Technical manual, built in a piecewise fashion and stands next to the SIR that can be updated as we go along as a living document.

What should go in this vs. the SIR; what should go in the next version of the SIR?

Work on/establish a level of formality for decision making in and out of consensus.

DPS is the main decision making body

Decisions need to be documented for inclusion in the SIR companion document.

JU Presentation

Substation backfeed

Definition: Current flows back through actual transformer at the substation, not back flow that travels over the bus. Issues arise from flow through the transformer.

System is only designed for one way power flow, and all protections schemes were designed with that in mind.

Multiple transformers, each feeding a few feeders, bus tie between them. When bus tie is closed, it creates a loop from the transmission system through the transformers. Voltage mismatches can be an issue with variance in impedances.

Long feeders often have a voltage regulator partway down the circuit. Reverse power flow can confuse the regulators in terms of how to react and potentially cause the substation regulation (LTC or voltage regulator) to work against the downstream voltage regulator. Not all regulators deployed on the system are bidirectional or offer co-generation modes of operation.

LTC vs. Feeder Regulation – Pros and cons for each for most situations, no one size fits all solution for ever scenario.

Bidirectional regulators – For operational flexibility well before DG was considered (Central Hudson). Cogeneration mode allows you to flatten the profile: looks at downstream voltage rather than upstream. Line drop compensation allows you to look at voltage downstream, but settings are hard to come up with due to the intermittent nature of solar/other DG.

Protection and voltage control scheme re-designs will often be needed to allow backfeed into substation transformers.

Common approaches by JU

LTC controllers to be replaced where substation transformer backfeeding is anticipated, if not capable of bi-directional regulation with generation

3Vo protection is explored for delta-wye winded transformers fed by a single source transmission line (either radial or tapped) where there is a risk for voltage rise due to ground fault.

Preliminary benchmarking with other jurisdictions indicates that the JU's approach is similar in many respects to what has been adopted elsewhere.

Voltage violations are likely to become a critical issue before substation transformer backfeeding.

Circuit design and device deployment standardization is a mere 25-30 years old on a 100 year old system…new system pieces tend to be standardized, but a large portion of the system nationwide is one-off due to lack of initial standardization when the system was originally developed. Many modern utilities were formed by merging other companies so there is often a mix of circuit designs within a single utility's service territory.

Inverter modeling: we need consensus on how to model inverters.

MatLab modeling at some utilities, rather than contracting, in order to improve process efficiency.

Substation information: what substations/how many are at or near the need for 3Vo. Can we come up with a list for statewide?

JU's to Developers: Why are we focusing on 3Vo over other upgrade options?

3Vo is a prudent investment, but is there a better way to get a similar response? (Cost effectiveness). Cost probably needs be driven down either by an effective technical solution, or socialized cost through ratepayers (ratepayers footing the bill is not an attractive solution). Cost discussions aren't technical and belong in a different forum.

Continuous backfeed from DG through a transformer is worse than centralized generation with double losses. Adding a cap would be beneficial to the system.

LMP+D – The valuation of D isn't moving fast enough, and the value of D won't be enough to offset the difference in land costs at potential DG development locations.

Backfeed policies

- ORU: allowed, protections are variable 3Vo, DTT. A lot of things haven't been determined.
- NYSEG/RGE: Backfeed is allowed but limited. Typically more voltage regulation over LTC
- Con Ed: Allow up to 50% of the transformer to backfeed (Pilot Program). Most/all other substations are not approaching backfeed conditions.
- PSEG: Allowed, with limitations.
- Central Hudson: No established limit. Reviewing a slew of applications one at a time. One transformer may be able to handle 90% backfeed while another could allow 50%. Over-standardization could be a major limitation.
- Grid: Allowed, with limitations.

Substation loading information is needed and this information is limited depending on utility and location:

- Rural subs only have drag charts with peak current available and utilities estimate minimum daytime loading at 15-25% of peak loading
- 70% of NYSEG substations are 4.8 kV
- If actual minimum daytime loading info is available, it is used in analysis

- o National Grid – use 25% or peak load to estimate minimum load where minimum load data doesn't exist. Internal analysis has found this to be a broadly applicable value suitable for use when measured data does not exist.
- o NYSEG – analysis has shown that many circuits have a minimum load that is 10-20% of maximum circuit load.
- o CHGE – Most cases measured minimum load data is available. Use 15-20% when data is not available.
- o O&R – use actual measured minimum daytime load data
- o Con Ed - use actual measured minimum daytime load data
- o PSEG-LI - use actual measured minimum daytime load data

JU's to develop criteria for 3Vo need and vet it with group for publication

Group to develop technical manual / matrix for specific protection requirements such as 3Vo and DTT.

