

**NERC**

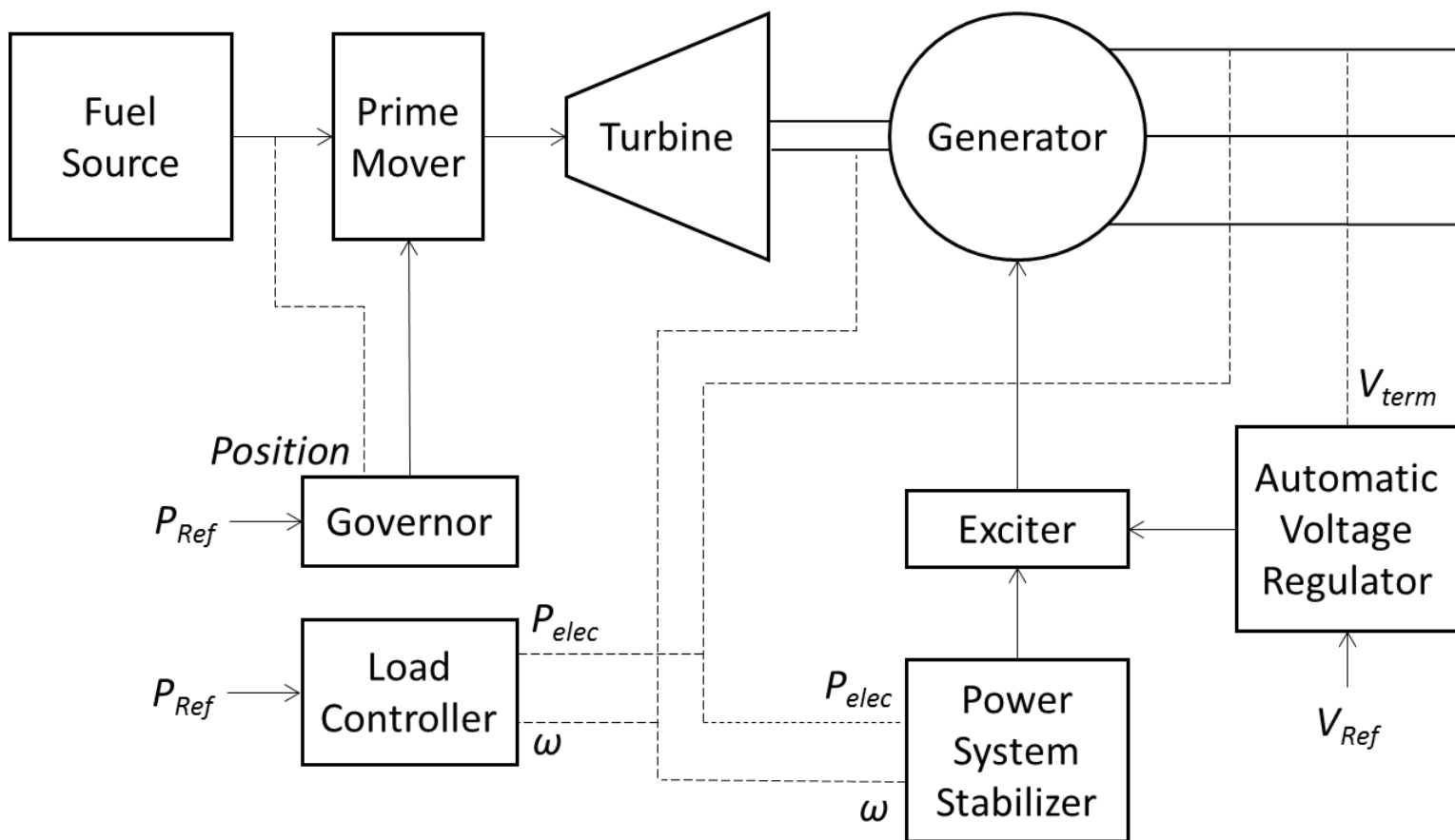
NORTH AMERICAN ELECTRIC  
RELIABILITY CORPORATION

