

# Data for Power System Modeling & Analysis Criteria



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**NOTE: WHEN REVISING THIS PROCEDURE ENSURE THE LATEST REVISION IS UPLOADED TO THE PUBLIC OASIS SITE. IF NECESSARY TO COORDINATE DATA, A COPY OF THIS PROCEDURE WILL BE PROVIDED TO THE RESPONSIBLE BALANCING AUTHORITY, GENERATOR OWNER, LOAD SERVING ENTITY, RESOURCE PLANNER, TRANSMISSION OWNER, AND TRANSMISSION SERVICE PROVIDER WHEN TRANSMISSION PLANNING REQUESTS UPDATES.**

**REVISION HISTORY**

Revision No.	Revision History	Date Revised
0	Original Issue	6/29/2015
1	Re-write; add sections and R2 – R4	5/15/2016

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## **Purpose / Introduction**

The purpose of this document is to ensure that Associated Electric Cooperative Inc. (AECI) establishes consistent modeling data requirements and reporting procedures for development of planning horizon cases necessary to support analysis of the reliability of the interconnected transmission system.

## **Applicability**

The MOD-032-1 NERC Standard applies to entities registered as Balancing Authority, Generation Owner, Planning Coordinator, Resource Planner, Transmission Owner, Transmission Planner, & Transmission Service Provider. AECI is registered with the North American Electric Reliability Corporation (NERC) as all of the aforementioned functional entities.

## **Requirements**

**R1** Serving both the Transmission Planner function and the Planning Coordinator function, AECI's Transmission Planning department has developed steady-state, dynamics, and short circuit modeling data requirements and reporting procedures for the AECI planning area.

**R1.1** Modeling data required is as follows:

Steady state. In order to model the system for steady state cases, the following data is required:

1. *Buses:* Bus number, name, nominal voltage, area, zone and owner.
2. *Loads:* Bus number, bus ID, status, area, zone, real power, and reactive power. [Aggregate load data is acceptable from AECI's Resource Planner.]
3. *Generators:* Bus number, generator ID, real power capabilities (gross maximum and minimum values), reactive power capabilities (maximum and minimum values at real power capabilities), station service auxiliary load for normal plant configuration, voltage set point, regulated bus, machine MVA base, generator step up transformer data (same data as in 5 below), generator fuel type (hydro, wind, fossil, solar, nuclear, etc.), and status.
4. *AC Transmission Line or Circuit:* To bus, from bus, circuit ID, impedance parameters (positive sequence R & X), susceptance (line charging B), ratings (normal and emergency), status, and length (if available).
5. *Transformers:* winding one bus number, winding two bus number, winding three bus number (if applicable), circuit ID, name, status, nominal voltages of windings, impedance(s), NLTC tap ratios, minimum and maximum LTC tap position limits, number of tap positions (for both the LTC and NLTC), regulated bus (for voltage regulating transformers), and ratings (normal and emergency).
6. *Shunt capacitors and reactors:* Bus number, mode of operation (fixed, discrete, continuous, etc.), adjustment method, status, regulated voltage band limits and regulated bus number (if mode of operation not fixed), admittances (MVars) of each capacitor and reactor, increment for each block, number of blocks.
7. *Series reactors:* Data should be in the same format as AC Transmission Line or Circuit above.

Dynamics. In order to model the system for dynamics cases, the following data is required:

1. *Generator:* Data consistent with the appropriate generator model within the PSS/E model library.
2. *Excitation System:* Data consistent with the appropriate excitation system model within the PSS/E model library.

