

SERTP – 2016 1st Quarter Meeting

First RPSG Meeting & Interactive Training Session

March 24th, 2016

APC Headquarters

Birmingham, AL

Process Information

- **The SERTP process is a transmission planning process.**
- **Please contact the respective transmission provider for questions related to real-time operations or OATT transmission service.**

Purposes & Goals of Meeting

- **2016 SERTP Process Overview**
- **Form the “RPSG”**
 - Regional Planning Stakeholders Group
 - Committee Structure & Requirements
- **Economic Planning Studies**
 - Review Previous Study Selections
 - Review Requested Sensitivities for 2016
 - RPSG to Select the Five Economic Planning Studies
- **Interactive Training Session**
 - MOD-032-1 and MOD-033-1
- **Miscellaneous Updates**
- **Next Meeting Activities**

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2016 SERTP Process Overview

Upcoming 2016 SERTP Process

- **SERTP 1st Quarter – *1st RPSG Meeting & Interactive Training Session***
March 2016
 - Form RPSG
 - Select Economic Planning Studies
 - Interactive Training Session

- **SERTP 2nd Quarter – *Preliminary Expansion Plan Meeting***
June 2016
 - Review Modeling Assumptions
 - Preliminary 10 Year Expansion Plan
 - Stakeholder Input & Feedback Regarding the Plan

Upcoming 2016 SERTP Process

- **SERTP 3rd Quarter – 2nd RPSG Meeting**
September 2016
 - Preliminary Results of the Economic Studies
 - Stakeholder Input & Feedback Regarding the Study Results
 - Discuss Previous Stakeholder Input on the Expansion Plan
- **SERTP 4th Quarter – Annual Transmission Planning Summit & Input Assumptions**
December 2016
 - Final Results of the Economic Studies
 - Regional Transmission Plan
 - Regional Analyses
 - Stakeholder Input on the 2017 Transmission Model Input Assumptions

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Regional Planning Stakeholder Group

The SERTP Stakeholder Group

- **RPSG – Regional Planning Stakeholder Group**
- **Serves Two Primary Purposes**
 - 1) **The RPSG is charged with determining and proposing up to five (5) Economic Planning Studies on an annual basis**
 - 2) **The RPSG serves as stakeholder representatives for the eight (8) industry sectors in interactions with the SERTP Sponsors**

RPSG Committee Structure

- **RPSG Sector Representation**
 - 1) **Transmission Owners / Operators**
 - 2) **Transmission Service Customers**
 - 3) **Cooperative Utilities**
 - 4) **Municipal Utilities**
 - 5) **Power Marketers**
 - 6) **Generation Owner / Developers**
 - 7) **Independent System Operators (ISOs) / Regional Transmission Operators (RTOs)**
 - 8) **Demand Side Management / Demand Side Response**

RPSG Committee Structure

- **Sector Representation Requirements**
 - Maximum of two (2) representatives per sector
 - Maximum of 16 total sector members
 - A single company, and all of its affiliates, subsidiaries, and parent company, is limited to participating in a single sector

RPSG Committee Structure

- **Annual Reformation**
 - Reformed annually at 1st Quarter Meeting
 - Sector members elected for a term of approximately one year
 - Term ends at start of following year's 1st Quarter SERTP Meeting
 - Sector Members shall be elected by the Stakeholders present at the 1st Quarter Meeting
 - Sector Members may serve consecutive, one-year terms if elected
 - No limit on the number of terms that a Sector Member may serve

RPSG Committee Structure

- **Simple Majority Voting**
 - RPSG decision-making that will be recognized by the Transmission Provider for purposes of Attachment K shall be those authorized by a simple majority vote by then-current Sector Members
 - Voting by written proxy is allowed

RPSG Formation

- 2015 Sector Representatives
- 2016 Sector Representatives

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Economic Planning Studies

SERTP Regional Models

- **SERTP Sponsors developed 12 coordinated regional models***
- **Models include latest transmission planning model information within the SERTP region**

No.	Season	Year
1	SUMMER	2017
2		2019
3		2021
4		2022
5		2024
6		2026
7	SHOULDER	2019
8		2021
9		2024
10		2026
11	WINTER	2021
12		2026

* Available on the secure area of the SERTP website upon satisfying access requirements

