FERC Notice of Proposed Rulemaking (NOPR)

Transmission System Planning Performance Requirements for Extreme Weather

Workshop #1

Preliminary PJM response plan to the NOPR and Stakeholders Input

Planning Committee
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Sami Abdulsalam
Sr. Manager, Transmission Planning

Transmission System Planning Performance Requirements NOPR

- FERC proposed to direct NERC to submit modifications to TPL-001-5.1 (Transmission System Planning Performance Requirements) within one year of the effective date of a final rule, to address reliability concerns pertaining to transmission system planning for extreme heat and cold weather events that impact the reliable operations of the Bulk-Power System.
- The revised TPL-001-5.1 standard would have compliance obligations beginning **no later than 12 months from the date of Commission approval** of the modified Reliability Standard.

The proposed modifications to TPL-001-5.1 would require:

Benchmark Planning Cases (Development):

- Development of benchmark planning cases based on information such as major prior extreme heat and cold weather events or future meteorological projections

Analysis Methods:

- Planning for extreme heat and cold events using steady-state and transient stability analyses expanded to cover a range of extreme weather scenarios, including the expected resource mix's availability during extreme weather conditions and the broad-area impacts of extreme weather

Actions:

- Corrective action plans that include mitigation for any instances where performance requirements for extreme heat and cold events are not met

Influencing Factors

ERCOT Cold Weather Event – February 2021

- 23,418 MW of manual firm load shed
- 65,622 MW of unplanned generation outages
- 210 deaths

FERC-Led Technical Conference on Climate Change, Extreme Weather, and Electric System Reliability (AD21-13) – June 2021

Mike Bryson provided testimony on behalf of PJM.

FERC Resilience Dockets (PJM provided comments):

- Docket No. AD18-7 (now closed Resilience Docket)
- Docket No. RM21-17 (Transmission Planning ANOPR)
- AD21-13 (Post Technical Conference Comments in Climate Change Docket)

PJM Response Timeline

- Currently, PJM is working internally to develop draft response to the RM 22-10-000 Extreme Weather Planning NOPR
  - Aug 26th, 2022 due date for comments on draft proposed rule

- Two Workshops Scheduled:
  - July 21st:
    - Provide update on preliminary PJM response plan to the NOPR and solicit input from Stakeholders
  - Aug 12th:
    - Final draft response update and discussion.

Workshop #1: Topics Covered

1. Modifying NERC Reliability Standard TPL-001-5.1
2. Establishing Benchmark Planning Cases
3. Transmission System Planning for Extreme Heat and Cold Weather Events Methods and approaches
   - Steady State and Transient Stability Analyses
   - Transmission Planning Studies of Wide-Area Events
   - Study Concurrent Generator and Transmission Outages
   - Sensitivity Analysis
   - Modifications to the Traditional Planning Approach
   - Coordination Among Planning Coordinators and Transmission Planners and Sharing of Study Results
4. Weather Events other Than Extreme Heat and Cold

1. Modifying NERC Reliability Standard TPL-001-5.1

- Reliability Standard TPL-001-4, and its successor, TPL-001-5.1:
  - Includes provisions to study system performance under extreme events based on regional/footprint “experience”.
  - **Current standards do not specifically limit the performance analysis be conducted for extreme heat and cold weather**, this represents a gap in system planning given the adverse impacts already experienced due to historical events.

- **FERC proposes to direct NERC to submit modifications to Reliability Standard TPL-001-5.1 within one year of the effective date of a final rule**
  - Compliance obligations for all proposed new or modified Reliability Standards beginning no later than 12 months from the date of Commission approval of the modified Reliability Standard.

1. Modifying NERC Reliability Standard TPL-001-5.1

- PJM acknowledges need to revise Reliability Standard TPL-001-5.1 and recommends providing a Project timeline that allows for additional time, if needed, instead of the proposed commitment of one year.
  - A one year timeframe for standard development and one year compliance turnaround could be too optimistic.
  - Which aspects of TPL-001-5.1 should be focused on for Resilience and Extreme Weather conditions?

- This will allow for an additional comment period for any potential substantive change requests as part of NERC's Standard Process, otherwise, there is a potential of the modifications not meeting the intended purpose of this notice of proposed rulemaking.

- PJM is of the position that any recommendations and changes in TPL-001-5.1 should be clear and actionable.

