



Energy Conservation Annual Review 2022





A note from Jamae Hilliard Creecy

Vice President of Energy Efficiency

It is my pleasure to share the Bonneville Power Administration's (BPA's) Energy Conservation Annual Review 2022, which highlights Energy Efficiency Program accomplishments achieved by BPA, our customers, and regional partners in fiscal year 2022. With BPA provided incentive funding and infrastructure support, 36.2 average megawatts (aMW) of programmatic and market transformation energy savings were delivered last year.

Energy conservation investments reduce the need for higher-cost resource acquisitions to meet BPA's power load obligations and help conserve one of the region's most important energy resources—the Federal Columbia River Power System (FCRPS).

Despite extraordinary challenges including labor shortages, supply chain constraints, inflated material and equipment costs, and financial hardships for many of our customers and those they serve, significant energy savings were achieved in 2022. BPA made program implementation and accessibility improvements which resulted in removal of ineffective measures, addition of new measures, and increased incentive levels across each sector. BPA also implemented a new energy reporting system to enable customers to more efficiently and effectively report conservation savings.

BPA will continue to assess opportunities for program improvement, including identifying the type of energy savings and implementation timelines that best meet the agency's conservation goals at the lowest possible cost. Using energy more efficiently is one of the most cost-effective ways to save money, reduce greenhouse gas emissions, and meet growing demand for energy.

We look forward to ongoing collaboration with our customers and regional partners to advance innovative energy solutions to sustain and enrich life in the Pacific Northwest.

Warmest regards,



Jamae Hilliard Creecy

A history of resource acquisition

Since 1982, BPA and its customers have achieved a lasting resource that includes...

2,541.7

aMW acquired

10.1M

avoided tons of CO₂e

\$1.9B

ratepayer savings every year

Accomplishments in 2022

36.2

aMW acquired (providing 82 MW of winter morning capacity)

144,143

avoided tons of CO₂e (equivalent to 31K cars' annual emissions)

\$27.1M

bill savings for ratepayers (enough to fund 509 average-wage jobs)

778,340

square feet serviced by weatherization measures

563

custom projects completed (providing 10.01 aMW of energy savings)

26,400

average Pacific Northwest homes powered annually by the energy saved

2022 Energy Savings

In 2022, BPA, our customers, and partners delivered 36.2 aMW of energy savings. This equates to reducing consumers' cost of electricity by \$27 million annually and avoiding emissions of more than 144,143 tons of carbon dioxide equivalent (CO₂e) or taking 31,335 cars off the road for a year.¹

BPA customers implemented program offerings which were directly responsible for 30.5 aMW of energy savings in 2022. As shown in **Table 1**, utilities acquired a diverse mix of conservation resources across all sectors, which is something BPA's Energy Efficiency Program aims for by offering a robust suite of measures, programs and technical services.

TABLE 1: Programmatic Savings by Sector, FY 2022

Sector	Savings (aMW)
Residential	8.8
Commercial	9.4
Industrial	8.2
Agricultural	1.1
Utility System Efficiency	0.2
Federal	2.9
Total	30.5

TABLE 2: Savings by Type, FY 2022

Savings Type	Savings (aMW)
Programmatic	30.5
NEEA Reported Savings	5.7
Momentum Savings	TBD
Total	36.2

Annual conservation achievements also include 5.7 aMW of Northwest Energy Efficiency Alliance (NEEA) energy savings as shown in **Table 2**. Please note, Momentum Savings totals are not yet available, but will be reported at the end of the Energy Efficiency Action Plan (Action Plan) period.

¹ CO₂e reductions are based on the Northwest Power and Conservation Council's estimate of 0.91 pounds/kWh CO₂e avoided. See https://www.nwccouncil.org/media/filer_public/ac/d9/acd94f75-20ef-4d1c-b0c9-ea5cf113778d/2018-1.pdf



A History of Conservation in the Pacific Northwest

The Power Act and its influence on energy conservation

The Pacific Northwest Electric Power Planning and Conservation Act (the Act) was passed in 1980 to help electrical consumers of the Pacific Northwest achieve cost-effective energy conservation, encourage the development of renewable energy resources, establish a representative regional power planning process, and to ensure an efficient and adequate power supply into the foreseeable future. The Act obligates the Bonneville Power Administration to acquire and encourage the development of energy conservation to maximize the value of the FCRPS. While the regional energy landscape has evolved significantly since 1980, energy conservation has proven to be a consistent and reliable resource for the agency and our customers. Energy efficiency has been a somewhat invisible but critical resource that has helped mitigate the impacts of market swings, extreme weather events, and a changing utility landscape.

Over the more than 40 years since the passage of the Act, in partnership with our utility customers and stakeholders, BPA has acquired an estimated 2,541.7 average megawatts of energy. To put this into perspective, this is enough energy to fuel 1.86 million homes for a year and an estimated \$1.9 billion in annual ratepayer savings due to our commitment to energy conservation and investment in the FCRPS.



2022 Accomplishments

BPA's success is built upon the foundation of a talented and dedicated team of professionals including managers and staff specializing in planning and evaluation, program development, engineering, technical oversight, emerging technologies, program marketing, market research, and customer service working together to meet customer needs and achieve the agency's conservation goals.

