Order 1000 Lessons Learned Analysis: Proposed Voltage Threshold Process

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Order 1000 Implementation Model

Challenge Under PJM Model

- For many projects there is very low likelihood that the ultimate solution will be a greenfield solution that is also eligible for designation to a non-incumbent developer.
- PJM is compelled to perform an evaluation of all alternatives submitted under a proposal window.
- Evaluation of every proposal is both time and resource intensive but must be completed within the annual RTEP cycle.
- Proposal windows for smaller lower voltage projects, which ultimately are assigned to incumbents under ROFR, takes PJM's focus away from larger project proposals where proposal windows have demonstrated clear customer benefits

PJM Proposal

Establish voltage threshold exempting below 200 kV reliability violations from the Proposal Window process unless one of the following exception criteria applies to thermal reliability violations identified on multiple transmission lines and/or transformers rated below 200 kV that:

1. Multiple facilities are impacted by a common contingent element such that multiple reliability violations could be addressed by one or more solutions, including but not limited to a higher voltage solution; or
2. PJM determines, given the location and electrical features of the violations, one or more solutions could potentially address or reduce the flow on multiple lower voltage facilities, thereby eliminating the multiple reliability violations.

Higher Voltage Solution Check

If PJM determines there is a potential above 200 kV solution for a below 200 kV violation that was initially exempted from a proposal window because it did not meet the one of two exceptions stated above, PJM will include the violation in a proposal window.

Benefits of Proposed Voltage Floor for Window Process

- This proposal focuses resources on projects more suited to the competitive process.
- The proposal minimizes added cost of competition where the solution to a reliability violation on a below 200 kV facility is likely to be designated to the incumbent transmission owner because the solution is almost always a ROFR exemption:
  - An upgrade to an existing transmission facility
  - A facility located within one zone and allocated solely to that zone

Other Benefits of Proposed Voltage Floor for Window Process

Other Potential Benefits

- Preserves competitive solicitation for groupings of violations that can be addressed through larger solutions
- Retains competitive solicitation for higher voltage violations
- Retains competitive solicitation for all market efficiency projects
- Provides transparency in posting of all violations

Basis for a Recommended 200 kV Cut-Off and Exception Criteria

Historically almost always violations are resolved through upgrades to existing transmission facilities, which Order No. 1000 reserves to the incumbent Transmission Owner.

PJM reviewed:

- Data from approved RTEP projects since 2000
- Data from approved projects that were recommended as a result of a PJM Proposal Window

PJM RTEP Historical Data

Previous RTEP data supports that there are few competitive opportunities for cases where the violations are below 200 kV - Of 1,523 Board approved projects, 104 (7%) were greenfield, of which only 13 (<1%) were allocated to more than one zone

Voltage	Quantity	Percent of total	Greenfield	Greenfield Cost allocated to >1 zone	Greenfield Cost allocated to >1 zone[1]
765 kV	25	1.0%	1	1	4%
500 kV	155	5.9%	16	16	10%
345 kV	145	5.6%	26	10	7%
230 kV	742	28.6%	52	15	2%
< 200 kV	1,523	58.8%	104	13	<1%

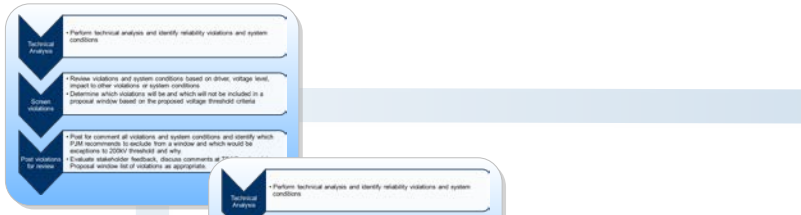
[1]Based on total number of approved projects in the voltage category.