2. Establishing Benchmark Planning Cases 1/3

- **FERC proposes** to direct NERC to develop modifications to Reliability Standard TPL-001-5.1 to require):
  - **(1) Development of benchmark planning cases** based on information such as major prior extreme heat and cold weather events or future meteorological projections;

- **PJM Initial Response: PJM supports developing rules and criteria for the development of benchmark planning cases consistently:**
  - The cases need to be statistically credible and reflect a specific likelihood of system conditions stemming from extreme weather conditions.
  - The combined impact of (load, transmission outages (topology) and resources (forced, planned and fuel availability)
  - NOPR referral to extreme heat and cold events do not necessarily reflect a higher than anticipated/forecasted peak loading conditions
    - Prior events did not necessarily result in higher than recorded peak loading but rather reflected a more stressed system condition due to combination of Loading, Outages (Planned and Forced) as well as availability of Fuel Resources depending on extreme weather conditions involved.
    - Coinciding conditions may impacts extreme operating conditions such as generation and transmission outages and gas pipeline dependencies may all contribute to event severity.

2. Establishing Benchmark Planning Cases 2/3

- Classical 90/10 load forecast rule may not be relevant.
  - As well as single or double outage assumptions) to model impacts of forced and planned outage coincident with the extreme events.
  - Example: One in 50 or One in XX years may be a desirable planning target criteria to establish reasonable weather conditions for the purpose of Resilience assessments.
- A set of corresponding Extreme Weather Conditions/Scenarios could be established and set in the planning benchmark case.
- Case setup considering generation and modeled transmission outages (due to off-season planned outages for example) could be set up for the purpose of resilience assessment/Analysis.
- Considerations:
  - Respect regional differences in Transmission Planning Process and Conditions.
  - Focus on only Wide-Spread events and avoid localized events that are less impactful

2. Establishing Benchmark Planning Cases 3/3

- Benchmark Case Parameters:
  - Extreme Heat and Cold beyond that used in 90/10 load forecast as part of load deliverability studies.
  - Generation availability and its impact on dispatch;
  - Transmission status.
  - Event duration.
  - Geographic scope.
- Challenge will be to develop extreme temp forecast and associated conditions.
  - Must first determine the frequency: e.g., once every 20 years? Every 50?
  - PJM has not experienced such “outlier” conditions in recent history.
  - Consideration of study scenarios where extreme heat/cold event hit several regions at once.

3. Transmission System Planning - Events Methods and approaches 1/6

- NERC would be required to address in a modified Reliability Standard pursuant to the proposed directives:
  1. steady state and transient stability analysis;
  2. transmission planning studies of wide area issues;
  3. concurrent generator and transmission outages;
  4. sensitivity analysis;
  5. consideration of modifications to the traditional planning approach;
  6. coordination among planning coordinators and transmission planners and sharing of results.
- FERC notes that a range of methods/approaches could satisfy the Commission's directive with regard to issues (3) through (6). NERC would retain flexibility with regard to how to address these topics, so long as it incorporates them into its proposed solution.

3. Transmission System Planning - Events Methods and approaches 2/6

- Transmission System Planning Studies Goal is to maintain as practically as possible, serving load reliably, minimize the amount of load shed and maintain overall system integrity during extreme weather event conditions.

- Consider listing all possible corrective actions in NOPR response, noting which are planning focused and which are operationally focused. Doing so has a bearing on which NERC Standards are affected. Some corrective actions discussed in NOPR may be more applicable to an Operations standard.

3. Transmission System Planning - Events Methods and approaches 3/6

- Should Planning Studies consider:
  - Installed capacity reserve margins to ascertain appropriate levels as a corrective action under system-wide extreme heat/cold events?
  - *Interregional Transfer Capability availability and requirements*

- A probabilistic study approach could be pursued that yields a standard for interregional transfer capability. Explore historical grid experience; perhaps analytics around source/sink combinations

- PJM re-emphasizes the need to study interregional transfer capability as part of corrective actions to address extreme heat/cold system-wide events.
  - PJM will offer to work with NERC, planning counterparts in other regions, and other federal agencies to study development of a minimum transfer capability requirement as part of a modified TPL-001 Standard to avoid system instability and cascading outages. This multi-agency, multi-region effort will entail significant research and study.

3. Transmission System Planning - Events Methods and approaches 4/6

- Use of Dynamic Analysis in Stability Assessments:
  - PJM will support to utilize dynamic analysis for wide area stability ensuring un-controlled separation will not occur for simulated conditions.
  - PJM does not believe that extremely long simulation timeframes (beyond typical stability assessment timeframes) will be required.
    - The stressed system conditions will be identified and implemented in the basecase (including statistically credible load, generation and transmission outages)
    - Focus on impact of severe contingencies on top of the modeled basecase conditions and ensure un-controlled separation does not occur.

3. Transmission System Planning - Events Methods and approaches 5/6

- Set of Contingencies to be studied:
  - PJM believes that this should be left to the Transmission Provider and ISOs/RTOs based on the design criteria to be identified (One in XX years).
  - Recognizing the regional differences and their impact on the weather related events.
  - Use of basic set of rules from NOAA or similar labs will help define how likely these events would unfold.
  - This effort will take more than one year to develop the standard

- Demand Response: PJM currently has 8-9 GWs of Demand Response:
  - Inclusion of this load in the model is important in order to capture its impact.