Residential Sector

In addition to acquiring 8.8 aMW of savings, the Residential sector continued developing infrastructure for scaling residential efficiency acquisition over the next several years with a focus on high-efficiency water heating measures and heating, ventilation, and air conditioning (HVAC).

In 2022, plans were initiated to retire the Performance Tested Comfort Systems program in 2023 and replace it with new residential HVAC measures with updated ratings requirements that better align with modern testing.

BPA, working with Energy350, developed new efficiency requirement ratings for HVAC measures based on updates to Heating Seasonal Performance Factor and Seasonal Energy Efficiency Ratio ratings.

BPA's Comfort Ready Home program gained traction by supporting utility implementation of residential weatherization and HVAC measures and helped to



Residential weatherization upgrades improve heating and cooling efficiency.

ensure a well-trained contractor pool to install these measures. In 2022, Comfort Ready Home expanded its contractor resources by providing updated on-demand instructional videos and the first in-the-field contractor workshop. Held in Hermiston, Oregon, the workshop provided weatherization contractors with comprehensive training on how to evaluate home energy use as a system.



Low Income Program

The program directly benefits low-income residents by funding the installation of energy efficiency measures in their homes at no cost to them. This program provides critical assistance to the most vulnerable households in BPA's service territory and in 2022 resulted in 0.321 aMW savings.

With a focus on improving program offerings, along with adding new deemed measures, BPA increased utility and grant payment cost caps for several existing residential low-income deemed measures to reflect rising equipment and installation costs.

BPA provided low-income grants to Washington, Oregon, Montana, and Idaho. State grantee teams moved forward on some unique residential opportunities such as repurposing multifamily buildings for housing homeless families, partnering with local tribal communities for energy efficiency work, supporting Community Action Partnerships to navigate a growing number of funding sources, and developing training opportunities to expand the workforce to meet a growing demand for energy efficiency.

Partnering with the Lower Elwha, Coeur d'Alene, Kalispel, Blackfeet, Yakama, Fort Bidwell, Cowlitz, and Rural Nevada Development Corporation, tribal grants were

established. Tribal grants provide funding for efficiency measures including insulation, windows and patio doors, ductless and ducted air source heat pumps, heat pump water heating, and efficiency appliances and lighting, which reduces energy burden and improves the health and safety of residents' homes. Grant funding supports the tribe's ability to manage staffing, community outreach, and the scale of the program to best meet their needs. BPA's Low Income Program also worked with tribes including Blackfeet, Colville, Burns Paiute, Yakama, and Coeur d'Alene to install high efficiency heat pumps as part of partnering on an engineering pilot program. These improved offerings and relationship building efforts laid the groundwork for additional work with regional federally recognized tribes in 2023.



Ductless high capacity heat pump installed by the Blackfeet Tribal Housing Authority.



Totem poles from the Jamestown S'Klallam Tribe commemorating its history and legends. "S'Klallam" is a Salish term for "The Strong People".

Commercial Sector

The largest programmatic savings came from the Commercial sector, which acquired 9.4 aMW of resources. In 2022, significant effort was made to identify opportunities to add new measures to the portfolio and reconfigure existing measures to drive more market activity. As a result, there are many portfolio additions anticipated in FY 2024 including new prescriptive measures for heat recovery ventilation, efficient pumps, variable frequency drives on pumps, secondary windows, refrigeration floating pressure controls, and retrofitting doors on refrigerated display cases. The existing measures for air-source heat pumps and ductless heat pumps are also being reconfigured to better align with equipment available on the market.

Measure level savings trends were reviewed using information from BPA's nonresidential lighting calculator. Lighting program activity was examined to help determine remaining opportunities for fluorescent to Light-emitting diode (LED) conversions. The findings of this review guided decisions around Action Plan energy savings goals and targeted incentive increases for specific lighting technologies.

Schools are included in this sector, so BPA and its customers partnered on energy efficiency projects that make positive contributions to local communities. With support from BPA, the Monument Elementary School in Monument, Oregon, installed a high efficiency dedicated outdoor air system to improve air circulation, ventilation, and thermal comfort. The project reduced HVAC energy use by 50 percent and overall building energy use by 35 percent.

Work has also started on replacement of the existing Nonresidential Lighting Calculator. The next version will offer a more stable platform for the region's utilities and trade allies to track and report lighting upgrade activities.

New System, Better Service

In 2022, BPA invested in a modernized energy conservation reporting system to improve processing time to help customers get reimbursed for savings faster. The BPA Energy Efficiency Tracking System (BEETS), debuted in October 2022 and has reduced processing times by 25 percent from initial submittal through payment to customers.

BEETS is a self-service platform offering on-demand reporting for customers that features visual dashboards with visibility into the application progress, budgeting and payments. It allows invoicing at the utilities' convenience. BEETS also features automated workflows and data verification checks to help expedite processing.

By creating new tools, researching new approaches, and evaluating new savings opportunities, BPA is well positioned to advance energy efficiency now and in the future.

