Improving Grid Safety and Resilience to Mitigate Ignition Incident and Fire Risks

Project Highlights:

- Facilitate an industry wildfire advisory group to prioritize relevant R&D and share leading strategies that reduce wildfire risk
- Collect vegetation management and fault incident data to support risk/spend efficacy
- Document emerging practices for wildfire mitigation, and recovery
- Evaluate protection and design strategies that reduce downed conductors and lead to enhanced public safety
- Test and verify fire protective applications

Background, Objectives, and New Learnings

Future power delivery systems must become more resilient and more adaptive to wildfire threats. Additionally, real time insights about system health, system electrical performance, and vegetation risks must become more readily accessible. Meeting these wildfire resilience requirements are anticipated to result in notable improvements in both ignition event reduction and in overall power system fire and ignition risk awareness.

Utilities in high fire threat regions are already exploring new risk reduction designs, awareness technologies, and risk mitigation leading practices. EPRI has a unique role with specialized testing and assessment capabilities that assist electric service providers with equipment and materials vetting. EPRI is also well positioned to coordinate with many industry stakeholders and to create collaboration opportunities that facilitate more efficient and well disseminated fire risk mitigation technology demonstration projects.

The objective of this project is to extend EPRI's R&D on wildfire resiliency by evaluating:

- Ignition reduction technologies
- Hardening of distribution assets and components
- Sensing and situational awareness systems
- Fire protection technologies

The new learnings from this project may inform risk reduction and mitigation strategies which, in turn, may improve public safety, worker safety, and system resilience.

Additionally, the new learnings may improve understanding of the unique ways to reduce specific ignition risk parameters.

Benefits

The potential benefits of this project include:

- New system hardening strategies and designs that reduce live downed conductor incidents.
- Documentation of vegetation management methods that decrease line contacts and fire risk.
- Increased understanding of the longevity of covered conductor designs.
- New strategies that reduce downed conductor incidents and lead to enhanced public safety.
- Increased understanding of the role of remote sensing and GIS tools to evaluate vegetation stress, fuel load, and fire risk near utility assets.
- Enhanced public and worker safety.

Project Approach and Summary

This research is expected to include testing, field evaluations, technology assessment, database development and knowledge transfer. EPRI proposes the following tasks.

Line Designs that Minimize Ignition Risk

Through EPRI's prior wildfire research, many power system components were identified that were not designed to minimize either their flammability or their potential to create arcing and molten spark showers that could initiate ground fire. This task investigates five unique areas associated with

line design where participants will benefit from test results, an industry data repository or general application guidance. The five areas include:

1. Insulated line coverings
2. Component flammability analysis
3. Minimizing conductor arcing and slap incidents
4. Testing fire protective wraps and applications
5. Forensic evaluation of fire exposed assets

Vegetation Management

Vegetation contacts with overhead power lines are a dominant cause of distribution related faults, electrical arcing, and ignitions. Treatment must be repeated between growth cycles which makes risk assessment both dynamic and highly weather dependent. This task has three components designed to support a future vision that overhead power line exposure and vegetation data layers are easily integrated into data platforms capable of analyzing different risk parameters. The three task activities include:

1. Industry data repository for vegetation treatment analytics and quantification of fault risk reduction
2. Evaluating vegetation conditions and ignition propensity based on electric arc energy curves
3. Evaluating remote sensors for vegetation condition assessment

Response and Recovery

For the situational awareness and recovery task, determining the extent of damage after a wildfire has passed through an area with power infrastructure is a critical component of future reliability and risk management. This task is designed to support both asset inspection efficiencies and evaluations in areas where fire has passed through such that assets and vegetation can be quickly evaluated and replaced where needed without unnecessarily removing structurally sound assets.

Deliverables

All project outcomes are anticipated to be disseminated over the course of the work as the results become available through:

- Wildfire advisory group events, quarterly webcasts, Lenox MA wildfire test events
- A web-repository of technologies, test results, and industry success cases

The non-proprietary results of this work will be incorporated into EPRI's Power Delivery and Utilization R&D programs and made available to the public for purchase or otherwise.

Price of Project

Pricing based on the higher of participant's annual distribution GWh or peak transmission MW. Utilities with >75,000 GWh annual distribution or 15,000 MW peak transmission, the price is $90,000. For all others, the price is $50,000. This project qualifies for self-directed (SDF) and tailored collaboration (TC) funds and can be paid over two years.

Project Status and Schedule

This project is expected to begin in the first quarter of 2023 and take approximately 24 months to complete.

Who Should Join?

Utilities currently evaluating approaches to:

- Reduce wildfire risks
- Improve total system resilience and reliability
- Quantify wildfire mitigation risk/spend efficacy

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