

Improving Grid Safety and Resilience During Extreme Weather Events and Wildfires



Background, Objectives, and New Learnings

Distribution systems are under continual pressure to improve resiliency, reliability, and performance during extreme weather and other environmental events. These major events (found in diverse regions and climates include wildfire, ice, and wind, among others) present unique challenges to the distribution system that can impact many customers and present distinct safety concerns.

Utilities continue to improve grid safety, reliability, and resiliency through modernization efforts. At the same time, utilities are exploring technologies, designs, and practices that can reduce risks and minimize the impact of extreme events. With this in mind, EPRI is launching this new research project to investigate different approaches and management practices to address both of these needs.

This project aims to continue EPRI's R&D on grid safety and resiliency, with added focus on wildfire events. The key focus areas of this project are prevention and recovery. Preventing faults and downed conductors can improve public safety, while reducing wildfire ignition and outages. Designing better overhead systems and improving operational practices can help utilities respond to events and recover more quickly.

Benefits

The potential benefits of this project include:

- Approaches to harden designs and reduce incidents of downed conductors
- Vegetation management approaches to improve resiliency and reduce wildfire risk

Project Highlights:

- Collaborate to share leading strategies and approaches to reducing wildfire risk
- Develop approach to improve grid safety and resiliency
- Test and evaluate overhead design considerations
- Test and verify advanced protection strategies
- Document emerging practices for wildfire mitigation, recovery and stakeholder engagement

- Increased understanding of the longevity of covered conductor designs
- Protection strategies that reduce downed conductors and lead to improved safety
- Increased understanding of the role of remote sensing and GIS tools to evaluate vegetation stress, fuel load, and fire risk near utility assets
- Improved customer and worker safety

Project Approach and Summary

This project intends to improve resiliency and reduce wildfire risks by providing an objective technical basis for advanced distribution system design, protection, and management techniques. Research will be conducted through lab and field testing, modeling and simulation, and investigation of leading management practices.

The protection focus is in detecting downed conductors and testing faster protection strategies. EPRI will investigate advanced protection strategies through modeling and simulation of approaches. These approaches will then be evaluated in laboratory and field settings.

Overhead asset design and testing will focus on understanding the performance and longevity of covered conductors and fully insulating the system. This will include testing the longevity of covered conductors and impact to work practices. EPRI also plans to investigate overhead structure designs, including mechanical and electrical testing of covered systems and spacer cables, flammability testing of components, and step potentials.

To build understanding of ignition scenarios and inform vegetation management strategies, EPRI plans to conduct testing, document pre- and post-event inspection practices, and document emerging management practices that use weather/ environmental data systems to improve operational preparedness and post-disaster recovery and restoration.

Deliverables

- Quarterly workshop webcasts
- Final report documenting all project findings and recommendations and annual updates as follows:
- Overhead resiliency update
 - Year 1 – Results from mechanical tests, flammability tests, step potentials from downed conductors, and industry review of arcing damage
 - Year 2 - Results from electrical and mechanical tests, aging covered-conductor systems and hardware tests, and arcing damage and burndown tests
- Protection approaches for resiliency update
 - Year 1 – Documenting existing approaches for downed conductor detection, modeling case studies of faster tripping, advanced reclosing
 - Year 2 - Results from lab tests and field pilots
- Ignition scenario development update
 - Year 1 – Determine scenarios for testing
 - Year 2 – Test results
- Operations and Maintenance Update
 - Year 1 & 2 – Document findings on vegetation management, inspections and technologies, and operational preparedness.

The non-proprietary results of this work will be incorporated into EPRI's Distribution Infrastructure, Distribution Operations and Planning, Information Communication Technology, Transmission and Distribution Environmental Issues, Water & Ecological Risk and Information and Communication Technology R&D programs and made available to the public for purchase or otherwise.

Price of Project

The cost of participation is a function of metrics as measured by distribution throughput (GWhrs). The pricing tiers are \$175,000 and \$300,000. This project qualifies for tailored collaboration (TC) or self-directed funding (SDF) and can be funded over four years.

Project Status and Schedule

This project is expected to begin in the first quarter of 2019 and take approximately 36 months to complete.

Year 1	Simulation	Lab Testing	Documentation
Year 2	Lab Testing	Documentation	
Year 3	Field Demo	Documentation	

Who Should Join

Utilities currently evaluating approaches to mitigate wildfires, changes to overhead design to improve resilience and reliability, and investigating advanced protection strategies that improve safety.

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