Trade Ally Network Northwest (TANNW) activities supported market partners challenged by COVID-19 limitations, increased engagement within the HVAC market, and helped utilities and trade allies navigate pandemic restrictions. Despite the difficult conditions, important relationships were maintained with 693 enrolled trade allies throughout the region. On the marketing front, TANNW developed a streamlined field guide, an expanded library of case studies, a fact sheet explaining Washington State's clean building law and the impact it might have on trade allies, and a video describing best practices in selling advanced rooftop unit control systems.

Industrial Sector

BPA's Industrial sector and Energy Smart Industrial (ESI) partners supported 8.2 aMW in reported savings in 2022 and perhaps more importantly developed a multi-year pipeline of projects that exceeded 20 aMW by the end of the year.

A hybrid approach pilot to delivering Strategic Energy Management (SEM) was launched and included a blended industrial cohort consisting of 12 sites spread across four states. The lessons learned from this cohort will inform recruitment strategies based on each potential participant's capacity to engage in the process rather than geographical location.

The Industrial sector also helped develop and test BEETS leading up to the soft launch of the system in October to ensure ESI partners knew how to use the system before it went live.

In collaboration with ESI and the American Council for an Energy Efficient Economy (ACEEE), the Industrial sector identified potential pilot sites for industrial heat pumps.

This technology is emerging as a viable option in an expanding number of industrial applications.

This work will help the region stay ahead of the curve by ensuring industrial electrification occurs as efficiently as possible.

A process evaluation of ESI's SEM offerings was completed and found the program was largely hitting the mark in its approach to engaging utilities and end-users in identifying and pursuing behavior-based energy savings in the industrial sector.



Efficient refrigeration and scrubbing upgrades at a Northern Washington industrial fruit packing warehouse.



Agricultural Sector

BPA's work in the Agricultural sector achieved 1.1 aMW of savings in 2022. The Agricultural sector collaborated with several utilities on a variety of successful projects, including installing variable frequency drives (VFDs) for two 2,000 horsepower pumps at the East Improvement District served by Umatilla Electric Cooperative. The VFDs moderate the speed of the pumps to better control the amount of water applied to individual crops during various stages of growth throughout the growing season. The project saved the district approximately 2.7M kWh (0.31 aMW) in annual savings.

In Okanogan Public Utility District's (PUD) territory, BPA worked with the Okanogan Irrigation District to replace three of their four pumps at its Shellrock pumping station that provides water to more than 1,000 local irrigators. The energy and maintenance savings will help to keep irrigation rates low for the district's 1,020 accounts representing more than 5,000 acres of farmland, about the size of 4,000 football fields.

BPA worked with Benton Rural Electric Association to install new air circulating fans for the fourth-generation JK Family Dairy Farm. Single-speed circulating fans were replaced with variable speed drive (VSD) controlled permanent magnet fan motors and saved 26,000 kWh, which was a 50 percent reduction in fan energy use. The fans are now able to run more slowly in the winter and evenings. This was the first installation of these types of fans in the region.



Columbia River pump installation helps recover and stabilize Eastern Oregon aquifers.

BPA provided technical support on the installation of a dozen large pumps to irrigate 26,500 acres with water from the Columbia River on a \$46 million project near Hermiston, Oregon. Using the Columbia River as the water source helps recover and stabilize the declining basalt aquifers in Eastern Oregon. BPA, working with the Umatilla Electric Cooperative, prioritized energy efficiency efforts for this important water conservation project.

Anticipating forthcoming challenges, the Agricultural sector is investing in demonstration projects to promote zonal variable-rate irrigation conversions and advanced water management irrigation scheduling. Additionally, a new agriculture energy audit measure was explored to holistically identify potential energy efficiency improvements at producer's sites.



Success Stories From The Field

BPA's Energy Efficiency staff provide technical expertise to support utility customers and the customers they serve when implementing conservation projects across the region. Here are some highlights of technical support provided in 2022.

- BPA's engineers worked with school districts to utilize remaining COVID relief funds to install efficient HVAC systems. Working with Jefferson PUD, BPA replaced the HVAC system at Salish Coast Elementary school in Port Townsend, Washington, as part of a \$2 million project. Reverse-cycle chillers were also installed with an estimated annual energy savings of 232,100 kWh.
- BPA engineers and Jefferson County PUD worked with Pacific Seafood, one of the world's largest shellfish hatcheries located in Washington's rural town of Quilcene, to upgrade lighting in its cultivation facilities. The project replaced 241 large metal 1000-watt halide bulbs with energy efficient 250-watt LEDs. This resulted in a 75 percent reduction in the facility's power consumption and \$130,000 a year in energy savings.
- BPA collaborated with Tacoma Power on a variety of energy efficiency projects at Joint Base Lewis-McChord (JBLM) in Tacoma, Washington. Projects include HVAC improvements, compressed air system upgrades, standby generator block heater retrofits, and over 100,000 interior and exterior LED lighting upgrades throughout the base. BPA provided support with contracting and financing arrangements, leveraging the federal-to-federal partnership with JBLM.



Upgraded 250-watt LED grow lights provide warmth for commercial oyster harvesting tanks while reducing electricity consumption.



