2018/19 RTEP Long-Term Proposal Window

Problem Statement & Requirements Document

Scope: Market Efficiency Congestion; 15 Year Reliability Analysis

PJM Interconnection
February, 2019
Version 3

2018/19 RTEP Long-Term Proposal Window

I. Purpose of Proposal Window

PJM seeks technical solutions (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) and market efficiency criteria.

II. Criteria applied for this proposal window:

A) Reliability Criteria

i) 15 Year Reliability Analysis

B) Market Efficiency Criteria

i) Market Efficiency Congestion

III. Terminology

For reliability proposal windows, PJM provides a list 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 page of the list. Additional information deemed necessary by PJM will be provided on a separate page along with the results file.

Typical thermal analysis column headings:

Column Headings	Title	Description
FG #	Flowgate Number	A sequential numbering of the identified potential violations
Fr Bus	From Bus Number	PSSE model bus number corresponding to one end of line identified as a potential violation
Fr Name	From Bus Name	PSSE model bus name corresponding to one end of line identified as a potential violation
To Bus	To Bus Number	PSSE model bus number corresponding to other end of line identified as a potential violation
To Name	To Bus Name	PSSE model bus name corresponding to other end of line identified as a potential violation
Monitored Facility	Monitored Facility	The circuit on which a potential violation is occurring
Base Rate (MVA)	Base Rate (MVA)	Normal facility rating (Rate A)
% Overload	Percentage Overload	Percentage above base rate

CKT	Circuit	Circuit number of identified potential violation
KVs	Kilovolt level (A/B)	Kilovolt level of both sides of potential violation, if A does not equal B, potential violation is a transformer
Areas	Area Numbers (A/B)	Area numbers of both ends of potential violation (A=From Bus Area Number, B=To Bus Area Number) If A does not equal B, potential violation is a tie line
Rating	Line Rating	Applicable thermal rating (MVA) of line
DC Ld(%)	Direct Current Loading percentage	Percentage above 'Line Rating' determined from DC testing
AC Ld(%)	Alternating Current Loading percentage	Percentage above 'Line Rating' determined from AC testing
Cont Type	Contingency Type	Contingency categorization (potential options include: Single, Bus, Line_FB, Tower)
Cont Name	Contingency Name	Contingency name as identified in associated contingency file or embedded in the spreadsheet
Contingency	Contingency	Contingency description
Violation Date	Violation Date	Date on which violation is expected to occur
Analysis Case	Analysis Case	Case title to use in replicating analysis

Typical voltage analysis column headings:

Column Headings	**Title**	**Description**
FG #	Flowgate Number	A sequential numbering of the identified potential violations
Bus #	Bus Number	PSSE model bus number corresponding to bus identified as a potential violation
Name	Bus Name	PSSE model bus name corresponding to bus identified as a potential violation
KV	Kilovolt level	Kilovolt level of bus identified as potential violation
Area	Area Number	Area number of bus identified as potential violation
ContVolt	Contingency Voltage (P.U.)	Per unit voltage at identified bus after contingency is applied
BaseVolt	Basecase Voltage (P.U.)	Per unit voltage at identified bus before contingency is applied
Low Limit	Low Voltage Limit(P.U.)	Threshold of per unit low voltage, if ContVolt is under this limit, a potential violation is identified
Upper Limit	High Voltage	Threshold of per unit high voltage, if ContVolt is over this limit, a

	Limit(P.U.)	potential violation is identified
Cont Type	Contingency Type	Contingency categorization (potential options include: Single, Bus, Line_FB, Tower)
Vdrop(%)	Voltage drop	The percentage that the voltage has dropped as a result of the contingency
Contingency	Contingency Name	Contingency name as identified in associated contingency file
Contingency 1	First Contingency	N-1 (first) contingency identified
Contingency 2	Second Contingency	N-1-1 (second) contingency identified in N-1-1 analysis
Violation Date	Violation Date	Date on which violation is expected to occur
Analysis Case	Analysis Case	Case title to use in replicating analysis

For market efficiency proposal windows, PJM provides a list of simulated congested facilities for the relevant study years that were identified through the analysis. 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. Additional information will be provided as necessary by PJM.

Typical market efficiency column headings:

Column Headings	**Title**	**Description**
Facility name	Facility name	Description of facility
Area	Area	Identifies the PJM transmission zone for the facility. M2M signifies a market-to-market facility.
Type	Type	Identifies the type of facility such as a transformer, interface, or a transmission line
Frequency (Hours)	Frequency	Number of hours the facility is constrained for the annual study year of the simulation
Market Congestion ($Millions)	Market Congestion	Total annual congestion dollars for the facility as a result of the simulation
Potential Upgrade	Potential Upgrade	Identifies potential upgrades to relieve congestion for the facility.

IV. Analysis Procedure

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

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

http://pjm.com/~/media/documents/manuals/m14f.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 congestion drivers. PJM will regularly retool analysis based on updated system information to ensure that solutions address the identified violations and/or congestion drivers, do not cause any new violations, and are still needed to address reliability criteria and/or market efficiency congestion drivers.

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, market efficiency congestion, and reliability pricing model (RPM) limiting constraints.

Objectives

Reliability Objectives

1. Develop solutions to identified potential violations;
2. If solutions cause any additional violations, such as, thermal, voltage, short circuit or stability violations, they must also be addressed within the proposal package; and
3. Adhere to all applicable criteria, including all PJM, NERC, SERC, RFC and Local Transmission Owner Criteria.

Market Efficiency Objectives

4. Identify enhancements or expansion that could relieve PJM transmission constraints stemming from the 2018 Market Efficiency Analysis for which no reliability based project has already been identified.

5. Perform and compare market simulations with and without proposed enhancements or expansions to evaluate if the benefit/cost ratio is at least 1.25 using the criteria as defined in Schedule 6, Section 1.5.7 of the PJM Operating Agreement and PJM Manual 14B, Attachment E[1].
6. Perform high level reliability analysis of proposed market efficiency enhancements or expansions to ensure the proposed enhancement or expansion does not create any reliability issues.

What PJM Provides:

The following data and related information is required for this analysis and will be provided by PJM:

Modeling Data for the Reliability Criteria :

The following data is provided:
(**NOTE**: These files are classified as Critical Energy Infrastructure Information (CEII) and should be handled accordingly.)

1. **Base Power Flow Case(s)**
   a. This window addresses a variety of reliability criteria that span several corresponding power flow cases. Each violation indicates which power flow case was used in the analysis.
2. **Contingency File(s).** List of all contingency types (Single, Bus, Tower, Line w/ stuck breaker).
3. **Subsystem File(s)**. List of all subsystem zones to be considered in analysis.
4. **Monitor File(s)** List of specific ranges of facilities by area and kV level to be considered in analysis.
5. **Applicable Ratings** (if different from ratings included in the case).
6. **Spreadsheet** containing the detailed power flow results and any additional technical comments.

Modeling Data for the Market Efficiency Criteria:

The following data and related information is provided for this proposal window. This data is provided through the PJM Competitive Planning Process or RTEP Development websites or in the PJM Transmission Expansion Advisory Committee (TEAC) materials.

[1] On February 12, 2019, FERC issued an Order accepting PJM's filed revisions to its economic transmission planning process (market efficiency process) as set forth in its Amended and Restated Operating Agreement (OA), Schedule 6, section 1.5.7. The accepted revisions address the generation assumptions included in PJM's market efficiency analysis. Specifically, the revisions exclude from these assumptions, with exceptions, generation with an executed Facilities Study Agreement (FSA) or an executed Interconnection Service Agreement (ISA) under suspension. On February 19, 2019 FERC issued an additional Order accepting PJM's filed revisions to the PJM Operating Agreement, Schedule 6, section 1.5.7 to cap the benefit/cost ratio calculation at 15 years beyond the year in which the project is included in the regional transmission expansion plan. Both of these revisions are effective for the 18/19 Long-term window.

1. **2018 Market Efficiency Economic Models:** These models contain the base set of PROMOD data for the 2018 Market Efficiency Analysis. Access to these models requires CEII authorization along with an active license with ABB for PROMOD and Nodal Simulation Data. PROMOD case and supporting files are available under the Modeling Information section: https://www.pjm.com/planning/rtep-development/market-efficiency/economic-planning-process.aspx.

2. **Market Efficiency Eligible Congestion Drivers**: Proposals must provide congestion reduction for facilities identified as eligible congestion drivers using the Market Efficiency criteria listed below. The list of eligible congestion drivers can be obtained here: https://pjm.com/planning/competitive-planning-process.aspx.

   Only proposals which address one or more of these PJM identified eligible congestion drivers will be evaluated. If the proposal does not substantially address a PJM eligible congestion driver, or is otherwise substantially deficient or is seriously flawed, it will be rejected and the proposer will be notified.

   a. Market Efficiency Criteria:

      i. Annual simulated congestion frequency of at least 25 hours in each of the 2023 and 2026 study years.

      ii. Congestion threshold:

      Lower voltage facilities: minimum of $1 million congestion in each of the 2023 and 2026 study years.

      Regional facilities: minimum of $10 million congestion in each of the 2023 and 2026 study years.

      Interregional facilities: minimum of $0.5 million congestion in each of the 2023 and 2026 study years.

   Although the above criteria are met, PJM may not recommend proposals for certain facilities due to following exceptions:

   b. Market Efficiency Exceptions:

      i. Congestion is significantly influenced by one FSA generator or a set of FSA generators.

      ii. Majority of the congestion was already addressed in previous window(s).

      iii. Simulated congestion for future study years displays a declining trend.

3. **Other Supporting Market Efficiency files:** The following supporting files can be downloaded from the secure Market Efficiency page:

   https://www.pjm.com/planning/rtep-development/market-efficiency/economic-planning-process.aspx.

a. **Market Efficiency Base Congestion Results:** For informational purposes only, PJM provided the complete set of base case congestion results for simulated years 2023 and 2026.

b. **2018 Market Efficiency Analysis Assumptions**: This file contains the input assumptions used for the 2018 Market Efficiency Analysis.

c. **2018 ARR Model**: This file provides the ARR modeling data for the 2018 Market Efficiency Analysis.

d. **2018/19 Benefit/Cost Evaluation Tool:** This file contains the inputs and formulas necessary for calculating the B/C Ratios.

e. **Test Case & Results:** This zip file contains input and outputs for a test data set.

