SUCCESS STORY

EPRI Model Informs Utility Wood Pole Fleet Management, Helps Increase Efficiency by Streamlining Asset Inspection Scheduling and Estimating Replacement Needs

Wood poles are used extensively in the electric utility industry to support both transmission and distribution class overhead lines. Wood poles provide a generally reliable and economic structure, but—as with all utility devices—they have a finite service life. Poles can fail due to sudden and catastrophic damage, such as from accidents or storms, but most gradually degrade because of natural stressors. In addition to the normal mechanical load, stressors include insects, birds, bacteria, and fungi. One would expect degradation to increase over time, and therefore be closely linked to pole age. However, age alone is not a reliable indicator of pole condition. Many old poles perform well, and some younger poles show a significant loss of strength. Many variables may affect the rate of pole degradation.

Utilities periodically perform inspections to assess the current remaining strength of the pole and provide a related metric that can be used as a trigger for removal or maintenance, either immediately (for severely degraded poles) or within the next maintenance cycle. EPRI researchers sought to determine how or whether inspection data could be used to improve pole fleet management and how or whether inspection data from multiple utilities may be used to yield industry-wide insights. EPRI's Transmission Asset Management Analytics program developed an analytical methodology by working with wood pole data from 16 different utilities, after it extracted, transformed, and organized the raw data in a format suitable for analysis to better understand the influence of various factors on pole service life. This analysis included data in a dozen separate files detailing approximately 1 million T&D wood poles inspected over 11 to 13 years.

OPPORTUNITIES TO APPLY METHODOLOGY

Xcel Energy Services, Inc., is among the top ten U.S. investor-owned utilities, comprising four operating companies in eight states: Northern States Power Company Wisconsin; Northern States Power Company Minnesota; Southwestern Public Service Company; and Public Service Company of Colorado. Its nearly 12,000 employees serve 3.6 million electric customers and 2 million gas customers. Xcel was experiencing challenges managing its electric

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> *EPRI's work is very complete and well thought out. Xcel will use the results to inform our new Transmission Asset Health Analytics (TAHA) system to allow us to make more planned asset renewal and maintenance decisions.*
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> ~ **BRIAN LORENTZ**
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> *Senior Director, Transmission Asset Management*
> Xcel Energy
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transmission and distribution wood pole fleet and understanding the performance of different types of wood poles used across its system. The utility has multiple data sources and multiple data collection methods and was lacking analytics to help it effectively prioritize inspections, assessments, and pole replacements.

So, the utility requested that EPRI investigate its available wood pole demographic and condition assessment data and determine what insights could be obtained to support asset management decisions, including inspection, assessment, maintenance, and replacement of these structures. Numerous factors contribute to power delivery wood pole condition, including wood species (Western Cedar, Southern Pine, Douglas Fir, and Lodge-Pole Pine in Xcel's case), original wood treatment type (pentachlorophenol, creosote, gas, and others), environmental factors, coatings, soil condition, and land usage. Some weather events result in structural pole damage regardless of the poles' condition and other events damage only some poles.

COLLABORATION YIELDS BENEFITS

EPRI's Transmission Asset Management Analytics program team was able to apply the analytical methodology it had developed with other utilities to address Xcel's specific issues. Xcel has applied EPRI's research results to answer two important questions: With no inspection or replacement, how many poles fleet-wide would be in a condition warranting rejection? Following a 15-year inspection cycle, how many poles would be rejected in each inspection year?

"Essentially, EPRI was able to model reject rates of different types of wood poles and create a survival curve," says Brian Lorentz, Xcel Energy's senior director of transmission asset management. "This model allows us to determine the projected age of various types of wood poles with and without retreatment and can be used to set up policies on treatments and/or where treatments would not work."

For more information, contact:

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