial heat pumps could save 2 to 5 percent of industrial process heat, a range of 270 to 550 trillion British thermal units (Btus)

[40] Ecosizer. *Electrifying water heating is a major decarbonization strategy for multifamily buildings.* Accessed December 2022. ecosizer.ecotope.com/sizer/

[41] American Council for an Energy Efficient Economy (ACEEE). (2022, March 30). "It's Time to Electrify Industry's Process Heat—with Heat Pumps." www.aceee.org/blog-post/2022/03/its-time-electrify-industrys-process-heat-heat-pumps?20March

per year, and avoid emissions of 12 to 25 million metric tons per year of carbon dioxide (CO_2), while electrifying select industrial processes.[42]

BPA is partnering with prospective utilities, facilities and industrial heat pump manufacturers to find demonstration sites to replace existing process heat loads and bring suitable products to the Northwest. BPA will collaborate with other national leaders to develop a robust baseline framework, with the overarching goal of helping sites that are installing these technologies make the most energy-efficient selection and design decisions. BPA will seek to standardize offerings where practical.

Motors

Electrical motors are significant energy users that drive multiple equipment devices. Presently, the National Electrical Manufacturers Association premium motors reference International Energy standard IE3 motors, while IE4 (super premium efficiency) are available, but limited, with newer higher efficiency IE5 motors available on an even more limited basis and at generally lower horsepower (20 hp and less). BPA is continuing to collaborate with national labs, industrial assessment centers and others to research potential new electric motor unit energy savings measures for IE5 motors.

Measurement and Verification Protocols Custom Projects

Energy savings from custom projects make up one-quarter to one-third of the entire energy efficiency portfolio's savings. A safe, cost-effective measurement and verification process and methodology is key to providing consistent delivery of reliable energy savings. BPA created its Measurement and Verification Tools and Protocols in 2012 and updated them in 2018. Though not directly an emerging technology, BPA plans to support these custom project savings by updating its measurement and verification protocols in this plan cycle.

Agricultural

Large-Volume Heat Pump Water Heater for Dairies

Agricultural water heating in dairy farms holds significant conservation potential. Starting in 2023, BPA plans to explore the use of large-volume heat pump water heaters (HPWHs) at dairies throughout the region. These large-volume, low global warming potential HPWHs are new to the U.S. BPA will use the demonstrations and case studies to create new HPWH incentive measures for dairies. If successful at dairies, BPA will pursue additional demonstrations of these HPWHs at other types of facilities.

[42] American Council for an Energy Efficient Economy (ACEEE). (2022, March 30). "It's Time to Electrify Industry's Process Heat—with Heat Pumps." www.aceee.org/blog-post/2022/03/its-time-electrify-industrys-process-heat-heat-pumps?20March.

Variable Rate Irrigation

With zonal variable rate irrigation (VRI), an irrigation system can apply different amounts of water to different areas of a field. VRI offers potential energy savings by reducing the energy used for irrigation pumping and can also serve as a drought-mitigation strategy by reducing the amount of water applied to crops. Market adoption of this advanced technology is nominal at about one percent and only in water-short areas in the region, but there may be opportunities to demonstrate VRI in the region. BPA will partner with others to determine the next prudent research steps regarding crops, soil conditions and cost-effectiveness.

Utility Distribution

Conservation Voltage Reduction and Voltage Optimization

During this Action Plan, BPA is focusing on energy savings in the Utility Distribution sector through conservation voltage reduction (CVR), also known as voltage optimization (VO). Though neither technology is new, significant regional conservation remains. BPA's goal is to develop a new CVR/VO regional marketing campaign to encourage utilities to save energy by lowering service voltage to the lower end of the standard established by the American National Standards Institute. This marketing campaign requires that BPA staff offer dedicated expertise to utilities seeking to adopt new control strategies.

Several new products that provide on-site CVR are available for medium-to-large commercial and industrial facilities. One offers on-site voltage regulation for facilities with 480-volt service. The voltage regulation units are modular, and customers can install more than one in parallel to scale and serve larger loads. The utility would also be the owner. BPA had intended to demonstrate this product prior to the new Action Plan period but canceled the demonstration due to the pandemic. The agency plans to reschedule this demonstration.

