

# Distribution Area Review 2023



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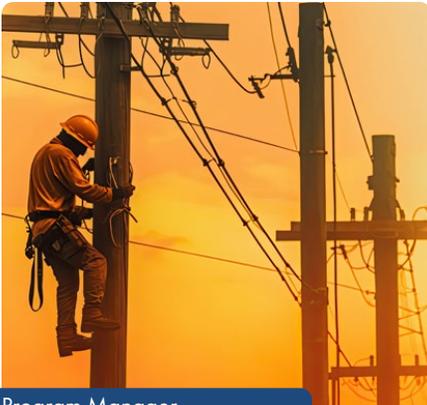
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## Introduction

Distribution system owners and managers are responsible for addressing a broad range of challenges. Asset performance, environmental compatibility, and worker & public safety are all important considerations. In order to support these utility needs more effectively, EPRI has multiple teams of experts working on each of these issues. The research performed by these teams is presented in this document to give utility personnel a comprehensive view of the R&D that is needed to manage a modern distribution system.

### P180 Distribution Systems



Program Manager  
**Joe Potvin**  
jpotvin@epri.com

- Overhead Distribution
- Underground Distribution
- Distribution Automation
- Safety & Work Practices
- Asset & Reliability Analytics

### P51 T&D Environmental Issues



Program Manager  
**Yamille del Valle**  
YdelValle@epri.com

- Vegetation Management & Remote Sensing
- Avian & Animal Interactions
- Substation Environmental Issues
- Environmental Aspects of Siting, Construction, & Maintenance of T&D Infrastructure
- Environmental Considerations of Utility Poles

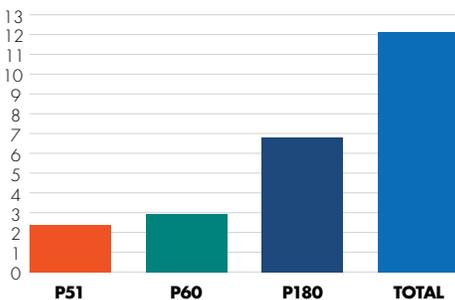
### P60 EMF and RF Health and Safety



Program Manager  
**Phung Tran**  
ptran@epri.com

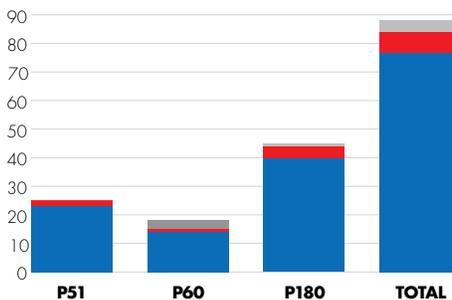
- Health Studies & Risk Communication
- Exposure Characterization & Management

### Funding



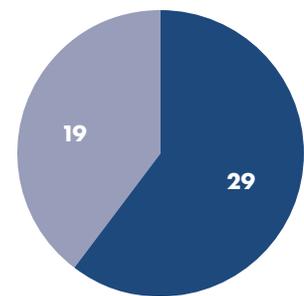
<b>P51</b>	\$2,388,729
<b>P60</b>	\$2,940,560
<b>P180</b>	\$6,786,202
<b>TOTAL</b>	\$12,115,491

### Members



Program	US	Canada	Other
<b>P51</b>	23	2	0
<b>P60</b>	14	1	3
<b>P180</b>	40	4	1
<b>TOTAL</b>	77	7	4

### Staff



**Technical R&D Programs:** 29  
**Laboratory Teams:** 19



**Ross Barrette**  
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## Overhead Distribution Assets – P180.001

Improves utilities’ ability to design resilient and reliable systems, perform inspection and maintenance, and perform advanced monitoring and diagnostics. Key drivers are resilience, reliability, and cost management.



### RESEARCH TOPIC

**Overhead Distribution Structure Performance**

**Overhead Distribution Connectors**

**Composite Crossarm and Poles**

**Transformer Performance**

**Online Condition Monitoring**

### 2023 Accomplishments & Key Deliverables

Published a resilient design guide for overhead distribution structures, gathering ten years of test results and insights into one document.

**3002026835 Resilient Overhead Distribution Design Guide**

Analyzed commercially available corrosion inhibitors to determine which contained chemical corrosion inhibitors or moisture blockers. Tested connectors installed with various inhibitors and on new and aged conductor.

