



TIP 25d: EPRI P37 Spare Transformer Strategy Development Supplemental: Development of Substation Equipment Spares Strategy Methodology, Analytics and Guidelines for BPA

Context

Currently, NERC Standard TPL-001-2 Transmission System Planning Performance Requirements demands that spare equipment strategies that could result in the unavailability of major transmission equipment with a mitigation lead time of one year or more (such as a transformer), the impact of this possible unavailability on the system performance must be evaluated.⁷

FERC and several US Congressmen have also expressed significant interest in spare transformer strategies.

The recent sabotage of several transmission tie transformers at a distribution utility facility including two 500 kV transformer banks is sure to increase the scrutiny of spare transformer availability and strategies.

Description

This EPRI supplemental project develops a common methodology, framework, and application for evaluating the benefits of spare transformer strategies. The results of the project will depend on actual progress.

The project contains three phases, each with stage gates and evaluation that will determine if the project is providing value and should continue on to the next phase. The phases are separated into tasks which are valuable in themselves even if the remaining phases are not completed.

The first phase of the project will involve four tasks.

Task 1 involves researching the range of spare transformer strategies and identifies strengths and weaknesses of each. This provides the background for why BPA manages spare transformers in the manner it does by documenting the range of available strategies and then identifying why a particular strategy best meets BPA's needs. This research also provides the ability to discuss risk and strategic direction among different BPA working groups with different areas of expertise. Tasks 2-4 of the first phase involve the application of the research and the quantitative risk tools developed by EPRI under their Industry Wide Database for Power Transformer project.

Task 2 involves identifying the performance metrics which are affected by spare transformer decisions. The application development then seeks to handle multiple variables requiring user input to determine how decisions or strategies will impact these performance metrics. The

objective is not to develop a "one-size" fits all strategy but rather to allow the user to project how decisions will impact their utility tomorrow.

Tasks 3 and 4 in the first phase further the development of the application by prototyping it and then applying it to a subset of BPA's transformer population in order to test it. These tasks also allow for feedback to EPRI and discussion among participating utilities on the applications at their utilities.

Phase two and three are a further refinement of the application to increase functionality and usability. It is under these two phases that BPA will be able to replicate the existing Emergency Restoration Guides using the new quantitative tools and methodologies. Advancement to phase two and three will depend on the progress and results developed in phase one.

Why It Matters

The project contributes to and further documents decisions BPA makes which impact the Substation Asset Strategy project currently underway with SDG. While the Substation Asset Strategy uses a rigorous and comprehensive methodology it relies significantly on input from subject matter experts. The EPRI supplemental project bolsters and supports the documentation of subject matter expert input making the Substation Asset Strategy all the more defensible and valuable.

The project also complements the 'Mission Essential Function (MEF) Risk Assessment' program underway with the Supply Chain and the Risk Management groups. The EPRI supplemental project not only provides quantitative methodology and input to the MEF but also illustrates how such quantitative tools could be used in various other equipment categories to ensure mission essential function is maintained in an emergency.

Goals and Objectives

Project goals include:

- Updating and improving BPA’s existing spare transformer strategies (Emergency Restoration Guides) by applying quantitative tools developed by EPRI.
- Measuring how transformer repair/replace decisions and sparing strategies effect BPA’s ability to deliver power at cost.

The objective is to provide a reference for BPA to document existing strategies and a resource for how it might improve them. Strategies developed out of this project will share common methodologies with participating utilities and will have been developed in conjunction with EPRI putting BPA in a more proactive position when documentation of compliance is requested by a regulatory entity.

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Funding

Included in BPA FY2014 Membership

Reports & References (Optional)

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Links (Optional)

Participating Organizations

Salt River Project
Con Edison
San Diego Gas & Electric (SDG&E),
Tri-State
FirstEnergy