A second product is a high-efficiency transformer with load tap changers for facilities that serve voltage above 480 volts. The facility purchases and owns the unit. Though technically a measure offered by the Industrial or Commercial sectors, BPA will offer its expertise and support the demonstration.

5 Demand Response

This section summarizes the 2021 Power Plan and Resource Program's treatment of demand response and BPA's plans for exploring and implementing demand response programs over the Action Plan period.

5.1 Demand Response Landscape and Context

BPA does not anticipate a need for peak load reductions or capacity purchases through the mid-2030s, according to the 2021 Power Plan and the 2022 Resource Program. Consequently, BPA is not currently implementing any peak reduction demand response programs or products. The 2021 Power Plan and 2022 Resource Program recommend that BPA encourage and enable the implementation of approximately 300 MW of two categories of demand response products demand voltage regulation (DVR) and time-based pricing products (time-of-use rates or critical peak pricing) to offset the electric system needs during peaking and ramping periods and to reduce emissions. Regarding time-based pricing products, BPA does not have authority to establish residential (retail) rates, but it can collaborate with customers to support the use of these technologies.

2021 Power Plan Recommendations

In the 2021 Power Plan, the Council identified a consistent regional and BPA service area need for resources to offset system demands and emissions during daily peaking and ramping (high price) periods. This particular focus in the Power Plan differs from past utility planning where seasonal peak energy and load requirements drove resource needs. The current focus is forward-facing in its anticipation of broader grid relationships and approaches to addressing climate change. Demand response products designed to reduce peaks for a few hours in a small number of seasonal peak demand

periods during each event are not useful in the Power Plan's scenarios. Most of those products cannot be used on a frequent basis to respond to daily price variations and ramps.

The Council ran several sensitivity analyses to test whether certain demand response products capable of frequent – that is, daily – deployment could help meet the new types of system needs. The Council focused on two products, demand voltage regulation and time-of-use rates, and separated these into a modeling "bin" that the Council's optimization model could independently select. With the new assumptions of how these products would be used, the Council's models selected them for the BPA service area in every sensitivity run as they produced lower power supply costs for BPA and lower emissions. By late 2026 in every sensitivity run, the 2021 Power Plan selected a minimum of 300 MW of these frequently used, low-cost, long-duration, low-consumer-impact, energy-related, load-reducing demand response products for the BPA service area. When Council assumed greater electrification loads, the Power Plan selected more than 1,500 MW of these types of products.

The 2021 Power Plan noted that, under BPA's current power sales contract, many BPA customer utilities see little value in pursuing demand response and are limited in the ability to provide a demand response resource to another utility, both within and external to the pool of BPA customer utilities. As such, the Power Plan encouraged BPA to consider establishing contract provisions so its customers could set up demand response and export this resource to other utilities, both within and external to BPA's system. The Power Plan also encouraged BPA to research opportunities to use demand response to support resource adequacy and system balancing since demand response can shift loads away from high-price periods to other times of the day when energy loads and prices are low.

BPA's Resource Program Results

Prior BPA Resource Program studies selected energy efficiency and energy purchased from the market in the least-cost mix of resources required to meet the agency's expected energy needs. The results of the 2022 Resource Program are unique in that, for the first time, demand response is included in the least-cost mix of resources for BPA.

The 2022 Resource Program's least-cost portfolio selected 436 MW of summer demand response and 283 MW of winter demand response by 2027 using two low-cost products, demand voltage regulation and critical peak pricing. The Resource Program selected these to meet short-duration energy needs in the hours and months with the highest market prices but not for capacity reductions. Reducing energy usage, such as load demand through a form of demand response, is assumed to be less costly than making market purchases of power or acquiring higher cost energy efficiency or renewables.

In every Council or BPA modeling run that considered new types of frequently used, low-cost, long-duration, energy-related load-reducing demand response products, a minimum of 300 to 400 MW of new

demand response in the BPA service area by 2027 was part of the lowest-cost resource strategy or portfolio to meet expected BPA loads.

5.2 Demand Response Goals

In the past few years, the variety of demand response products and programs in use across the country has advanced dramatically in technical sophistication, use cases and value streams. Demand response is now capable of providing large quantities of automated, reliable, predictable, low-cost and high-value energy, capacity and ancillary services. Modern demand response can be used several times each day; it no longer must be a short-duration (two- to four-hour) peak load reduction product available for 5 to 10 uses each season. It can serve as an energy-related, load-reducing product used daily to move load from high-cost periods to low-cost periods as well as used an energy-savings product.

