

Massachusetts Technical Standards Review Group (MTRSG)

Chair: Babak Enayati, National Grid

Vice-Chair: Michael Conway, Borrego Solar Systems

MTRSG Regular Meeting

Date: September 17, 2014

Time: 9AM-3:30PM

Location: MA DPU Office

Hearing room A

One South Station

Boston, MA 02110

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Roll Call

Babak Enayati - Ngrid

Justin Woodard - NGrid

Bob Andrew - NSTAR

Tim Roughan - NGrid

Lulu Young - Qado Energy

Chris Riffle - Unitil

Paul Krell - Unitil

Jeanne - Ngrid

John Texeira - NGrid

Gerry Bingham - DOER

Mike Coddington - NREL

Jeremy - Source One

Reid Sprite - SourceOne

Eric Every - Solectria

Ghebre Daniel - DPU

Brian Ritzinger - DPU

Kristen Nicole - Gridco (EPRI/DOE)

Efrem Tagliamonte – Advanced Energy

Dave Forrest – ISO NE

Agenda

1) The meeting kick off by Babak and introduction 10 mins

Babak has taken a new position - John Teixeira will become the new Ngrid representative

Utilities must appoint a successor for Chair

1-A - 11-75-E DPU Order, review (100 penetration screen & timeline enforcement)

DPU follow up questions

1. Tracking

2. Unexpected consequences of using 100%

NU - consequences may be use of Transfer Trip (in WMECO territory)

NREL - Sandia has backed away from their report using 67% load:gen as a benchmark, and clarified that it is one of several criteria involved in the recommended screening

Unitil - Using 2:1 as a barometer for taking a closer look (detailed islanding study)

Ngrid (TR) - Why does DPU want utilities to retroactively track once 100% has been accepted
The screen doesn't necessarily preclude a study, or necessitate the equipment itself.

3. Utility actions taken to mitigate

TSRG future tasks (from 11-75-E order)

From order "Encouraged to engage in ongoing research into higher penetrations that are coincident with load"

- Conway - TSRG's role should be to work closely with Ngrid on their Solar Phase II project to explore power curtailment during MDL, but higher penetration at coincident load, higher capacity times
- Reid - TSRG can make a filing with department on what each company plans to do, and results of Ngrid explorations
- Ngrid - TR, Ngrid is doing a solar program that fits with Green Communities Act, but may not coincide with CHP, other technologies
- DOER, Gerry - May dovetail with Grid Mod
- Reid – goal is to show some level of responsibility that the utilities are trying to learn from these technologies
- Paul K - what is the expectation for involvement , suggestion of peer review or National Grid findings - Unutil's participation in TSRG is an example of their research, but capital investment is very unlikely (without cost recovery protection)
- DOER - all of this is in the context of "should we have a penetration screen or not?"
- Babak - companies must report to DOER, but what is the TSRG's role? - could be limited

NSTAR Reverse Power Flow

- Babak - intro NSTAR to allow backfeed when manufacturer provides a waiver, or on certain manufacturers that honor warranty
- Conway – NSTAR's policy is the single most significant barrier to reaching the state's goal of 1600MW PV generation. NGrid's policy allows reverse power flow with additional protection – that policy is echoed by many other utilities across the nation.
- Conway – A joint effort between TSRG and NREL polled various utilities across the country regarding their policies on reverse power flow, and no utility in a mature DG market shared NSTAR's view. Utilities polled are:
 - HECO (Hawaii)
 - AEP (Ohio, Texas, Indiana, Michigan, Kentucky (Appalachian))
 - APS (Arizona)
 - PG&E (California)
 - Duke Energy (N Carolina, S Carolina, Ohio, Kentucky, Indiana, Florida)
- NSTAR, Bob - NSTAR aren't xfmr designers, they defer to manufacturers. Manufacturer must also identify the rating. Newer manufacturers will give that info, older xfmrs won't, may be out of business
- Reid - discussions off-line with NSTAR representatives indicate significant momentum internally to reverse the standard - We haven't seen any documentation that reverse power flow would negatively effect the transformer performance. One case cited xfmr lifetime concerns
- Bob, these transformers are specified for step-down, not step-up