# Disturbance-Based PPMV Overview

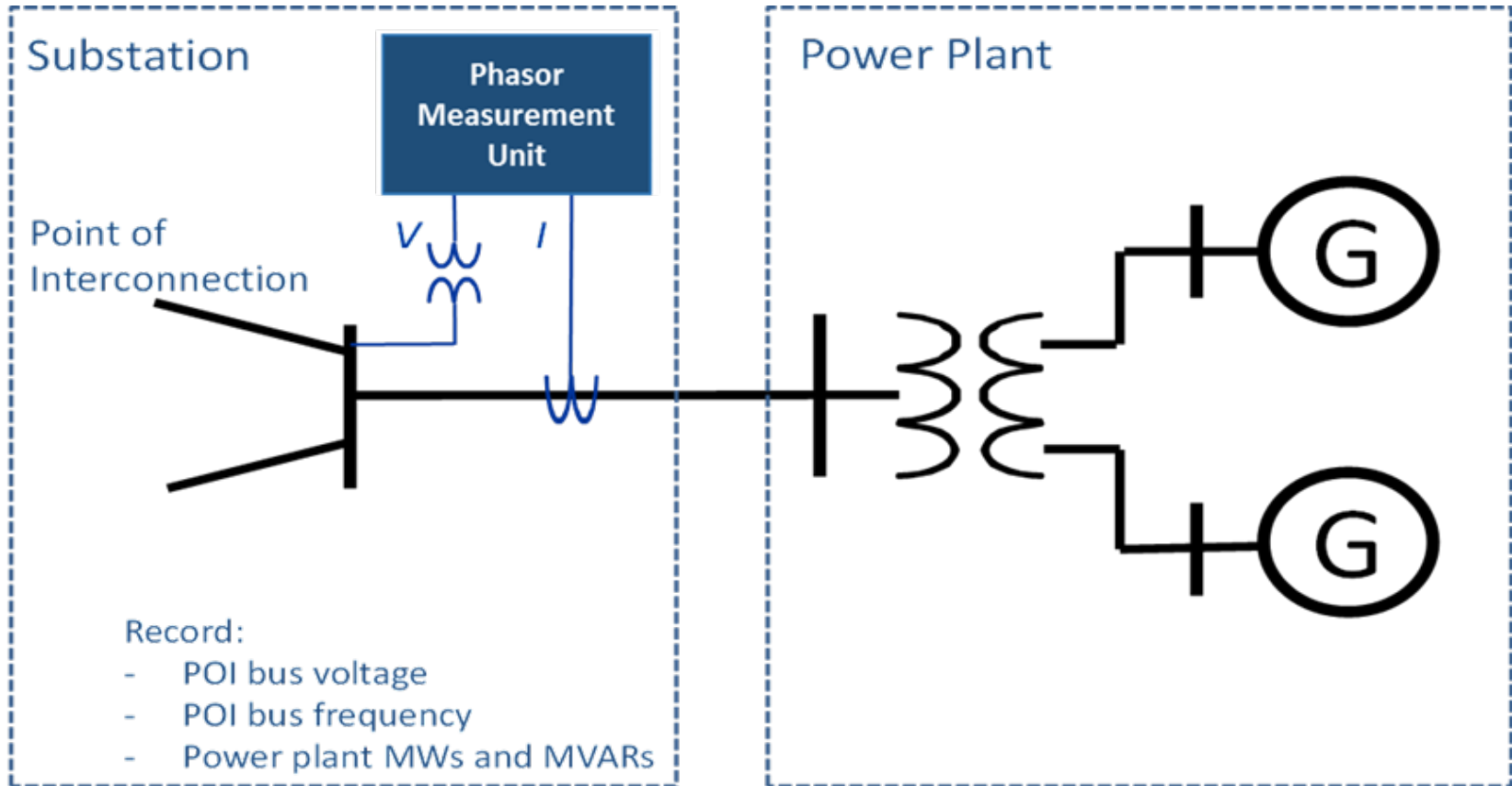
Ryan Quint, NERC  
NASPI-NERC PPMV Tools Workshop  
October 2016

