



TRANSMISSION RELIABILITY MARGIN

Electric System Planning

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1 PURPOSE

The city of Lakeland, doing business as Lakeland Electric (LAK), as a Transmission Operator chooses to maintain a Transmission Reliability Margin (TRM) as permitted by the NERC MOD standards (MOD-008 and MOD-028).

This document describes Lakeland Electric's (LAK's) implementation of a methodology for calculating Transmission Reliability Margin (TRM) and provides information related to LAK's calculation of TRM as a Transmission Operator (TOP). This document will promote the consistent and reliable calculation, verification, preservation, and use of TRM to support analysis and system operations. This document includes or references applicable documentation that demonstrates LAK's compliance with the requirements of the NERC standards for a TRM Implementation Document.

2 INTRODUCTION

2.1 APPLICABILITY

- LAK as a Transmission Operator (TOP) that maintain TRM

2.2 REFERENCE

- NERC Reliability Standard MOD-008
- OATI FTTCs TTC/ATC CALCULATION REFERENCE DOCUMENT ("Methodology Document")

2.3 EFFECTIVE DATE

- March 31, 2011

3 BACKGROUND

3.1 NERC STANDARD MOD-008

The NERC MOD standard MOD-008 "Transmission Reliability Margin Calculation Methodology" describes the requirements and details for a Transmission Reliability Margin Implementation Document (TRMID).

TRM and Capacity Benefit Margin (CBM) are the two transmission transfer capability margins used in the calculation of Total Transfer Capability (TTC) and Available Transfer Capability (ATC). Transmission users benefit from the assurance that transmission services will be reliable under a broad range of potential system conditions due to TRM and CBM inclusion in transfer calculations.

Transmission Reliability Margin is defined as the amount of transmission transfer capability necessary to provide reasonable assurance that the interconnected transmission network will be secure. TRM accounts for the inherent uncertainty in system conditions and the need for operating flexibility to ensure reliable system operation as system conditions change.

3.2 TTC ENGINE

The Florida Transmission Capability Determination Group (FTCDG), of which LAK is a member, has contracted with Open Access Technology International (OATI) to develop and maintain a Florida Transmission Transfer Capability System (FTTCS or Engine).

The TTC Engine Methodology Document¹ contains the algorithms for TTC Firm and Non-Firm Calculation as well as the inputs and process flow. The algorithms and components used are consistent with those described in NERC MOD-001, -008, -028.

The Engine develops TRM on a per path basis by subtracting the difference in TTC developed using a TOP/TSP's rate 'B' facility rating from TTC developed using a TOP/TSP's rate 'C' facility rating. Rate 'C' equates to or is a proxy for a utility's highest emergency ratings while rate 'B' equates to a longer term or continuous rating. Each utility determines how its facility ratings populate the model.

The Engine provides a TRM Adder for TOP use. This value is summed with the TRM developed within the Engine as applicable.

LAK uses the TRM Adder to reserve a LAK specific TRM based on Reserve Sharing Obligations. A TRM value is determined for each path in each direction. TRM is set for every outgoing path and is equal to LAK's obligation to the Reserve Sharing Group. This accounts for LAK's obligation to deliver its portion of the statewide reserves to any other participant. TRM on each incoming path is based on that neighboring entity's portion of reserves that LAK may import, post disturbance, on that path.

The Engine-calculated value is added to LAK's specific TRM to reach the total TRM value.

3.3 LAK TRANSMISSION PATHS

ATC/TTC/TRM is developed for four paths. Others will be calculated upon request.

The paths are: PLK-TEC, TEC-PLK, PLK-FPC & FPC-PLK

¹ The methodology document is available on request to those with a reliability related need as identified in MOD-008 R3.

