AUGUST 2025

PROGRAM 51 - OVERVIEW

Electric transmission and distribution (T&D) systems are increasingly interrelated with the surrounding environment. As they design, construct, and operate T&D infrastructure, many utilities seek to minimize and mitigate environmental impacts and associated costs.

EPRI's research regarding T&D environmental issues (P51) is designed to help utilities reduce costs, increase reliability, and manage the environmental aspects of T&D infrastructure. The team conducts research on emerging technologies, protection of natural resources, handling of environmental impacts, and human health and safety.

The program also focuses on informing permitting, regulatory compliance, corporate strategy, and social responsibility.

The program's research falls into five major areas (Figure 1):

- Vegetation management and remote sensing
- Wildlife interactions with T&D assets
- Environmental aspects of substations
- Environmental aspects of T&D lines
- Strategic T&D environmental topics

Research results are communicated to stakeholders through reports, webinars, in-person and virtual workshops, site visits, and via interactive content on the P51 subscriber's website (here).

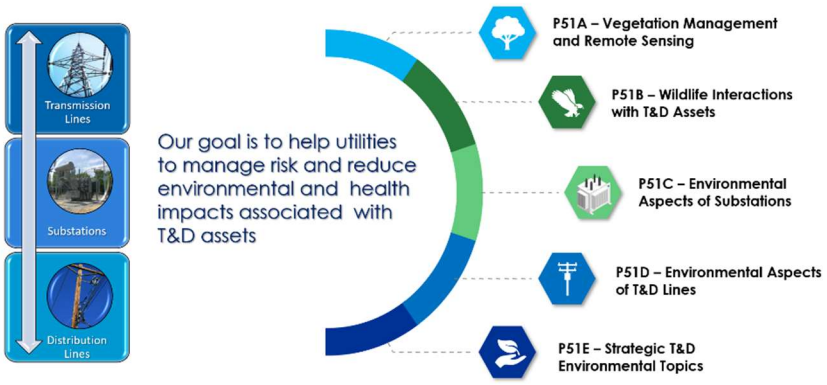


Figure 1: Program 51 Research Areas

RESEARCH VALUE

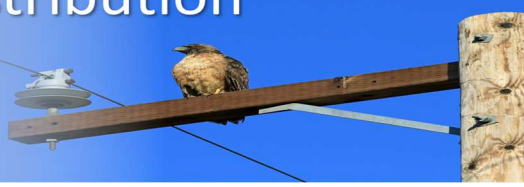
Reduces costs for:
- Right-of-way (ROW) maintenance
- Management of utility pole and other assets
- Management of mineral oil spill
- Compliance of spill prevention, control, and countermeasure (SPCC) plans

Improves power system reliability through:
- Decreased potential for T&D outages from avian/animal interactions
- Informed enhanced and emerging vegetation management leading practices
- Reduced vulnerabilities and risks to substation reliability

Reduces ecological and human health risks along T&D ROWs through:
- Optimized vegetation management
- Prevention of avian and other wildlife impacts
- Prevention or remediation of soil and water contamination related to T&D activities

Enhances T&D line permitting and regulatory compliance along T&D ROWs and at substations.

Helps utilities to attain strategic corporate goals by reducing financial risk as well as balancing the economic and environmental challenges of siting, constructing, and upgrading T&D infrastructure and ROWs.



Program 51 Projects and Tasks

P51A: Vegetation management and remote sensing

Integrated vegetation management (IVM) practices: IVM practices promote the use of low-growing, compatible vegetation in rights-of-way (ROWs). This task examines different IVM methods, field-tests new products, and investigates the use of ROWs to promote biodiversity.

Optimized vegetation management techniques: scouts and tests new technologies to optimize vegetation management cycles by identifying canopy height, encroachment, tree health, and tree strike potential.

Remote sensing and new technologies: studies applications and benefits of remote sensing technologies as well as other emerging technologies to monitor ROW vegetation and biodiversity.

P51B: Wildlife interactions with T&D assets

This project performs field trials of new technologies and develops leading practices to help utilities mitigate impacts of avian and other wildlife interactions in substations and T&D lines.

P51C: Environmental aspects of substations

Mitigation of substation environmental impacts: documents, analyzes, and tests mitigation options for chemicals of concern and nuisance conditions in substations.

Sustainable Substations: develops guidance for sustainable substations, including retrofits, and explores opportunities to apply circular-economy principles.

P51D: Environmental aspects of T&D lines

Line siting and construction: research focused on new solutions to reduce the time and personnel burdens of siting linear infrastructure.

Line maintenance: develops guidance to minimize environmental impacts during the service life of T&D lines (ex. access roads, stormwater management, and underground cable systems).

Utility poles: seeks to understand and mitigate environmental issues associated T&D line poles. Includes assessing environmental fate and transport of wood pole preservatives and conducting human health risk assessments relevant to utility operations.

P51E: Strategic T&D environmental topics

This project investigates the current state and trends in T&D environmental topics through a combination of exploratory research, utility subject matter expert knowledge, and industry data.

P51 – Transmission and Distribution Environmental Solutions

2026 Annual Research Portfolio (ARP)

P51 A

Vegetation Management and Remote Sensing

Assessing the Value of Rights-of-Way for Bats and Bat Foraging Resources

Assessing ROW habitat for bees, birds, and bats compared to other land cover types

Integrated Vegetation Management (IVM) Template – Field Methods for Metric Collection

Evaluating Flammability of ROW Vegetation

Detection of Native Plant Communities on ROWs with AI

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P51B

Wildlife Interactions with T&D Assets

Flight Diverters: Assessing Durability

Flight Diverters Effectiveness- Interim results

Substation Deterrent – Methyl Anthranilate laboratory and field results

Animal Deterrent Database – Tool Update

Industry Insights & Design Approaches for Avian Nesting Mitigation

Industry Experience with Wildlife Fencing in Utility Environments

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P51C

Environmental Aspects of Substations

Can vegetative screens reduce nuisance conditions without creating wildlife impacts?

Mineral Oil Spill Estimation Software - Multiphase (MOSES-MP) v5.5

Can nano dust effectively coagulate mineral oil, natural & synthetic esters, and diesel fuel?

Understanding Wildfire Impacts on Substations

Updating the EPRI PCB Database

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P51D

Environmental Aspects of T&D Lines

Can Confinement Grids Stabilize Erosion on Access Roads?

Fate and Transport of DCOI - DCOI Assessment Method Development & Improvement

Environmental Aspects of Wildfire Resiliency for T&D Infrastructure

Mat Usage and Materials in T&D Construction

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P51E

Strategic T&D Environmental Topics

Spill, Prevention, Control and Countermeasure (SPCC) Maturity Models

Robotic Applications for Environmental Inspections in Substations

Deployment of Technology Innovation and AI for Environmental Applications

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Program 51 has laboratory setups at the following EPRI locations:

- Charlotte Lab: outdoor test setup to assess the fate and transport of utility poles treated with DCOI.
- Lenox Lab: in the process of installing a vegetative screen to assess its potential to reduce nuisance conditions (light, noise, heat) without attracting wildlife.

Lean more about the program: