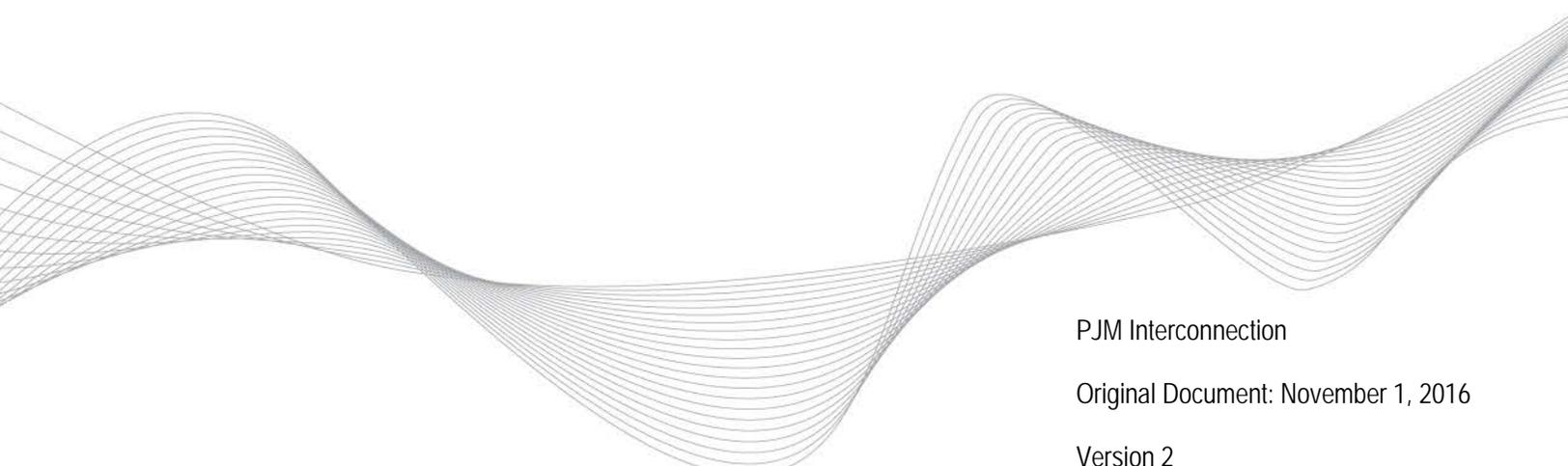




# PJM RTEP – 2016/17 RTEP Long Term Proposal Window Problem Statement & Requirements Document

Scope: Market Efficiency Congestion; 15 Year Reliability Analysis

A decorative graphic consisting of multiple thin, overlapping lines that form a complex, wavy pattern across the lower half of the page. The lines are light gray and create a sense of movement and depth.

PJM Interconnection

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Version 2

**Email: [ProposalWindow-Admin@pjm.com](mailto:ProposalWindow-Admin@pjm.com) or  
[RTEP@pjm.com](mailto:RTEP@pjm.com) with any questions or  
clarifications and include a reference to 2016/17  
RTEP Long Term Proposal Window**

**2016/17 RTEP Long Term Proposal Window**

**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) and market efficiency criteria.

**II. Criterion applied by PJM for this proposal window:**

- A) Reliability Criteria
  - i) 15 Year Reliability Analysis
  
- B) Market Efficiency Criteria
  - i) Market Efficiency Congestion

**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:

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	Per Unit Voltage at identified bus before contingency is applied

	(P.U.)	
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 Limit(P.U.)	Threshold of Per Unit High voltage, if ContVolt is over this limit, a 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 will post an Excel workbook 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.

**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.

#### **IV. 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**

1. Develop solutions to identified potential violations;
2. If solutions cause any additional violations (Such as: Thermal, Voltage, Short Circuit or Stability), they should also be addressed within proposal package; and
3. Adhere to all applicable criteria, including all PJM, NERC, SERC, RFC and Local Transmission Owner Criteria.

Market Efficiency:

4. Identify enhancements or expansion that could relieve PJM transmission constraints stemming from the 2016 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.
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 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(s).**
  - a. 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(s).** All Contingency Types (Single, Bus, Tower, Line w/ stuck breaker).
3. **Subsystem File(s).** Identifying all subsystem zones to be considered in analysis.
4. **Monitor File(s)** 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.

#### Market Efficiency Modeling Data:

The following data and related information is provided for this proposal window. This data is provided through the PJM 2016 Market Efficiency web page, the PJM Transmission Expansion Advisory Committee (TEAC) materials, or on the PJM RTEP Development web pages.

