Transmission Reliability Margin Implementation Document (TRMID)

NERC Reliability Standards MOD-008-1
Transmission Reliability Margin

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FERC approved 11/24/2009

Revision History

Revision	Date	Revised By	Comments
0	03/31/2011	Kale Ford James Sharpe	Original document

Document Review Requirements

The currency of this document is the responsibility of the Manager, Transmission Planning. This document will be reviewed and revised as needed to reflect current practices.

Distribution

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Introduction:

SCE&G uses the NERC approved definition of Transmission Reliability Margin TRM, which is "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."

In Reliability Standard MOD-008-1, NERC requires all Transmission Operators to prepare and keep current a Transmission Reliability Margin Implementation Document (TRMID) which explains procedures certain information relating to the calculation and allocation of (TRM). Pursuant to this requirement, SCE&G has created the present document. In compliance with Requirement 3 of MOD-008-1, SCE&G will make this document, and if requested, underlying documentation (if any) used to determine TRM, in the format used by SCE&G, to any Transmission Service Provider, Reliability Coordinator, Planning Coordinator, Transmission Planner, or Transmission Operator who makes a written request.

SCE&G will review and revise this document as needed to reflect current practices

I. Components of Uncertainty Used to Establish TRM:

SCE&G may use only one or any combination of the components listed in MOD-008-1 R1.1 in the determination of TRM values. SCE&G does not include any of the components of CBM in determining TRM values. SCE&G's treatment of TRM is the same across all horizons. SCE&G typically uses the following components for calculating TRM:

- Reserve sharing requirements.
- Inrush Flow Impact

II. Method for Allocating TRM:

For each Flowgate, the larger impact due to either:

- the TRM-Reserve Sharing methodology or
- the TRM-Inrush Flow Impact methodology

is used for the TRM value for that flowgate. The results of the two methodologies are not combined/additive.

In order to account for the TRM in the AFC process, it is necessary to represent the TRM values as Flowgate-based values. This process simulates the import and export of the full amount of the reserves to and from each of the reserve sharing participants. The largest impact on each Flowgate determines the TRM amount allocated to that Flowgate. Additionally, the Flowgate-based TRM values will be established for any Flowgate added to the transfer capability calculation process.

SCE&G is a participant along with all of its neighboring interconnected Transmission Providers in the SERC NTSG OASIS support studies process. This process results in five (5) jointly coordinated seasonal models. SCE&G and neighboring companies further develop these for use in the AFC process.

The databases used in the calculation of SCE&G's TRM values are power system models developed through SERC Long-term Study Group (LTSG) and further modified by the SERC Near-term Study Group (NTSG).

Methodology Used to Determine and Allocate TRM-Reserve Sharing (RS)

SCE&G participates in the VACAR Reserve Sharing Arrangement. This arrangement requires each participating company to provide a Contingency Reserve commitment. SCE&G maintains at each import interface enough TRM (RS) to accommodate each participating company's reserve commitment. Additionally, SCE&G maintains an export TRM (RS) at each interface to accommodate SCE&G's reserve commitment.

Modeling of the VACAR Reserve Sharing Arrangement is used to determine if additional transmission capacity, above the amount determined by the TRM-Inrush Flow Impact (IFI) analysis should be preserved to accommodate the reserve sharing arrangement. The IFI calculates the natural response of the integrated grid due to in-rush.

TRM-Reserve Sharing is allocated as a MW value for each impacted Flowgate. The Reserve Sharing is implemented by creating a generation excess at the source(s) and a generation deficiency at the sink(s) and analyze the MW change in flow on each participating Flowgate.

SCE&G's Reserve Sharing Agreement includes contributions from Duke Energy Carolinas, Progress Energy Carolinas, and Santee Cooper. For TRM RS purposes the allocation is determined by simultaneously calculating the transmission system response due to importing the full Reserve Sharing Agreement potential from Duke, Progress, and Santee Cooper.

Methodology Used to Determine and Allocate TRM-Inrush Flow Impact (IFI)

Sensitivity studies of the natural responses of the integrated grid are used as a "proxy" to address uncertainties associated with items such as load distribution uncertainty, forecast uncertainty in transmission system topology, parallel path impacts, simultaneous path impacts, variations in generation dispatch and inertial response and frequency bias, etc. Analysis is conducted to determine the impact of the inrush power flow on each Flowgate due to a sudden loss of any single generator connected to the SCE&G system.

