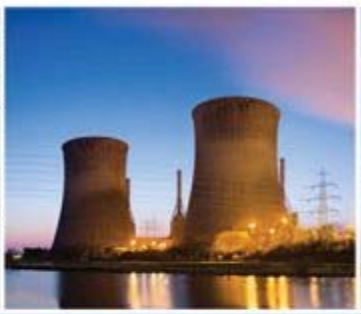
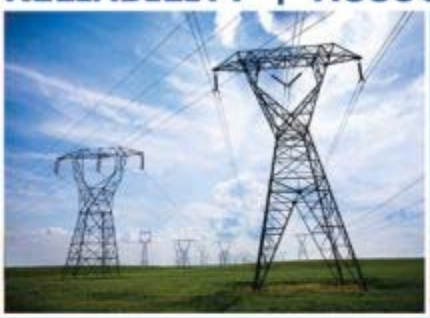
NERC

NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

NERC Cost Effective Analysis Process (CEAP) Pilot for NERC Project 2010-13.2 — Phase 2 of Relay Loadability: Generation — PRC-025 CEA Phase 2 Report

RELIABILITY | ACCOUNTABILITY


Executive Summary

The CEAP Team, NERC Staff and the "Relay Loadability: Generation" Standard Drafting Team thank all entities who submitted comments on the "pilot" of Phase Two of the Cost Effective Analysis Process (CEAP) for Project 2010-13.2 – Phase 2 of Relay Loadability: Generation. This standard was posted as Draft 2 for a 45-day public comment period from January 25, 2013 through March 11, 2013. Stakeholders were asked to provide feedback on the standard and associated documents through special electronic comment forms. There were 22 sets of comments, including comments from approximately 74 different individuals from approximately 52 entities representing 9 of the 10 Industry Segments.

For the pilot of the NERC CEAP (CEA phase 2), the CEAP Team utilized Phase 2 of Relay Loadability: Generation – PRC-025. This second phase of the CEAP represents the Cost Effectiveness Analysis (CEA). The CEAP pilot calls for this analysis to be performed during the initial ballot of the draft standard. The CEA is a more detailed assessment whose purpose is to provide information about the relative effectiveness and cost impacts of different approaches to address the reliability objective.

CEA results indicated that the majority of those who responded, primarily composed of Generator Owners, believed that the standard's potential reliability benefits were minimal, because most generators have not experienced a trip due to relay loadability. Some noted that the standard "as written" did not provide adequate protection during low level faults for generators. A group of commenters did identify an alternate way to meet the proposed reliability objective by using standard overcurrent relays. This potential alternative has been provided to the SDT for their consideration. Also, a significant majority of commenters believed a 7-8 year implementation plan would be required when replacement of load responsive relays was required, rather than the 72 month period identified in the implementation plan. The majority of commenters believed that a whitepaper would be preferable to a standard; however this project is a response to directives in FERC Order 733. Resources to implement the standard submitted by the commenters did not appear egregious to the CEAP team. One entity commented that consideration should be given to the Reliability Assurance Initiative attributes for this standard, i.e. emphasis on internal controls to identify, mitigate and improve, rather than try to develop another "zero defect" standard.

Initial installed cost estimates provided by commenters ranged from $5,000 per generating unit for generators that do not require replacement of existing relays, to $100,000 or more per generating unit depending on the scope of equipment that needed to be replaced. There was general agreement that ongoing incremental maintenance costs were minimal and would be subsumed into an entity's existing relay maintenance program.

Standard Type – PRC - Protection

The March 18, 2010, FERC Order No. 733, approved Reliability Standard PRC-023-1 – Transmission Relay Loadability. In this Order, FERC directed NERC to address three areas of relay loadability that include: (1) modifications to the approved PRC-023-1, (2) developing a new reliability standard to address generator protective relay loadability, and (3) developing another reliability standard to address the operation of protective relays due to power swings. This project, Phase 2, is focused on developing a new reliability standard, PRC-025-1 – Generator Relay Loadability, to address generator protective relay loadability. This reliability standard establishes requirements for the Generator Operator functional entity to set protective relays at a level such that generating units do not trip during system disturbances that are not damaging to the generator, thereby not unnecessarily removing the generator from service.

