

NASPI & NERC Synchronized Measurement Subcommittee MODEL VERIFICATION TOOLS TECHNICAL WORKSHOP

October 18, 2016

1:00 – 5:00pm

Seattle Marriott Waterfront Hotel

The use of phasor measurement unit data for disturbance-based Power Plant Model Verification (PPMV) enables the capability to monitor power plant performance during actual grid events. This can offer time and cost savings as well as greater awareness of model accuracy and plant operating performance.^{1,2} Use of PMU data for model verification is one means of meeting the NERC Reliability Standards MOD-026 and MOD-027.³ Most commercial software platforms now have the capability to play back event data into the simulation for model verification. Model-simulated data can be compared with actual disturbance data from PMUs to determine whether or not the model sufficiently represents the actual plant dynamic behavior.

This workshop will dive into the tools for disturbance-based PPMV and give participants an understanding of the features, capabilities, and differences between the commercial software tools available. The workshop sessions will examine the tools available for disturbance-based verification using PMU data and discuss evolving calibration methods.

- **Event Playback Demonstration** – Event playback involves using PMU data recorded at the high- or low-side of the generator step-up (GSU) transformer or Point of Interconnection (POI) for major grid disturbances. The measured conditions are played into the simulation tools to excite the power plant model and measure its simulated performance. This session will demonstrate several software tools that compare actual PMU data against simulated results.
- **Model Calibration Test** – Model calibration involves using measured (PMU) data over multiple grid disturbances to tune the model to match actual asset performance. Using multiple grid events and datasets of actual generator performance during each grid event and an understanding of the generator, engineers may be able to tune or calibrate the model to identify potential errors or inconsistencies with the model. Model calibration participants will explain their algorithms and methods, and the workshop will compare calibrated model results using test datasets.

¹ See NASPI Report, “Model Validation Using Synchrophasor Data,” (March 2015). Available: [HERE](#).

² NERC Synchronized Measurement Subcommittee (SMS) report, “Reliability Guideline on Power Plant Model Verification using PMU Data,” (Sept 2016). Available: [HERE](#).

³ See NERC Reliability Standards [MOD-026-1](#) and [MOD-027-1](#).

TECHNICAL WORKSHOP AGENDA

- 1:00 pm **Overview and introductions**
- Jim Kleitsch (ATC & NERC Synchronized Measurement Subcommittee)
- 1:10 pm **NERC Reliability Guideline: PPMV using PMU data**
Walkthrough of PPMV process and update on recently approved NERC Reliability Guideline on Power Plant Model Verification using PMUs
- Ryan Quint (NERC)
- 1:30 pm **Model playback session**
Commercially available playback tools will be demonstrated using video demonstrations (shown in random order) and a Q&A session.
- Introduction – Dmitry Kosterev (BPA)
 - GE PSLF + PhasorAnalytics
 - Pacific Northwest National Laboratory (PNNL) PPMV Tool
 - Powertech TSAT and ModV Tool
 - PowerWorld Simulator
 - Siemens PTI PSS/E
- 2:50 pm **Break**
- 3:10 pm **Model calibration session**
Calibration techniques and algorithms will be tested against a standard set of PMU events and models to show various aspects and algorithms for disturbance-based PPMV calibration, with a comparison of model results.
- Introduction – Ryan Quint (NERC)
 - Electric Power Group (EPG)
 - Georgia Tech
 - MathWorks
 - PNNL
- 4:00 pm **Considerations for PPMV**
Reliability aspects, baseline model development and testing, PMU data quality, effective PPMV for improving power system models, with Q&A.
- Ryan Quint (NERC)
 - Dmitry Kosterev (BPA)
- 4:45 pm **PPMV Success Story Example**
Example of model re-certification using disturbance-based PPMV and next steps for disturbance-based PPMV.
- Steve Yang – BPA
- 5:00 pm **Meeting adjourns**