**RELIABILITY | ACCOUNTABILITY**

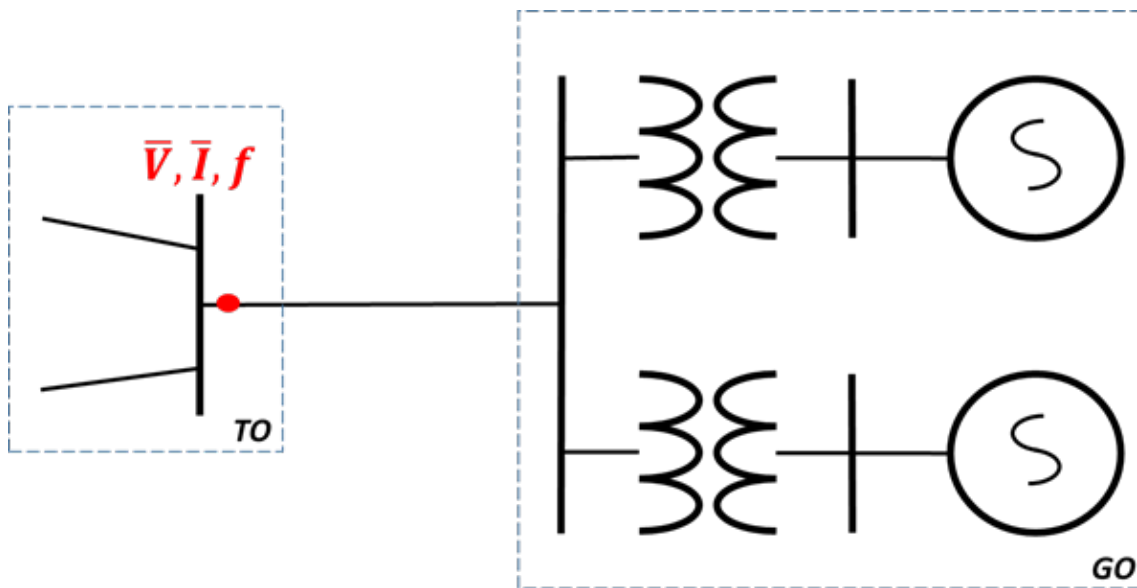
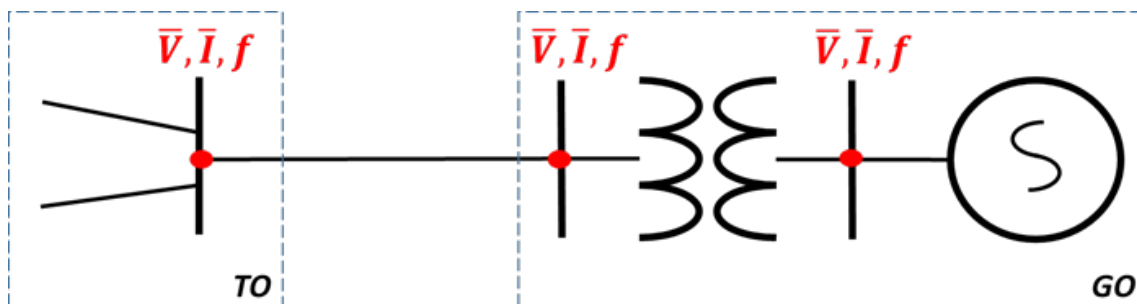




