Background
The objective of this proposal is to outline an approach to develop a method toward measuring of Reliability Standard implementation costs. Federal, State and Provincial regulatory authorities, the NERC Board of Trustees, Regional Entities, and many industry stakeholders have expressed interest in the identification of the costs incurred from implementing NERC Reliability Standards compared to risks addressed. The desire is to balance costs and risks during the standards development and revision process.

In the past, determination of the costs from the implementation of NERC Reliability Standards was implicitly considered throughout the standards development process. Through this process, detailed comments are sought and modifications to proposed standards are made based on input from the standards ballot pool, which represents a cross-section of interested participants. However, some entities have requested a more direct assessment of costs, citing a number of different reasons. For example, registered entities have identified the need to estimate implementation costs for budgeting and rate case development. Further, many state regulators would like this information to determine consumer costs implications.

The actual cost to implement a Reliability Standard may be difficult to estimate. In general, registered entities vary in their operations, vulnerabilities, and starting points from which to calculate incremental costs. Hence, the costs for Reliability Standard implementation may vary by orders of magnitude by entity.

Consideration of Risks to Reliability
NERC has transitioned to include risk analysis in all aspects of its regulatory model, focusing the Electric Reliability Organization’s (ERO) and stakeholder resources on the highest risks to the reliability of the Bulk Electric System (BES).

Proposed Pilot for Developing Cost Evaluations during Standard Development
The proposal for developing cost evaluations during standard development is as follows. A voluntary questionnaire will be provided to industry participants in order to obtain sufficient information to develop
a high level analysis of the risk reduction to the BES under consideration, as well as the potential costs (e.g. monetary and societal) of not addressing the reliability risks. This questionnaire will be conducted prior to, or in conjunction with, the standard authorization stage (SAR) stage of standard development. If, during the development of a SAR, the drafting team believes there is a need to pose questions to the industry during the drafting phase, it may identify the reliability risk being mitigated and provide industry the opportunity to identify alternate methods to be captured in the standard that may achieve the reduction in risk to the BES in a cost effective manner. If conducted prior to the development of the SAR, questions could be developed in a similar manner to obtain information that may provide insight on SAR development options.

Initial Pilot
There are two outstanding directives from FERC Order No. 786\(^1\) relating to TPL-001-4 — Transmission System Planning Performance Requirements.

- Paragraph 40 directs NERC to modify Reliability Standard TPL-001-4 to address the concern that the six-month threshold could exclude planned maintenance outages of significant facilities from future planning assessments.
- Paragraph 89 directs NERC to consider a spare equipment strategy for stability analysis that is similar to that required for steady state analysis upon the next review cycle of Reliability Standard TPL-001-4.

Project 2015-10: Single Points of Failure TPL-001 from the 2016-2018 Reliability Standards Development Plan is developing a SAR to address potential modifications to TPL-001-4. The results of this pilot will be provided to the drafting team to inform their work on modifying this standard. The following questions are provided to obtain information about risks and costs related to the two directives above.

Questions

1. Reliability Standard TPL-001-4 requires an entity to consider planned maintenance outages greater than six months in duration in its studies. What, if any, risk is there to the reliable operation of the Bulk Power System (BPS), as defined in Section 215 of the Federal Power Act (i.e., “operating the elements of the bulk-power system within equipment and electric system thermal, voltage, and stability limits so that instability, uncontrolled separation, or cascading failures of such system will not occur as a result of a sudden disturbance . . . or unanticipated failure of system elements”) if planned maintenance outages of less than six months in duration are not considered in studies during one or both seasonal off-peak periods? Please explain your response:

Draft Answer: Removing the six-month TPL-001-4 planning assessment threshold is not cost effective and the FERC directive in paragraph 40 of Order No. 786\(^2\) relating to TPL-001-4 should not be implemented due to unintended impacts of removing the six-month threshold.


The MRO NSRF suggests an equally effective alternative be proposed to address FERC’s concerns about off-peak conditions. The MRO NSRF suggests that existing wording in the NERC standard be identified or clarified to include outages of more than six-months should include a sensitivity analysis if the outage occurs in the spring and/or fall months.

Planned maintenance outages of less than six months in duration aren’t necessary for long-term annual planning assessments such as TPL-001-4. The annual TPL-001-4 assessments which look in the near-term (years 1 – 5) and long-term (years 6 – 10) planning horizons are reasonable projections of system conditions and aren’t meant to represent the specific operational type concerns for outages shorter than six months. Risk is based on probability, duration, and severity. The probability and duration of outages less than six months reduces the chance of an event towards zero as the duration gets smaller. Therefore, the industry reviewed and approved six month duration threshold is appropriate for a planning assessment.

