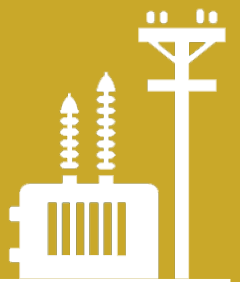




# BPA Energy Efficiency Utility Distribution New Opportunities Guide



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# Introduction

The Bonneville Power Administration (BPA) energy efficiency program is continuously evolving to meet Public Power's share of energy savings targets laid out by the Northwest Power and Conservation Council's Power Plan. Strategically, BPA also uses energy efficiency to address future energy resource constraints in a cost effective manner.

Many utilities in the Pacific Northwest and throughout the United States have aging transmission and distribution infrastructure. As the distribution system landscape changes and demand for power increases, BPA provides opportunities for utilities to increase system performance, while also claiming energy savings. Typically, these savings come in the form of service conductor replacements or substation power transformer replacement. Other energy savings 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).

This guide provides an overview of a selection of measures available for work done that improves utility distribution systems, and the recently created [Re-conductor and Transformer \(RT\) Calculator](#). Customers may report utility distribution measures using the one of two ways in the BPA Energy Efficiency Tracking System (BEETS): (1) Custom Project Program (i.e., Option 1 or Option 2); or (2) Re-Conductor and Transformer (RT) Program.

For more information about the Utility Distribution sector program components and offerings, please consult section 12 of the current BPA [Implementation Manual](#).

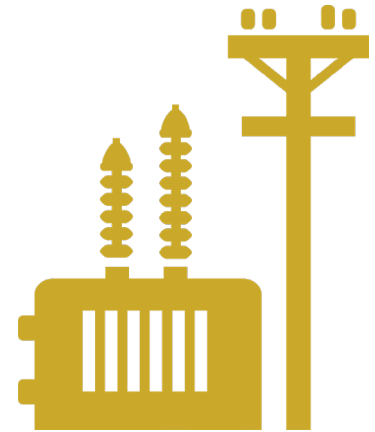


## Utility Distribution Measures

Utilities are under pressure to improve reliability and system performance, while dealing with the ongoing challenges of this aging infrastructure, and increasing customer demands for higher reliability and power quality. Utility Distribution measures offer a financial incentive for utilities pursuing improvements to their distribution systems.

BPA acquires energy savings through the Utility Distribution sector offerings, which includes voltage optimization (VO) and electrical distribution system improvements. VO is a technique for improving the efficiency of the electrical grid by reducing voltage on the feeder lines running from substations to retail loads. System improvements create greater efficiency of the electrical distribution system.

The utility distribution measures focus exclusively on the savings acquired through work done by the utilities to improve their distribution system. BPA engineering staff work with the utilities' distribution engineers and conservation representatives to find and track energy savings, and available incentives.



# Sector Offerings

## CONSERVATION VOLTAGE REDUCTION/VOLTAGE OPTIMIZATION

A key measure utilities should consider is CVR or VO, which is a technique that can improve the efficiency of the electrical grid by reducing voltage on the feeder lines running from substations to utility retail loads. The measure can be very cost effective, and allows the utility to pursue aggressive or mild savings. For example, a 2.5% average annual reduction in voltage typically results in a minimum of 1% energy reduction. These typically range in 200,000-700,000+ kWh/year savings per substation, from small to large substations, respectively. BPA customer utilities have successfully deployed voltage reductions in the 1-4% range on the primary lines and have maintained the ANSI service voltage standard to all retail customers.

There are two qualifying approaches to CVR/VO. BPA created the first approach, Simplified Voltage Optimization Measurement and Verification Protocol, to assist utilities with implementing voltage optimization projects. This simplified protocol requires analytics from load-flow studies or other tools, and is based on the Regional Technical Forum guidelines. It focuses on substations serving residential and small commercial end-use loads and requires specific system stability thresholds be met prior to lowering service voltage.

The second approach, a custom measurement and verification (M&V) allows for increased feeder understanding and the possibility for higher system optimization. It also allows opportunities for the utility to explore demand voltage reduction, a demand response opportunity that targets peak hours to employ voltage reduction to decrease demand impacts. However, it can be more labor intensive.

With either approach, utility distribution engineers, conservation staff and system operators will work together with BPA engineers to plan, launch, measure and validate CVR/VO on their distribution system.

UTILITY DISTRIBUTION MEASURES		
MEASURES	UTILITY BEETS* REPORTING METHOD	
	CUSTOM PROJECT PROGRAM (OPTION 1 OR OPTION 2)	RE-CONDUCTOR & TRANSFORMER PROGRAM
Power Transformer Replacement	X	X
Service Conductor Replacement	X	X
Higher Distribution Primary Voltage, including insulator additions and replacement	X	X
Transformer Load Management (replacement of improperly sized transformers for loss improvements)	X	X
Balancing Load and Phases	X	X
Adding Parallel Feeders	X	X
Operation Improvement (recognition and phase balancing)	X	X
Power Factor Improvements to Reduce Line Losses	X	X
Volt-Amperes-Reactive, or VAR (reactive power) management	X	X
Fixed and Switched Capacitors	X	X
Lower Loss Service Distribution Transformer; Single- or Three-Phase, Pole or Pad Mounted	X	X

