Transmission Reliability Margin TRM Implementation Document (TRMID)
PJM Effective Date: January 27, 2023

1.0 Purpose

The purpose of this document is to describe how PJM establishes Transmission Reliability Margin (TRM) values for ATC calculations consistent with the requirements of NERC MOD-008-01 standard, FERC 890 Orders, and NAESB Business Practices.

2.0 NERC Functional Roles

PJM is registered as the Transmission Operator (TOP), Transmission Planner, and the Transmission Service Provider (TSP) for the PJM transmission system.

3.0 TRM Methodology Description

3.1 TRM Components (NERC MOD-008-1 R1.1, NAESB WEQ-023-1.3.2, WEQ-023-4.1):

PJM includes TRM in the AFC/ATC process to provide a reasonable level of assurance that the interconnected transmission network will be secure. NERC MOD-008-1 R1.1 and NAESB WEQ-023-4.1 requires identification in the TRMID of the components of uncertainty used in establishing TRM and a description of how the component is used to determine the TRM value.

PJM applies a default value of 2% of the flowgate rating to represent historical load forecast error. PJM also considers the allowances for loop flow impacts and variations in generation dispatch as described below:

Aggregate load forecast uncertainty

PJM uses the Aggregate Load Forecast Error as one component of uncertainty in the calculation of TRM values. Load forecast error generally increases as the forecast time period moves further away from real-time. PJM average day-ahead load forecast error has historically been approximately 2%.

Allowances for parallel path (loop flow) impacts

PJM considers an uncertainty factor of allowances for parallel path (loop flow) impacts, including gen-to-load and transmission service impacts. The MW value of historical net loop flow through PJM is used to calculate the anticipated change in loading of the system. The MW value of loop flow, which is the difference in actual interchange and scheduled interchange, is simulated as transactions using the PJM ATC process. The difference in flow on each flowgate (with and without the loop flow transactions applied) is then calculated as a percentage of the flowgate rating. This calculated percentage is the parallel path (loop flow)

uncertainty component which is considered when determining the TRM. If CBM is included in any of the historical time period, those periods will be excluded from the calculation of the loop flow impact. This is to ensure no components of Capacity Benefit Margin (CBM) are included in the TRM. (NERC MOD-008-1 R2, NAESB WEQ-023-1.3.2, WEQ023-4.1)**:**

Variations in generation dispatch

If the ATC calculation is limited by a flowgate, and that same limit is not observed in real time operations, this may be the result of variations in generation dispatch between the AFC case and real time operations. As a result, PJM may apply an adjustment to TRM, sufficient to prevent the flowgate from artificially restricting ATC.

Exceptions to the normal TRM determination:

The PJM TRM Methodology allows for TRM adjustments due to certain historic conditions, current and expected operating conditions, unusual circulation and other operating conditions. PJM may set TRM on specific Flowgates consistent with historic loading, load forecast and distribution error, variations in facility loadings, uncertainty in transmission system topology, loop flow impact, variations in generation dispatch, automatic sharing of reserves, and other uncertainties, as identified through the NERC reliability standards. If a flowgate is constrained in real time operations, but not in the AFC calculation, PJM may increase TRM to prevent additional commitments on the flowgate.

3.2 Description of Methodology used to allocate TRM across ATC Flowgates (NERC MOD-008-1 R1.2 ; NAESB WEQ-023-1.6)**:**

The Transmission Reliability Margin is a reliability margin applied to the flowgate in the AFC Calculation. TRM accounts for the inherent uncertainty in system conditions and its associated effects on ATC calculations and the need for operating flexibility to ensure reliable system operation as system conditions change. TRM includes uncertainty of load forecasts, loop flow sources, and variations in generation dispatch.

PJM calculates TRM using the following methodology:

3.2.1. TRM shall be set to 2% of the flowgate rating for all PJM owned flowgates that are included in the AFC/ATC process for non-Firm ATC calculations. For Firm ATC calculations, TRM shall be set to 2% of the flowgate rating for all PJM owned flowgates except as noted below.

3.2.2 TRM shall be set to the value established by the loop flow impact analysis if the loop flow impact is determined to be greater than 2% of the flowgate rating.

3.2.3. TRM shall be set to 5% of the flowgate rating for all PJM owned flowgates that had Transmission Loading Relief (TLR) issued in the 12 months prior to

PJM's TRM re-evaluation. If the loop flow impact is greater than 5% for the flowgate, the TRM will be established based on loop flow analysis.

3.2.4 TRM shall be set to 5% of the flowgate rating for Interconnection Reliability Operating Limit (IROL) facilities located in Manual 37: Reliability Coordination. If the loop flow impact is greater than 5% for the flowgate, the TRM will be established based on loop flow analysis.