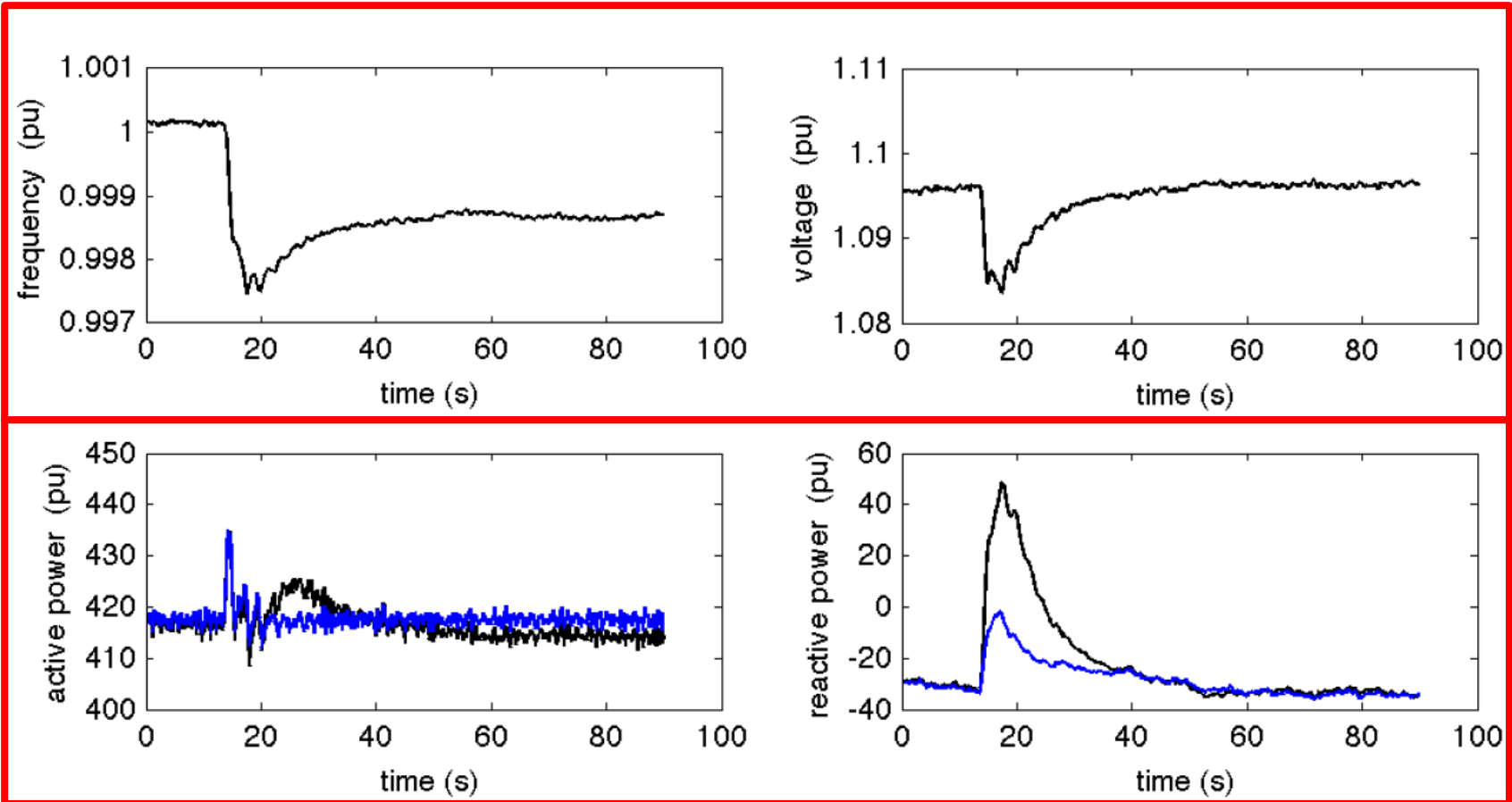
# Disturbance-Based PPMV Overview



# Data Recording Locations

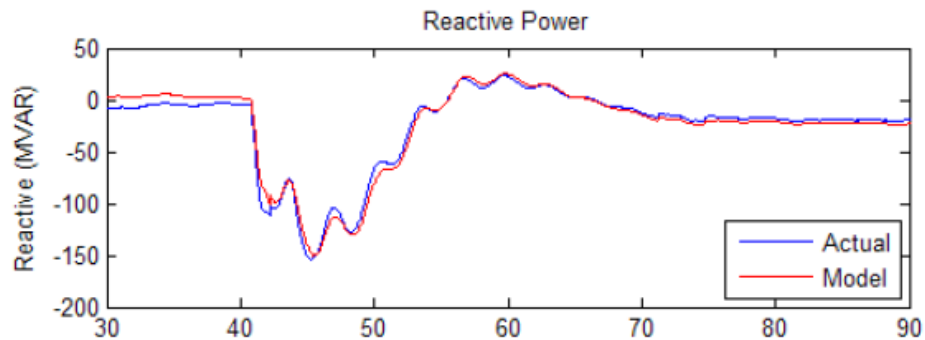