Paul Farnan, third from left, principal deputy assistant secretary of the Army (Installations, Energy and Environment), along with Col. Phil Lamb, center, JBLM commander, and representatives of Tacoma Public Utilities, pose with the energy efficiency incentive check during the presentation at JBLM on Oct. 18, 2022. Photo By Edzel Butac.



Engineering Services

Whether designing a school retrofit, tracking emerging technologies, or vetting vendor claims of product performance, BPA engineers stretch the capabilities and bandwidth of our customers.

BPA created new offerings to deliver savings to untapped, underserved markets, and developed more multifamily products. Support for product development for large volume heat pump water heaters (HPWHs) in multifamily applications was provided. Working with Ecotope Engineering, Seattle City Light, and Tacoma Power, BPA established a rigorous product development process, the Technology Innovation Model, to guide development of new HPWH technologies. The implementation of this process resulted in six new products with additional manufacturers poised to enter the market in the next year. BPA contributed to the development and launch of a commercial HPWH skid package with grid stability capability and peak load reduction strategies serving Bayview Towers, a 100 unit low-income senior housing building.

Similar assessments were also launched for commercial end-use applications including dairies, lodging and public buildings, such as fire stations, police stations, and hospitals.



Bayview Towers commercial heat pump water heating system.

BPA engineers identified ways to combat the effects of drought in the Lost River Electric Cooperative service area using existing technology and incorporating custom project solutions. While working with the Big Lost River Irrigation District to assist with another project, engineers identified an opportunity to mitigate water loss through evaporation and natural soil drainage. The solution was to install irrigation lining along the extensive canal system, improving water delivery, and providing more irrigation to the fertile lands of the Lost River Valley. The district is currently searching for additional funding opportunities, and BPA engineers are standing by to help guide this project to completion to improve the efficiency of this irrigation district and economic health and vitality of the region.



Program Evaluation

BPA's program evaluations provided an independent assessment of performance and improvement opportunities for energy efficiency measures and programs.

In 2022, BPA implemented changes to its cost-effectiveness approach, moving from a granular measure level analysis to a more holistic portfolio level measurement. Historically, BPA used the Northwest Power and Conservation Council's calculations of cost-effectiveness for each measure group. This approach was effective when there was an abundance of low-cost conservation and high prices for other resources. As alternate resources like wind, solar, and gas costs fell and conservation became more expensive to acquire, BPA's cost-effectiveness approach had to evolve. Using past BPA practices, many critical residential measure offerings would have been excluded from the portfolio, including residential HVAC and weatherization measures that are critical for our customers and vital to support low

income programs. By assessing the cost-effectiveness of its programs overall, rather than one by one, BPA can include these vital measures while maintaining a program that is cost effective and ensures a low-cost, reliable resource for the region.

An evaluation of Energy Efficiency's custom industrial portfolio included site visits, data gathering, and engineering analysis for a sample of 40 custom measures. Evaluation results provided valuable information, which confirmed the value of these savings and helped improve program performance by recommending things like an expansion to BPA's streamlined approach to measurement and verification, enhancements to project documentation review, and a review of the treatment of baselines in the calculation process. These recommendations will help support the continuous improvement of a critical piece of BPA's efficiency portfolio.

Compliance Oversight

Compliance oversight is the review process that BPA performs on a sample set of applications and projects to verify that energy conservation acquired is in compliance with BPA's statutory and financial obligations. In 2022, this review process was integrated into BEETS with some notable changes, such as selection based on

individual applications rather than invoice packages, automated notifications, direct uploads into the system, and saved results for reference. These changes help streamline the compliance process for BPA and our customers.



Emerging Technologies

BPA works closely with utilities and stakeholders throughout the region to identify new technologies and demonstrate them in real-time applications in the field. In 2022, water heating was a large focus for emerging technologies supporting the Advanced Water Heater Initiative, a national effort to accelerate the adoption of HPWHs. This includes both retrofit of existing building stock and new construction.

Current projects are focused on the development of advanced water heaters with higher performance, efficiency, and demand response support. As part of this wider initiative, BPA led the development and adoption of large volume central HPWHs.

BPA and Snohomish PUD collaborated with Ecotope Engineering to design, test, install, and commission a variety of different HPWH products with the goal to provide healthy, comfortable, and energy efficient spaces. The result was an award-winning hot water system in the HopeWorks Station, an innovative campus that brings together high-performance, affordable housing with training programs to transition residents to high-skilled jobs and independence. This project received a regional technology innovation award from the American Society of Heating, Refrigerating and Air-Conditioning Engineers.

Additionally, BPA funding spurred adoption of advanced



Hopeworks Station in Everett, Washington.

water heaters with marketing and training of supply-side market actors. The goal is to make yesterday's new technologies today's market standard, like the recent examples of ductless heat pumps and LEDs in many applications.

BPA is also exploring high performance, high capacity heat pumps. In 2022 a regional field test was launched to quantify energy and capacity savings across all three heating and cooling zones. Originally the test only covered ducted systems, but at the request of several utilities, the team added high performance ductless heat pumps to the study. Data from this research is expected to be the first field performance data for cold climate heat pumps in the United States.