**3002026843 2023 Overhead Connectors Update: Connector and Corrosion Inhibitor Performance**

Tested mechanical strength of attachments to composite crossarms and poles, including vertical load strength, longitudinal strength, hardware overtightening tests on crossarms. Includes results from accelerated aging tests.

**3002028560 Alternate Structural Material Performance - Distribution Systems: 2023 FRP Crossarm Update**

Conducted performance testing on a solid-dielectric transformer, including applied potential, temperature-load characterization, and partial discharge testing.

**3002026857 2023 Solid Dielectric Transformer Update**

Tested a line monitoring system at the EPRI Power Delivery capable of classifying and locating line anomalies, such as downed conductors, tree strikes, and fallen branches.

**3002026859 Online Condition Monitoring Update**

### 2024 Plan

- In 2024, this task plans to develop a means of assessing the ability of a structure to dissipate impact loads, such as those created during tree strikes or when neighboring structures fail, i.e., cascading failures.

- Assess the performance of bolted and explosive-based wedge connectors.
- Investigate how fault currents affect the mechanical strength of full tension connectors.

- In 2024, this task plans to investigate the short- and long-term performance of existing and emerging concrete pole materials.
- Alternative Pole and Crossarm Material Evaluation.

- Continue to collect field data using these inspection tools, along with other methods.
- Includes field testing at utility sites and additional laboratory testing.

- Expand laboratory testing of online monitoring systems, subjecting them to a regimented and controlled test protocol to quantify performance.
- Remote sensing technology evaluations for distribution inspection: handheld cameras, drones, and automobiles.



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## KEY APPLICATION AREAS

### Structural Testing for Resilience



### Forensic Analysis





**Josh Perkel**  
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## Underground Distribution Assets – P180.002

Addresses unique technical challenges faced by underground distribution system owners. Robust research on asset health diagnostics, performance, and failure analysis. Focused strategic research on manhole event and underground structure risk mitigation. Results are captured and shared in reference guides, online tools, and topical interest groups.



### RESEARCH TOPIC

**Distribution Underground Switches and Transformers**

**Cable / Cable Accessory Research**

**Diagnostics / IR / Online Monitoring**

**Risk Mitigation of Manhole Events / UG Structures**

### 2023 Accomplishments & Key Deliverables

Published content for 1st edition Underground Switch Guide. Completed forensic examination of an automated switch.  
**3002027534** *Distribution UG Switches: 2023 Update*

Performed forensic investigations of various joints and separable connectors. Designed test approach for assessing the endurance of recently adopted cable insulation materials. Expanded Bronze Book to include new chapter on Cable Quality and Manufacturing  
**3002026866** *Cable and Cable Accessory Performance: 2023 Update*  
**3002027553** *Medium Voltage Cable Aging: 2023 Update.*

Launched MV cable accessory test bed for refining the use of infrared thermography as a diagnostic tool for cable accessories. Completed testing of an online DGA monitor for use with ester-based fluid filled network transformers.  
**3002026867** *Infrared Thermography in Underground: 2023 Update*  
**3002026868** *Network Transformer Monitoring: 2023 Update*

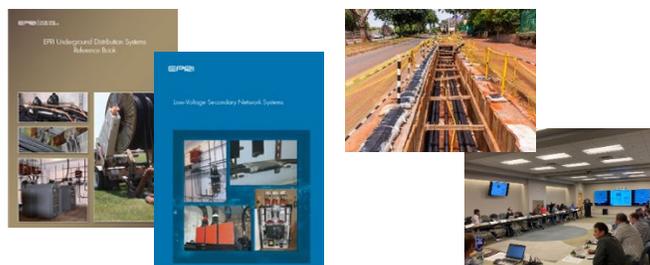
Completed laboratory research into combustible gas generation and behavior of LV cables under overheating and arcing conditions. Launched project to inform corrosion management in UG structures.  
**3002026870** *Risk Mitigation of Manhole Events: 2023 Update*  
**3002026869** *UG Equipment and Structure Corrosion: 2022 Update*