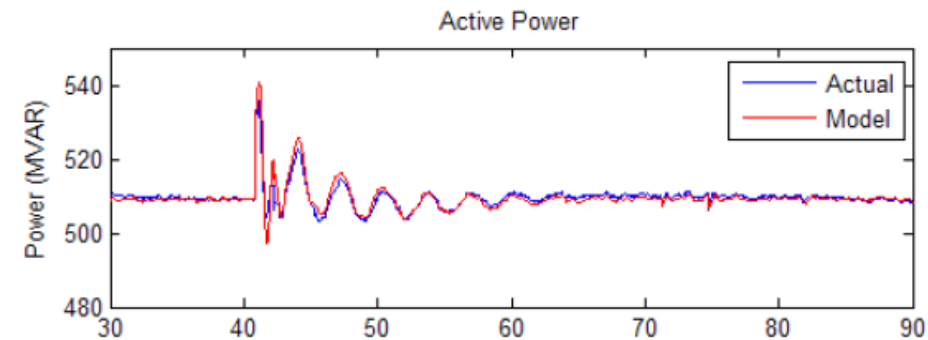
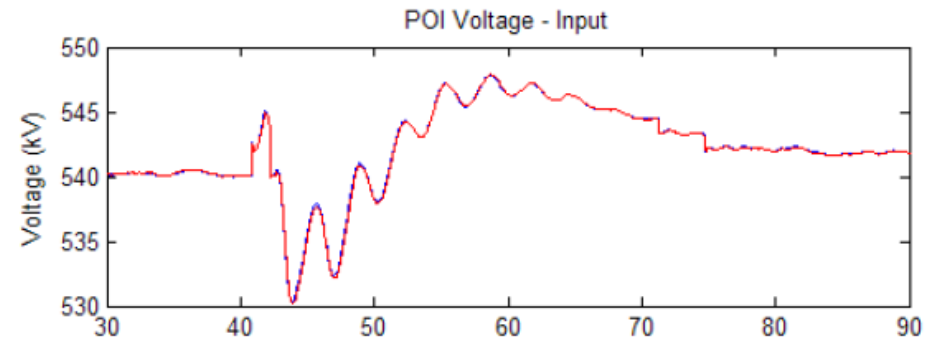
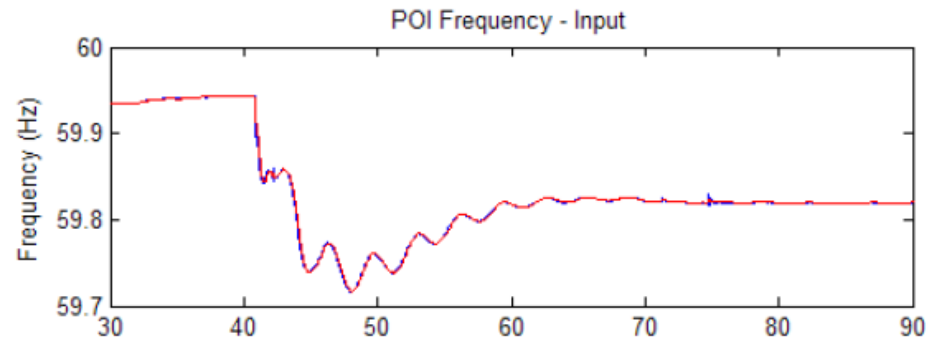