Functional Model Entity Applicability

Generator Owner "GO" that applies load-responsive protective relays at the terminals of Facilities as identified in the standard.

Survey Participants

Analysis of Participants –

There were 22 sets of comments, including comments from approximately 74 different individuals from approximately 52 entities representing 9 of the 10 Industry Segments. The responses represented a cross section of GOs from across North America, owning generation capacity from less than 300 MW to greater than 40,000 MW. Among these entities were some of the largest Registered Entities in North America. The commenters in total own in excess of 275,000 MW in total capacity. Generation Owners owning assets in all eight NERC Regions participated in the responses.

Cost and Implementation Analysis

Nine Pilot CEA Survey Questions were posed to the industry:

CI-1 Describe the size of your organization in broad general terms, e.g. GO-Total installed MWs, TOs circuit miles by kV and total load served, etc.

CI-2a What are the initial one time, ongoing, implementation, and maintenance costs of complying with the requirements?

CI-2b What is the on-going long term cost impact (after implementation) of complying with the requirements in terms of equivalent full time employees (EFTE)?

CI-2c What are the resource benefits (labor, materials, administrative) of implementing these requirements?

CI-2d What are the reliability benefits of implementing these requirements?

CI-3 Are there alternative method(s) or existing reliability standard requirement(s) not identified in the draft standard which may achieve the reliability objective of the standard that may result in less cost impact (implementation, maintenance, and ongoing compliance resource requirements)? If so what? Please provide as much additional supporting evidence as possible.

CI-4 How long would it take your organization to implement full compliance to the standard as written? What would affect the implementation (i.e. outage scheduling, availability of materials, human resources, etc.)?

CI-5 Would a technical guideline or "best practices" whitepaper or a training program be effective in achieving a desired outcome to meet the reliability need, as opposed to a "continent-wide" standard or variance?

CI-6 Do you have any other comments? If so, please provide suggested changes and rationale.

Data Analysis:

A number of the commenters noted that it was difficult or impossible to provide a good estimate of initial and ongoing costs associated with the standard because the extent of the cost could not be accurately determined until the relay settings were all reviewed.

In order to provide some helpful information regarding initial and ongoing costs the CEAP Team will present results based on industry minimum and maximum reported costs to provide GOs and industry with a potential range of costs. Conclusions from the data are as follows:

- Cost estimates provided by commenters indicated initial costs of at least $5,000 per generating unit for generators that do not require replacement of existing relays.
- Cost estimates provided by commenters indicated initial costs of $100,000 or more per generating unit for generators that require replacement of existing relays, depending on the scope of equipment that must be installed.
- There was general agreement that ongoing incremental maintenance costs were minimal and would be subsumed into an entity's existing relay maintenance program.
- Subsequent to implementation, ongoing compliance resources were reported to be minimal. Most commenters stated that no additional Equivalent Full Time Employees (EFTE) would be necessary to comply with the standard. One commenter reported a need for an additional 2.5 EFTE to comply with the standard.

When entities were asked if alternative method(s) could achieve the reliability objective of the standard resulting in a more cost effective and efficient solution, the following response was provided:

- One comment suggested using standard overcurrent relays to protect for overloads as described in ANSI standards. Then, reset backup distance relays to approximately 180% of generator rated MVA.

When entities were asked what the reliability benefits of implementing these requirements were, the following response was provided:

- Some commenters noted that there were reliability benefits to the proposed standard. They identified the benefit of preventing unnecessary tripping of generators during a system disturbance for conditions that do not pose a risk of damaging the generator.
- Other commenters noted that a potential adverse impact to reliability could be created by the proposed standard. The currently proposed setting specifications in the standard may not adequately protect the generator (which may allow machine damage for the low level fault or overload condition).

Conclusions:

Based on the responses provided, the CEAP team finds that the proposed standard achieves the reliability objective in a cost effective manner and is not unduly cost prohibitive. The CEAP team further provides for standard drafting team consideration the comment of industry participants that the currently proposed setting specifications may not adequately protect the generator and could inadvertently expose generators to damage for low level faults or overload conditions. Finally, a group of commenters proposed an alternative way to meet the proposed reliability objective which was provided to the SDT for their consideration.