By removing the six month threshold, FERC opens the door to annual TPL-001-4 planning assessments being performed for one day outages such as those required for mandated PRC-005-2 relay and maintenance testing. Short term outages are considered in operational planning assessments such as seasonal, next-day, and current-day assessments.

Annual Planning Assessments are not operational assessments. In short, annual planning assessments become meaningless as durations become shorter than six months. An annual TPL-001-4 planning assessment represents a reasonable general snapshot of the system assuming all equipment is available and in-service except for the specific contingency performed. Daily operational conditions almost never have the system entirely intact and available due to necessary system maintenance and testing.

**Action Item:** Look at the future IRO-017 for consistency

a. If there are risks to the reliable operation of the BPS, are the likelihood of the occurrence of these risks low, medium or high?

**Draft Answer:** Low.

**Please explain your response:**

**Draft Answer:** The likelihood of an occurrence of the probability of a contingency to occur combined with the duration of an outage of less than 6 months is low.
b. What costs should be considered when evaluating these risks or in adding planned maintenance outages less than six months to TPL-001-4? Please explain your response:

**Draft Answer:** Additional costs to consider include duplicative staff, duplicative equipment, additional computing time, and compliance enforcement costs related to performing additional annual planning assessments for TPL-001-4 which are already adequately and properly covered in seasonal, next-day, and current day studies. If daily PRC-005-2 outages must be evaluated, then the number of duplicate annual planning contingency studies with no additional reliability benefit is significant.

c. If you identified one or more risks and identified a likelihood of “medium” or “high”, is there a more cost effective manner to reduce them rather than revising TPL-001-4 or is there an preferred approach to revising TPL-001-4 that takes into consideration cost effectiveness?

☐ Yes
☒ No

Please explain your response including descriptions of potential cost effective solutions and the associated benefits to reliability:

2. What, if any, risk to the reliable operation of the BPS, as defined under Section 215 (see question 1 above) is there if an entity does not perform stability analyses for the P0, P1 and P2 categories in TPL-001-4 that consider the possible unavailability of long lead-time equipment? Please explain your response:

**Draft Answer:** Paragraph 89 of Order No. 786\(^3\) to consider P0, P1, and P2 stability analyses for long lead-time equipment with outages of more than six months is reasonable if the scope is limited. There are concerns that a P2 stability analysis with an assumed third contingency base case long-term outage can easily go beyond typical electric grid designs resulting in additional transmission construction.

Entities already cover the P0 and possible the P1 conditions as part of their normal stability analyses. A P0 no outage condition with an assumed base six-month element outage becomes a P1 outage condition (an N-1 contingency). Similarly a P1 condition with an assumed base six-month element outage becomes a P2 outage condition (an N-2 contingency). However, a P2 condition with an assumed base six-month element outage is an atypical 3\(^{rd}\) contingency or N-3 contingency. Unless limited, this could have significant impacts in terms of staff, time, and ultimately electric grid reinforcements.

The risks posed by not performing P0, P1, and P2 stability analyses is specific in nature depending upon the type of equipment and the impact of that equipment. Long lead-time equipment could include common Bulk Electric System (BES) equipment with no significant thermal, voltage, and

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stability impacts. Similarly the equipment could be specialized and be part of a critical BES Facility such as an Interconnected Reliability Operating Limit (IROL).

A typical reactor or transformer may take more than 12 months to obtain and have almost no thermal, voltage, or stability impacts if associated with a BES generator that almost never runs. If the equipment isn’t typical such as a series capacitor bank used to improve system stability on an IROL, the risks and impact could be high.

a. If there are risks to the reliable operation of the BPS, are the likelihood of the occurrence of these risks low, medium or high?

**Draft Answer:** See the answer for item 2 above.

Please explain your response:

**Draft Answer:** See the answer for item 2 above.

b. What costs should be considered when evaluating these risks? Please explain your response:

**Draft Answer:** Additional costs would include time and staff required to perform more stability studies.

c. If you identified one or more risks and identified a likelihood of “medium” or “high” is there a cost effective manner to reduce them rather than revising TPL-001-4 or is there an preferred approach to revising TPL-001-4 that takes into consideration cost effectiveness?

- [x] Yes
- [ ] No

Please explain your response including descriptions of potential cost effective solutions and the associated benefits to reliability:

**Draft Answer:** Revising the TPL-001-4 standard to evaluate P2 stability impacts of long lead-time equipment associated with identified IROLs seems reasonable.

**Overall Comment:** The NSRF thinks our key comment on cost-effectiveness and risk is where the most effective solution to accommodate maintenance of a particular facility is construction. If you wait to capture the issue in the operating horizon, you either increase the risk and have to rely on operating guides, re-dispatch, and workarounds; or you shift the work to some other period where dispatch cost is higher.