### 2024 Plan

- Examine performance issues with control cabling and connectors.
- Complete the UG Switch Guide.
- Investigate emerging UG transformer options and approaches for extending existing fleet life.
- Continue forensics examination of cable accessories focusing on MV joints to understand failure modes.
- Expand forensics to include aged MV cable.
- Research thermal performance of cable accessories in different environments.
- Investigate anticipated performance of cable insulation materials such as EPR and EAM.
- Research impacts of external contamination and submergence on cable system components.
- Complete MV cable accessory test bed construction.
- Examine heating from different connector installations to understand differences in internal heat generation and external IR measurements.
- Develop assessment criteria for improving the field deployment of IR technology.
- Experiment with different gas sensing technologies and their use within UG structures.
- Research detection of other (non-gas related) manhole event precursors.

### KEY RESOURCES

- Bronze Book - 3002024700**
- Network Reference Book - 3002023996**
- UG Practices Repository - DRC**
- Interest Groups - NADUUWG / U-DIG**



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**Jason Anderson**  
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## Distribution Automation Assets – P180.003

Supports distribution automation (DA) deployment and management with laboratory testing to assist in utility specification and selection, analysis to understand failure and degradation modes, and improved inspection techniques and maintenance procedures. Also creates reference books, asset databases, practices, and guidelines to assist with asset deployment and management, and offers a collaborative environment for sharing lessons learned and leading practices.



### RESEARCH TOPIC

**Grounding and Lightning Protection**

**Recloser Failure Analysis**

**Control Cables and Connectors**

**Advanced Inspection Tools and Technologies**

**Laboratory Evaluation of New Designs**

**Underground Distribution Automation**

**Power Electronics on Distribution Grid**



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### 2023 Accomplishments & Key Deliverables

Performed laboratory testing to develop a method to detect failed arrester on reclosers. Also developed guidance based on this project to inform what an arrester designed for use with a recloser should look like.

**3002024704** *Distribution Automation Assets: Grounding and Lightning Protection*

Analyzed failed reclosers to understand degradation mechanisms and failure modes.

**3002026880** *Distribution Automation Assets: Recloser Failure Analysis*

Investigated recloser control cable failures and performed testing to help inform specification and selection decisions of control cables and connectors. Developed a long-term test to age new connectors and cables.

**3002026892** *Distribution Automation Assets: Control Cables and Connectors*

Investigates tools and technologies to assist a utility with DA asset inspections. Approaches evaluated included handheld IR and PD detection tools and the use of unmanned aircraft systems (UAS) and 3D data capture and laser scanning techniques.

**3002021667** *Distribution Automation Assets: Advanced Inspection Technologies and Tools*

Performed laboratory testing and evaluation of Siemens CMR recloser to help inform specification and deployment decisions.

**3002026876** *Siemens CMR and RCU Test Results*

Began to explore UG DA equipment including failure modes and approaches for FAT and CBM.

**3002026934** *Underground Distribution Automation Assets*

Reviewed potential application and challenges of the use of power electronics devices on the distribution grid and determined what is currently on the market.

**3002026893** *Power Electronic Assets on the Distribution Grid and Voltage Regulators*

### 2024 Plan

- Continue development of failed arrester detector for recloser and integrate with control/recloser.

- Perform additional failure analysis and continue to develop failure analysis guide.

- Expand control cable and connector tests through long-term outdoor testing, complete accelerated aging test facility, and analyze additional failed cables as needed.

- Develop a test bed to evaluate technologies and tools in lab environment.
- Create known defects in devices to evaluate tools against.

- Continue testing of ABB Eagle Recloser.
- Put S&C IntelliRupter through recloser testing protocol.

- Continue failure analysis of UG DA equipment.
- Develop guide on various UG DA topics.

- Reviewed potential application and challenges of the use of power electronics devices on the distribution grid and determined what is currently on the market.



**Tom Short**  
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## Distribution Work Practices & Safety – P180.004

Provides technical results, resources, and tools to assist utilities in reducing risk to workers and the public. Focuses on unique distribution challenges such as arc flash, grounding, and downed conductors.