Economic Planning Study Process

- **SERTP Sponsors identify the transmission requirements needed to move large amounts of power above and beyond existing long-term, firm transmission service commitments**
 - Analysis is consistent with NERC standards and company-specific planning criteria
- **Models used to perform the analysis incorporate the load forecasts and resource decisions as provided by LSEs**
 - Power flow models are made available to stakeholders to perform additional screens or analysis
- **These studies represent analyses of hypothetical scenarios requested by the stakeholders and do not represent an actual transmission need or commitment to build**
- **Scoping Meeting typically held in April/May**

Economic Planning Study Requests

- 2015 Economic Planning Studies
- 2016 Economic Planning Study Requests
- **Vote on 2016 Economic Planning Studies**

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Interactive Training Session

MOD-032-1

Data for Power System Modeling and Analysis

MOD-033-1

Steady State Dynamic System Model Validation

Old Standards

- **MOD-010 Steady State Modeling**
 - TO, TP, GO Follow Regional procedures for supplying data
- **MOD-011**
 - Regions shall develop steady state data collection procedures and requirements for building Interconnection-wide models
- **MOD-012 Dynamics Modeling**
 - TO, TP, GO Follow Regional procedures for supplying data
- **MOD-013**
 - Regions shall develop dynamics data collection procedures and requirements for building Interconnection-wide models

Old Standards (cont.)

- **MOD-014**
 - Regions develop and maintain interconnection wide steady state models annually
- **MOD-015**
 - Regions develop and maintain interconnection wide dynamic models annually

Main Driver for Change in MOD Standards

- **FERC never approved MOD-011, MOD-013, MOD-014, and MOD-015**
 - “Fill in the blank” standard applicable to Regions
- **FERC Order 693**
 - Make the standard applicable to Planning Authorities
 - “include a requirement to verify that steady-state models are accurate”
 - “require that the results of these dynamics models be compared with actual disturbance data to verify the accuracy of the models.”
 - Require filing of all contingencies used in performing steady state and dynamic studies

NERC Action

- **A subgroup of NERC System Analysis and Modeling Subcommittee (SAMS) wrote a white paper and then the SAR for modifying MOD 10 -15 standards**
- **Informal standard drafting effort began in 2013**
 - NERC's attempt to speed up standard development
 - Held many meetings and several technical conferences to build industry consensus
- **Formal drafting team formed summer 2013**

Standard Drafting Team (SDT) Actions

- **Merged six standards into two**
 - One for data collection (MOD-032)
 - One for model validation (MOD-033)
- **In addition to steady state data and dynamics data, added short circuit data into MOD-032**
 - Makes it consistent with TPL-001-4 which requires short circuit studies in addition to steady state and stability studies
- **Both standards passed on the first ballot!**

MOD-032 Model Data Collection Standard

- **R1: PC and each TP to jointly develop procedures for collecting data that include:**
 - Data listed in Attachment 1
 - Specifications consistent with procedures for building the Interconnection-wide case(s)
 - Specifications for distribution or posting of the data requirements and reporting procedures

MOD-032 Attachment 1

- **Three columns of data – steady state, dynamics, and short circuit**
- **“Data must be shareable on an interconnection-wide basis to support use in the Interconnection-wide cases”**
- **“If a user-written model(s) is submitted in place of a generic or library model, it must include the characteristics of the model, including block diagrams, values and names for all model parameters, and a list of all state variables”**