BPA's Demand Response Strategy

The least-cost resource solutions produced by the Council and BPA modeling indicate that the most economical solution for BPA to meet its energy obligations for the Action Plan period and beyond includes some amount of demand response (the models selected at least 300 MW by September 30, 2026) in addition to energy efficiency and market purchases. The value of demand response can also extend to reducing emissions and balancing system needs during ramping periods as well as avoiding more expensive energy purchases.

BPA's near-term goal is to explore, along with BPA's customers, the potential for increasing demand response capability to offer frequently used, low-cost, long-duration, low-consumer-impact, energy-related, load-reducing demand response products in the BPA service area. This exploration will focus primarily on the application of DVR, but will also assess customer interest in the implementation of time-based pricing products.

Challenges and Strategic Opportunities

Table 19 shows the actions BPA will take to better understand the unique challenges and opportunities associated with implementing the evolving types of demand response.

Table 19. Demand Response Challenges and Strategic Opportunities

Challenge or Opportunity	How BPA Will Address
Evolution in demand response technology and program value trends.	Examine demand response products identified in the 2022 Resource Program and 2021 Power Plan, including DVR, rate-based products and similar products that are frequently deployable and low-cost, have minimal customer impact and deliver load-reducing and energy-savings benefits.
Changing demand response technology use cases.	Research opportunities for BPA to use demand response products to support adequacy and system balancing and economic resource acquisition.
No precedent strategies where both the BPA and customers might benefit from implementation of the new types of load-reducing or flexible demand response.	Develop implementation mechanisms for these demand response applications with both products and use cases in a way that provides value to BPA.
Uncertainty concerning individual customer utilities' demand response program considerations to meet identified regional and BPA demand response needs.	Support BPA customers in building the types of demand response identified in the 2022 Resource Program and 2021 Power Plan by late 2026, starting with Washington customer utilities that are required to comply with the Clean Energy Transformation Act (CETA).
Low implementation of practical demand response programs by customer utilities. Investigating demand response value streams has not been a priority for a majority of BPA customer utilities.	Encourage BPA customers to pursue DVR and rate-based products and other low-cost, high-value, flexible-demand products with programs designed in collaboration with customers and stakeholders.
Updating demand response technology and program modeling assumptions.	Update demand response modeling assumptions used in the 2022 Resource Program and 2021 Power Plan, including a new suite of energy-focused, frequently deployed, load-shifting demand response products to replace the use of standard peak-related, infrequently deployed demand response products.

Monitor Electrification Load Impacts

Currently, there is considerable uncertainty about the pace of potential electrification in the BPA service area. The 2021 Power Plan found the loads that could be placed on BPA could almost double over the next 10 to 15 years if rapid electrification occurs in BPA's service area. This could justify acquiring large quantities of energy-saving, low-cost, frequently used and/or load-reducing demand response products. The pace and degree of electrification has a direct and significant effect on the quantity of energy-related load-reducing demand response selected by power planning models. Monitoring the pace and breadth of electrification in the region and BPA service area will help inform BPA's demand response strategy.

Keep Current with Demand Response Technology, Costs and Use Cases

As additional data concerning demand response product definitions, use patterns, costs and benefits become available, BPA will update modeling inputs for subsequent Resource Program studies to reflect any significant changes and share updated inputs with the Council and customer utilities.

6 Program Evaluation

BPA's program evaluation provides an independent assessment of performance and improvement opportunities for the agency's energy efficiency measures and programs. These valuable insights support BPA energy efficiency programs in achieving continuous improvement and efficient, cost-effective implementation.

BPA's energy efficiency program performs both impact and process evaluations.

- **Impact evaluations** verify the amount of energy savings that BPA claims toward its energy savings targets and assess cost-effectiveness.
- **Process evaluations** assess how well programs are designed and implemented in an effort to better understand and improve program performance.