4 REQUIREMENTS

4.1 TRMID (MOD-008-1 R1)

REQUIREMENT OWNER: TRANSMISSION PLANNER

R1. EACH TRANSMISSION OPERATOR SHALL PREPARE AND KEEP CURRENT A TRM IMPLEMENTATION DOCUMENT (TRMID) THAT INCLUDES, AS A MINIMUM, THE FOLLOWING INFORMATION:

M1. EACH TRANSMISSION OPERATOR SHALL PRODUCE ITS TRMID EVIDENCING INCLUSION OF ALL SPECIFIED INFORMATION IN R1. (R1)

LAK's Transmission Reliability Margin Implementation Document (TRMID) documentation is contained paragraph 4.1 and its subparagraphs.

4.1.1 UNCERTAINTY (MOD-008 R1.1)

REQUIREMENT OWNER: TRANSMISSION PLANNER

R1.1 IDENTIFICATION OF (ON EACH OF ITS RESPECTIVE ATC PATHS OR FLOWGATES) EACH OF THE FOLLOWING COMPONENTS OF UNCERTAINTY IF USED IN ESTABLISHING TRM, AND A DESCRIPTION OF HOW THAT COMPONENT IS USED TO ESTABLISH A TRM VALUE:

- *AGGREGATE LOAD FORECAST.*
- *LOAD DISTRIBUTION UNCERTAINTY.*
- *FORECAST UNCERTAINTY IN TRANSMISSION SYSTEM TOPOLOGY (INCLUDING, BUT NOT LIMITED TO, FORCED OR UNPLANNED OUTAGES AND MAINTENANCE OUTAGES).*
- *ALLOWANCES FOR PARALLEL PATH (LOOP FLOW) IMPACTS.*
- *ALLOWANCES FOR SIMULTANEOUS PATH INTERACTIONS.*
- *VARIATIONS IN GENERATION DISPATCH (INCLUDING, BUT NOT LIMITED TO, FORCED OR UNPLANNED OUTAGES, MAINTENANCE OUTAGES AND LOCATION OF FUTURE GENERATION).*
- *SHORT-TERM SYSTEM OPERATOR RESPONSE (OPERATING RESERVE ACTIONS).*
- *RESERVE SHARING REQUIREMENTS.*
- *INERTIAL RESPONSE AND FREQUENCY BIAS.*

4.1.1.1 SHORT-TERM SYSTEM OPERATOR RESPONSE (TTC CALCULATOR COMPONENT)

LAK identifies "**Short-term System Operator response**" as a component of uncertainty used to establish TRM for LAK paths.

For the calculation of Total Transfer Capability (TTC), some TPs choose to provide short-term facility ratings that are higher than the continuous ratings and reflect System Operating Limits (SOL) which have time restrictions. The Short-term System Operator Response component is the difference between the TTC calculation using the short-term facility ratings and TTC calculation using the continuous facility ratings.

Since these SOLs are time dependent and System Operators have the option to curtail non-firm transactions as a mitigation measure, this component is used to prevent this higher capacity from being used for firm transactions which cannot be curtailed.

This component of TRM is determined for each individual ATC path each time TTC is calculated, and is applicable only if the limiting facility has a difference in short-term and continuous ratings.

4.1.1.2 RESERVE SHARING REQUIREMENTS

LAK identifies "**Reserve Sharing Requirements**" as a second component of uncertainty used to establish TRM for LAK paths.

The second component of TRM is meant to reflect LAK's and neighboring utility's responsibilities to the region's Reserve Sharing Group (RSG). Reserving this capacity assures emergency capacity is available during forced or unplanned outages of a unit that have a significant impact on Available Transmission Capability.

This component of TRM is determined for all posted ATC paths. The initial reserve sharing requirements based TRM adder, applicable as of 2011-04-01, is determined to be:

LAK – FPC 24 MW

LAK – TEC 24 MW

FPC-LAK 184 MW

TEC-LAK 86 MW

LAK develops a TRM adder based on "**Reserve Sharing Requirements**," at least once every 13 months for each path.

In summary, for this uncertainty, a TRM adder value would equal the source entity's contingency reserves responsibility to the reserve sharing group. This ensures sufficient capability exists to meet the NERC Disturbance Control Standard and to reestablish resource and demand balance following a disturbance.

