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**Transmission Reliability Margin Implementation Document**

**For**

**Associated Electric Cooperative, Inc.**

**Effective Date: July 1, 2017**

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**Manager, Engineering  
& Operations:**

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Jeff Harrison  
**Print Name**

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**Signature**

**\*\*\* NOTE: When revising this procedure the AECI OPEN ACCESS TRANSMISSION TARRIFF (OATT) needs to be reviewed for changes.**

<u>Revision No.</u>	<u>Revision History</u>	<u>Date Revised</u>
0	Original Issue	03/31/2011
1	Updated TRM value and OASIS coordinator	04/30/2012
2	Added TRM consideration for SPP RSG	10/31/2012
3	Updated TRM value	05/01/2013
4	Updated TRM value	07/21/2014
5	Removed OASIS Coordinator	12/01/2014
6	Updated TRM value	06/19/2015
7	Updated TRM value	06/23/2016
9	Updated TRM value. Revised TRM calculation methodology.	06/23/2017

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## Transmission Reliability Margin Implementation Document (TRMID)

### 1.0 Purpose and Scope

This document describes the methodology used in the calculation of Transmission Reliability Margin (TRM) and its implementation in AECI's AFC process with respect to AECI as the Transmission Operator (TOP) and AECI as the Transmission Service Provider (TSP) for the AECI Balancing Authority Area.

### 2.0 Components of TRM:

AECI evaluates four components of uncertainty to establish TRM in its AFC process; Aggregate Load forecast error, Allowances for parallel path (loop flow) impacts, Short-term system operator response, and allowances for loss of firm generation.

#### 2.1 Aggregate Load Forecast Error

A reasonable margin of error can be assumed with any load forecast. In order to account for this uncertainty, AECI assumes a 5% load forecast error and calculates the change in loading on all AECI flowgates. The average percentage change in flow (on each flowgate rating) will produce a value of uncertainty (U1) that may be used in the TRM calculation in Section 2.5 below.

#### 2.2 Allowances for parallel path (loop flow) impacts

Loop flow on AECI flowgates can occur due to confirmed service on adjacent transmission providers. AECI's Reliability Coordinator reports typical bias across the AECI system. This bias is assumed to be 1,000 MW on average from northwest to southeast. AECI models these biases and calculates the change in loading on all AECI flowgates. The average **positive** flow impact (as a percent of flowgate ratings) will produce a value of uncertainty (U2) that may be used in the TRM calculation in Section 2.5 below.

#### 2.3 Allowances for loss of firm generation

AECI joined the Congestion Management Process in October 2016. Flowgate allocation methodology as a result of this membership requires verification of the monthly Effective ATC between AECI and the Southwest Power Pool (SPP), of which AECI is a member of a generation reserve sharing group. Effective ATC on this interface with SPP should allow for energy transfers exceeding a loss of AECI firm generation. For AECI, the largest single generator is Thomas Hill unit #3 at 715 MW. If the Effective ATC with SPP exceeds 715 MW, sufficient capacity is available to import generation reserves in the event of a loss of generation. If Effective ATC does not exceed 715 MW, allowance for loss of firm generation (U3) will be determined and used in the TRM calculation in Section 2.5 below.

#### 2.4 Short-term System Operator response

AECI has a generation reserve sharing agreement with the SPP to provide reserves up to the capacity of the largest generating unit scheduled to be on line. Normally the SPP Reserve Sharing Group will add an additional Operating Reserve Requirement over and above its Regulating Reserve and first contingency Reserve equal to one-

half of the next largest generating unit scheduled to be on-line within the SPP Reserve Sharing Group. TRM for this component is considered during the calculation of loop flow impacts. The 1,000 MW bias is larger than the output of AECI's largest generator, and therefore the maximum amount of callable reserves is considered in this transfer.

### **2.5 TRM Calculation**

Consistent with N-1 contingency planning, AECI will use the maximum uncertainty calculated in the four components listed above as TRM for all AECI flowgates.

$$\text{TRM} = \text{Maximum of U1 and U2 and U3}$$

This calculation will be used for all time periods: same day and real-time, day-ahead and pre-schedule, and beyond day ahead and pre-schedule, up to thirteen months ahead.

### **3.0 Allocation of TRM**

TRM is allocated equally to all AECI flowgates as a percentage of the flowgate rating.

### **4.0 Capacity Benefit Margin (CBM) and Reserve Sharing agreements**

CBM is not included in the calculation of TRM applied to AECI flowgates.

### **5.0 Availability of AECI TRMID**

AECI shall make available its TRMID, and if requested, underlying documentation (if any) used to determine TRM, in the format used by AECI, 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, or Transmission Operators.

### **6.0 Updates to TRM**

At least once every 13 months, AECI shall establish TRM values in accordance with the TRMID. Actual TRM values used on AECI flowgates, and the uncertainty factors, U1, U2, and U3 used to calculate TRM, are listed in the Table in Appendix A.

### **7.0 AECI functions as Transmission Operator and Transmission Service Provider.**

NERC Standard MOD-008-1, R5 requires that "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." Since AECI is the Transmission Service Provider, Transmission Operator, and Transmission Planner these results will be shared internally between the required departments.

### **8.0 TRM and Contract Path**

## **AECI Transmission Reliability Margin Methodology**

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AECI recognizes contract path limitations on interfaces to adjacent Transmission Service Providers and will confirm transmission service based on AFC up to the contract path limit. TRM is applied to flowgates in the calculation of AFC, but not to the contract path limits which are also used as a limit to grant or deny service.

**APPENDIX A**

**Table of TRM Values used for AECI flowgates**

**Table 1: TRM values used for AECI flowgates**

<b>Effective Date</b>	<b>TRM Value</b>	<b>U1 (Load forecast error)</b>	<b>U2 (Loop flow uncertainty)</b>	<b>U3 (Loss of firm generation allowance)</b>
April 1, 2011	3.7%	1.1%	3.7%	
May 1, 2012	4.6%	2.3%	4.6%	
June 1, 2013	4.1%	3.2%	4.1%	
July 21, 2014	3.6%	1.3%	3.6%	
June 26, 2015	2.8%	1.2%	2.8%	
July 1, 2016	3.6%	1.2%	3.6%	
July 1, 2017	3.5%	0.9%	3.5%	3.4%