

ComEd GMD Preparedness

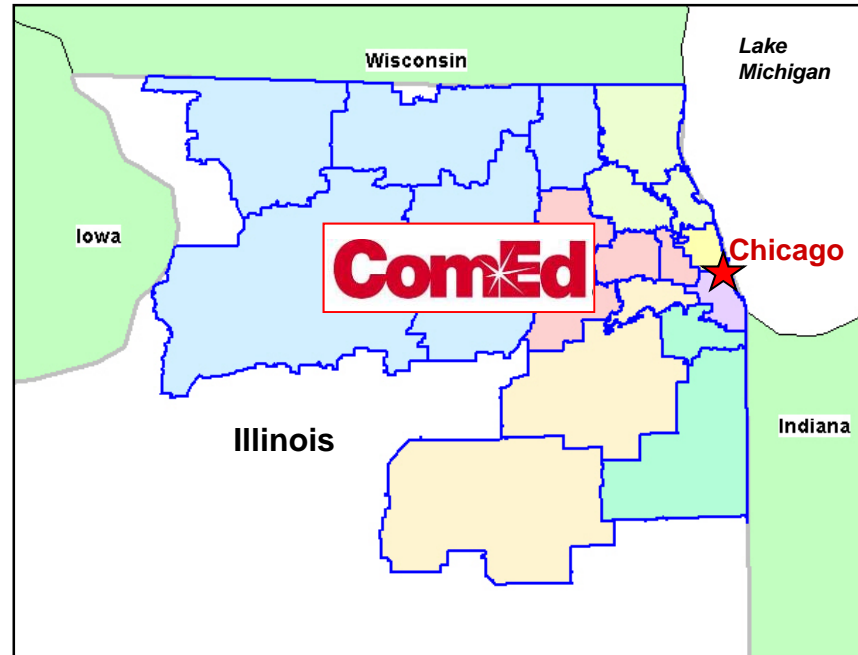
Alan Engelmann

Transmission Planning

ComEd

ComEd Overview

- ComEd is a unit of the Chicago-based Exelon Corporation
- Provides transmission and distribution service to about 3.8 million electric customers in northern Illinois
- Transmission voltages of 138 kV, 345 kV, and 765 kV
- Over 7,000 MVAR of capacitors and 600 MVAR of SVCs installed at the transmission level
- Peak summer load is about 23,750 MW
- Transmission Operator is PJM



GMD Activities

- ComEd GMD preparedness activities include:
 - Transformer specification and analysis
 - Transformer monitoring
 - Update of GMD operating guidelines
 - System modeling and analysis
 - Monitor latest industry alerts and technical information
- Historically ComEd has not experienced any significant GMD-related issues

Transformer Monitoring

- Electronic transformer monitoring systems are installed on most 345kV/138kV autotransformers
- Provide essentially real-time monitoring of transformer health and status indicators.
 - Includes oil and winding temperatures.
- GIC monitoring has been installed on two autotransformers as part of the transformer monitoring system.
 - Uses Hall Effect CT installed on neutral connection.
 - GIC measurements sent to SCADA, PI-Historian, and PJM.
 - Transformer alarm for GIC (currently set for 75A) .
 - SCADA limit of 10A GIC - prompts operator to contact PJM

Transformer Design

- Transformer specifications now include GIC-related requirements
 - GIC current withstand
 - Analysis of GIC impact
 - Includes autotransformers and GSUs
- Analysis of older transformers
 - Several manufacturers have been requested to perform analysis of GIC impacts on existing transformers

Operating Approach

- ComEd Transmission Operations Guidelines
 - Restore outages to return the system as close to normal as possible.
 - Turn on capacitor banks to help increase generator reactive reserves.
 - Attempt to control transmission voltages to near normal levels and maintain sufficient reactive reserves.
 - Monitor alarms for high transformer temperature.
 - Avoid unnecessary switching of transmission equipment.
- Operator training
 - Operator training includes overview of GMD issues and operating guidelines

Operating Approach

- ComEd operations must be coordinated with PJM
- Addressed in PJM Manual 13: Emergency Operations
- PJM GMD Actions
 - Provides notification to PJM members of GMD alert
 - Monitors neutral currents at several locations.
 - Looking for GICs of 10A
 - Implements conservative operation measures as necessary
 - Inter-area transfers
 - Generation dispatch
 - Voltage adjustments

Transmission Planning

- Areas of attention
 - Guidance for transmission operations
 - GIC monitoring locations
 - Modeling and analysis
 - Voltage stability
- PowerWorld modeling and simulation of ComEd system
 - In addition to power flow model, data included grounding resistance, transformer resistance, transformer winding configuration
 - Simulations run for various storm directions and magnitudes
 - Results indicate increases in reactive losses and transformers susceptible to high GIC.

Ongoing/Future Work

- GIC monitoring is planned for additional autotransformers
 - Geographically dispersed through ComEd area
- Review results of PowerWorld simulations
 - Assess system impact of increased reactive losses
 - Identify potential GIC monitoring locations
- Additional system studies?
 - What criteria and assumptions should be applied?
- Stay current with industry activity and advisories (e.g., NERC, EPRI)

Thank You!

Alan Engelmann
alan.engelmann@comed.com