

Introduction

- The latest version of the JU's Anti-Islanding criteria has been posted to the DPS ITWG website and should be considered in effect going forward until otherwise noted.
- DPS Staff is aware of specific concerns the solar industry has with the JU's Anti-Islanding criteria and is willing to discuss these concerns further with both parties as needed to come to a resolution.
- The IPWG is actively working on rules for applying the JU's Anti-Islanding criteria retroactively, but a final resolution has not been agreed to by all parties at this time.

NREL: Control and Monitoring

- Metering in 15 minute intervals - determine energy production
 - Billing/production metering
 - Program compliance
 - Production performance
 - Higher-res metering provides some level of situational awareness and ability to plan with higher levels of confidence and accuracy
 - Can make fewer "worst case" assumptions if you know what is actually going on
- PCC Monitoring – near real time that communicates the status and output level
 - Dist. Planning – aids in asset management, phase balancing, load planning, and protection review
 - DER Interconnection: improved future interconnection decisions
 - Dist. Operations: data used for load management
 - High Penetration DER scenario: data used for resource planning at Bulk/ISO level, better estimate needed reserves, ramping, etc.
 - ADMS: can inform the operation of other controllable equipment
- Typically for larger commercial and utility scale systems Advanced DER Control – control of the DER/plant directly using externally derived set points to meet specific control objectives
 - Responding to control inputs for distribution level services
 - Active dispatch/participation in ISO level services
 - With Islanding Capability – increase resiliency, higher reliability
- Monitoring and Control Requirements are typically a function of:
 - DER project size
 - Voltage level
 - Market requirements often supersede interconnection requirements
 - DER asset ownership
- What level of capability is needed?
- Monitoring first or control first?
 - Across the country: typically monitoring is applied first
 - Ex. APS applies monitoring at 500kW which is a pretty typical number
 - Control may be applied at 1MW

- Systems less than 1MW may be subject to the APS remote disconnect and monitoring requirements depending on the generation type (i.e. synchronous generation).

Industry Presentation:

- Recommendations & Conclusion:
 - Develop specified thresholds for various line voltages
 - Use voltage based thresholds to eliminate broadly applicable exceptions
 - Eliminate retroactive requirements by avoiding broad wording of criteria
 - eliminate requirement for individualized production
 - differentiate between control and/or monitoring requirements needed for safe and reliable interconnection
 - expand efforts in partnership with solar developers to identify lower cost equipment options
- Suggest 1MW Threshold for minimum load for control functions of a recloser.
- DER below a certain system size should not have dispatch and control as a requirement
- Cellular and/or power line carrier technology should be utilized to the extent possible for data stream
- Smart inverter and batteries
 - Majority of site level monitoring control and protection requirements can be met through inverters
 - Utilities will need increased access to inverters and battery systems for advanced grid services
 - Use internet protocol

Utility Presentation: Monitoring and Control

- Current Monitoring
 - Monitoring is required for PV \geq 1MW
 - Monitoring Parameters to be provided on near real-time (per REV)
 - Monitoring @ generation will include
 - Metering @ PCC, per phase voltage/current, 3-phase values for real and reactive power
- Future Monitoring
 - PV 100kW +
 - Monitoring required for multiple >50 kW on feeder that exceed 100kW aggregate
 - Different threshold can be established for smaller systems that only require monitoring and NOT control
 - FERC NOPR: M&C is required for DER/storage/DR \geq 100kW

ITWG Notes
January 18, 2017

- Distribution Management Systems will require monitoring of PV systems below 1MW
 - For power flow convergence and provide functionality such as Volt-Var optimization/fault location/isolation/service restoration
- Current Control
 - Systems \geq 1MW: recloser w/SCADA
 - Systems $<$ 1MW: SCADA w/RTU may be required based on system configuration and delivery voltage level
- Future Control
 - Control will be required for PV \geq 100kW
 - Control will be for multiple PV $>$ 50kW on feeder that exceed 100kW aggregate
- Joint Utilities M&C Recommendations
 - Monitoring at 100kW (for individual systems and use aggregate of applications $>$ 50kW from single developer on one feeder)
 - Control at 100kW (for individual systems and use aggregate of applications $>$ 50kW from single developer on one feeder)
 - Polling Frequency
 - Real time monitoring will be required
 - 2-10 second sampling rate for PV performance
 - Standards
 - Use of inverters that are firmware upgradeable for future smart functions
 - RTU/communication firewall most likely needed for cyber security

DPS/NYSERDA will put together a list of questions for both the JU's and solar industry for submission before the next ITWG meeting to facilitate further discussion at that time.

Pterra presentation: GFOV Phase 1 – Confirm the potential for GFOV

- Evaluated a sub-transmission line
- Delta-wye-grounded substation transformer
- DG installed on the distribution feeder
- Event sequence
 - SLG fault on high side
 - Fault detected
 - Sub-transmission breaker opens islanding the faulted line and distribution feeders with dg
 - DG on island do not trip fast enough
 - Not enough load on the island to depress voltage
 - Overvoltage occurs on the sub-transmission line
- Need for 3V0
 - One measure is to add PTs on the transformer delta (high) side
 - PTs measure the 3V0 voltage to identify an overvoltage
 - Relays send signals to trip DG or other breakers to eliminate overvoltage

- Findings
 - GFOV is possible in the studied configuration
 - 2 of 3 inverter DG models were found able to excite the high side of transformer to high voltage
 - Commercial inverters tested: 2-250kW and 1-1MW; all 3-phase UL-1741 certified
 - Magnitude of overvoltage depends on
 - Ratio of DG to load on the island
 - Performance of surge arresters when present
 - Interaction of different manufacturer designs for inverter controls in the island
- Anti-islanding protections were turned off for conservatism in analysis
- Grid was modeled with the ideal source
- Reactive portion of the load was tuned to minimize reactive power mismatch
- Phase 2 will look to identify potential mitigations

National Grid DG Technical Workshop Overview Presentation:

- Existing calculation methods for ground fault over voltage is of concern
 - NG reevaluating calculation method
 - Daytime loading & inverter performance (8AM-8PM may need update)
 - Method for accounting for existing DG in calculation
 - Consider allowing for sub-transmission & transmission connected load
- NG is not currently comfortable with using negative sequence relaying and surge arrestors for GFOV protection
 - NG will provide data for Negative Sequence Relaying research
 - NG concerned with substation equipment use outside of their intended use
- NG reaffirmed that grounding switches are prohibited and affect safety and reliability

Discussion

- Below are the proposed ITWG meeting dates out through the rest of 2017
 - March 29th – next meeting
 - Control and Monitoring
 - May 10th – NYSERDA
 - July 19th – DPS
 - Sep 27th – NYSERDA
 - Nov 29th – DPS
- All agenda's will continue to be vetted through party liaison's several weeks prior to scheduled meeting date.