PJM RTEP – 2015 RTEP Proposal Window #1
Problem Statement & Requirements Document

Scope: 2020 Baseline (N-1) Thermal and Voltage; 2020 Generator Deliverability and Common Mode Outage; 2020 Load Deliverability Thermal and Voltage; 2020 N-1-1 Thermal and Voltage
Email: RTEP@pjm.com with any questions or clarifications and include a reference to 2015 RTEP Proposal Window #1

2015 RTEP Proposal Window #1

I. Purpose of Proposal Window

PJM seeks technical solution alternatives (hereinafter referred to as “Proposals”) to resolve potential reliability criteria violations on facilities identified below in accordance with all applicable planning criteria (PJM, NERC, SERC, RFC, and Local Transmission Owner criteria).

II. Criterion applied by PJM for this proposal window:

A) Baseline Thermal and Voltage N-1 Contingency Analysis

B) Generator Deliverability and Common Mode Thermal Analysis

C) Load Deliverability Thermal and Voltage Analysis

D) N-1-1 Thermal and Voltage Analysis

III. Terminology

For Proposal windows, PJM will distribute an Excel workbook of potential violations on facilities identified through a series of analyses. The following column headings are generally representative of the data fields that will be used to identify the specific facility and other factors of the output of this analysis. Not all column headings will appear in every sheet within the workbook. Additional information deemed necessary by PJM will be provided on a separate sheet along with the results file.

Typical thermal analysis column headings:

<table>
<thead>
<tr>
<th>Column Headings</th>
<th>Title</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>FG #</td>
<td>Flowgate Number</td>
<td>A sequential numbering of the identified potential violations</td>
</tr>
<tr>
<td>Fr Bus</td>
<td>From Bus Number</td>
<td>PSSE model Bus number corresponding to one end of line identified as a potential violation</td>
</tr>
<tr>
<td>Fr Name</td>
<td>From Bus Name</td>
<td>PSSE model Bus name corresponding to one end of line identified as a potential violation</td>
</tr>
<tr>
<td>To Bus</td>
<td>To Bus Number</td>
<td>PSSE model Bus number corresponding to other end of line identified as a potential violation</td>
</tr>
<tr>
<td>Column</td>
<td>Title</td>
<td>Description</td>
</tr>
<tr>
<td>---------------------------------------------</td>
<td>--------------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>FG #</td>
<td>Flowgate Number</td>
<td>A sequential numbering of the identified potential violations</td>
</tr>
<tr>
<td>Bus #</td>
<td>Bus Number</td>
<td>PSSE model Bus number corresponding to bus identified as a potential violation</td>
</tr>
<tr>
<td>Name</td>
<td>Bus Name</td>
<td>PSSE model Bus name corresponding to bus identified as a potential violation</td>
</tr>
<tr>
<td>KV</td>
<td>Kilovolt level</td>
<td>Kilovolt level of bus identified as potential violation</td>
</tr>
<tr>
<td>Area</td>
<td>Area Number</td>
<td>Area number of bus identified as potential violation</td>
</tr>
<tr>
<td>ContVolt</td>
<td>Contingency Voltage (P.U.)</td>
<td>Per Unit Voltage at identified bus after contingency is applied</td>
</tr>
<tr>
<td>BaseVolt</td>
<td>Basecase Voltage (P.U.)</td>
<td>Per Unit Voltage at identified bus before contingency is applied</td>
</tr>
<tr>
<td>Low Limit</td>
<td>Low Voltage Limit (P.U.)</td>
<td>Threshold of Per Unit Low voltage, if ContVolt is under this limit, a potential violation is identified</td>
</tr>
</tbody>
</table>
### Upper Limit Table

<table>
<thead>
<tr>
<th>Upper Limit</th>
<th>Cont Type</th>
<th>Vdrop(%)</th>
<th>Contingency</th>
<th>Analysis Case</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Voltage Limit (P.U.)</td>
<td>Contingency Type</td>
<td>Voltage drop</td>
<td>Contingency Name</td>
<td>Case title to use in replicating analysis</td>
</tr>
<tr>
<td>Threshold of Per Unit High voltage, if ContVolt is over this limit, a potential violation is identified</td>
<td>Contingency Categorization (potential options include: Single, Bus, Line_FB, Tower)</td>
<td>The Percentage that the voltage has dropped as a result of the contingency</td>
<td>Contingency Name as identified in associated contingency file</td>
<td></td>
</tr>
<tr>
<td>Contingency 1</td>
<td>First Contingency</td>
<td>N-1 (First) Contingency identified</td>
<td>N-1-1 (Second) contingency identified in N-1-1 analysis</td>
<td></td>
</tr>
<tr>
<td>Contingency 2</td>
<td>Second Contingency</td>
<td>Violation Date</td>
<td>Date on which violation is expected to occur</td>
<td></td>
</tr>
<tr>
<td>Analysis Date</td>
<td>Analysis Case</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### IV. Analysis Procedure

