Supplemental Project Notice

LIVE LINE BYPASS SYSTEM FOR OVERHEAD LINE SWITCHES

Line switch inspection

PROJECT HIGHLIGHTS

- Provide a technical solution for live exercise or preventive maintenance of line switches on overhead lines subject to operative restrictions
- Minimize line outages
- Improve reliability of line switches in service
- Improve grid resiliency
- Reduce overall substation switching operations

Background, Objectives, and New Learnings

Line switches play a crucial role, enduring harsh operating conditions throughout their lifespan. One major issue they encounter is mechanism seizing, often caused by the buildup of contaminants and corrosion on blade contacts and bearings. This buildup can prevent the switch from functioning properly when needed. To address this, along with preventive maintenance, regular operation of line switches is essential. Exercising the line switch helps clear away contamination from blade contacts and allows bearings to keep themselves lubricated, ensuring smooth operation.

However, carrying out such maintenance cycle poses a significant challenge for utilities, mainly due to strict regulations on system loading. Operating line switches requires de-energizing overhead lines, very often taking the switches to extended periods without operation, which in many cases result in mechanism seizing. Thus, utilities need innovative solutions that allow for safe and affordable bypass system to allow for operation and maintenance of in-service switches, without de-energizing the overhead line.

This project intends to design and develop a prototype of a switch bypass system to be installed using live line techniques with minimum resources. This new system aims to enable the exercise and maintenance of in-service line switches without causing interruptions or excessive maneuvers in the power grid.

Benefits

The societal benefits of this include increased asset reliability and power system resilience, fewer unplanned outages, and lower failure events. Therefore, ensuring uninterrupted access to essential services. Moreover, the reduction in planned line interruptions for de-energized maintenance not only minimizes inconvenience for consumers but also fosters greater economic productivity and can extend the lifespan of switching components in electrical utilities.

Funder benefits include increasing of operational efficiency and reduction of corrective maintenance costs.

Project Approach and Summary

The following high-level tasks define the project approach:

1. **Design of Live Line Bypass System:** This task intends to include conceptual design, fabrication drawings, 3D model, and live working installation procedure of the initial prototype.
2. **Laboratory Testing:** New components are subject to temperature variation due to steady-state current demands, transient currents, and electromechanical stresses at short circuit conditions. This task intends to include usability evaluation, current rating and short-circuit testing.
3. **Utility Demonstration:** This task intends to demonstrate the prototype usage in a funding member's installation.

Deliverables

Expected project deliverables include:

- Bypass Connector prototype #1 (3D printed)
- System prototype #1 (fabricated)
- De-energized installation/demonstration
- A final report sent to all participating utilities including:
  - Conceptual design
  - Executive/Prototype design drawings (2D and 3D fabrication drawings)
  - Laboratory test results

Price of Project

This project is $25k per project funder with a minimum of four funders required to complete the full scope of the project.

Project Status and Schedule

The project is estimated to take up to 24-months to complete from project kickoff.

Who Should Join

Utilities with operational constraints to perform periodic exercising or planned maintenance of line switches installed on overhead transmission line structures operating at 115-kV or above.

Contact Information

For more information, contact the EPRI Customer Assistance Center at 800.313.3774 (askepri@epri.com).

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