6.1 Evaluation Benefits

Evaluation offers a variety of benefits for BPA, stakeholders and the region, including these:

- **Ensures reliability of savings** – Though BPA builds reliability into its portfolio during the planning process and program implementation activities, an impact evaluation is an important component to independently and retrospectively assess the amount of savings achieved. BPA's impact evaluations ensure program savings achievements are accurate and reliable and also allow the agency to assess the effectiveness of program spending.
- **Encourages continuous improvement** – BPA conducts process evaluations to confirm program successes, determine whether programs are meeting goals and outcomes, and identify areas of improvement to enhance financial stewardship and customer service. Evaluation provides

actionable recommendations that help program managers understand why effects occurred and offer constructive and strategic feedback on ways to continuously improve current and future program offerings. Programs use these data internally to strengthen programs.

- **Provides transparency and accountability** – Evaluations provide transparency and additional certainty to stakeholders through independent verification of savings. They also provide transparency into program activities and accountability to ensure that the agency is making wise investments in these resources. BPA also shares evaluations publicly for regional learning and transparency.

6.2 Structure and Processes

The agency follows the evaluation policies developed through the BPA Quality System Strategy and Implementation (QSSI) process and updated as needed via BPA's Energy Efficiency Decision Making Process. Impact evaluation generally follows the Regional Technical Forum guidelines for evaluation.

BPA evaluates program savings in partnership with stakeholders using best practices. Development of BPA's evaluation strategy includes input from internal staff and external stakeholders into scope, approaches and the unique considerations of various groups. Internal staff includes contracting officers, technical representatives and planning, management, programs, engineering and marketing teams. External stakeholders include BPA's customers, Regional Technical Forum and the Council.

Impact evaluations are typically conducted by a third party that works with BPA's Planning and Evaluation group, which is separate from the group responsible for implementing BPA's Energy Efficiency Program with utilities.

6.3 Coverage of the BPA Portfolio

Consistent with the Regional Technical Forum guidelines, BPA aims to achieve 90 percent coverage of the energy efficiency portfolio through impact evaluation in a four-year period.[43] When selecting which programs to evaluate in a given year, the evaluation will balance the objectives of portfolio coverage, strategic research needs, timely feedback, annual budgets and the cost and effort required.

To achieve these broad impact evaluation coverage requirements, BPA has separated the portfolio into four major measure categories. The agency plans to begin one study per year on a rolling basis on a

[43] BPA's impact evaluations sample from at least 90 percent of savings in the portfolio, with additional coverages goals by measure type.

four-year cycle. Table 20 shows the major measure categories and the planned cadence of these evaluations. BPA plans to begin one study per year on a rolling basis on a four-year cycle.

Table 20. Planned Evaluation Cadence by Measure Category

	2023	2024	2025	2026
Nonresidential Lighting	✓			
Custom – Nonindustrial		✓		
UES Delivery Verification			✓	
Custom – Industrial				✓

In addition to these planned studies, BPA recently completed an evaluation of its custom industrial portfolio for Option 1 utilities in FY 2022,[44] and it expects to complete the evaluation of its industrial portfolio for Option 2 utilities in mid-2023.

BPA also plans to conduct focused studies targeting specific measures to reduce uncertainty and other valuable topics. BPA will implement these studies as it identifies opportunities. In FY 2023, BPA will complete an evaluation assessing the persistence of Strategic Energy Management (SEM) measures.

BPA undertakes process evaluations over time, rather than once every few years, to maximize the value to programs, provide more timely feedback and minimize evaluation costs. In FY 2022, BPA completed a process evaluation of its SEM offering. In FY 2023, BPA plans to conduct an evaluation of its Low Income Energy Efficiency Program.

For more information on planned, in-progress and completed evaluation studies, visit BPA's evaluation webpage, www.bpa.gov/energy-and-services/efficiency/evaluation.

[44] BPA categorizes utilities as Option 1 or 2 for measurement and verification purposes. For Option 1 utilities, BPA is often involved throughout the project lifecycle by providing technical support for project development, implementation, approval, and measurement and verification. Option 2 utilities provide their own technical support, including measurement, verification and custom project quality control, such as a project proposal and completion report review.

7 Market Research

This section discusses the history of market research at BPA and the benefits BPA sees in leveraging market research as part of its overall strategy. It outlines the agency's vision and goals for its research and gives an overview of the markets BPA plans to study over the Action Plan period.