## *PLAY-IN DATA (INPUTS)*

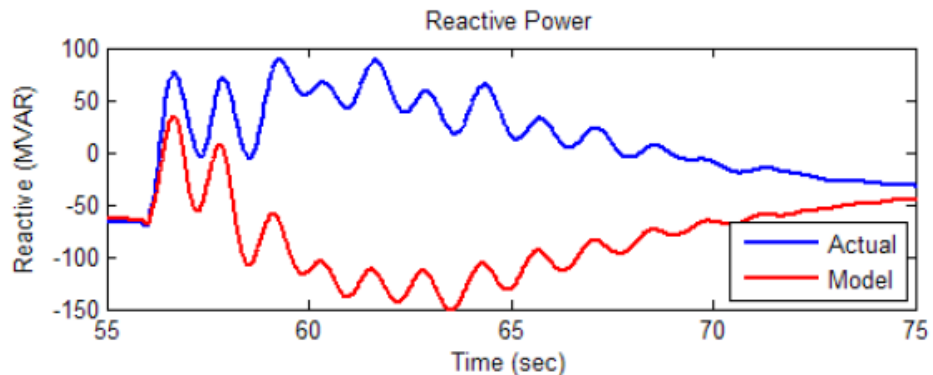
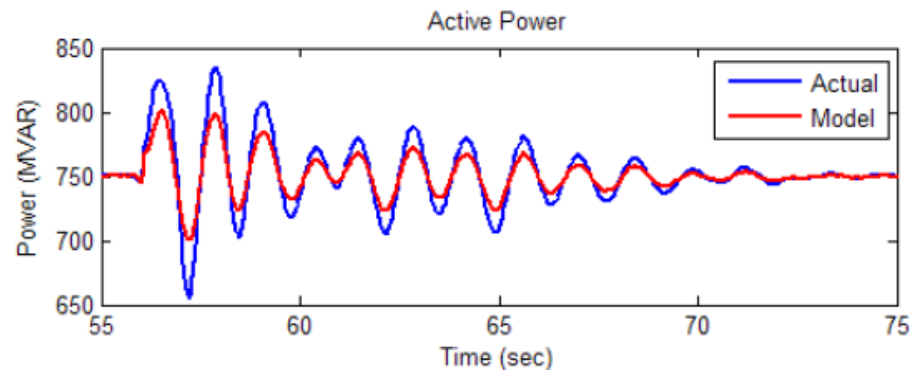
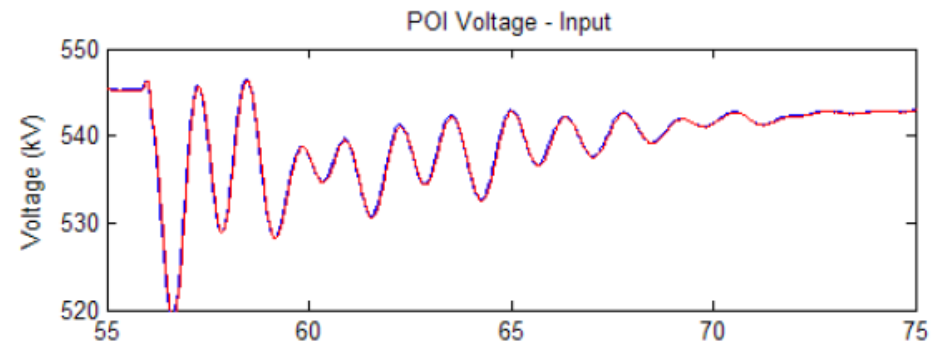
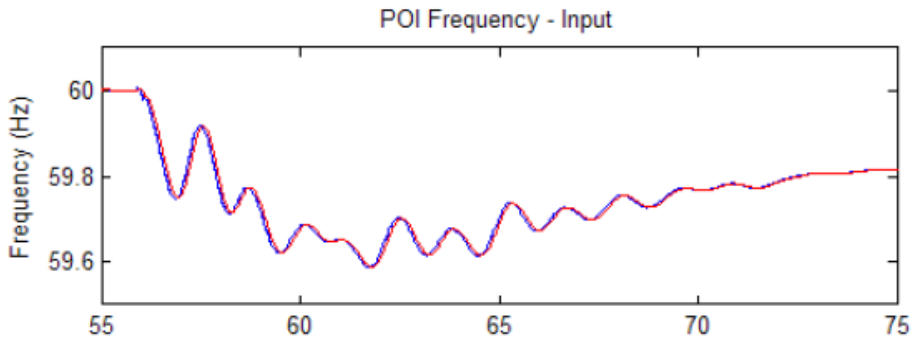