3. *Minimum Excitation Limiter*: Data consistent with the appropriate minimum excitation limiter model within the PSS/E model library.
4. *Maximum Excitation Limiter*: Data consistent with the appropriate maximum excitation limiter model within the PSS/E model library.
5. *Power System Stabilizer*: Data consistent with the appropriate stabilizer model within the PSS/E model library.
6. *Turbine-Governor*: Data consistent with the appropriate governor model within the PSS/E model library.
7. *Turbine Load Controller*: Data consistent with the appropriate turbine load controller model within the PSS/E model library.
8. *Compensator*: Data consistent with the appropriate compensator model within the PSS/E model library.
9. *Demand*: If applicable, load data consistent with the appropriate load characteristic model within the PSS/E model library.
10. *Wind Turbine Data*: Data consistent with the appropriate wind generator model within the PSS/E model library.
  - a. Generator
  - b. Electrical control
  - c. Mechanical control
  - d. Pitch control (a.k.a. aerodynamic model)
11. *Photovoltaic systems*: Data consistent with the appropriate photovoltaic system model within the PSS/E model library.
12. *Static Var Systems and FACTS*: Data consistent with the appropriate static var or FACTS system model within the PSS/E model library.
13. *DC system models*: Data consistent with the appropriate DC system model within the PSS/E model library.
14. Other information requested by the Planning Coordinator or Transmission Planner necessary for modeling purposes.
15. Prior to submitting user-written model(s) to AECI's Transmission Planning, the GO shall verify that the user-written model(s) correctly initialize in the latest available MMWG models.
  - a. All user-written models submitted must include the characteristics of the model, including block diagrams, values and names for all model parameters, and a list of all state variables.

Short Circuit. In order to model the system for short circuit cases, the following data is required:

1. Positive, negative, and zero sequence data for all applicable elements listed above under Steady State data requirements.
2. Mutual Line Impedance Data
3. Other information requested by the Planning Coordinator or Transmission Planner necessary for modeling purposes.

**R1.2** In receiving data from others, AECI's Transmission Planning department is fairly flexible and able to calculate parameters from information as general as structure type, conductor type, static, line length, etc. Transmission Planning will work with the submitting entity to satisfactorily model the facilities and equipment.

**R1.2.1** The data format for building the Interconnection-wide case(s) follows:

Steady state. Models developed for use in the Eastern Interconnect are coordinated by the Multi-Regional Model Working Group (MMWG) per PSS/E modeling format. The data format is outlined in PSS/E Program Operation Manual (POM) of the agreed upon version determined by the MMWG.

Dynamics. Models developed for use in the Eastern Interconnect are coordinated by the Multi-Regional Model Working Group (MMWG) per PSS/E modeling format. The data format is outlined in the model library of the agreed upon PSS/E version determined by the MMWG.

Short Circuit. Models are initially developed for short circuit simulations in the ASPEN OneLiner program format. The OneLiner format is converted to PSS/E and then provided to the SERC Short Circuit Database Working Group (SCDWG).

**R1.2.2** Parameters required for modeling equipment in each of the software programs is outlined in the respective user manuals.

**R1.2.3** Transmission Planning builds light load, spring, summer peak, shoulder, fall, and winter peak models as required by the various regional model building working groups.

**R1.2.4** Transmission Planning routinely revises its Modeling and Network Transmission Information System (MANTIS) database as updates are received. Transmission Planning participates in the annual regional model building efforts of SERC and ERAG/MMWG and follows those processes' schedules for submission of data. Prior to those model building efforts, Transmission Planning requests updates from the responsible Balancing Authority, Generator Owner, Load Serving Entity, Resource Planner, Transmission Owner, and Transmission Service Provider for which Transmission Planning must submit data.

**R1.3** To communicate these modeling data requirements to those entities responsible for providing the data, this MOD-032-1 procedure is posted on the AECI public OASIS website. Additionally, if necessary to coordinate data, a copy of this procedure will be provided to the responsible Balancing Authority, Generator Owner, Load Serving Entity, Resource Planner, Transmission Owner, and Transmission Service Provider when Transmission Planning requests updates.

**R2** Power Production will provide steady-state, dynamics, and short circuit modeling data as applicable to Transmission Planning according to the data requirements and reporting procedures in Requirement R1 above.

Planning & Marketing will provide steady-state, dynamics, and short circuit modeling data as applicable to Transmission Planning according to the data requirements and reporting procedures in Requirement R1 above.

**R3** Upon receipt of written notification from Transmission Planning regarding technical concerns with data provided under requirement R2, including the technical basis or reason for technical concerns, Power Production or Planning & Marketing shall respond to Transmission Planning as follows:

**R3.1** Provide either updated data or an explanation with a technical basis for maintaining the current data;

**R3.2** Provide the response within 90 calendar days of receipt, unless a longer time period is agreed upon by Transmission Planning.

**R4** Transmission Planning shall make available models for its planning area reflecting data provided to it under Requirement R2 to the Electric Reliability Organization (ERO) or its designee to support creation of the Interconnection-wide case(s) that includes AECI's planning area.