### RESEARCH TOPIC

Serious Events (SIFs)

Arc flash

Downed-Conductor Detection and Prevention

PPE, Tools, and Technologies

Work Practices

### 2023 Accomplishments & Key Deliverables

Two SIFs workshops with brainstorming on events and hazards; created a SIFs library.  
<https://distribution.epri.com/safety/sifs/>

**Video 3002026861** Proper Wearing of Arc-Rated FR Protective Clothing  
<https://distribution.epri.com/safety/personnel-protection/proper-wear/>  
**Tech update 3002026862** Evaluations of Arc-Rated PPE: Tests of Shirts from Multiple Vendors (surprising results)  
<https://distribution.epri.com/safety/2023/fr-clothing/>

**Tech update 3002026860** Approaches to Downed Conductor Detection: Review of Distributed Sensors and Falling-Conductor Technologies

**Tech update 3002026863** Mechanical Performance of Rubber Gloves: Material Evaluation and Mechanical Testing  
**Tech update 3002028036** Live-Line Coverup Verification Modeling: Initial Model Creation and Evaluation

**Whitepaper 3002028487** Hot Line Tags and Protection Speeds: Fast tripping during hotline tags can reduce risks, particularly in contact scenarios  
<https://distribution.epri.com/safety/2023/hot-line-tag-speed/>  
**Video 3002026864** Insulation and Isolation Practices on Distribution Systems

### 2024 Plan

- Workshop on Underground Safety.
- Workshop on Overhead Safety.
- Expand the SIFs library.
- More clothing tests.
- Continue testing of advanced technologies.
- Technologies for proximity awareness and 3D mapping.
- Technologies to improve utility truck safety.
- Continue with utility information exchanges.

## ONLINE RESOURCES

[distribution.epri.com/safety/](https://distribution.epri.com/safety/)

216 Technical Pages

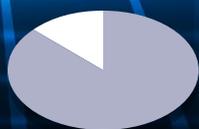
12 Online Apps

11 Videos



### FLYERS

**Print and post these flyers**  
**Easy videos**  
**No passwords**  
**Targeted at field workers**  
[distribution.epri.com/sp](https://distribution.epri.com/sp)



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## Distribution Asset & Reliability Analytics – P180.005

Data science and analytical approaches to provide utilities with industry leading decision support tools, metrics and methodologies based on current and future equipment performance, and the understanding of appropriate approaches to risk management.



### RESEARCH TOPIC

#### Leveraging Outage Data to Better Understand Distribution System Performance

### 2023 Accomplishments & Key Deliverables

Developed a technique to analyze historical outage data to:

- Project customer outage minutes.
- Quantify the outage frequency and financial impact of outage mitigation strategies.
  - Outage frequency, financial impact.
- Explore impact on seasonal and yearly trends due to factors such as climate change and severe weather events.

### 2024 Plan

- Continue to collect and curate data from new and existing members.
- Apply the analytical technique to increase confidence.
- Incorporate location information (e.g., GIS) to understand the effect of environmental factors like climate and severe weather on outage rates.

**3002026865** *Distribution Asset Performance: Results from Analysis of Readily Available Data*

#### Leveraging AMI Data to Better Understand Distribution Asset Performance

Surveyed Distribution Utilities to better understand Analytics Using Meter Data Management System to Assess Transformer Loading Levels.  
Investigated analytic tools, methods and metrics for distribution transformers, including analysis of metering data.

- Work with members to identify & obtain datasets of sufficient quality suitable for exploratory analysis.
- Perform exploratory analysis with focus on asset performance.
- Develop analytics to support asset performance assessment use-cases such as transformer over or under utilization, transformer slow incipient fault detection, changes in asset utilization, and fault detection, location.

#### Wood Pole Fleet Management

Analyzed 11.1 million wood pole inspection records from 33 different companies to better understand useful life by species, original treatment type and climate zone.  
Applied results at three utilities to help them prioritize inspections.  
**3002026865** *Distribution Asset Performance: Results from Analysis of Readily Available Data.*

- Continue to collect and curate additional raw data from new and existing funders.
- Develop new metrics for additional pole species, investigating the benefit of retreating wood poles.
- Initiate efforts to benchmark industry wide performance.

#### Pole Top Capacitor Performance

Developed can replacement rates for pole top capacitors.

- Continue to collect and curate additional raw data from new and existing funders.

#### Geospatial Analytics and Insights

New task for 2024.

- Demonstrate new approaches to visualize data such as SCADA, AMI, power flow, and asset performance and health.

#### Computer Vision for Asset Health and Inventory

New task for 2024.