- Babak, can TSRG find similar transformer in another service territory, same manufacturer - can it be used as a benchmark for getting NSTAR more comfortable?
- Bob, Ngrid decided as an organization to take a calculated risk to allow power flow, NSTAR doesn't have the same appetite for that risk
- Babak, again - can other transformers, same manufacturer, same age, be used as an example?
- Bob - non-committal
- DG - is there a point at which the body of evidence is large enough for NSTAR to make a change?
- Bob - non-committal
- Paul K - there are very real differences in transformer designs, between winding sizes, positioning, etc
- M Coddington - Has specified a lot of substation transformer in his experience, there are many different configurations but they are all fundamentally bidirectional. Is the concern that they will be damaged?
- Babak, concern is saturation, leakage flux when power flows in the opposite direction - extra flux needs to be created
- Bob - Nothing disrupts company operations more than a bulk distribution transformer failing. The company has made major strides in terms of testing, O&M
- Babak - concerns may not be technical concerns on the specific transformer, but policy
- Dave F - dramatic changes in load duration curve - Energy Efficiency influences this. We used to have winter peak and summer peak, and the load duration curve was robust
- Reid - where do we go from here? Is Ngrid getting more concerned based on NSTAR's concern (Babak clarifies that it was not a transformer concern, but transmission administration concern) - Either way it needs to be addressed - we need to continue to concentrate on this, find xfmr experts, aggregate standards. Utilities had the same concerns existing about 3MW solar facilities 3-4 years ago.
- Babak, TSRG willing to support NSTAR with documentation. **TSRG expects documentation, examples of failure, etc from NSTAR**
- Reid, provide an example where a transformer failed due to reverse power flow
- Conway - we'd like to build a road map to a future where NSTAR would allow this
- Paul K - Perspective of decision is exposure, consequence - business risk. Large power transformer is an insured piece of equipment - what does the insurer think about reverse power flow
- Next Steps? Supporting documentation from TSRG members

4) Break 10AM-10:15AM

5) Updates on National Grid's 20MW solar filing. 10:15-10:45

MA DPU has approved the solar filing. Babak will introduce the technical goals of the solar filing and will ask for feedback on how TSRG team should monitor the progress of the installations.

Justin Woodard, Ngrid, Presentation - Slide deck to be made available

- Phase 1 was in concert with EPRI
- Phase 2 is independent, data will be shared - results will be presented at TSRG meeting
- Cindy - only 13.8kV feeders? Or will 4kV and other voltages be studied? Different distances from substations? Loop schemes? Power quality monitors being installed?

- Justin - Only 15kV was proposed by developers. Loop scheme wasn't specified in the criteria. Different distances are being used. Power quality will be monitored.
- Tim R, higher voltage harmonics from DG - Ngrid is interested in looking at this
- Paul K - what is Ngrid monitoring for a control case to compare the results to?

6) Updates to Common Guideline 10:45AM-11:15AM

a. NSTAR Anti-Islanding screening

NSTAR not represented at this time (Bob Andrew left early)

b. NSTAR progress on DG fixed PF requirement

NSTAR not represented at this time (Bob Andrew left early)

// Bob was operating as Mike Brigandi's proxy, Mike is out on sick leave

Babak - UL1741 has not covered multiple inverters operating together

c. Status of each utility's interconnection guideline (were expected March '14)

- Ngrid - ESB756C is currently under revision (end of year target)
- Unitil - Chris R - high volume has slowed progress - Draft is in review - Target: no target for review
- WMECO - In progress - Some sections are close to completion, some in progress. No document yet. Seminar slides are available on WMECO's website. 280% increase in applications has tied up bandwidth (end of year target)

d. Other updates?