TRM-Inrush Flow Impact is allocated as a MW value for each impacted Flowgate. The Inrush Flow is determined by calculating the natural response on each Flowgate due to the outage of each generator connected to the SCE&G system individually. The power lost from the outaged generator is naturally compensated for by contributions from SCE&G interconnections and not from a specific source.

Situational generation modeling is included to view the impact of units that operate simultaneous such as combined cycle. The TRM-Inrush Flow Impact simulates the natural response of the integrated grid to the loss of a single unit, however in some cases more generation will be lost due to the loss of a single unit. While other scenarios exist, the situations used will represent the greatest impact. These situations include McMeekin Unit #1 which has two units that operate simultaneous, Jasper Gas Turbine #2 (the largest of the three units) with its contribution to Jasper Steam Turbine, and Urquhart Gas Turbine #6 with Urquhart Steam Turbine #2.

The MW change in flow on each participating Flowgate is recorded for each process then compared. The largest impact from each study will result in the Flowgate TRM allocation.

TRM will be reported as Flowgate and Path values. Path based TRM is the sum of all TRM allocated to the tie lines on the interface with each neighboring system.

Overview:

PowerGem software, TARA, will be used in accordance with the procedure below to produce Transfer Distribution Factors (TDF) for the VACAR Reserve Sharing and Inrush Flow Impact analysis. The output from TARA will be used to calculate TRM for each Flowgate. Each study performed will be archived and made available, on request,

Procedure:

SCE&G's method for calculating TRM using PowerGEM's TARA software and internal programs can be found in Appendix A.

Operating Practices

SCE&G applies TRM (RS) or TRM (IFI) to all Flowgates and treatment of TRM is the same for each of the following time periods:

- Same day and real-time
- Day-ahead and pre-schedule
- Beyond day-ahead and pre-schedule, up to thirteen months ahead

SCE&G does not allow TRM to be sold on a firm or non-firm basis, as doing so would increase risks to system reliability.

Frequency of TRM Determination

SCE&G's TRM values are determined annually or more frequently as system conditions warrant, and the results are posted on the SCE&G OASIS.

Exports

The TRM values for SCE&G exports on each interface are set equal to the greater of SCE&G's Reserve Sharing commitment or the opposing Transmission Provider's TRM import value.

Wheel-throughs

The TRM values for SCE&G wheel-throughs are the greater of the import and export TRM values on the requested path.

Appendix A

Procedure:

1.0 TARA input files

- 1.1 Study period .raw power flow case
- 1.2 *control area*_combined.fgt developed from the Flowgate Screening process
- 1.3 Edit the TRM_Reports.dir to match input file names and Flowgate count

2.0 Run script and check for errors.

- 2.1 Run command line (dos prompt) then navigate to working folder. Enter the following: tara.exe %read TRM_Reports.dir
- 2.2 Review tara.log for errors and TRM_Flowgates_*control area*.csv to assure all Flowgates were processed. If errors are identified restart at 1.0.
- 2.3 Copy files created by TARA to the TRM directory containing ClassifyFGs2_0.exe. This includes:
  - 2.3.1 TRM_Flowgates_*control area*.csv
  - 2.3.2 TRM_Definitions_*control area*.csv
  - 2.3.3 Generator_DFAX_*control area*.csv
  - 2.3.4 Subsystem_Redispatch_*control area*.csv

3.0 Edit ClassifyFGs2_0.ini

- 3.1 Modify the .ini files to include the files created by TARA
- 3.2 Set CalculateTRM to true
- 3.3 Set all other operation flags to false
- 3.4 Run ClassifyFGs2_0.exe
  - 3.4.1 *control area*_Fgate_Definitions.csv will contain TRM values for each Flowgate.
  - 3.4.2 TRM_Results.csv is used to easily review results.
- 3.5 If any errors occurred during section 3.0 please restart at 1.0 and determine the problem

4.0 TRM file for submittal

- 4.1 Review *control area*_Fgate_Definitions.csv
- 4.2 email final *control area*_Fgates_Definitions.csv to Operations Planning for record and OATi upload

5.0 Archiving

- 5.1 Create sub folder *current date*_*season*_TRM
- 5.2 Move all files used to this folder for proper documenting
- 5.3 Retain all TRM filings for most recent three calendar years plus current year