Customer Service

Customer service is a central tenet of BPA's Energy Efficiency Program. A focus on enhanced customer service led to several system and process improvements.

In 2022, BPA resumed in-person annual regional customer roundtable meetings to tackle issues, share successes, and establish best practices. Each event was packed with a full agenda, including topics such as cost-effectiveness and sector energy savings strategies, BPA marketing products, distribution system upgrades, an overview of the new BEETS reporting system, low-income program updates, news from NEEA, the Washington Clean Energy Transformation Act changes, and discussions about why utilities should promote energy conservation.

BPA facilitated 31 bilateral EEI fund transfers between customers, which allowed for flexibility in deploying more than \$3.62 million to achieve energy savings. BPA provided customers with an additional opportunity to fully utilize EEI funds carried over from the last rate period to increase energy savings. This allowance for carryover increased the total FY 2022 Conservation Purchases budget to \$140.1 million.

Energy Efficiency Representatives also helped transition customers to the new BEETS reporting system with instructor-led training sessions, a suite of reference materials, instructional videos, and scheduled drop-in office hours for direct customer support. The Utility Focus Group (UFG) provided early feedback on system design and were the first external BEETS users. Approaching the system with a range of perspectives, the UFG provided critical insight and ideas for how best to use and improve the system. Their involvement helped BPA hit the ground running with the rest of the utilities, and their contributions were invaluable to the successful launch of BEETS.

Thanks to these efforts, all customers have successfully transitioned to the new system.



Marketing

It was a busy year filled with organizing and hosting virtual conferences, developing training materials for BEETS, responding to utility customer requests for new marketing materials, and planning for the annual Efficiency Exchange (EFX) Conference that was held in May of 2022.

Hosted by BPA and NEEA, this premier networking and learning conference engages energy efficiency professionals from across the Northwest. Regional and national attendees from public and private utilities, consulting and research firms, and government and non-profit organizations come together to learn and connect to help the region more effectively achieve its energy efficiency goals.

The conference was held virtually for the second year in a row in response to the COVID-19 pandemic. Session topics included clean buildings, electric vehicle charging, Washington's Clean Energy Transformation Act, variable speed motors, decarbonization, and others. EFX was well attended with 250 participants, and 85 percent rated the event as good or excellent.

BPA's promotional offerings were expanded and included more personalized support for utilities, taking on direct requests for new marketing materials like bill stuffers, postcards and brochures, tailored for the requesting utilities. This approach incorporated input from the requesting utility to modify and improve promotional materials.

A catalog of customer resources was also developed on how to use the new BEETS reporting system, including FAQ documents, user guides, video demos, and tutorials. Additionally, the Energy Efficiency Utility Quick Start Guide and sector New Opportunities Guides content was expanded to include BEETS information.



Market Research

BPA conducted market research and analysis of the different energy markets and shared findings with internal and regional stakeholders.

Residential HVAC Market Model [research](#) provided important information to BPA program managers, NEEA, and regional utilities. In 2021, almost three-quarters of the region's homes had some form of cooling with saturation of heat pumps reaching 26%, which was corroborated by a 2022 general population survey conducted by the Energy Trust of Oregon. These [results](#) provided quantitative evidence to regional power planners on the rising adoption of cooling and heat pumps and enabled more accurate analyses of future power system needs.

Multiple sources of residential weatherization market research data were combined with regional insulation installer surveys to characterize the Pacific Northwest weatherization market. [Research](#) showed that regional weatherization activity is steady, and regional codes and program requirements have likely improved average insulation installation practices.

BPA published a comprehensive [package](#) of research and model results of stand-alone industrial pumps and fans in 2022, which provided foundational data on industrial adjustable speed drives growth, remaining potential, and

savings estimates. The information supported regional utility programs and NEEA's Extended Motor Products program and further exploration of power drive system retrofit opportunities in the region.

Another focus was quantifying "Momentum Savings" which result when an end user chooses an efficient option without receiving a financial incentive directly from an energy efficiency program. Many factors may drive such choices, including the "momentum" generated by past efficiency programs, new codes and standards, corporate sustainability policies, and technology trends. Momentum Savings are energy savings that are cost effective, not directly paid for by utilities, not part of NEEA's Net Market Effects, and above the Northwest Power and Conservation Council's Power Plan baseline. In 2022, the Market Research Team completed and presented three Momentum Savings market models. BPA's research data and methods are vetted by an external expert panel composed of independent industry experts and regional stakeholders. The market research team quantifies and monitors Momentum Savings over the duration of BPA's Action Plan period and will be final in early 2028.



Market Transformation

BPA's energy efficiency portfolio includes market transformation energy savings achieved in partnership with NEEA, an alliance of 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 region. NEEA supports BPA customers by pooling regional resources to identify and validate emerging technologies, find and remove barriers to adoption, and deliver tools and resources to encourage consumers to use energy efficient technologies. They actively seek technologies that have broad benefits across the region, including in small and/or rural markets. Examples include variable speed heat pumps, HPWHs and efficient pumps.