7.1 BPA's Market Research History

Historically, BPA's market research work focused primarily on quantifying and counting Momentum Savings. The agency gathered market research with the main goal of increasing the rigor and accuracy of its Momentum Savings estimates. Over the past couple years, the focus has gradually expanded to consider how to better leverage the many strategic benefits of market research for improved BPA's Energy Efficiency Program design and delivery.

Moving forward, the agency will continue to improve ways to extract and share market intelligence from its Momentum Savings models with program planners and managers. The following sections expand on the strategic benefits of BPA's market research and set a vision and goals for efforts moving forward.

7.2 Benefits of Market Research at BPA

BPA's market research provides significant energy savings by quantifying Momentum Savings and is a vital piece of BPA's conservation strategy. This strategy provides several advantages to the agency, its customers and the Northwest:

- **Provides market intelligence to maximize program impact** – Leveraging market data collected through BPA's Momentum Savings market research helps the agency develop and

refine programs by creating awareness of shifts in market dynamics, such as changes in price, market actors or the supply chain. In the past, BPA has used this research to determine which markets and measures no longer need utility support and to uncover new program opportunities.

- **Informs investment strategies** – BPA's Momentum Savings research illuminates where energy savings are happening without utility funding, so the agency and the region at large can better target investments. By quantifying the total efficiency resource in the market, BPA can direct its efforts to achieving the greatest impact. That may mean investing in harder-to-achieve measures, measures with greater demand and/or capacity value, or areas of inequity.
- **Supports data-driven decisions** – BPA uses research and data to establish more accurate potential assessments, load forecasts and measure baselines that encourage more informed decisions by power planners and analysts.

7.3 Vision and Goals for Market Research

The Energy Efficiency Program aspires to provide strategic data, market insights and analysis so that BPA leadership can offer bold demand-side programs and policies that lead to an efficient, decarbonized and resilient grid across the Northwest.

BPA realizes this vision by performing market research and building robust quantitative market models that adhere to four established high-level principles:

- **Study what matters** – BPA prioritizes studying markets with high value to the agency and the region. The agency's research aims to have the greatest impact on BPA's and the region's market intelligence about energy efficiency.
- **Be consistent in methods** – BPA uses a structured research process and follows a consistent analytical framework.
- **Use an open, accessible process** – BPA openly engages stakeholders and third-party reviewers to help improve accuracy and better meet stakeholder needs.
- **Build regional market intelligence** – BPA aspires to provide all stakeholders with actionable data and market insights to support planning and program functions.

Market Research Goals

High-level market research goals for the Energy Efficiency Action Plan are to:

- Elevate the value of demand-side resources by integrating carbon, capacity and demand flexibility metrics into market modeling.

- Study changes in electric load and adoption of conservation resources to build intelligence on resilience and enable informed planning decisions.
- Generate market intelligence to help program and policy decision-makers maximize impact and ensure benefits reach the Northwest equitably.

BPA energy conservation research goals align the 2021 Power Plan recommendation that the region continue to support market research, stock assessments and related analyses to help ensure that the region will meet its energy efficiency goals.

7.4 Markets BPA Studies

During this Action Plan period, BPA plans to study four core markets: nonresidential lighting, residential HVAC, commercial HVAC and nonresidential adjustable speed drives. BPA will consider expanding to additional markets as the need arises and resources allow. High-level plans and research focus areas for the four core markets are described below. More information is on the BPA's market research webpage.[45]

Nonresidential Lighting

BPA continues to investigate the nonresidential lighting market, comprehensively focusing on stock and sales trends and questions of product adoption, use and lifetimes. BPA intends to gather market intelligence from multiple industry perspectives and analyze sales data directly from Northwest lighting distributors to understand how this market is adjusting to technology developments and new codes and standards. The agency is also undertaking a market characterization study to determine the effect of lighting controls on the overall energy consumption of lighting. The market intelligence gathered from this research will inform BPA program and planning decisions as well as provide guidance on policy.

Residential HVAC

Residential HVAC is the largest residential end use. Energy-saving improvements in this sector provide many benefits beyond electricity reduction, including capacity savings and grid resilience during winter and summer peaks, lower maintenance costs and carbon footprint, and greater comfort and air quality. These benefits increase proportionately to the region's growing focus on capacity needs, decarbonization and equity. There is an increasing need for rigorous market research to track market shifts as well as provide intelligence to help programs and planners understand which homes and subregions require the most assistance in reducing heating and cooling energy consumption. BPA plans to explore improving

[45] Bonneville Power Administration. "Lighting Market Research." Accessed February 2022. www.bpa.gov/energy-and-services/efficiency/market-research-and-momentum-savings

geographic granularity in its analysis of NEEA's annually collected HVAC sales data and capture the time-varying value of residential HVAC energy savings in its market model.

