

DER Interconnection Technical Challenges

NYSRC DISTRIBUTED ENERGY RESOURCES WORKSHOP

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Existing Technical Challenges Include:

1. Overvoltages
 - A. GFOV
 - B. LROV
 - C. $3V_o$
2. Flicker
3. Monitoring & Control

Ground Fault Overvoltage (GFOV)

Definition – Overvoltage during ground fault on an unfaulted phase

Historical Solution – For spinning machines the solution was to ensure effective grounding with the installation of a supplemental ground source to ensure $R0/X1 < 1$ and $X0/X1 < 3$. Assumes all sources are voltage sources and $Z2 < Z1$.

Inverter Differences – Different mechanism with a current source and a large negative sequence impedance ($Z2$). Inverter self protection overvoltage (SPOV) and clamping minimize the transient overvoltage

Recent Work – Approval of C62.92.6 (current regulated sources), 1547.1 testing and various NYSERDA/NREL funded projects

Load Rejection Overvoltage (LROV)

Definition – Overvoltage when a DER exporting power is suddenly islanded (ie. a breaker opens) causing overvoltage as the output current cannot be changed immediately

(Similar to GFOV)

Inverter Solutions – Inverter self protection overvoltage (SPOV) and clamping minimize the transient overvoltage

Recent Work – IEEE 1547.1 future testing, 1.4 pu limit by some utilities

3Vo Protection for Ground faults

Definition – Overvoltage on the transmission side of a delta transformer winding due to islanded condition and a transmission line ground fault. DER cannot “see” ground fault and continues to operate.

Historical Solution – Installation of 59N (3Vo) relaying which requires transmission side PTs.

Recent Work –NYSERDA funded projects

Flicker

Definition – Voltage fluctuations from intermittent solar irradiance that impact PV output on distribution circuits due to passing clouds.

Recent Issues – Failures of the supplemental CESIR screen using IEEE 1453 methodologies have resulted in reduced system sizes and/or large reconductoring costs.

Next Steps – Time Series Analysis projects currently in process to provide better understanding of the flicker associated with solar installations. Require 1 second data for irradiance (PV output power).

Monitoring & Control

Background – Installation of a method for monitoring and controlling (on/off) desired by utilities for operational functionality and planning purposes.

Existing Requirements

Large Standalone PV (>500kW) – typical to have a utility controlled recloser
Small Commercial (50-500kW) – additional hardware requirements is prohibitive from a \$/kW standpoint.

Challenges – Use of smart inverter technology to facilitate low cost solutions

Future Work –NYSERDA funded projects

Questions?