As shown in **Table 3**, NEEA contributed 5.7 aMW of regional savings directly attributed to their influence in expediting market transformation opportunities. NEEA's investment in a variety of evolving market technologies accelerated the removal of barriers to existing and new efficiency technologies, influencing their adoption without continued direct investment.

NEEA advanced market transformation initiatives in its Extended Motor Products program in clean water pumps and fans and advanced its initiative in High Performance Commercial HVAC. They also worked with BPA to provide foundational research for the region's energy planning and program activities.

In 2022, BPA collaborated with NEEA on the third Residential Building Stock Assessment and plans were put in place for the next Commercial Building Stock Assessment. The End Use Load Research study is metering end use loads in 400 residential and 80 commercial buildings to further our understanding of how and when buildings use energy and demonstrate the time value of energy efficiency. NEEA research and evaluation efforts help BPA and the region understand how markets function and how to overcome barriers to expedite the adoption of existing and future market technologies.

TABLE 3: NEEA Reported Savings by Sector, 2022

Sector	Savings (aMW)
Residential	5.0
Commercial	0.7
Industrial	0
Agricultural	0
Total	5.7



2022 Energy Efficiency Action Plan

The Action Plan describes BPA's portfolio management strategy and program measures to meet the agency's energy conservation goal of 300 aMW from 2022-2027.

The Action Plan objectives are to:

- Acquire energy efficiency savings that provide the greatest benefit to BPA by aligning the Energy Efficiency program portfolio with the 2022 Resource Program;
- Meet BPA's share of the energy efficiency goals established in the 2021 Power Plan and prioritize cost-effective measures; and
- Offer a portfolio that all BPA customers can implement, specifically supporting small, rural, and residential utilities.

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

The agency consulted with customers to solicit information about the value of its efficiency programs and

opportunities for improvement. BPA 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.

Demand energy response was incorporated into the energy efficiency portfolio. A business case was developed to support implementation of a demand response product through an energy efficiency lens in demand voltage reduction.

The Action Plan is a living document, implementation progress is tracked, and as needed, BPA revises its strategies and actions to ensure energy savings goal are met.

BPA continues to work with customers and stakeholders to chart a course for energy efficiency acquisition under long-term preference power contracts. Creating a post-2028 outlook for BPA's Energy Efficiency Program provides an opportunity to think creatively about how to best continue a legacy of energy conservation.



Looking Ahead

BPA and its customers have successfully acquired much of the most cost-effective and easily accessible efficiency potential, and we recognize the energy landscape is changing:

- Renewables rapidly continue to come down in price and are cost effective relative to many types of resources, including some energy efficiency measures.
- Emerging regulatory trends in some states and local jurisdictions are accelerating decarbonization efforts and highlighting the importance of equity.
- Thermal plant retirements and electrification make capacity an emerging regional issue.
- The increasing frequency of extreme weather events, combined with the above trends, places emphasis on the timing, location, and flexibility of energy conservation measures and demand-side resources.

Considering these challenges and changes, BPA's Energy Efficiency Program will continue to evolve to meet agency and customer needs. We will examine the benefits of our energy conservation program by improving our methods for calculating capacity reductions and avoided emissions. We look forward to continuing conversations about how to improve program accessibility, ensure diverse and equitable portfolio offerings, and enhance program participation.

Long-Term Strategies

To adapt to changing market conditions and savings goals, BPA has been hard at work planning for cost effective energy efficiency across multiple sectors. Easily adoptable "low hanging fruit" like LEDs have now saturated the market and become standard so new offerings are being developed. For example, in the Residential sector, there is a new focus on HVAC, home energy reports, HPWHs, home weatherization, and new low-income opportunities. BPA is positioning itself to provide customers with a more robust set of offerings and provide an improved pipeline of new measures.