4.1.2 TRM ALLOCATION (MOD-008 R1.2)

REQUIREMENT OWNER: TRANSMISSION PLANNER

R1.2 THE DESCRIPTION OF THE METHOD USED TO ALLOCATE² TRM ACROSS ATC PATHS OR FLOWGATES

See R4.1.2 above

² Allocate – to set something aside for a purpose

4.1.3 TRM CALCULATION AND TIME PERIOD (MOD-008 R1.3)

REQUIREMENT OWNER: TRANSMISSION PLANNER

R1.3 THE IDENTIFICATION OF THE TRM CALCULATION USED FOR THE FOLLOWING TIME PERIODS:

- *R1.3.1 SAME DAY AND REAL-TIME.*
- *R1.3.2 DAY-AHEAD AND PRE-SCHEDULE.*
- *R1.3.3 BEYOND DAY-AHEAD AND PRE-SCHEDULE, UP TO THIRTEEN MONTHS AHEAD.*

4.1.3.1 SAME DAY AND REAL-TIME (SCHEDULING HORIZON)

For the above horizon only the Short-term System Operator Response component of TRM is applied.

4.1.3.2 DAY-AHEAD AND PRE-SCHEDULE (OPERATING HORIZON) AND BEYOND DAY-AHEAD AND PRE-SCHEDULE, TO THIRTEEN MONTHS (PLANNING HORIZON)

For the operations horizon only the Short-term System Operator Response component of TRM is applied.

From the planning horizon, monthly ATC, the TRM applied is equal to the sum of the Short-term System Operator Response component and the Reserve Sharing Requirements component.

That is, the Reserve Sharing Requirement TRM adder is only summed with the Short-Term System operator response TRM component in the determination of Monthly ATC.

4.2 TRM REQUIREMENTS (NOT INCLUDED IN THE TRMID)

4.2.1 TRM CALCULATION (MOD-008 R2)

REQUIREMENT OWNER: TRANSMISSION PLANNER

R2. EACH TRANSMISSION OPERATOR SHALL ONLY USE THE COMPONENTS OF UNCERTAINTY FROM R1.1 TO ESTABLISH TRM, AND SHALL NOT INCLUDE ANY OF THE COMPONENTS OF CAPACITY BENEFIT MARGIN (CBM). TRANSMISSION CAPACITY SET ASIDE FOR RESERVE SHARING AGREEMENTS CAN BE INCLUDED IN TRM.

M2. EACH TRANSMISSION OPERATOR SHALL PROVIDE EVIDENCE INCLUDING ITS TRMID, TRM VALUES, CBM VALUES, OR OTHER EVIDENCE, (SUCH AS WRITTEN DOCUMENTATION, STUDY REPORTS, DOCUMENTATION OF ITS CBM PROCESS, AND SUPPORTING INFORMATION) TO DEMONSTRATE THAT ITS TRM VALUES DID NOT INCLUDE ANY ELEMENTS OF UNCERTAINTY BEYOND THOSE DEFINED IN R1.1 AND TO SHOW THAT IT DID NOT INCLUDE ANY OF THE COMPONENTS OF CBM. (R2)

LAK does not calculate CBM and does not use elements of uncertainty related to CBM in its calculations of TRM. LAK may utilize only two of the possible elements of uncertainty from TRM in its TRM calculations:

- Short-term System Operator response and

- Reserve Sharing Requirements

4.2.2 TRM CALCULATION BACKGROUND MATERIALS (MOD-008 R3)

REQUIREMENT OWNER: TRANSMISSION PLANNER

R3. EACH TRANSMISSION OPERATOR SHALL MAKE AVAILABLE ITS TRMID, AND IF REQUESTED, UNDERLYING DOCUMENTATION (IF ANY) USED TO DETERMINE TRM, IN THE FORMAT USED BY THE TRANSMISSION OPERATOR, 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 PLANNER
- TRANSMISSION OPERATORS

M3. EACH TRANSMISSION OPERATOR SHALL PROVIDE A DATED COPY OF ANY REQUEST FROM AN ENTITY DESCRIBED IN R3. THE TRANSMISSION OPERATOR SHALL ALSO PROVIDE EVIDENCE (SUCH AS COPIES OF EMAILS OR POSTAL RECEIPTS THAT SHOW THE RECIPIENT, DATE AND CONTENTS) THAT THE REQUESTED DOCUMENTATION (SUCH AS WORK PAPERS AND LOAD FLOW CASES) WAS MADE AVAILABLE WITHIN THE SPECIFIED TIMEFRAME TO THE REQUESTOR. (R3)

LAK's TRMID is available on its public website. Underlying documentation is available upon request.