- Investigate application of artificial intelligence to data collected from inspection technologies.
- The intent is to enable automated data processing and build confidence in computer-predicted asset health.



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## Program 51 – T&D Environmental Issues

Focused on enhancing the safe and reliable delivery of electricity while protecting environmental and cultural resources, as well as supporting corporate reliability, resilience, sustainability, and conservation goals.

**Yamille del Valle**  
YdelValle@epri.com



### RESEARCH TOPIC

#### Vegetation Management & Remote Sensing

### 2023 Accomplishments & Key Deliverables

Delivered a video highlighting utilities' integrated vegetation management (IVM) and conservation programs. Performed field studies to assess eDNA as a biodiversity monitoring tool. Started research to better understand (i) how rights-of-way ROWs can benefit bats and (ii) if satellite data can be used to add a temporal component to LiDAR data.

- 3002026829** *Can eDNA be Used to Detect Pollinators*
- 3002024726** *Assessing the Quality of Native Pollinator Habitat for Management and Biodiversity Monitoring*

### 2024 Plan

- Continue investigation on how ROWs can support bat populations.
- Continue research to identify how satellite imagery can leverage LiDAR data over time.
- Create a template for integrated vegetation management (IVM) progress and reporting.

#### Wildlife Interactions with T&D Assets

Published a guide to help utilities better manage and mitigate issues with bird nests in power system structures. Developed utility surveys to be distributed among participants next year.

- 3002026830** *Successful Nest Management Techniques*

- Drone installed line markers demonstration in Lenox Laboratory
- Establish leading practices for use of UAVs around protected birds.

#### Substation Environmental Issues

Created educational material about retrofits options that can improve sustainability, resilience, and reduce nuisance conditions in substations.

- 3002026826** *Overview of Sustainable Retrofit Options for Substations*

- Assess effectiveness of vegetative screens to reduce substation nuisance conditions without creating wildlife impacts.
- Study the feasibility of using waste heat and stormwater from substations to support small-scale agriculture.

#### Environmental Aspects of T&D Lines

Provided an overview of the types of equity and justice (E&J) that may be applicable to T&D siting projects and identified methods by which utilities may be able to incorporate E&J into their siting procedures.

Evaluated seed mats for postconstruction revegetation. Seed mats were installed under different site preparations to identify best practices.

Continued yearly soil and porewater samples in Charlotte's outdoor laboratory setup. The data collection aims to assess the fate and transport of DCOI from treated wood utility poles in soil and groundwater.

Assessed alternative options for circular economy of utility wood poles using wood pole generated biochar.

- 3002026828** *Environmental Justice Considerations for Power Delivery Siting in Rural and Suburban areas*
- 3002026833** *Evaluating Seed Mats for Postconstruction Revegetation*

- Evaluate the feasibility of using remote sensing data and machine learning algorithms to detect cultural resources. This approach can help reduce the time and effort required for surveys that are necessary for new infrastructure siting projects.
- Prepare an overview of current practices for 3rd party construction environmental compliance.
- Continue yearly soil and porewater samples from DCOI treated wood poles.
- Explore considerations for using Airepel to prevent woodpecker damage in utility poles.



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## Program 60 – Electric and Magnetic Fields and Radio-Frequency Health Assessment and Safety

Focuses on addressing the potential health effects of EMF and RF on humans and non-human biota and provides exposure management tools and resources to address impacts to workers and the public.



### RESEARCH TOPIC

#### 60A: Health Studies and Risk Communication

### 2023 Accomplishments & Key Deliverables

Updated TransExpo Multi-National Childhood Leukemia Study to include data from the Netherlands.

Accepted peer reviewed journal publication of alternative risks for childhood leukemia from pesticide exposures and plant nurseries situated near powerlines.

Created FAQ Information Briefs on Smart Meters and 5G to facilitate risk communication.

Completed evaluation of health and environmental impacts from HVDC and Hybrid overhead lines.

**3002027316** *Pesticides as a Potential Childhood Leukemia Risk Factor and Confounder for EMF Exposures*

**3002027321** *Environmental and Potential Health Effects of HVDC and Hybrid Transmission Lines*

**3002028428** *5G FAQ Information Brief*

**3002028427** *Smart Meter FAQ Information Brief*

### 2024 Plan

- Complete and submit manuscript for TransExpo epidemiology study to a peer reviewed journal.
- Conduct feasibility study to evaluate other agents/factors near powerlines that may influence risk for childhood leukemia.
- Create additional FAQ information briefs on key EMF or RF exposure topics (e.g. microshocks).
- Begin software development of a Public Exposure Database.
- Begin development of a resource for EMF risk communication.

