Project 14-9:
Guide to Best Practices for Improving Distribution System Reliability

Final Report: April 2015; available online @ www.dstar.org

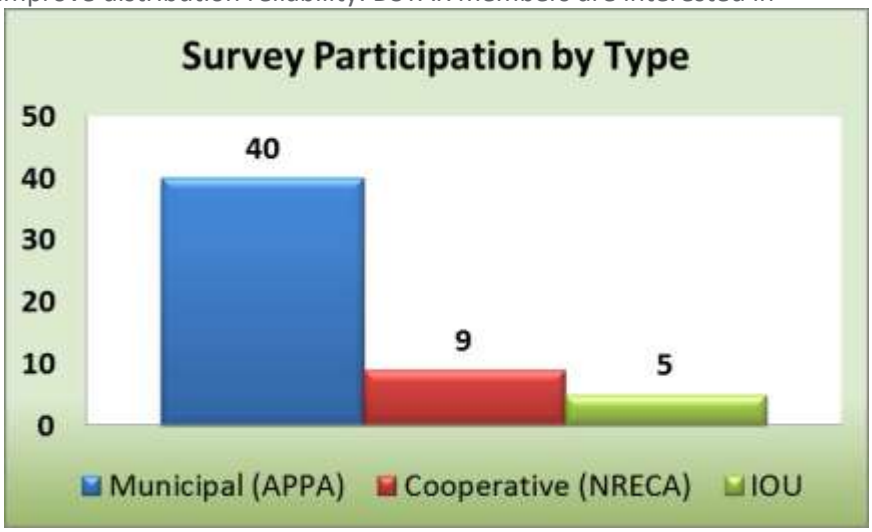
Project Summary:

Electric distribution systems are inherently complex structures with equipment connected in radial, looped or networked configuration to facilitate, regulate and control the flow of power from the substation to the end customer. Typical North American distribution systems tend to cover a wide area with feeders that can be overhead, underground or a combination. In general, circuits are designed and engineered to minimize the impact of equipment failures, breaks, faults and other contingencies on customers. The frequency and duration of customer interruptions define the reliability of the distribution system.

In electric distribution systems, reliability is characterized by the ability of the system to deliver power to the end-customer. The components that typically impact distribution reliability are: line/cable sections and busbars; transformers and generators; protection and switching devices; regulators, capacitors, and reactors; arresters, insulators and bushings; anything that directly or indirectly disrupts the flow of power from sources to loads.

Most state regulatory bodies in the U.S. have some form of distribution reliability reporting requirement for regulated utilities, with some states imposing performance based rates that reward or penalize utilities based on the reported system reliability.

Due to regulations at the state level, municipal or utility standards, and consumer expectations, utilities are focused on finding ways to improve the reliability of service to distribution customers. Several utilities and organizations such as the IEEE, APPA and NRECA have gathered reliability data from a number of individual utilities. However, beyond benchmarking, there is no real consensus on how to best use the metrics, and how to apply them to improve distribution reliability. DSTAR members are interested in information that summarizes member activities and identifies best practices for improving system reliability.



The scope of this project included literature search, utility survey, and interviews.

The survey was conducted among the members of DSTAR Program 14. The goal was to collect relevant information and identify prevailing reliability issues and best practices. A

breakdown of survey respondents by utility type is shown in the chart above. The survey responses are summarized in the report.

In addition, the study leveraged the research and findings of Project 13-10 (Smart Grid Impact on Distribution Reliability), during which analytical simulations were conducted on several DSTAR member distribution feeders to assess the impact of progressive investment in feeder automation technology.

The final Project 14-9 report summarizes DSTAR member activities for improving distribution system reliability, and highlights best practices from the survey as well as a review of relevant research publications and reports.

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Who Should Use:

Distribution Planning, Standards, Power Quality and Reliability Groups

For the complete report on Project 14-9: Guide to Best Practices for Improving Distribution System Reliability, visit www.dstar.org.

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