PJM Planning follows a documented procedure for all RTEP analysis as set forth in PJM Manual 14B. This problem statement requires participants to perform analysis and identify solutions to potential violations identified using RTEP procedures detailed in Manual 14B:

http://pjm.com/~/media/documents/manuals/m14b.ashx

Additionally, all proposed solutions must meet the performance requirements outlined in PJM Transmission Owner Criteria:

http://www.pjm.com/planning/planning-criteria/to-planning-criteria.aspx

PJM performs a preliminary quality assessment of the analysis in coordination with PJM Transmission Owners, Generation Owners, Neighboring Transmission Owners, and any other affected parties. In this quality assessment PJM reviews potential violations as determined by the analytical tools used throughout RTEP analysis. Through this coordination PJM seeks to identify only the violations for inclusion in the proposal window process. As PJM works through this quality assessment and continues to develop the RTEP analysis, it is possible that identified potential violations will be removed from the potential violation list as determined by PJM Planning. It is also possible that as the analysis continues, other potential violations that were not on the potential violation list originally are added to that list as deemed necessary by PJM Planning.

This process is intended to develop upgrades to address system reliability criteria violations and market efficiency projects. PJM will regularly retool analysis based on updated system information to ensure that solutions address the identified violations, do not cause any new violations, and are still needed to address reliability criteria and/or market efficiency projects.

PJM maintains the right to select the most appropriate project to address the violation/constraint/issue.
V. Scope of Work

Through this Proposal window PJM is seeking solutions to identified Reliability Criteria violations.

As noted at previous TEAC meetings and in the results of the analysis for this window, PJM identified several potential issues on facilities where the loading on the facility includes a contribution from a generator that has notified PJM of their expectation to retire, but either has not yet retired or has not been retired for greater than 1 year. PJM rules require retired generators to be included in the model for 1 year after their retirement to preserve their capacity rights. Assuming generation retires as anticipated, the loading on these facilities will be within applicable rating, and these are not likely to be criteria overloads at that time. Additionally, PJM identified several potential issues on facilities where the loading on the facility includes a contribution from a FSA generator which is in PJM’s Generation Interconnection queue. FSA generation does not always proceed to the ISA and commercial operation. **PJM does not intend to recommend upgrades to solve these issues at this time.**

Objectives

1. Develop solutions to identified potential violations;
2. Solutions should not cause any additional violations (Such as: Thermal, Voltage, Short Circuit or Stability). If additional violations are caused by the solutions, this should be addressed within proposal package; and
3. Adhere to any applicable criteria, including all PJM, NERC, SERC, RFC and Local Transmission Owner Criteria

What PJM Provides:

The following data and related information is required for this analysis and is expected to be available from PJM:

Modeling Data:

The following data is provided (Please note these files are Critical Energy Infrastructure Information (CEII) and should be handled accordingly):

1. **Base Power Flow Case.**
   - This window addresses a variety of reliability criterion that span several corresponding power flow cases. The data in the Excel spreadsheet notes which case(s) correspond to each identified reliability criteria violation.
2. **Contingency List.** All Contingency Types (Single, Bus, Tower, Line w/ stuck breaker).
3. **Subsystem File.** Identifying all subsystem zones to be considered in analysis.
4. **Monitor File** Identifying specific ranges of facilities by area and kV level to be considered in analysis.
5. **Applicable Ratings (if different from what is in case)**
6. **Excel Workbook** containing the detailed power flow results and any additional technical comments.

**Response back to PJM (Deliverables)**

The following must be provided no later than the close of the window. Please use the PJM provided templates to describe the high level details of your proposal. Proposing entities must provide separate templates for every proposal. PJM will not accept proposals with multiple options. Each proposal with a unique set of electrical characteristics and/or routing characteristics must be submitted as a separate proposal. If the proposer wishes to include more detail, additional narrative may be included in the Proposal Report (Word/PDF document) added to address specifics of your proposal including, but not limited to:

1. **Description of the proposed solution and corresponding violation(s) it resolves.**
   a) Describe to PJM if the project should be considered only as a whole or if portions of the project should be considered as well.

2. **Detailed analysis report on proposed solutions, including:**
   a) Breaker one-line diagrams to illustrate system topology
   b) Spreadsheets (e.g. Output of analysis showing solution to identified issue)
   c) High level estimate of:
      i. Time to construct the proposed solutions and the overall expected in-service date
      ii. Cost
         i. Cost estimates should include an itemized list of costs for each major component (e.g. substation work, transformer cost, transmission line cost).
         ii. with a description of assumptions (e.g. base cost, risk and contingency (R&C) costs, and total cost)
      iii. Availability of right of ways

3. **Incumbent vs. Non-incumbent scope of work**
   a) If a non-incumbent proposal assumes that a portion of the work will be completed by an incumbent Transmission Owner, the high level scope and itemized cost for that work shall be provided.