Commercial HVAC

The commercial HVAC market is in a period of transformation, largely due to updates to state and regional building codes that require the electrification of commercial heating systems. Therefore, it is critical to follow and understand trends in commercial HVAC. BPA is developing a new market model to track changes in electric consumption over time in the commercial HVAC market. This model will focus on product adoption, installation and the addition of controls technology in new construction and large retrofit projects. Using permit data, BPA will get the best available stock data on trends in product selection and installation. BPA is undertaking a market characterization study of controls to determine their effects on the overall energy consumption of commercial HVAC. During this Action Plan period, the agency also plans to collect market intelligence from multiple industry perspectives including manufacturers, distributors, manufacturer representatives and building specifiers. Together, these studies will inform BPA program and planning decisions as well as increase mutual understanding of the impact that state building codes are having in the Northwest.

Nonresidential Adjustable Speed Drives

Adjustable speed drives are a form of electronic control that can save significant energy for motor-driven equipment. Recognizing that motors consume the majority of electricity in the Industrial sector, many industries have adopted adjustable speed drives as a reliable technology to reduce the electric consumption of motor-driven equipment such as pumps and fans. BPA will continue to track the penetration of adjustable speed drives in the industrial stand-alone pumps and fans market. BPA is interested in exploring the usage and impact of adjustable speed drives in other sectors and applications, including industrial material handling and processing, the water and wastewater industry, and stand-alone pumps and fans in the Commercial sector. Given the intersection between drives and different motor-driven equipment markets, the agency plans to collect market intelligence from multiple perspectives, including motor/drive manufacturers/distributors, equipment manufacturer/distributors and engineering firms and installers.

8 Next Steps

This section presents the steps BPA will take throughout the Action Plan period to implement the strategies detailed in this document. BPA will publish an update midway through the Action Plan period, describing any changes since original publication and associated impacts on forecasted savings.

Refine BPA's Energy Efficiency Program. Energy conservation acquisitions are getting more difficult and expensive, and cost-effectiveness constraints impact the Energy Efficiency Program's offerings. This Action Plan is a living document, and BPA will adapt the strategies within it to address shifts in the energy landscape.

Evaluate portfolio offerings and delivery channels. BPA is already investigating moving some programs, such as commercial HVAC and lighting, to less costly midstream delivery channels and prioritizing as the most cost-effective technology applications within measure groups. It is also ramping up delivery models, such as digital home energy reports to replace paper, to allow for a higher volume of savings at lower cost. Achieving a lower-cost portfolio will take time, and BPA will carefully balance Power Plan targets, priority areas identified by BPA's Resource Program and needs of BPA's utility customers.

Focus on customer needs. BPA will continue to work with its customers to shape its efficiency program offerings and acquisition models to best fit an evolving power system and BPA and customer needs. BPA prioritizes its relationship with each utility customer and its support of local program implementation.

Monitor new policy impacts. The national, state and local policy landscape for the utility industry is changing rapidly with significant uncertainty on the horizon. BPA will actively monitor all federal, state and local policies as it shapes its portfolio in future years.

9 Forecasting Methodology

This section provides further details on the methodology used by BPA staff to develop the forecasts of savings and costs in this Action Plan.

9.1 BPA Program Savings

Program savings include measures funded through BPA's energy efficiency incentives as well as those funded directly by utility customers. These include unit energy savings, calculated measures, customer measures and other programs.

BPA developed six-year forecasts for the Action Plan using the 2021 Power Plan targets and cost-effective potential, Resource Program results, recent program history and other considerations. The agency summarized its program history and the outcomes of the Power Plan and Resource Program at multiple levels of BPA's measure taxonomy, enabling staff to forecast their programs, and to see the corresponding program history, Power Plan potential and Resource Program selections, at the appropriate level of granularity.

The agency assumed that approximately 30 percent of savings would come through utility self-funded measures. This assumption occurs universally across all sectors and programs.