#### 60B: Exposure Characterization and Management

Accepted peer reviewed publication of RF exposures near 5G new radio small cells.

Completed assessment of EMF impacts to marine life from HVDC submarine cables and developed an EMF assessment framework to facilitate utility environmental impacts analysis

Completed EMF measurement protocol for residential dwellings.

Began review of potential EMF impacts from grid level energy storage technologies.

Began development of a resource for EMF considerations for public use of transmission line easements.

**3002027319** *RF-EMF Exposure near 5G NR Small Cells*

**3002028429** *EMF from HVDC Submarine Cables*

**3002028430** *EMF Residential Measurement Protocol (joint with 60A)*

- Conduct EMF characterization study of grid-level battery energy storage sites.
- Conduct EMF characterization of select electrification technologies.
- Develop handbook of EMF calculations.
- Begin software development of a Public Exposure Database.
- Begin migration of EMFast to the web.
- Complete resource for EMF considerations for public use of transmission line easements.

### EMF-RF Knowledge Transfer

Conducted four technical webinars:

- EMFast Practical Applications (Part 1 and Part 2)
- Utility Experiences with Public Meetings
- EMF Risk Communication.

Disseminated twelve editions EMF Now.

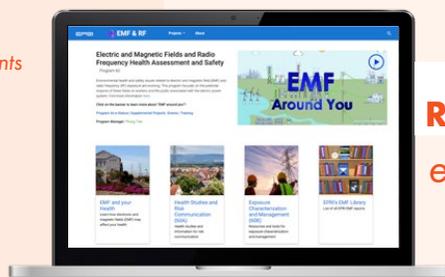
Updated the EMF/RF Resource Center (emf.epri.com) with an EMF Library and interactive graphic.

**3002027323** *EMF Now – 2022 Compilation*  
[www.epri.com/research/programs/025025/events](http://www.epri.com/research/programs/025025/events)

- Conduct technical webinars to facilitate knowledge transfer and peer-to-peer exchange of experience.
- Disseminate monthly editions of EMF Now.



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**ONLINE RESOURCES**

[emf.epri.com](http://emf.epri.com)

## REFERENCE NAME

**20 Online  
Distribution Calculators**

**P180**<https://distribution.epri.com/categories/app/>

**Infrared Guide**

**P180.001**<https://www.epri.com/research/products/000000003002021658>

**Wood Pole  
Management Guide**

**P180.001**<https://www.epri.com/research/products/000000003002023592>

**Wood Pole Inspection  
Technology Database**

**P180.001**<https://distribution.epri.com/overhead/inspection-main/nde-wood-pole/>

**Wildlife Guard Database**

**P180.001**<https://distribution.epri.com/overhead/components/wildlife-guard-database/>

**Underground Practice  
Repository**

**P180.002**<https://distribution.epri.com/underground/knowledge/repository/>

**Underground  
Reference Book**

**P180.002**<https://www.epri.com/research/products/000000003002021664>

**Network Reference book**

**P180.002**<https://distribution.epri.com/underground/knowledge/network-reference/>

**Network Training**

**P180.002**<https://distribution.epri.com/underground/public/knowledge/training/>

**DA Guidebook**

**P180.003**<https://distribution.epri.com/automation/switching-devices/guide/>

**Mineral Oil Spill Estimation  
Software - Multiphase  
(MOSES-MP) v5.0 Beta**

**P51**<https://www.epri.com/research/products/000000003002027599>

**EMF Reference Book**

**P60**<https://www.epri.com/research/programs/025025/results/3002024734>

**EMFast**

**P60**<https://www.epri.com/research/programs/025025/results/3002022505>

Value Obtained

**PowerSouth Energy**

**Field Evaluation of Airepel® HC to Reduce Woodpecker Damage to Utility Poles**

PowerSouth requested EPRI to design a two-year field study to evaluate the effectiveness of a topical treatment of anthraquinone AQ to reduce Pileated Woodpecker damage to utility poles. PowerSouth replaced 20 damaged poles with AQ treated poles. The poles were observed at intervals and compared with control poles that were not treated with the AQ product (some will have metal mesh as deterrent).