4. **Equipment parameters and assumptions**
   a) All parameters (ratings, impedances, mileage, etc.)
   b) For reactive devices, settings and outputs
   c) For synchronous machines, MW and MVAR output assumptions

5. **Complete set of power flow and dynamic cases containing proposed solutions** (all cases should be solvable, not containing any non-convergence issues, in line with industry standards). You must provide a PSS/E IDEV file so that the modeling of the proposal may be easily applied to other models (please only use unused bus numbers for the creation of new busses). Please contact PJM with any questions. Provide any other necessary data including critical contingency files to reproduce the proposed solutions. All cases and data files for dynamic simulations must be in PSS/E ver. 32 format.
6. Any other supporting documentation required by PJM that is required to perform verification review, that isn’t explicitly stated in this document.

7. Submission of Deliverables
   b) Alternate - VIA electronic mail to RTEP@pjm.com
   c) Alternate (e.g.: DVD or flash/thumb drive) - VIA FedEx to Nancy Muhl, PJM Interconnection, 2750 Monroe Boulevard, Audubon, PA 19403

PJM requires all proposal solutions, both upgrades to existing facilities and Greenfield projects, to complete the 2015 RTEP Proposal Window Template, included within the downloadable package of files. An example of how to fill out the template can be found at:


If the proposal is a Greenfield solution then, the ‘2015 Greenfield Project Proposal Template’ included within the downloadable package of files must also be included in the project proposal package. The Greenfield template can also be found at:

http://pjm.com/~/media/planning/rtep-dev/expan-plan-process/ferc-order-1000/order-1000-greenfield-project-proposal-template.ashx

Proposing entities are required to provide a public and non-public version of the project proposal. Proposing entities should expect that PJM will post the public version of the proposals after the close of the window. The public version must include redactions for any CEII information and information which the proposing entity deems is business proprietary and confidential (Note: PJM reserves the right to review the proposing entity’s proposed redactions to ensure the appropriate level of transparency while protecting confidential and proprietary information and CEII). Redaction guidelines can be found at:


Proposal Fees

There is no proposal fee for the 2015 RTEP Proposal Window #1. Please note that Fees for future proposal windows are currently under discussion through the PJM committee process.

Timeline

6/19/2015, Opening of 2015 RTEP Proposal Window 1
7/20/2015, Close of 2015 RTEP Proposal Window 1
   • Items due at close of 30 day window:
PJM RTEP – 2015 RTEP Proposal Window #1

• RTEP Proposal Template (Excel Spreadsheet) with initial planning level cost estimate
  ▪ The initial cost estimate is not binding and it is PJM’s intent to use this initial estimate to support the creation of an initial analytical work plan.

• All analytical files needed for technical analysis & simulation
  ▪ Include all results of proposer’s simulations
  ▪ e.g. all PSS/E files, contingency files, one line diagrams, etc.

• Detailed substation (showing all breaker and transmission topology) and route diagrams

• Pre-qualification documentation


• Items due 45 days after window opening:
  • RTEP Proposal Template (Excel Spreadsheet) updated to include both an overall project cost and detailed cost of each component
    ▪ This cost estimate may differ from the 30 day cost estimate.
    ▪ This is a detailed cost estimate and should include any relevant information that PJM could need to make a project selection.
    ▪ Any cost cap or cost containment mechanisms should include enough detail for PJM to understand the implementation and impact of the cost mechanism under theoretical scenarios.
      • Describe in detail every aspect of the proposed cost where the cost mechanism does and alternatively does not apply
      • If supplemental theoretical examples of how the cost mechanism would behave under varying scenarios would benefit PJM’s understanding of the cost mechanism, include them with the project documentation.
  • Greenfield RTEP Proposal document (Detailed Word/PDF Report, Redacted and Un-redacted)

Notes:
• PJM will not make any proposal details public until all items are submitted.
• Entities cannot modify intrinsic details of the proposal or make new proposals after the initial 30 day submission.

<table>
<thead>
<tr>
<th>Action</th>
<th>Target Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recipients submit pre-qualification packages and updates to PJM*</td>
<td>On or before 7/20/2015</td>
</tr>
<tr>
<td>PJM distributes Problem Statement to RTEP proposal window participants</td>
<td>6/18/2015</td>
</tr>
<tr>
<td>Recipients submit questions to PJM</td>
<td>6/18/2015 – 7/20/2015</td>
</tr>
<tr>
<td>PJM distributes answers to questions to all recipients*</td>
<td>6/18/2015 – 7/20/2015</td>
</tr>
<tr>
<td>Recipients submit proposal template to PJM**</td>
<td>On or before 7/20/2015</td>
</tr>
</tbody>
</table>
Recipients submit detailed greenfield proposals and final cost to PJM**

On or before 8/4/2015

*PJM will maintain confidentiality of individual proposals for the duration of the window, including the additional 15 days.

**Any proposals received after close of the proposal will not be accepted.

Document Revision History

6/18/2015
Original File Posted