Proposal Window Statistics

	Artificial Island	Market Efficiency	2014 RTEP Proposal Window 1	2014 RTEP Proposal Window 2	2014/15 RTEP Long-Term Proposal Window	2015 RTEP Proposal Window 1	2015 RTEP Proposal Window 2
Flowgates (violations)	1	25	112	311	77	306	22
Total Proposals	26	17	106	79	118	91	23
Entities	7	6	15	14	22	9	4
Cost Range	$100M-$1.5B	$0.19M - $528M	$0.02M - $1.4B	$0.2M - $450M	$0.1M - $432.5M	$0.013M - $167.1M	$.075M - $31M
Proposals approved by PJM Board	1	1	22	34	11	19[2]	0[3]
Approved Greenfield Projects	1[1]	0	0	4	0	0	N/A
Approved Upgrade Projects	1[1]	1	22	30	11	19	N/A
Approved Incumbent	1[1]	1	22	33	11	19	N/A
Approved Non-Incumbent	1[1]	0	0	1	0	0	N/A

1. Portions of this project were awarded to both the incumbent and non-incumbent entities, additionally this project includes both greenfield and upgrade aspects
2. One additional project is recommended for approval at the Dec. 2015 Board Meeting
3. Six additional projects are recommended for approval at the Dec. 2015 Board Meeting

Solution Review for Below 200kV Voltage Solutions



Technical analysis

Open a proposal window

Evaluate Proposals

Present Recommended Projects at TEAC

Develop < 200 kV Solutions

High Voltage Solution Check
If PJM determines there is a potential above 200 kV solution for a below 200 kV violation that was initially exempted from a proposal window because it did not meet the one of two exceptions stated above, PJM will include the violation in a proposal window.

Overview of Voltage Threshold Up-Front Process

Technical Analysis

- Perform technical analysis and identify reliability violations and system conditions

Screen violations

- Review violations and system conditions based on driver, voltage level, potential for larger solution
- Determine which violations will be and which will not be included in a proposal window based on the proposed voltage threshold criteria

Post violations for review

- Post for comment all violations and system conditions and identify which PJM recommends to exclude from a window and which would be exceptions to 200 kV threshold and why.
- Evaluate stakeholder feedback, discuss comments at TEAC and update proposal window list of violations as appropriate.

Screening violations for Proposal Window

Market Efficiency Driver	All voltages	Include in Proposal Window
Reliability violations 200 kV and above		Include in Proposal Window
Reliability violations below 200 kV	Meets Exception Criteria	Include in Proposal Window
Reliability violations below 200 kV	Does not meet exception criteria	Exempt from Proposal Window

Exception criteria

Voltage is below 200 kV

1. Multiple facilities with thermal overload reliability violations below 200 kV impacted by a common contingent element
2. Multiple facilities with thermal overload reliability violations that PJM determines could be solved by a common solution not an upgrade

Post violations for review and comment

Post all violations and system conditions and identify which PJM recommends the solution will be designated to the incumbent Transmission Owner

Posting will include:

- Description of violation
- Indication if the solution for the violation will be designated to the incumbent Transmission Owner
- Identification of the Facility with violation
- TO zone in which the facility is located

Stakeholder Review and Comment

- Stakeholders provide written comments to PJM regarding exemptions recommended by PJM
- Review comments and input from stakeholders at next TEAC meeting
- If appropriate, update which violations will be included in a Proposal Window based on the criteria

PJM RTEP Plan

- For lower voltage violations exempted from a proposal window, PJM develops RTEP recommendations and presents all projects at TEAC that will be recommended to the PJM Board for approval.

Proposal Windows – *if voltage threshold were in place*

If PJM had the 200 kV voltage threshold in place, how many violations would have been exempted from a PJM proposal window?

- 2014 and 2015 windows (reliability violations only)
  - 802 flowgates posted
    - ≥ 200 kV – 114 would have been included in a window
    - < 200 kV and met exception to exemption criteria based on common contingent element – 154 would have been included in a window
    - < 200 kV and did not meet exception to exemption criteria – 534 flowgates would have been exempted from a proposal window
- 2014/2015 Windows Market Efficiency
  - 44 flowgates posted
    - Exemption for voltage threshold would not apply to Market efficiency flowgates