The following data is provided:

- 1) **2016 Market Efficiency Economic Models:** These models contain the base set of PROMOD data for the 2016 Market Efficiency Analysis. Access to these models requires CEII authorization (available on the PJM web site: <http://www.pjm.com/planning/rtepdevdevelopment/market-efficiency.aspx>) 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 at the following link: <http://pjm.com/planning/rtepdevdevelopment/market-efficiency.aspx>
- 2) **Market Efficiency Base Congestion results:** Proposed enhancements or expansions should provide congestion reduction for recommended facilities identified within the results at the following link: <http://pjm.com/planning/rtep-development/market-efficiency.aspx>. PJM recommends proposals for facilities that meet the below criteria with certain exceptions. Facilities below these

thresholds are not anticipated to pass the Benefit/Cost threshold because of the expected cost of an upgrade. Congestion for 2027 study year is considered more speculative and therefore will be monitored in future analysis.

- a) Market Efficiency Criteria:
  - a. Annual simulated congestion frequency of at least 25 hours in both 2021 and 2024 study years.
  - b. Lower voltage facilities: Minimum of \$1 million congestion in both 2021 and 2024 study years.
  - c. Regional facilities: Minimum of \$10 million congestion in both 2021 and 2024 study years.
  - d. Interregional facilities: There will be no minimum threshold criteria for congestion or for frequency, since congestion is impacted by both regions (example - although PJM unilaterally may not observe \$ 1 million or more congestion in both 2021 and 2024 study years, when both PJM and MISO congestion is combined, the \$ 1 million threshold maybe met).

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

- a) Market Efficiency Exceptions:
  - a. Congestion is significantly influenced by a FSA generator or a unique set of FSAs
  - b. Majority of the congestion was already addressed in previous window(s)
  - c. Simulated congestion for future study years displays a declining trend

Other Supporting Market Efficiency Data:

Additional Supporting Market Efficiency Data is available at the following link: <http://pjm.com/planning/rtep-development/market-efficiency.aspx>

1. **2016 Market Efficiency Analysis Input Assumptions:** This file contains the input assumptions used for each study year of the 2016 Market Efficiency Analysis.

2. **Market Efficiency Modeling Practices Document:** This file provides a description of the modeling methods and procedures used for PJM Market Efficiency Analysis.

### **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 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. 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 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 version 33 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 (Contingency Files must be provided in one Word document for each contingency type (Single, Bus, Tower, Line Fault Stuck Breaker) with the following sections 1) Modified Contingencies 2) New Contingencies 3) deleted Contingencies). All cases and data files must be in PSS/E ver. 33 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
  - a) Preferred – VIA Axway Secure File Transfer portal <https://sftp.pjm.com/>
  - b) Alternate - VIA electronic mail to [ProposalWindow-Admin@pjm.com](mailto:ProposalWindow-Admin@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 Transmission Owner Upgrades to existing facilities and Greenfield projects, to complete the 2016 RTEP Proposal Window Template, included within the downloadable package of files. An example of how to fill out the template can be found at:

<http://www.pjm.com/~media/planning/rtep-dev/expan-plan-process/ferc-order-1000/rtep-proposal-windows/2016-rtep-proposal-window-template.ashx>

If the proposal is a Greenfield solution then, the ‘2016 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://www.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:

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

## Proposal Fees

All proposals, upgrade and greenfield, submitted to 2016/17 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 (must be submitted along with final proposal submissions). 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

11/1/2016, Opening of 2016/17 RTEP Long Term Proposal Window

2/28/2017, Close of 2016/17 RTEP Long Term Proposal Window

- Items due at close of 120 day window:
  - 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
- RTEP Proposal Template (Excel Spreadsheet) including both an overall project cost and detailed cost of each component
  - 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.

Action	Target Date
PJM distributes Problem Statement to RTEP proposal window participants	11/1 /2016
Recipients submit questions to PJM	11/1 /2016 – 2/28/2017
PJM distributes answers to questions to all recipients	11/1 /2016 – 2/28/2017
Recipients submit proposal template to PJM**	On or before 2/28/2017

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

**Document Revision History**

**11/1/2016 – V1 - Original File Posted**

**11/2/2016 – V2 – Updated window close date to 2/28/2017 and fixed fee due date language, added wire transfer details**

**2/15/2017 – V3 - Updated Language to clarify timing of items due at close of window**