Appendix A

FIGURE 1: BPA's Annual Programmatic Savings (aMW), FY 2017-2022

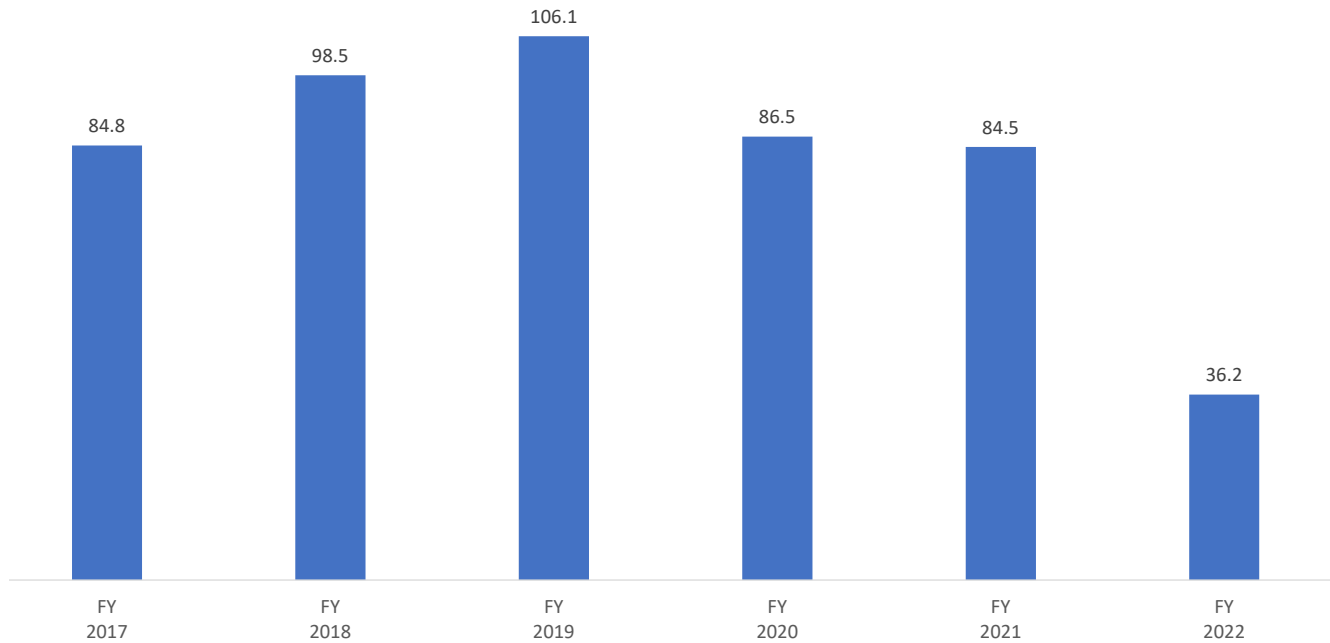


TABLE 4: BPA's Annual Conservation Savings, FY 1982-2022 (aMW)

	Total FY 1982-2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	Total FY 1982-2022
Residential	484.0	22.3	13.5	12.4	9.9	10.0	8.8	560.8
Commercial	369.9	20.6	23.3	23.3	10.6	14.3	9.4	471.5
Industrial	264.8	19.9	15.2	15.1	10.9	12.6	8.2	346.7
Agricultural	59.2	4.5	5.2	5.6	1.0	1.5	1.1	78.1
Multi-Sector	108.9	0.0	0.0	0.0	0.0	0.0	0.0	108.9
Utility System Efficiency	8.8	0.6	0.3	0.3	0.0	0.5	0.2	10.7
Federal	2.1	5.0	1.1	1.4	6.6	1.1	2.9	20.2
Sectors Subtotal	1297.7	72.9	58.6	58.1	39.1	40.0	30.5	1596.9
Residential Building Codes	128.6	-	-	-	-	-	-	128.6
Commercial Building Codes	59.9	-	-	-	-	-	-	59.9
Building Codes Subtotal	188.5	-	-	-	-	-	-	188.5
NEEA Reported Savings	251.7	13.1	22.3	29.9	27.0	29.3	5.7	378.9
BPA Momentum Savings	307.2	-1.3	17.7	18.1	20.4	15.2	N/A	377.4
TOTAL SAVINGS	2045.1	84.8	98.5	106.1	86.5	84.5	36.2	2541.7

Data in this document may include corrections to prior years' data. This data should be used as official data until the next Annual Review.

TABLE 5: BPA's Annual Conservation Savings by Sector, Funding Source, FY 2017-2022 (aMW)

	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	Total FY 2017-22
Programmatic Residential							
Low-Income Weatherization, State Implemented	0.3	0.1	0.2	0.1	0.2	0.1	1.0
Programmatic Low-Income Weatherization, Utility Self-Funded	0.2	0.1	0.1	0.0	0.1	0.1	0.6
Programmatic Low-Income Weatherization, EEI Funded	0.3	0.5	0.3	0.2	0.2	0.2	1.6
Programmatic Utility Self-Funded	12.0	3.3	5.7	1.1	0.9	2.4	25.3
Programmatic EEI Funded	9.5	9.5	6.2	8.4	8.7	6.1	48.3
Programmatic Residential Subtotal	22.3	13.5	12.4	9.9	10.0	8.8	76.8
Programmatic Commercial							
Programmatic Utility Self-Funded	9.0	7.0	11.8	0.7	3.8	0.5	32.8
Programmatic EEI Funded	11.6	16.2	11.5	10.0	10.5	8.9	68.8
Programmatic Commercial Subtotal	20.6	23.3	23.3	10.6	14.3	9.4	101.6
Programmatic Industrial							
Programmatic Utility Self-Funded	8.3	5.9	4.1	2.5	2.5	1.4	24.7
Programmatic EEI Funded	11.6	9.3	11.0	8.5	10.1	6.8	57.3
Programmatic Industrial Subtotal	19.9	15.2	15.1	10.9	12.6	8.2	81.9
Programmatic Agricultural							
Programmatic Utility Self-Funded	0.2	1.2	1.7	0.0	0.2	0.0	3.3
Programmatic EEI Funded (with Scientific Irrigation Scheduling [SIS] adjustment)	4.3	4.0	3.9	1.0	1.3	1.1	15.6
Programmatic Agricultural Subtotal	4.5	5.2	5.6	1.0	1.5	1.1	18.9
Programmatic Utility Systems Efficiency							
Programmatic Utility Self-Funded	0.5	0.1	0.1	0.0	0.3	0.1	1.0
Programmatic EEI Funded	0.1	0.2	0.2	0.0	0.2	0.1	0.9
Programmatic Utility Sys. Efficiency Subtotal	0.6	0.3	0.3	0.0	0.5	0.2	2.0
Programmatic Federal							
Programmatic Federal	5.0	1.1	1.4	6.6	1.1	2.9	18.0
Programmatic Federal Subtotal	5.0	1.1	1.4	6.6	1.1	2.9	18.0
NEEA and Momentum Savings							
NEEA Reported Savings	13.1	22.3	29.9	27.0	29.3	5.7	127.2
BPA Momentum	-1.3	17.7	18.1	20.4	15.2	N/A	70.2
NEEA and Momentum Savings Subtotal	11.9	40.0	48.0	47.4	44.5	5.7	197.4
Total Savings	84.8	98.5	106.1	86.5	84.5	36.2	496.6
ALL EEI-Funded Programmatic Savings							
ALL EEI-Funded Programmatic Savings	42.8	40.9	34.6	34.8	32.4	26.1	211.5
ALL Self-Funded Programmatic Savings							
ALL Self-Funded Programmatic Savings	30.1	17.7	23.5	4.3	7.6	4.4	87.7
All Programmatic Savings	72.9	58.6	58.1	39.1	40.0	30.5	299.2