MOD-032 Attachment 1

steady-state	dynamics	short circuit
<ol style="list-style-type: none"> 1. Each bus [TO] <ol style="list-style-type: none"> a. nominal voltage b. area, zone and owner 2. Aggregate Demand² [LSE] <ol style="list-style-type: none"> a. real and reactive power* b. in-service status* 3. Generating Units³ [GO, RP (for future planned resources only)] <ol style="list-style-type: none"> a. real power capabilities - gross maximum and minimum values b. reactive power capabilities - maximum and minimum values at 	<ol style="list-style-type: none"> 1. Generator [GO, RP (for future planned resources only)] 2. Excitation System [GO, RP (for future planned resources only)] 3. Governor [GO, RP (for future planned resources only)] 4. Power System Stabilizer [GO, RP (for future planned resources only)] 5. Demand [LSE] 	<ol style="list-style-type: none"> 1. Provide for all applicable elements in column "steady-state" [GO, RP, TO] <ol style="list-style-type: none"> a. Positive Sequence Data b. Negative Sequence Data c. Zero Sequence Data 2. Mutual Line Impedance Data [TO] 3. Other information requested by the Planning Coordinator or Transmission Planner necessary for modeling
<ol style="list-style-type: none"> <ol style="list-style-type: none"> c. station service auxiliary load for normal plant configuration (provide data in the same manner as that required for aggregate Demand under item 2, above). d. regulated bus* and voltage set point* (as typically provided by the TOP) e. machine MVA base f. generator step up transformer data (provide same data as that required for transformer under item 6, below) g. generator type (hydro, wind, fossil, solar, nuclear, etc) h. in-service status* 4. AC Transmission Line or Circuit [TO] <ol style="list-style-type: none"> a. impedance parameters (positive sequence) b. susceptance (line charging) c. ratings (normal and emergency)* d. in-service status* 	<ol style="list-style-type: none"> 6. Wind Turbine Data [GO] 7. Photovoltaic systems [GO] 8. Static Var Systems and FACTS [GO, TO, LSE] 9. DC system models [TO] 10. Other information requested by the Planning Coordinator or Transmission Planner necessary for modeling purposes. [BA, GO, LSE, TO, TSP] 	<p>purposes. [BA, GO, LSE, TO, TSP]</p>

MOD-032 Attachment 1

steady-state	dynamics	short circuit
<ul style="list-style-type: none"> 5. DC Transmission systems [TO] 6. Transformer (voltage and phase-shifting) [TO] <ul style="list-style-type: none"> a. nominal voltages of windings b. impedance(s) c. tap ratios (voltage or phase angle)* d. minimum and maximum tap position limits e. number of tap positions (for both the ULTC and NLTC) f. regulated bus (for voltage regulating transformers)* g. ratings (normal and emergency)* h. in-service status* 7. Reactive compensation (shunt capacitors and reactors) [TO] <ul style="list-style-type: none"> a. admittances (MVars) of each capacitor and reactor b. regulated voltage band limits* (if mode of operation not fixed) c. mode of operation (fixed, discrete, continuous, etc.) d. regulated bus* (if mode of operation not fixed) e. in-service status* 8. Static Var Systems [TO] 		
<ul style="list-style-type: none"> <ul style="list-style-type: none"> a. reactive limits b. voltage set point* c. fixed/switched shunt, if applicable d. in-service status* 9. Other information requested by the Planning Coordinator or Transmission Planner necessary for modeling purposes. [BA, GO, LSE, TO, TSP] 		

MOD-032 Model Data Collection Standard

- **R2: Data owners submit data to TP and PC according to the procedures**
 - For data that has not changed since the last submission, a written confirmation that the data has not changed is sufficient
- **R3: Data owners must respond to a PC request for data review if there are technical concerns**
 - Provide either updated data or an explanation
 - Respond within 90 days

MOD-032 Model Data Collection Standard

- **R4: PC to supply data to ERO or its designee to support creation of interconnection-wide cases**
- **Regions create interconnection-wide cases through ERAG/MMWG**
- **Regions cannot be required by a standard to do anything**
- **Who is the “designee”?**
 - **MMWG**

Data Collection Procedures

- **SERTP sponsors have individual procedures for their respective areas which include requirements such as:**
 - Data owners to provide steady-state, dynamics and short circuit modeling data to PC and TP.
 - Periodic data submissions such as once every 13 calendar months or at a specified time annually. If data has been previously submitted, written confirmation that the data has not changed is sufficient.
 - Some require revised model data to be submitted within a specified time of generator equipment changes becoming operational (i.e. 90 days).
 - Data types, formats, and templates for data to be supplied.
 - Provide standard PSS/E models. If user-written model is supplied, it must include all details and be sharable.

