CIGRE: Grid of the Future 2019
NGN Tutorial: Power Quality Impacts of Inverter-Based Generation Resources on Utility Systems

AGENDA

1. Welcome, Introductions

2. Voltage fluctuations (flicker, rapid voltage changes/sags)
   a. Background on voltage fluctuations
   b. Causes (variable nature of the generation, inverter control tuning issues, transformer energization, capacitor bank switching)
   c. Impacts (lamp flicker complaints, issues with sensitive loads especially in low short-circuit strength areas)
   d. Industry standards – Measurements, Limits (IEEE 1543, IEEE 1547, IEEE P2800)
   e. Study tools (EMT modeling and simulations)
   f. Mitigation (e.g. proper tuning, pre-insertion switching, point-on-wave switching)
   g. Real world case studies

3. Harmonic Distortion
   a. Background on harmonics and inter-harmonics, current and voltage distortion
   b. Industry standards – Measurements, Limits (IEEE 519, IEEE 1547, IEEE P2800)
   c. Study tools (frequency scans, distortion analysis)
   d. Mitigation (e.g. harmonic filter banks)
   e. Real world case studies