3.2.5 TRM may be set to 5% of the flowgate rating for PJM owned flowgates that were bound constrained in the 12 months prior to the PJM's TRM re-evaluation. If the loop flow impact is greater than 5% for the flowgate, the TRM will be established based on loop flow analysis.

3.2.6 TRM may be modified during times of unusual circulation or other operating conditions to ensure reliable system operations.

3.2.7 TRM may be modified to reflect variation in generation dispatch to prevent the flowgate from artificially restricting ATC.

3.2.8 Notwithstanding the calculations noted above, PJM may set TRM on specific flowgates consistent with components of uncertainty identified in this document and NERC MOD-008-1 and NAESB WEQ-023.

3.2.9 For non-PJM flowgates, PJM uses the TRM values provided by coordination entities for the PJM AFC calculation on these flowgates, in accordance with applicable agreement with such entities. If TRM values are not provided by the coordination entities, then PJM applies a TRM of 2%.

3.3 Identification of the TRM Calculation used for different time periods (NERC MOD-008-1 R1.3):

PJM applies the same calculation of TRM values for all time periods for all ATC products; hourly, daily, weekly and monthly.

3.4 TRM Re-evaluation Frequency (NERC MOD-008-1 R4 and R5):

PJM re-evaluates TRM at least once every 13 months, but may re-evaluate TRM values more frequently when deemed appropriate. Reasons for updating the TRM values may include, but are not limited to a change in control areas, change in RTO membership or change in base case model. The current TRM values are in the flowgate definitions file posted on the PJM website. PJM is the Transmission Service Provider, Transmission Operator and Transmission Planner and all aspects of ATC calculations are administered within the Transmission Services Department.

4.0 Data Requests (NERC MOD-008-1 R3):

PJM shall make available its TRMID, and if requested, any underlying documentation used to determine TRM to any of the following who make a written request no more than 30 calendar days after receiving the request: Transmission Service Providers, Reliability Coordinators, Planning Coordinators, Transmission Planners, and Transmission Operators.

5.0 Document Control (WEQ-023-1.6):
PJM's Transmission Reliability Margin Implementation Document (TRMID) is reviewed at least once every 13 months and is posted on PJM's public website at the link below.

https://www.pjm.com/pub/oasis/TRMID.pdf

6.0 Questions:

If you have questions, please email PJMATCMethodologyContact@pjm.com

Revision History

Reviewed January 27, 2023

- *Added NAESB 3.3 WEQ-023 related references.*
- *Added examples of parallel path (loop flow) in section 3.1*

Reviewed September 14, 2022

- *Updated TRMID link to https*

Reviewed Dec 8, 2021

- *No changes necessary*

Reviewed Jan 20, 2021

- *OASIS Hotline contact information has been removed from Section 6, as the service has been discontinued*

Reviewed Jan 13, 2020

- *No changes necessary*

Reviewed May 28, 2019

- *No changes necessary*

Reviewed September 5, 2018

- *No changes necessary*

Reviewed February 3, 2018

- *No changes necessary*

Reviewed June 13, 2017

- *No changes necessary*

Reviewed February 04, 2017

- *No changes necessary*

Reviewed January 20, 2017

- Added page headers

Reviewed February 04, 2016

- No changes necessary

Reviewed September 01, 2015

- No changes necessary

Reviewed February 26, 2015

- No changes necessary

Revised July 29, 2014

- Minor wording change in section 3.4.

Revised December 6, 2013

- Clarified wording in section 3.1 under the 'Aggregate Load Forecast Uncertainty' heading and under the 'Allowances for parallel path (loop flow) impacts' heading.
- Minor wording change for clarification purposes in section 3.1 under the 'Exceptions to the normal TRM determination' heading.
- Minor wording changes for clarification purposes in sections 3.2.2, 3.2.3, 3.2.4, and 3.2.9.
- Under section 4.0, added the specific entities to which PJM will provide TRMID and underlying documentation if requested: TSP, RC, PC, TP, and TOP.
- Renumbered sections 5.0, 6.0, and 7.0 as 4.0, 5.0, and 6.0 respectively.
- Changed 'annually' to 'at least once every 13 months' under the TRM Re-Evaluation Frequency section and the Document Control section.

Revised May 14, 2013

- Modified format to describe how PJM complies with requirements not previously addressed in earlier version based on feedback received during the 2013 Mock and RFC audits.
- Combined TRMID and TRM Methodology documents.
- Added revision history

Revised December 13, 2022

- Added NASBE WEQ reference to section 3 to show PJM complies with the NASBE WEQ-023-4.1 requirement.