Field trial show promising results in deterring woodpeckers from damaging poles in areas where woodpeckers were identified as a problem. Because of this success, the manufacturer of the AQ product is seeking EPA approval with the support of PowerSouth.



**National Grid**

**Control Cable Failure Analysis**

EPRI performed analysis on five recloser control cables that had failed in the field. There were several failure and degradation mechanisms identified during the analysis. Moisture penetration was the most prominent cause identified. There were several materials found in the design that were inadequate for the environmental conditions that these cables are exposed which would lead to a shorter service life.

This research allowed National Grid to work with their manufacturer to make design improvements based on the results of the analysis. This led to a redesign of their existing control cable components. National Grid also came back to EPRI to evaluate their new designs for future product deployments.



**Amprion**

**AC/DC Hybrid Line Ion Emissions and EMF Evaluation**

In order to meet Germany's 2035 renewable energy goals, EPRI assisted Amprion in modeling the ion current density and EMF environment for different environmental factors and three different hybrid line designs.

Although renewable energy is highly supported by the German public, powerlines and health issues remain a major concern by 82% of the public surveyed. The project results support one of Germany's most ambitious grid projects and provides timely information for responding to public health concerns.



**Central Hudson Gas & Electric**

**Dynamic Testing of Light-Duty Fiberglass Crossarms**

EPRI tested light-duty fiberglass crossarms from two manufacturers using dynamic load testing and past EPRI research. CHG&E increased use of Class 4 poles in new construction due to shortages of larger-diameter wood poles. CHG&E wanted to adjust their design to reduce the likelihood of Class 4 pole breaks under extreme structural loads.

EPRI test results demonstrated that the strength of either crossarm was less than the strength of Class 4 poles. Due to this research, CHG&E will use light-duty fiberglass crossarms on Class 4 poles. CHG&E used deflection and strength data gathered testing to inform their selection of crossarm.



## Wildlife Interactions Studies

Resolving substation outages or avian collision/ electrocution with lines depends on knowing what animals / birds are causing the problems and then applying the appropriate solutions. EPRI frequently performs studies to understand the type and patterns of the wildlife interactions with T&D assets and to evaluate deterrent effectiveness. Evaluation is performed on-site and with a data driven approach. Example of deterrent that can be tested in the field are programmable lasers, fogging solutions, line markers, etc.



## Forensics Applications

Asset failures can significantly impact system operation, reliability, and safety. These failures are frequently difficult or impossible to predict, and they can sometimes seem random. A forensic analysis may be the best opportunity to learn why a component failed. This helps you prepare for the future by improving specifications, inspections, or maintenance practices.

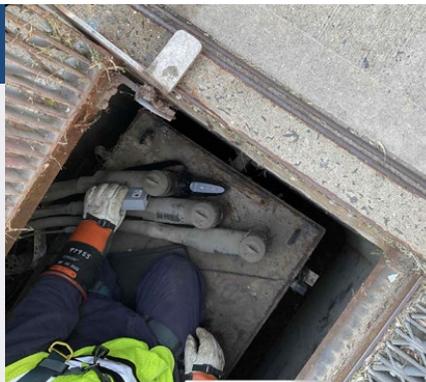
EPRI frequently performs forensic analysis on a multitude of component types. Our capabilities include a suite of materials analysis techniques, electrical testing, and component tear-downs.



See more at <https://distribution.epri.com/resources/applications/forensics/>

## Laboratory Testing and Field Trials

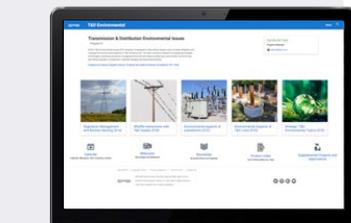
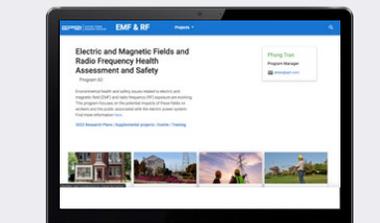
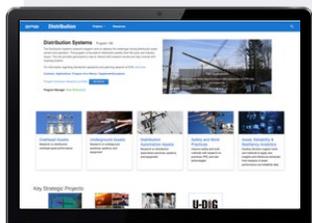
New technologies are continually being introduced to the marketplace for distribution systems. EPRI researchers use laboratories to evaluate new products, and the team is able to develop and execute field pilots to produce high-quality test data. The results of an EPRI lab or field test are designed to help you understand new technology performance, enabling you to make better decisions about technology deployment.