## *MEASURES OF SUCCESS (OUTPUTS)*

# What a Good Model Looks Like

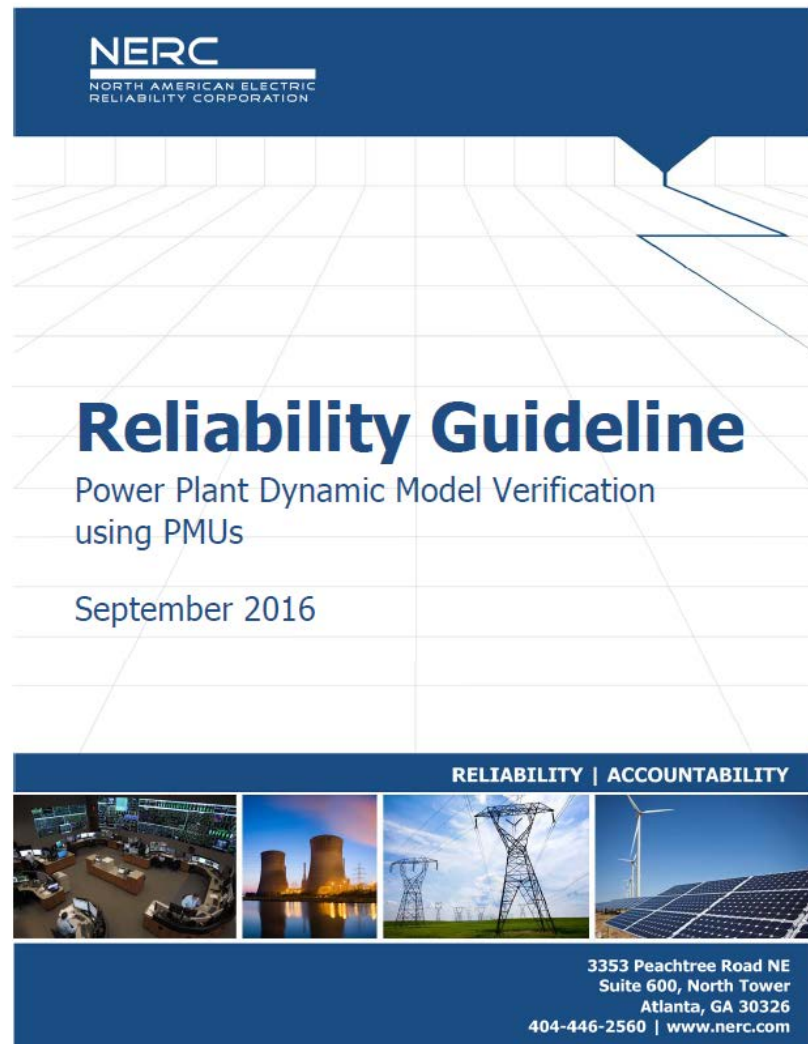


- Approximates general shape of response very well
- Minor differences between events



- Does not approximate general shape of response well
- Substantial differences in comparison (between events)

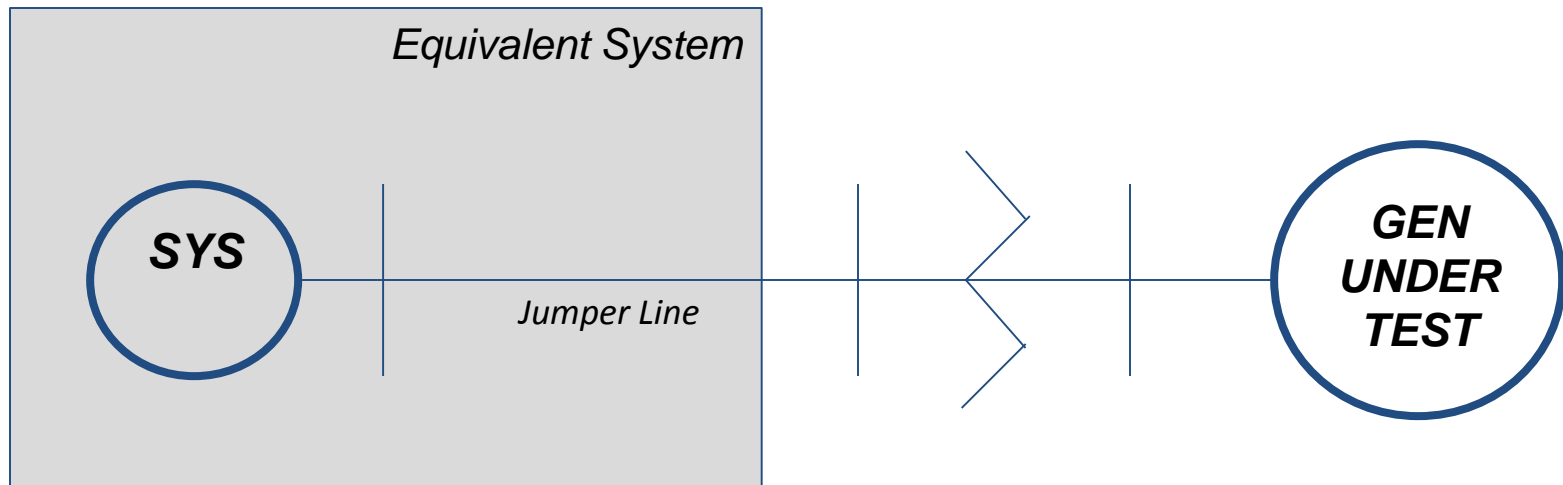
- Guideline approved by NERC Planning Committee Sept 2016
- Overview of mechanics and considerations for performing disturbance-based verification
- Appendix of available playback model and tools
- First step in supporting industry with model verification



