



TIP 23: EPRI P35: Overhead Transmission

Context

Transmission companies are focused on improving safety and reliability, while looking for ways to reduce operations and maintenance costs. Increasing transmission capacity without making large capital investments and reducing capital expenditures for new/refurbished equipment are major priorities. BPA is partnering with the Electric Power Research Institute (EPRI) to address these needs.

This project is an organizational effort to better coordinate BPA/EPRI research activities for increased efficiency and productivity. Membership association with EPRI allows BPA to go far beyond what BPA's own facilities could provide in terms of duration and extremity of testing and subject matter considered. For Program 35 (Overhead Transmission) the strategy for EPRI involvement is to promote R&D through EPRI program projects and supplemental projects that are directly applicable to BPA's business lines and agency obligations. Pure knowledge from data gathered is, of course, gained through this affiliation; but the primary focus is on finding and promoting EPRI projects that directly apply to bulk power transmission owners like BPA. BPA project managers are selected based on their expertise in a particular area as well as the relevance of that subject to BPA's needs, and are expected to facilitate the involvement of other Subject Matter Experts (SMEs) in projects that can produce a demonstrable return on BPA investment.

This is a programmatic effort to formalize BPA's collaboration with EPRI so that engagement is less arbitrary and more focused, with careful attention to a project's value added.

Description

The Electric Power Research Institute's Program 35, *Overhead Transmission*, addresses research needs of transmission asset owners. It includes projects focused on specific components (e.g., insulators, compression connectors and cross arms) as well as projects focused on transmission-related issues (e.g., lightning and grounding, live working and transmission capacity). It delivers a blend of short-term tools such as software, reference books and field guides, together with longer-term research, such as component aging tests and the development of sensors for monitoring line components and performance. The program consists of multiple

projects that are added or concluded during each program year.

This program also performs long-term laboratory experiments aimed at better understanding the aging and failure mechanisms of structures and line components. Corrosion laboratories create environments to better understand the impact of corrosion above and below ground; insulators are tested for aging and degradation to learn more about their long-term performance characteristics.

Why It Matters

Overhead transmission is a major area of responsibility for meeting BPA's strategic objectives. This program encompasses and addresses the technology needs described in the Transmission Technology Roadmap. BPA's continued participation assures the agency's representation in this program's governing body.

Collaboration with other EPRI member utilities affords opportunities to leverage agency interest, share information and, in particular, avoid the very high costs associated with independently conducting this research. BPA's membership in this program includes access to EPRI's laboratories and testing facilities.

Goals and Objectives

BPA's participation will add the results of current EPRI R&D projects to Transmission Engineering design and analyses practices as well as provide BPA's contribution to EPRI member utilities in the following areas:

- Foundation analysis and design practices at BPA
- Conductor compression fittings and other advanced conductor work at BPA
- BPA's subgrade corrosion management practices
- BPA practices and techniques for live working
- BPA's work with polymer insulators and other composite components
- Lightning performance and analyses on BPA transmission lines and structures

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Project Start Date: January 1, 2009

Project End Date: Annual Membership Renewal

Key Activities:

In the coming year, the Overhead program expects to accomplish the following:

- New research on advanced line design and emergency restoration
- Updated reference books, guidelines, and field guides
- Evaluation of new and emerging inspection technologies
- Development of an inspection tool for subgrade corrosion on structures, foundations, and anchors
- Forecasted transmission line ratings methodologies
- Determination of dynamic load impact factors for overhead lines
- Development of a software tool for estimating the lightning impulse strength of transmission lines
- Evaluation of the vibration performance of high-temperature low-sag (HTLS) conductors
- Continued research on:
 - Transmission line resiliency
 - Line switches
 - HVDC lines
 - Selection, application, and maintenance of composite structures
 - Accelerated tests of polymer insulators
 - Selection of overhead line tension
 - Accelerated aging tests of compression connectors

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Links

EPRI reports are available to BPA employees here:
<http://internal.bpa.gov/Services/Library/Pages/Databases.aspx>

In 2018, TIP 23e: EPRI P35 Supplemental: High Temperature Conductor and Connector Systems-Phase II was subsumed into EPRI Program 35 as EPRI Project P35.014. Further reporting on this project will be included in TIP 023: EPRI P35 Overhead Transmission.