3. Transmission System Planning - Events Methods and approaches 6/6

- Modification to Traditional Planning Approach:
  - PJM supports the use of probabilistic planning approaches and statistical methods in basecase building and assessing the impacts including load loss, etc.
    - Statistical and probabilistic approaches could be adopted to help establish the baseline and sensitivity system conditions that the deterministic approaches will be applied to.
  - Benefits of applying probabilistic methods include planning to conditions within a pre-established design threshold.
    - This ensures realistic selection of parameters and assumptions that together lead to appropriate likelihood of concurrence (low-likelihood, high impact condition) that is reasonably credible.

Corrective Action Plans 1/5

- **FERC proposes** to direct NERC to **modify Reliability Standard TPL-001-5.1 to require corrective action plans** that include mitigation for any instances where performance requirements for extreme heat and cold events are not met. ***Examples of actions*** *that could be included in a corrective action plan are:*
  - planning for additional contingency reserves.
  - implementing new energy efficiency programs to decrease load.
  - increasing intra- and inter-regional transfer capabilities.
  - transmission switching.
  - adjusting transmission and generation maintenance outages based on longer-lead forecasts.

- **PJM is seeking input regarding order through which these corrective plans could be considered.**

Corrective Action Plans 2/5

- FERC further states that in particular, **increases in interregional transfer capability could** be considered as one option to address potential reliability issues during extreme weather events.
  - Such transfer capability would allow an entity in one region with available energy to assist one or more entities in another region that is experiencing an energy shortfall due to the extreme weather event.
  - Increasing interregional transfer capability may be a particularly robust option for planning entities attempting to mitigate the risks associated with concurrent generator outages over a wide area.

- FERC believes that there may be potential benefits in better incorporating interregional transfer capability into corrective action plans, where warranted and **encourage NERC to consider establishing requirements that appropriately recognize the value of interregional transfer capability.**

Corrective Action Plans 3/5

- PJM agrees that from Planning perspective, that #1 – additional reserves - and #3 – interregional transfers – would be valuable elements of a corrective action plan.

- Energy efficiency programs impact will be accounted for in basecase. They may have little impact during an extreme weather event to be relied on

- Installed capacity reserve requirements should consider fuel diversity for extreme weather.
  - 1993 Deep Freeze – generating unit fuel availability impacted by such considerations as frozen coal piles and frozen rivers, and what neighbors ***concurrently*** have as reserves
  - Should installed capacity reserves be a ***"consideration"*** or a ***"corrective action/solution"?***

Corrective Action Plans 4/5

- Other FERC proposed elements like ***"transmission switching"*** and ***"adjusting transmission and generation maintenance schedules"*** are more rightly in the realm of operational-timeframe driven NERC standards.
  - Many of these standards were enhanced and/or developed out of post Winter 2021 event analysis.
  - They would be tools for PJM operators and ***can complement*** PJM transmission solutions to enhance system overall resiliency in preparation of and during contemplated by this NOPR.

- PJM will clarify that its response to this NOPR regarding NERC Standard TPL-001-5 ***is in the planning space***; operational dimensions may have to be addressed in the context of other NERC standards.

Corrective Action Plans 5/5

- Cost of implementation:
  - The cost of implementing a given corrective action plan will depend on nature of the extreme event being analyzed and who is benefiting.
  - The more the grid is stressed, the more widespread and severe reliability criteria violations will be identified, and, thus, the greater the potential cost for a corrective action.
  - Greater the cost AND the greater the impact – i.e., greater extent of impact to stakeholders, load and market participants;
    - would suggest more system wide approach to cost allocation?

Weather Events other Than Extreme Heat and Cold

Other Extreme Weather Events:

- Examples: Hurricane, tropical storm, flood, tornado, derecho.
- These tend to be localized events and should not be the focus of the Standard.
- Focus should be on impact of region-wide, persistent extreme heat and cold. Example, winter 2021 event in ERCOT, SPP, and MISO.
- Drought, if it were ever to hit PJM footprint, would likely impact hydro availability and units requiring water intake – predictable and with long lead preparation time.

Contact

Facilitator:
Danielle Croop,
Danielle.Croop@pjm.com

Secretary:
Tarik Bensala,
Tarik.Bensala@pjm.com

SME/Presenter:
Sami Abdulsalam,
Sami.Abdulsalam@pjm.com

Member Hotline

(610) 666 – 8980

(866) 400 – 8980

custsvc@pjm.com

Revision History

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1	7/20/2022	• Original slides posted

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