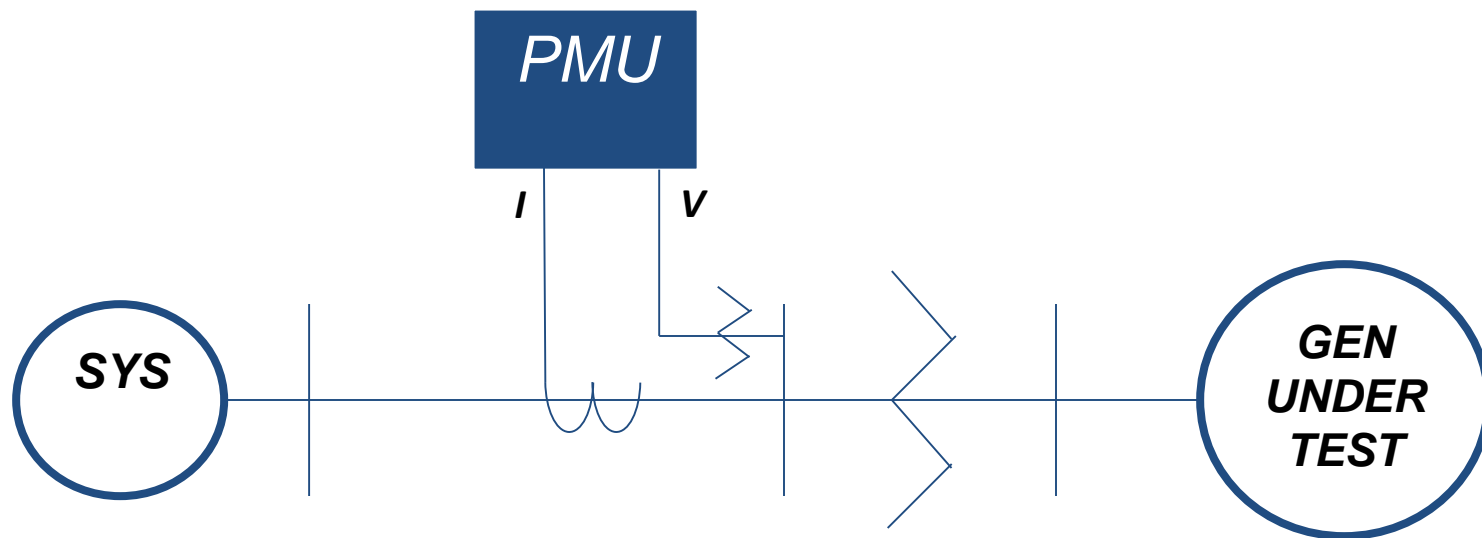


- **Purpose:** Raise industry awareness of disturbance-based Power Plant Model Verification (PPMV) using PMU data and tools available to industry
- **Event Playback Demonstration Session:** Demos of commercially available tools for model verification using test datasets
  - Functionality, features, execution, inputs, and management of data
- **Model Calibration Session:** Illustration of calibration techniques using test datasets developed by workshop organizers
  - Description of method
  - Testing on base case
  - Comparison of results

- Each base case provided includes a single unit, generator step-up (GSU) transformer, and equivalent system model.
  - 1 – System Equivalent Bus
  - 101 – GSU High-Side Bus
  - 102 – GSU Low-Side Bus
  - Branch 1-101 is equivalent jumper line
    - Used for monitoring, impedance < jumper threshold



- PMU measures the following quantities at the high-side of the generator step-up (GSU) transformer
  - Bus Voltage Magnitude and Angle
  - Bus Frequency
  - Active and Reactive Power





# Questions?