## Online Resources

There are multiple ways to stay involved in the research on the web. Be sure to visit and bookmark the EPRI webpages so that you can stay involved and updated. These sites also contain a breadth of technical knowledge for your reference and use.

 [linkedin.com/company/epri/](https://www.linkedin.com/company/epri/)  
 [twitter.com/EPRINews](https://twitter.com/EPRINews)



[distribution.epri.com](https://distribution.epri.com)

[epri.com](https://epri.com)

[emf.epri.com](https://emf.epri.com)

[td-environmental.epri.com](https://td-environmental.epri.com)

## Climate READi

As extreme weather increases in frequency and intensity, along with society's dependence on electricity, the need for a comprehensive and consistent approach to physical climate risk assessment is an increasing imperative. EPRI is launching a new, three-year initiative, Climate READi: Power (REsilience and ADaptation initiative), convening global thought leaders and industry stakeholders to develop a common framework to address this challenge.

The distribution team is working to understand how the changing climate could impact distribution asset performance, particularly regarding extreme events.



## Wildfire Risk Management

Understanding and mitigating the risks and impacts of wildfire events is a critical task for many distribution asset owners. EPRI has completed a three-year project focused on understanding potential assets and technologies that could reduce ignition risk from medium voltage equipment. Phase one of this research was completed in 2022. Phase two is in progress and runs through 2025. This research leverages EPRI unique test laboratories, expertise, and ability to pilot new technologies to help utilities focus on the highest value technology options. A unique element of the work involves cataloging and evaluating (existing and emergent) wildfire risk reduction technologies and applications, then working with advisors to develop the framework for an industry wide wildfire risk reduction action plan that could be implemented within the next five-years.



## Urban Pollinator Conservation and Multifunctional Site Design (3002028221)

The goal of this supplemental is to evaluate the potential for urban utility sites to support multifunctional site design that integrates pollinator habitat, biodiversity conservation, and benefits to the community. Topics to be evaluated include:

- Best practices for establishing & maintaining urban pollinator habitat
- Design of multifunctional spaces
- Added value to communities
- Improve strategies for weed control
- Document pollinator benefits
- Track costs and outcomes



## Using Machine Learning to Supplement the EPRI-GTC Siting Model (3002028196)

Data collection and evaluation to perform power delivery infrastructure siting is labor-intensive and often takes months to complete. Advances in machine learning may offer a solution to analyze large numbers of aerial photographs, freeing labor resources to review only a fraction of the material for quality control.

Machine learning models are able to answer multiple questions at one time from the same photographs, for example, what is the land cover, what is the land use, and if the land use is agricultural, is it intensive agriculture.

## Evaluation of Consumer Grade ELF EMF Meters (3002027647)

This project will evaluate the characteristics and performance of several consumer grade ELF EMF measurement meters through standardized testing approaches in a laboratory setting. The project will provide insights on the accuracy of different instruments and the factors that may affect their performance. This information can be used to inform utility communication with members of the public.



## Vehicle Impacts on Utility Poles (3002025812)

Utilities are seeking information regarding the performance of poles during an automobile collision. Utilities have also expressed interest in means of protecting motorists and poles during these collisions. Protective options could include barriers, breakaway poles, or energy absorbing materials. The objective of this project is to conduct research to better understand how different pole materials respond during a motor vehicle impact and how protective materials change that response.

## Drone Dock Lab Testing and Utility Applications (3002026330)

This project will specify, procure, deploy, and test emerging drone dock technologies at EPRI's Lenox lab. A drone dock combines a drone that 'lives' in a protective enclosure. With strategically deployed drone docks, utilities could respond faster and inspector more. However, these are unproven technologies developing at a rapid pace. Testing systems collaboratively in a lab environment is the best way for utilities to minimize their risk, while gaining experience with drone dock technologies.





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