4.2.3 TRM CALCULATION PERIODICITY (MOD-008 R4)

REQUIREMENT OWNER: TRANSMISSION PLANNER

R4. EACH TRANSMISSION OPERATOR THAT MAINTAINS TRM SHALL ESTABLISH TRM VALUES IN ACCORDANCE WITH THE TRMID AT LEAST ONCE EVERY 13 MONTHS.

M4. EACH TRANSMISSION OPERATOR SHALL PROVIDE EVIDENCE (SUCH AS LOGS, STUDY REPORT, REVIEW NOTES, OR DATA) THAT IT ESTABLISHED TRM VALUES AT LEAST ONCE EVERY THIRTEEN MONTHS FOR EACH OF THE TRM TIME PERIODS. (R4)

LAK's TRM calculations (for short term operator response) are performed by the Engine automatically. Calculations of TRM occur each time a TTC is determined. These calculations are detailed in the ATCID or its references.

LAK's TRM calculations (for Reserve Sharing Requirements) are performed at least once every 13 months. For the implementation year, it was performed on this documents effective date.

4.2.4 TRM CALCULATION DISSEMINATION (MOD-008 R5)

REQUIREMENT OWNER: TRANSMISSION OPERATOR

R5. THE TRANSMISSION OPERATOR THAT MAINTAINS TRM SHALL PROVIDE THE TRM VALUES TO ITS TRANSMISSION SERVICE PROVIDER(S) AND TRANSMISSION PLANNER(S) NO MORE THAN SEVEN CALENDAR DAYS AFTER A TRM VALUE

IS INITIALLY ESTABLISHED OR SUBSEQUENTLY CHANGED. [VIOLATION RISK FACTOR: LOWER] [TIME HORIZON: OPERATIONS PLANNING]

M5. EACH TRANSMISSION OPERATOR SHALL PROVIDE EVIDENCE (SUCH AS LOGS, EMAIL, WEBSITE POSTINGS) THAT IT PROVIDED THEIR TRANSMISSION SERVICE PROVIDER(S) AND TRANSMISSION PLANNER(S) WITH THE UPDATED TRM VALUE AS DESCRIBED IN R5. (R5)

LAK is a vertically integrated municipal utility. LAK is the sole TOP, TSP and TP for its system. It is understood that once TRM is developed it has been provided to the LAK TSP/TP.

5 DEFINITIONS

Operating Horizon – In the Engine, this is a moving window that extends from the end of the Scheduling Horizon Interval to hour 24:00 of the next day. At hour 10:00 the Operating Interval expands to include all of the current day through hour 24:00 of the following day. On Fridays at 10:00 this expands to include all of the weekend and Monday until hour 00:00 of Tuesday. If the following day is a holiday the window expands further to include the entire holiday. This concept also applies if a holiday occurs anytime in the week.

Planning Horizon - In the Engine, this window begins at the end of the Operating Interval and extends 13 months from the current date.

Scheduling Horizon – In the Engine, this is a moving window extends from the current hour through the next three hours (total of 4 hours).

6 REFERENCE DOCUMENTS/NOTES

Title/Description	Number
OATI FTTCS TTC/ATC Calculation Reference Document	OATI Project #971 – Current Version

Date	Notes	Author
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7 AUDIT HISTORY

Date	Type	Response	Findings
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8 REVISION HISTORY

Version	Date	Action	Reviewed/Approved By
1.0	2011.03.30	Original Document	Watt, Larry Tran, Phuong Velummylum, Ganesh

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