EPRI

2024

AT A GLANCE

Distribution Automation Assets

Program 180.003

Research Value

- A solid technical basis for making informed decisions regarding the specification, selection, and installation of automation assets
- Knowledge of degradation mechanisms and failure modes of automation assets
- Guidance on how to increase asset reliability and reduce O&M expenses by using advanced inspection tools and technologies and through the development of visual inspection guidance
- Better understanding of power electronic asset options for application on low and medium-voltage distribution systems
- The ability for member utilities to share experiences about DA assets

For more information
scan the QR code or visit
distribution.epri.com/automation.

Grid modernization and electrification are driving substantial change in how the distribution system is designed, constructed, maintained, and managed. The EPRI Distribution Systems research team performs industry-leading R&D to enable and inform utilities in their design and effective management of the distribution system. The research focuses on distribution assets, such as poles, transformers, reclosers, and cable systems, across their entire life cycle, from specification to removal.

This program produces advanced knowledge, technologies, and tools to inform decisions regarding distribution assets' life cycles. Researchers produce these results by identifying high-value research opportunities, creating and executing robust research projects, and implementing results with utilities. Researchers use various approaches to produce these results, including:

- Laboratory testing of new, aged, and failed equipment
- Evaluation of emerging technologies
- Investigations into equipment failure modes and degradation mechanisms
- Collection and assessment of utility practices
- Accelerated aging of components
- Assessment of asset performance

EPRI transfers these results to utilities through reports, webcasts, interest groups, task forces, videos, and databases.

Research Highlights

- **Distribution Automation Asset Laboratory Testing and Evaluation** – This task intends to develop and perform laboratory testing on new and emerging automation assets including distribution reclosers, sensors, and controls. In 2024, this task plans to investigate the performance a 15-kV S&C IntelliRupter.
- **Recloser Failure Analysis and Guidebook** – This task investigates the failure modes of reclosers, working with member utilities to analyze failed units removed from service to identify approaches to reduce the likelihood of future failures. Findings are incorporated into the EPRI recloser guidebook, a reference containing guidance on the specification, selection, installation, operation, and maintenance of solid dielectric reclosers.
- **Underground Distribution Automation Assets Testing** – This research plans to investigate medium-voltage underground automated switchgear, focusing on identifying degradation mechanisms and failure modes to better understand long-term performance expectations. The research also includes switch controls, integrated sensors, switch control cabling, and other auxiliary components.
- **Cabling and Connectors for Automation Equipment** – This research investigates control cabling failure modes and performs testing to inform specification and selection decisions related to control cables and connectors. In 2024, EPRI plans to apply a newly developed accelerated aging test to connectors/cables intended to identify potential issues such as moisture ingress.
- **Advanced Technologies and Tools for DA Inspections and Asset Health Monitoring** – The widescale deployment of automation assets comes with additional challenges to utilities of how to inspect and maintain this large fleet of complex equipment. This task plans to investigate technology and tools to assist with inspections of newly installed automation assets, routine inspections, and failure investigations
- **DA Visual Inspection Field Guide** – Visual inspections, whether performed by a human or artificial intelligence (AI) system, require training to detect specific anomalies. To assist with this, EPRI is developing guidance on what to look for and how to act upon visual inspection results from DA assets. This field guide is planned to include images that illustrate various conditions and factors that commonly affect DA assets.
- **Power Electronics Devices on the Distribution Grid** – Power electronic devices represent a new class of asset that have yet to be widely deployed on medium and the low-voltage distribution systems. In 2024, this task plans to scout and document potential technologies, while developing laboratory test approaches to investigate device functionality and long-term performance.
- **DA Practices** – This task investigates leading practices for management and field operation of DA devices. Focus areas include DA asset design, provisioning, installation, commissioning, inspection, maintenance, and troubleshooting.
- **Technology Scouting** – The pace of change in distribution technology is accelerating with new technologies, approaches, vendors, and service providers entering the market and offering new solutions. This research will scout new technologies for distribution automation and identify opportunities for further investigation and

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