Data in this document may include corrections to prior years' data. This data should be used as official data until the next Annual Review.

Glossary

Average megawatt, or aMW	aMW refers to a unit of energy output over a year, equivalent to the energy produced by the continuous operation of one megawatt of capacity over a period of time. It is also an average of one million watts transferred over a period of time (often a year, thus average annual megawatts). One aMW is therefore equivalent to one megawatt produced continuously for 8,760 hours (the number of hours in a year) for a total of 8,760 megawatt-hours.
CO₂e	Carbon dioxide equivalent or CO ₂ e means the number of metric tons of CO ₂ emissions with the same global warming potential as one metric ton of another greenhouse gas.
Conservation	Conservation means any reduction in electric energy consumption resulting from an increase in the efficiency of electric energy use, production or distribution, the direct application of a renewable resource, or modifications in consumer behavior that decrease energy consumption.
Energy conservation measures, or ECM	Materials or equipment installed or activities implemented to produce electric energy savings. A specific action or installed device that saves energy. Also referred to as conservation measures.
First-year savings	BPA programs are reported in terms of the savings that occur in one year, although the cost effectiveness of measures is based on the expected life of the measures. Measures can last 10, 20 or more years. Therefore, total savings are calculated by multiplying the first-year savings by the measures' life.
HVAC	Heating, ventilation and air conditioning systems include furnaces, ducts, air control system filters, baffles, motors, vents, sensors and chillers. These systems present many efficiency improvement opportunities. HVAC systems are found in houses and industrial facilities, but the primary use of the term is associated with cooling, heating and venting of air within large commercial structures.
Low-Income Residential Weatherization (state-implemented)	This program mitigates the rising energy costs that make it difficult for low-income citizens to adequately heat and cool their homes. The program helps low-income earners use less energy, reduce their energy bills, and live in safer and more comfortable homes using BPA funding through state programs and partnerships with local community action agencies, like Community Action Partnership in Idaho. Low income means household income that is at or below 200 percent of the federal poverty level, unless a statewide eligibility definition is provided.
Market Transformation	The strategic process of intervening in a market to create lasting change in market behavior by removing identified barriers and/or exploiting opportunities to accelerate the adoption of all cost-effective energy efficiency as a matter of standard practice. Market transformation refers to a specific programmatic effort operated through NEEA that receives funding directly from BPA and additional funding from utilities.
Momentum Savings	Momentum Savings are energy savings that are cost effective, not directly paid for by utilities, not part of NEEA, Net Market Effects, and above the Northwest Power and Conservation Council's Power Plan baseline (Council baseline).
Multi Sector	Multi sector is a catchall term for savings that don't fit into a single sector.
Sector	Sector refers to a segment of a market, such as residential, commercial, industrial and agricultural end users. Each sector employs a different approach and program design specific to its contents.

System efficiencies

System efficiencies refer to improvements in transmission, distribution and transformers that save energy. Examples include lower-loss transformers (silicon core), reconducted distribution lines with higher voltage and conservation voltage reduction, which lowers the voltage on distribution lines and saves energy during low load time periods.

Utility

Utility refers to an electric utility that is either consumer-owned or investor-owned. A consumer-owned utility can be a municipal electric utility, a public utility district, an irrigation district, a cooperative, a mutual corporation or an association that is engaged in the business of distributing electricity to one or more retail electric customers.

Utility self-funded

Beginning in FY 2007 and continuing through today, utilities can choose to self-fund conservation and achieve credit towards the conservation adjustment as described in the Tiered Rates Methodology, which went into effect in FY 2012. To be eligible, conservation activities must meet the same requirements as BPA-funded activities.

Weatherization

Modifying a building's exterior to reduce energy consumption for heating or cooling. Weatherization measures include adding insulation, installing insulated windows and doors, and air sealing.

B O N N E V I L L E P O W E R A D M I N I S T R A T I O N



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