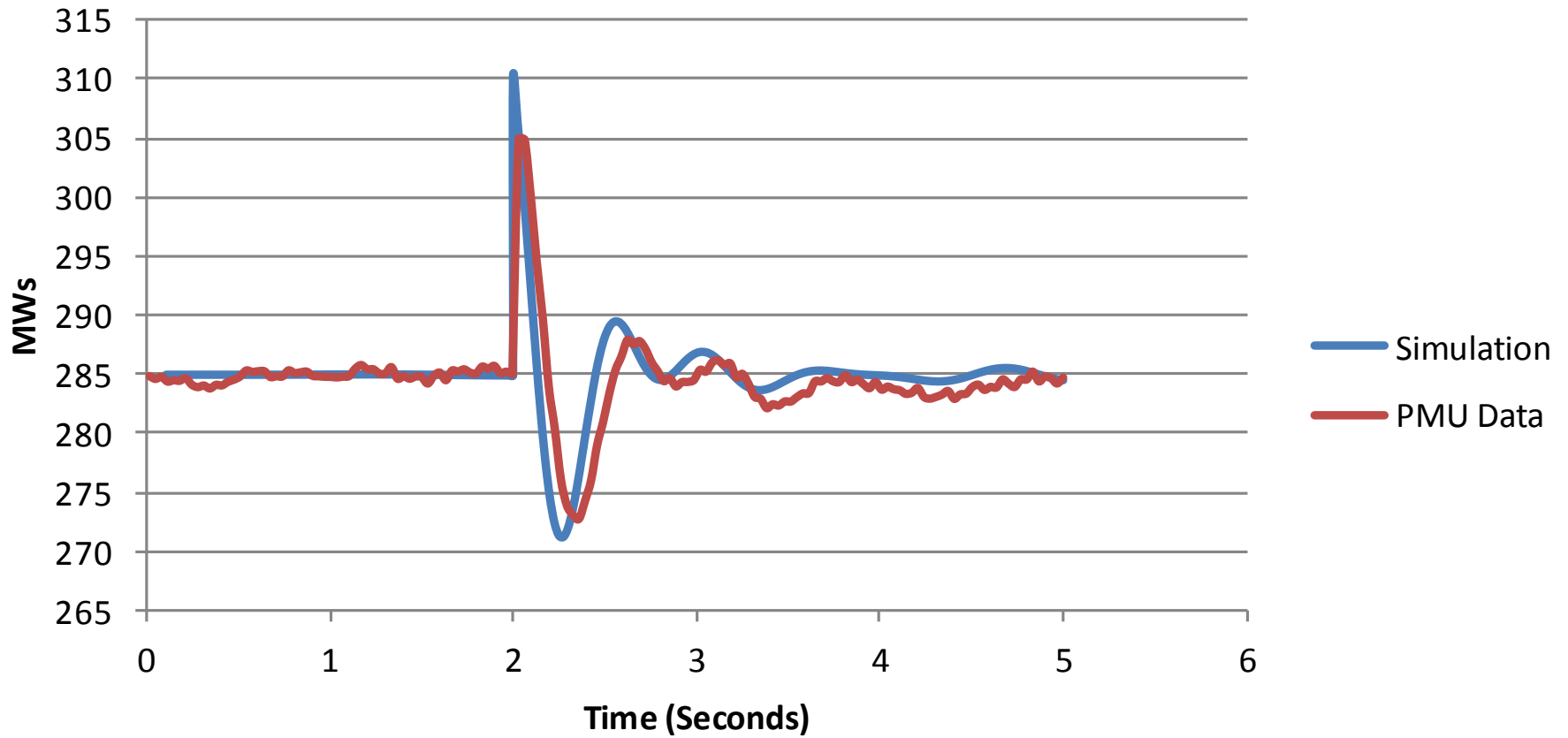
MOD-033 Model Validation

- **R1: PC shall implement a documented data validation process including:**
 - Compare power flow model to state estimator case (or other real time data)
 - Compare dynamic model results to actual results for “dynamic local event” at least every 24 months
 - Guideline which will be used to determine unacceptable responses
 - Guideline to resolve unacceptable differences
- **R2: RC and TOP must supply real time data upon PC request**