- None

7) Continue the inverter ride-through recommended settings by ISO-NE and start the discussions on under/over frequency ride-through 11:15AM-12PM

- Dave Forrest presented new proposed undervoltage ridethrough settings for DG
 - Must stay connected to a certain point - pausing at a certain point (.5 - .4 PU may cause inverters to lose synchronization if they try to inject active power, so they may pause, stop-gating mode)
 - AE, Efrem - Utility scale inverters may be able to stay on at lower voltages, but must be able to utilize voltage for self-power.
 - Existing 1547 is .88 and .5 PU steps
 - Dave F - what mechanism should ISO use to ask states to change these standard settings - Is TSRG the right group? TSRG meeting twice a year is a concern for ISO in terms of slow implementation
 - Babak - each company representative can take what's introduced at TSRG and review with the rest of their company.
 - Conway - ISO requests ride thru of 1 set for < .45 PU. That disagrees with even the new IEEE1547a settings. Inverters operating outside of that will run the risk of voiding their UL listing. How will the utilities handle that?
 - Next 1547 meeting is first week of November - this will be discussed at that time - **Babak to take this as an action item**
 - Special meeting to be considered for late this year
 - Cindy - is ISO's request limited to inverter-based generation? Dave- Yes

- Dave F - ISO discussions have indicated that $<.4$ could be limited to .3PU or so - whatever it reasonable for all parties - **ISO would like feedback from Distribution Companies and Inverter manufacturers**
 - ISO wants active power as low as the inverters can supply with while keeping synchronization.
 - **Babak/Mike Coddington action item: ISO / TSRG to have call with UL prior to Nov 1547 meeting**
- Dave F - DG forecast working group- NPCC is changing underfreq shedding/ridethru requirement. Now you can trip ON the curve, NPCC has determined that you must trip **below the curve**. Announcement from NPCC is forthcoming (*58.4 Hz at 100sec will likely be Borrego's new standard setting*)

8) Lunch 12PM-1PM

9) Supplemental Review Voltage/Power Quality and Safety/Reliability Screens 1PM-3:30PM

a. Utilities will be asked to talk about their existing process in addressing the safety/reliability and voltage/power quality screens. 1PM-1:45PM

Current practices, screens, tools

Ngrid - John T - Not every supplemental review is the same, Ngrid will leave out components that aren't necessary

- Looks much like the full impact study -
- Cym for load flow
- Aspen for Short Circuit
- May forego flicker if the penetration is low
- May forego field confirmation of what is in the GIS systems
- Reverse power flow screen / penetration screen
- Any substation work
- Proximity to substation to alleviate concerns
- What else is on the circuit? Other DG? If so, it probably needs to be looked at

Unitil - General comments from Paul K;

- Utility short circuit : generator ratio, stiffness factor, fault ratio test
 - No quantified ratio as is
- Subjective reviews for DG type, aggregate mix of DG
- Effective Grounding concern (winding configurations) under fault conditions
- Reliability - avoid sacrificing existing protective devices (in-line fusing)
- Tools - Millsoft Windwill (distribution circuit analysis)
- Short circuit: (Aspen Oneliner)
- A lot of the quick calcs are done in Excel spreadsheet

Babak, are there any screenings? Or is it all subjective

PK - stiffness factor, native load to generation ratio

Max continuous OV rating of arrestors (in PU), used for effective grounding tests

NSTAR - No representative

Babak to follow up with NSTAR for written response

WMECO

- Cindy: look at system modifications, field reviews
- Have not had any projects go through Supp review with these criteria, but in general:
- Circuit modeling software, for voltage checks, binarily (flicker)
- Check cutout ratings, other protection devices
- Voltage regulators without bidirectional settings
- Proximity of generation to cap banks
- Xfmr configuration in terms of effective grounding and relay functionality

Babak, sounds like most of the current practices are based on the engineers' experience / discretion

John T and Paul K - estimating the distribution upgrades for the estimate

b. Discussions with the non-utility members. 1:45PM-3:30PM

Review of Rule 21 Screens

Rule 21 screens cover:

Power Quality

- Voltage regulation
- Flicker
- Harmonics

If any of these topics cannot be resolved within 30 hours - a full impact study would be required

Next meeting - April 1, location TBA

A special meeting is likely to be scheduled to further discuss:

- **ISO ridethrough proposal and its effect on inverters UL status**
- **NSTAR responses for afternoon topics**

Mike Coddington made a motion on having Babak as the TSRG chair for 2015 and Reid Sprite second that.

Adjourn 3:00PM