- • Type of 3Vo protection shall be standardized:
  - o Trip substation low side breaker and remove all sources of fault (Most Utilities)
  - o Tripping the DG w/ DTT through 3Vo protection (ORU)

Summary of 3Vo demo's shall be distributed to JU's for comments / participation

Existing 3Vo demo concept is not looked at favorably by N. Grid – has protection issues in certain circumstances.

Conclusion of Substation backfeeding discussion: Once the substation backfeeding criteria is defined / developed and published, the JU's shall refer to that criteria in its application review responses to the applicants to better explain reasoning and need for additional protection such as 3Vo. Developers did not object to the need of 3Vo protection, but rather the limited criteria available and reasoning for need explained in utility responses. No real / viable alternatives to 3Vo at this time!

Break for Lunch

Ombudsman presentation

Developer (Borrego) would find it useful for old/inactive projects to be removed from the queue. Dead projects require customer permission to be removed from the queue, and is a major barrier toward removal. A strict cutoff would allow the developer to withdraw dead projects without hurting customer relations.

Voluntary opt-in to the new SIR for developers to help speed up/get rid of old projects?

We want to put together a Straw Proposal, and we need substantial input from the developer community.

Anti-Islanding

JU's approach

SANDIA recommendations followed by all utilities

- Aggregate AC rating of all DER should not exceed 2/3 of minimum feeder loading
- If an island consists of both rotation and inverter based DER, confirm that sum of all rotating machine AC ratings should be less than 25% of the total DER.
- Minimum of 2/3 of DER inverters in the system should be from the same manufacturer.

All JU companies currently use Direct Transfer Trip to implement anti-islanding.

Some utilities in JU are currently evaluating alternative options to DTT, because of the high cost and operational limitations. (PLC, Tight Frequency / Phase monitoring)

Anti-islanding (UL) testing environment/criteria can be fooled, it's not perfect, and errors can cause serious safety concerns.

100% certainty that an island situation will not happen is not an achievable benchmark.

SANDIA Screen approved as anti-islanding screen. Failure constitutes failure of the first bullet and one or both of the second.

Should detailed anti-islanding studies be required for projects that fail the screen? National Grid offers this additional study in MA, and sometimes in NY, but is looking to move away from this practice due to increased risk.

Questions is whether or not these additional studies should be offered by utilities and at what cost?

Any detailed anti-islanding study should be paid for by the developer.

Alternatives to DTT are being explored, but nothing currently stands out to take the stage.

PLC option is almost as expensive as DTT with its initial / up-front costs

Entire group (JU's / Developers / State) agree on sandia report screens being the standard criteria for anti-islanding and that DTT is the main solution to the problem. Again, similar to before, developers are asking for JU's to refer to that criteria in its application review responses to the applicants to better explain reasoning and need for additional protection such as DTT.

PSEG-LI and O&R utilize instantaneous reclose protection settings.

SIR Update

Red zone map provided by the end of 2nd quarter 2016

Tracking of all SIR timelines: How do developers envision this will be done?

When do developers envision applying the supplemental screening process?

Cost estimating clarification?

General Discussion

Pre-app, Customer field shouldn't be required in order to just get circuit information. This will help developers get information without crowding the queue, and "wasting everyone's time".

- How are pre-apps without customers linked to the full application if the decision is made to move forward?
  - We need to brainstorm a solution for maximum benefit to both sides.

Voluntary opt-in to the new SIR, developers even willing to pay a small fee?

- Option is on the table, but has to be analyzed from a logistical standpoint.
- We have to reach a consensus for queue management, and this is a viable option or partial option as a part of the tentative queue management process.

Next Meeting

At DPS in Albany

Doodle poll, avoiding lobby days and Fridays. Scheduling farther in advance to ensure room availability.