Response back to PJM (Deliverables)

The following must be provided no later than the close of the window. Use the proposal templates included with the problem statement package to describe the high level details of your proposal. Proposing entities must provide separate templates in Microsoft Excel format 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. Additional detail should be included in a narrative proposal report (in MS Word or pdf format). The report should address specifics of your proposal including, but not limited to:

1. Description of the proposed solution and corresponding violation(s) resolved.
   a. Indicate whether 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., results of analysis showing resolution of identified issue.
   c. High level estimate of:
      i. Time to construct the proposed solutions and the overall expected in-service date
      ii. Cost
         1. Cost estimates should include an itemized list of costs for each major component, e.g. substation, transformer, transmission line work.
         2. Provide a description of assumptions, e.g. base cost, risk and contingency (R&C) costs, and total cost.
      iii. Availability of rights of way.
3. Delineation of incumbent vs. non-incumbent scopes 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, i.e., 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 cases containing proposed solutions. Per industry standard practices, all cases should be solvable and free from non-convergence issues. Provide the information in a format compatible with PSS/E version 33 IDEV file. When adding busses to the case, identify the busses with unique numbers. Contact PJM with any questions. Provide any other data critical to reproducing the proposed solutions

   Provide contingency files in MS Word format. Create a separate file for each contingency type: single, bus, tower, line fault, stuck breaker). Within each file, organize contingencies into one of the following sections: modified contingencies, new contingencies, or deleted contingencies. All cases and data files must be compatible with PSS/E ver. 33 format.
6. Any other supporting documentation which is needed by PJM to perform a verification review, whether explicitly requested or not.

Submission of Deliverables

a. Preferred – Via File Share portal https://sftp.pjm.com/
b. Alternate - Via electronic mail to Kenneth.Seiler@pjm.com and Aaron.Berner@pjm.com.
c. Alternate (e.g.: DVD or flash/thumb drive) - Via FedEx to Ken Seiler, PJM Interconnection, 2750 Monroe Boulevard, Audubon, PA 19403

PJM requires all proposal solutions, both Transmission Owner upgrades to existing facilities and greenfield projects, to complete the 2018 RTEP Proposal Window Template, included within the downloadable package of files. An example of how to fill out the template can be found on the PJM Competitive Planning Process webpage:

https://www.pjm.com/planning/competitive-planning-process.aspx

Proposing entities are required to provide a public and non-public version of the project proposal. The public version of the proposal will be posted on pjm.com after the close of the window. The public version must redact all CEII information and information which the proposing entity deems is business proprietary and confidential. 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:

http://pjm.com/~/media/planning/rtep-dev/expan-plan-process/ferc-order-1000/rtep-proposal-windows/proposal-redaction-guidelines.ashx

Proposal Fees

All proposals, whether upgrade and greenfield, submitted to 2018/19 RTEP Long-Term Proposal Window are subject to the Proposal Fee based on the following fee structure:

- No fee ($0) for any proposed projects (upgrade and greenfield) below $20M
- $5,000 fee for any proposed projects (upgrade and greenfield) greater than $20M and less than $100M
- $30,000 fee for any proposed projects (upgrade and greenfield) greater than $100M

The fee is based on the total cost estimate provided by the proposing entity in the detailed proposal. Total cost estimate shall include all scope elements required in proposal, including the cost estimate of upgrade work to be completed by other entities and cost estimate of work required to alleviate any new violations caused by the proposal.

Timeline

11/2/2018, Opening of 2018/19 RTEP Long-Term Proposal Window

3/15/2019, Close of 2018/19 RTEP Long-Term Proposal Window

Items due at close of 120 day window:

- Completed RTEP Proposal Template to include both an overall project cost and detailed cost of each component.
  - 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.
- All analytical files needed for technical analysis & simulation
  - Include all results of simulations.
  - E.g. include all PSS/E files, contingency files, one line diagrams, etc.
- Detailed substation and route diagrams. Show transmission topology and all breakers.
- Pre-qualification documentation.
- Greenfield RTEP Proposal document (Detailed Word/PDF Report, Redacted and Un-redacted)

Proposal details will not be made public until all items are submitted.

Action	Target Date
Problem statement issued to RTEP proposal window participants	11/2/2018
Recipients submit questions to PJM	11/2/2018 – 3/15/2019
PJM distributes answers to questions to all recipients	11/2/2018 – 3/15/2019
Recipients submit proposal template to PJM**	On or before 3/15/2019

**Proposals received after close of the proposal window will not be accepted.

Document Revision History

11/1/2018 – V1 - Original File Posted

11/2/2018 – V2 – Window open and close dates updated

2/22/2019 – V3 – Window close date extended to 3/15/2019