## SYSTEM IMPROVEMENTS

BPA offers several distribution level efficiency improvement measures and may include the following measures:

- Substation power transformer replacement
- Service conductor replacement
- Higher distribution primary voltage, including insulator additions and replacement
- Transformer load management (replacement of improperly sized transformers or loss improvements)
- Balancing loads and phases
- Adding parallel feeders
- Operation improvement (recognition and phase balancing)
- Power factor improvement to reduce line losses
- Volt-amperes-reactive (reactive power) management
- Fixed and switched capacitors
- Lower loss service distribution transformer; single or three phase, pole or pad mounted



# BPA Resources

The following resources are available to help utilities optimize their working relationships with BPA, program operations and other personnel to support utilities in their work to achieve better energy efficiency and savings.



## MARKETING MATERIALS

Marketing support is available to help utilities communicate the value of utility distribution upgrades with their ratepayers. Utilities may work directly with the [Program Marketing team](#) to create new promotional materials or customize existing materials. Your BPA Energy Efficiency Representative (EER) can help you connect with Program Marketing to find a solution that meets your needs.

## GETTING STARTED WITH UTILITY DISTRIBUTION SECTOR

To start a utility distribution project, utilities are encouraged to reach out to their EER or Engineer. Since there is more than one way to submit a project's completion report and book the savings, we encourage you to work with your EER or energy efficiency customer service engineer (CSE), so they can help to guide the project successfully.

There are different funding options available for utility distribution projects. Your energy efficiency incentive (EEI) budget is issued based on a specific formula that calculates your utility's share of the BPA system. EEI budgets are part of a utility's Energy Conservation Agreement (ECA), and are issued for the two-year rate period. These funds can be used for utility distribution projects. Another option to help keep rates low long-term is self-funding the project. Self-funding projects are qualifying energy savings for which a utility chooses not to seek a payment from BPA. Some utilities use their performance payment to pay for additional energy efficiency, and other utilities have the approval from their board or council to self-fund additional energy efficiency in addition to using their EEI budget. Utilities are encouraged to work with their EER to review your projects, timelines, and funding options to determine the best path forward.

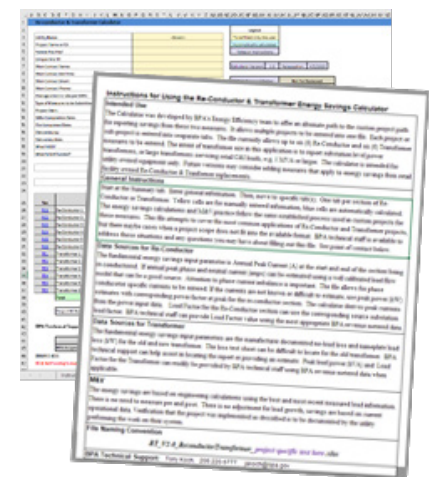


## RECONDUCTOR & TRANSFORMER PROGRAM AND RT CALCULATOR

BPA's [RT Calculator](#) and Transformer Program that utilizes the RT Calculator provides a more streamlined approach to the calculations and documentation, reducing technical and administrative work for utility and BPA staff. Your CSE will work with the utility's distribution staff to ensure the calculator is filled out correctly and all necessary documents are provided.

This calculator is also able to capture savings from transformer load management (replacement of improperly sized transformers), balancing phase current and adding parallel feeders.

The updated RT Calculator allows utilities the ability to capture savings from upgrading distribution transformers to amorphous core material or other incremental improvements that are based on the U.S. Department of Energy 2016 distribution transformer efficiency standard. A distribution transformer does not necessarily need to have an amorphous core material to be eligible for a BPA incentive. Consult with your CSE for more details.



## ADDITIONAL RESOURCES

- [Utility Distribution System Efficiency \(DEI\) Phase 1 Report](#) Background information on the Distribution Efficiency Initiative study to support and encourage marketing transformation of distribution efficiency improvements via simplified cost-effective measures.
- [Implementation Manual \(IM\)](#) provides guidelines and requirements for implementing EE projects in the region.
  - See [Section 4.1 Custom Projects Payment Rate Table](#) provides incentive payment rates for custom projects based on project type and measure life.
  - See [Section 4.6 Custom Projects Documentation Requirements](#) outlines required documentation for option 1 and option 2 custom projects.
- [IM Document Library](#) contains all documents referenced in the Implementation Manual.
- [Custom Projects Documentation Requirements](#) outlines required documentation for option 1 and option 2 custom projects.
- [Custom Projects Payment Rate Table](#) provides incentive payment rates for custom projects based on project type and measure life.





# Sector Payment Summary

PAYMENT SUMMARY	
PROGRAM COMPONENT OR MEASURE	PAYMENT
12.1 Utility Distribution Custom Project Program (4-19 year measure life)	\$0.33 per kWh or 70% of project cost
12.1 Utility Distribution Custom Project Program (20+ year measure life)	\$0.38 per kWh or 70% of project cost
12.2 Re-Conductor and Transformer Program (4-19 year measure life)	\$0.33 per kWh or 70% of project cost
12.2 Re-Conductor and Transformer Program (20+ year measure life)	\$0.38 per kWh or 70% of project cost