MOD-033 Model Validation

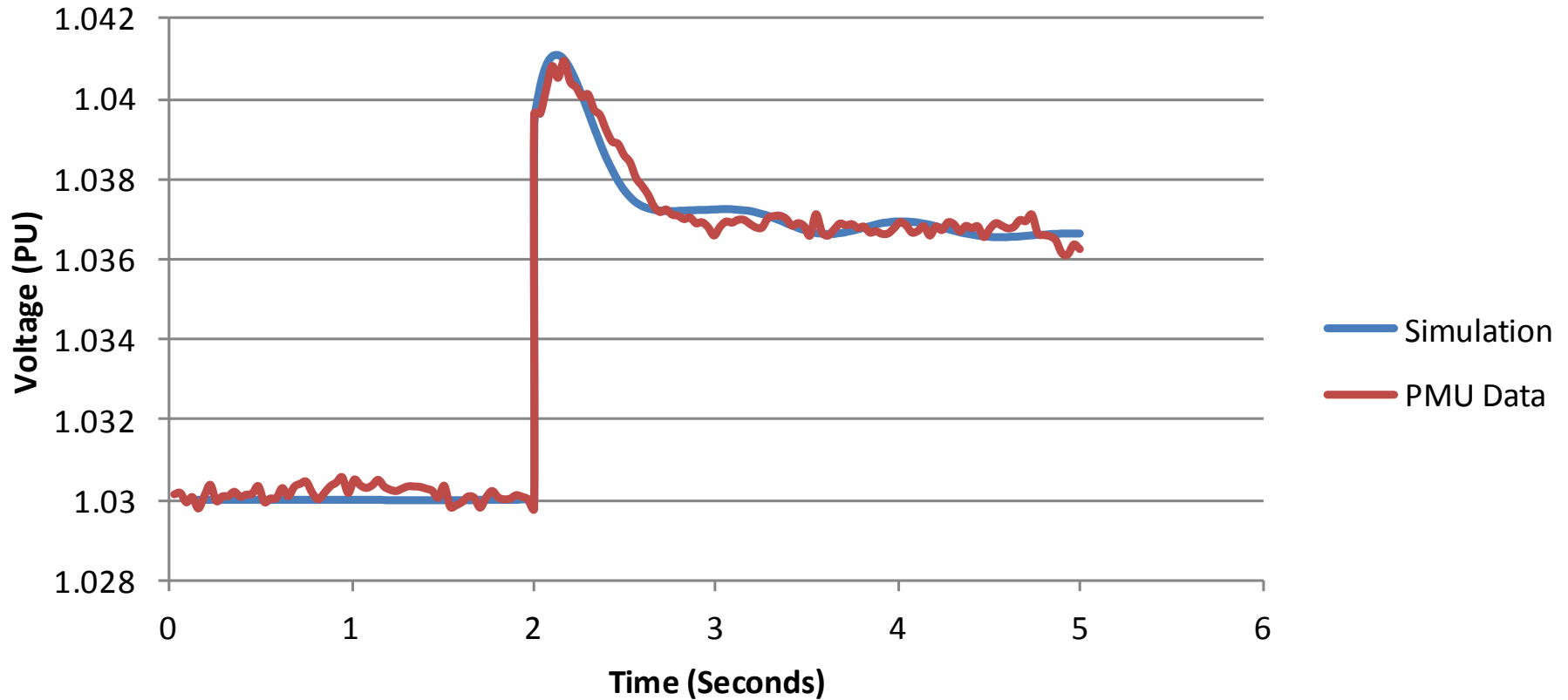
- **Dynamic local event described in R1:**
 - A disturbance on the power system that produces some measurable transient response, such as oscillations. It could involve one small area of the system or a generating plant oscillating against the rest of the grid. The rest of the grid should not have a significant effect. Oscillations involving large areas of the grid are not local events.

Simulation vs. Real World SERTP Example



Generating Unit MW Output

Simulation vs. Real World SERTP Example (cont.)



500 kV Bus Voltage

Summary

- **MOD-032**
 - R1 of became effective July 1, 2015
 - R2–R4 become effective July 1, 2016

- **MOD-033**
 - Becomes effective July 1, 2017

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Miscellaneous Updates

Order No.1000 Regional Update

Transmission Needs Driven by Public Policy Requirements (PPRs)

- **Three (3) stakeholder proposals submitted for the 2016 planning cycle for the following proposed PPRs:**
 - 1) *Carbon Pollution Emission Guidelines for Existing Electric Utility Generating Units*
 - 2) *National Primary Ambient Air Quality Standards for SO₂, National Ambient Air Quality Standards for Ozone, Clean Water Act Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category, Cross-State Air Pollution Rule, Disposal of Coal Combustion Residuals*
 - 3) *North Carolina Renewable Energy and Energy Efficiency Portfolio Standard*
- **None of the stakeholder proposed transmission needs driven by PPRs were identified for further evaluation of potential transmission solutions in the 2016 planning cycle.**
- **Response posted on the SERTP website.**

Next Meeting Activities

- **2016 SERTP 2nd Quarter Meeting**
 - **Location: TBD**
 - **Date: June 2016**
 - **Purpose:**
 - Review Modeling Assumptions
 - Discuss Preliminary 10 Year Expansion Plan
 - Stakeholder Input & Feedback Regarding the Plan

Questions?

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