

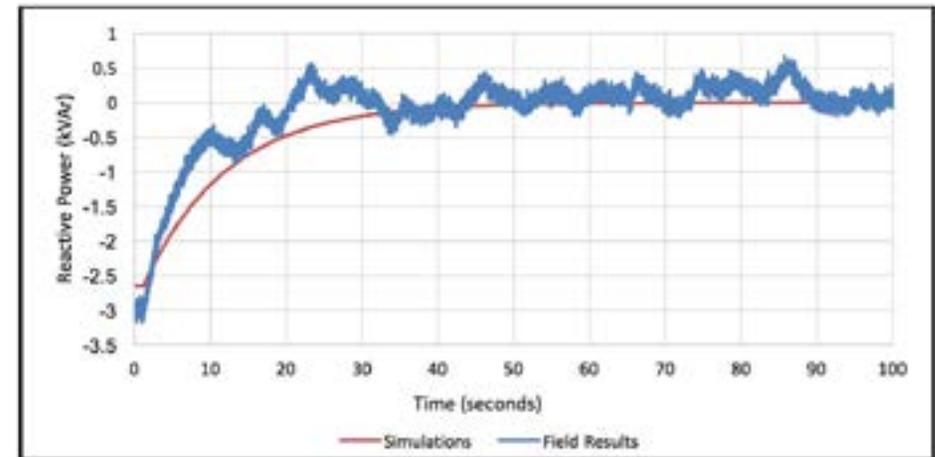
### Project Description

The Wind Project (WP) is located north of Jamestown in Stutsman County, North Dakota. WP consists of one hundred (100) Vestas turbines, each rated at 2,000 kW for a total wind project size of 200 MW. WP is connected to the Point of Interconnection at 115 kV through a 17.1 mile transmission line and two 34.5 kV/115 kV main power transformers (MPTs).

### Need

(EPE) to evaluate the performance of the WP and performed a dynamic model validation study per the North American Electric Reliability Corporation (NERC) to demonstrate compliance with NERC MOD-026-1 and NERC MOD-027-1. To demonstrate compliance with NERC MOD-026-1, it is required to verify that the project's Volt/VAr control system, as represented in simulation models, faithfully represents the dynamic behavior of the actual system in regard to voltage and reactive power disturbances. Additionally, WP must demonstrate compliance with NERC MOD-027-1 by verifying the active power/frequency control model and parameters for simulation models to ensure that the dynamic model accurately represents the generator's active power response to system frequency variations.

EPE completed a transient stability analysis in PSS®E to evaluate WP's response to a voltage and frequency event to validate the dynamic model response versus the field test results. This analysis evaluated WP under two (2) scenarios. One scenario was evaluated for NERC MOD 026-1, representing a voltage excursion event while the second scenario evaluated WP for NERC MOD-027-1 representing a frequency excursion. Compliance with each standard was evaluated by monitoring the voltage and reactive power for the voltage event and frequency and active power for the frequency event.



### Results

The results of the transient stability analysis were compared against the results of the Automatic Voltage Regulator (AVR) test as well as the Primary Frequency Response (PFR) test that were provided. EPE tuned the PSS®E dynamic model representing WP to obtain a comparative response to the field tests performed. The comparison of the transient stability analysis and the field tests demonstrates that the dynamic model representing WP is representative of the field tests performed; thus, is found to be in compliance with NERC MOD-026-1 and NERC MOD-027-1.