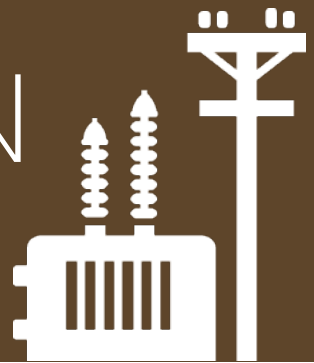




BPA ENERGY EFFICIENCY UTILITY DISTRIBUTION NEW OPPORTUNITIES GUIDE



Introduction **1**

Utility Distribution Measures **2**

Conservation Voltage Reduction/Voltage Optimization3

System improvements4

BPA Resources **5**

Marketing Materials5

Getting Started with Utility Distribution Sector6

Re-conductor & Transformer (RT) Calculator7

Additional Resources8

Sector Savings Overview **9**

Introduction

The Bonneville Power Administration, or 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, or CVR, also referred to as voltage optimization, or VO.

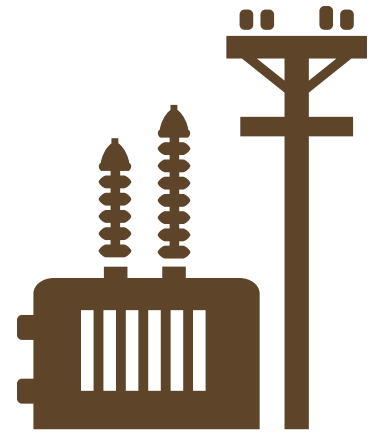
This guide provides an overview of a selection of measures available for work done that improves utility distribution systems, and the recently created [Reconductor and Transformer, or RT, Calculator](#). For more information about the Utility Distribution sector program components and offerings, please consult section 11 of the [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 and electrical distribution system improvements. Voltage optimization 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 or 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.



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 EER and the BPA marketing staff are happy to help you 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 BPA Energy Efficiency Representative or Engineer. There are multiple paths to submit project completion reports and book savings so working with your EER or engineer will help guide the project successfully.

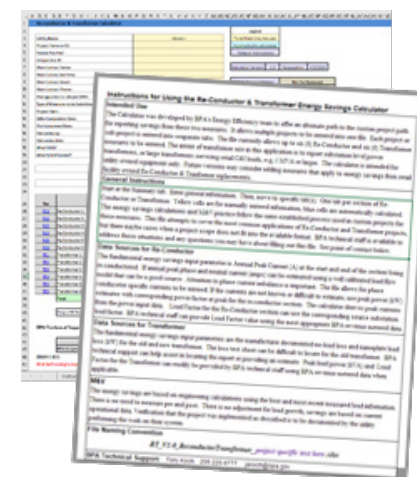
There are different funding options available for utility distribution projects. Your EEI budget is issued based on a specific formula that calculates your utility's share of the BPA system. EEI budgets are part of the utility's Energy Conservation Agreement (ECA), and are issued for the two-year rate period. These funds can be used for utility distribution projects. Another option to help keep rates low long-term is self funding. Self-funding 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.

RE-CONDUCTOR & TRANSFORMER CALCULATOR

BPA's [RT Calculator](#) is a helpful tool to report utility-system improvements and claim energy savings for option 1 utilities. The RT Calculator is an alternative to submitting limited measures via custom project C1 file. The most common utility improvements are service conductor replacements, substation and distribution transformer replacements. The RT Calculator offers the same incentives as those available in the [BPA Option 1 Custom Project Calculator](#). However, the RT Calculator provides a more streamlined approach to the calculations and documentation, reducing technical and administrative work for utility and BPA staff. BPA engineers will work with utility 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.

An updated version of the calculator will allow 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 a BPA energy efficiency customer service engineer for more details.



ADDITIONAL RESOURCES

- [Utility Distribution Efficiency Initiative Study](#) 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.
- [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 Savings Overview

These are some of the most frequent Utility Distribution measures utilities in the BPA service territory have installed from 2013 to 2020.

MEASURES	ENERGY SAVINGS (kWh)	ENERGY SAVINGS (aMW)	BPA INCENTIVES
Conductors	5,157,334	0.59	\$ 1,711,734
Transformers	1,250,731	0.14	\$ 482,592
Voltage Optimization	14,649,082	1.67	\$ 1,500,261
Grand Totals	21,057,147	2.40	\$ 3,694,588