BPA used an iterative process, in which program staff forecast their individual programs and measures then rolled up the results to the portfolio level. Agency staff collaborated in reviewing the results and discussing the adjustments made in an iterative process.

9.2 BPA Program Costs

BPA forecasted program costs are similar to the program savings forecast. Program staff developed reimbursement rates, calculated as a ratio of dollars per first-year savings ($/kWh), from BPA's program history across multiple levels of the measure taxonomy. These reimbursement rates served as a reference point for future reimbursement rates. Program staff could plan increases or decreases from these levels based on future program plans and priorities. Forecasts of fixed program costs were also developed.

As with the savings forecast, BPA projected program costs and compared them to BPA's Integrated Program Review (IPR)-defined budgets. Additional metrics such as the average $/kWh, $M/aMW and levelized costs were developed by year and sector for review and comparison to historical averages. BPA performed subsequent adjustments on an iterative basis.

Projections of costs used the same approximate 30 percent self-funding assumption as was applied to the savings above.

9.3 Northwest Energy Efficiency Alliance Market Transformation

NEEA provided forecasts for market transformation and included individual measure level detail. NEEA forecasts categorized whether the savings were the result of a code or standard or of a market transformation initiative. NEEA's forecast includes projections of BPA's program savings to prevent any double-counting of achievements in a given market.

9.4 Momentum Savings

For more information about how BPA selects for which markets to measure and model Momentum Savings, see the section titled "Principles of Our Work" beginning on page 5 in Momentum Savings & Market Research: Purpose & Principles.[46]

[46] Bonneville Power Administration. (2021, August). *Momentum Savings & Market Research.* www.bpa.gov/-/media/Aep/energy-efficiency/momentum-savings/bpa-momentum-savings-market-research-purpose-and-principles.pdf

10 Abbreviations and Acronyms

ACEEE	American Council for an Energy Efficient Economy
aMW	Average Megawatts
AWM	Advanced Water Management
ASHP	Air-Source Heat Pump
BPA	Bonneville Power Administration
Btu	British Thermal Unit
CC&S	Commissioning, Controls and Sizing
CCA	Climate Commitment Act
CETA	Clean Energy Transformation Act
CO_2	Carbon Dioxide
Council	Northwest Power and Conservation Council
CVR	Conservation Voltage Reduction
DHP	Ductless Heat Pump
DVR	Demand Response Voltage Regulation
EE	Energy Efficiency
EEI	Energy Efficiency Incentive
EER	Energy Efficiency Representative
ESI	Energy Smart Industrial
ESIP	Energy Smart Industrial Partner
ESRP	Energy Smart Reserved Power
EUI	Energy Use Intensity
EV	Electric Vehicle
FCRPS	Federal Columbia River Power System
FEEAP	Federal Energy Efficiency Advisor Program
FY	Fiscal Year
HPHC	High Performance, High Capacity
HPWH	Heat Pump Water Heater
HRV	Heat Recovery Ventilator
HVAC	Heating, Ventilation and Air Conditioning
hp	Horsepower
IIJA	Infrastructure Investment Jobs Act
IPR	Integrated Program Review
IRA	Inflation Reduction Act
IT	Information Technology
kV	Kilovolt
kWh	Kilowatt Hour
LED	Light-Emitting Diode
LEPA	Low Energy Precision Agriculture
LESA	Low-Elevation Spray Application
MDI	Mobile Drip Irrigation
MESA	Mid Elevation Sprinkler Application
MW	Megawatt
NEEA	Northwest Energy Efficiency Alliance
NW	Northwest
PTCS	Performance Tested Comfort Systems
PVC	Polyvinyl Chloride
QSSI	Quality System Strategy and Implementation
RPAC	Regional Portfolio Advisory Committee
RETAC	Regional Emerging Technology Advisory Committee
SCADA	Supervisory Control and Data Acquisition
SEM	Strategic Energy Management
TSP	Technical Service Provider
UES	Unit Energy Savings
USACE	U.S. Army Corps of Engineers
USBR	U.S. Bureau of Reclamation
USDA	United States Department of Agriculture
VFD	Variable Frequency Drive
VO	Voltage Optimization
VRI	Variable Rate Irrigation
VSHP	Variable Speed Heat Pump
WRAP	Western Resource Adequacy Program