Babak Enayati, NGrid
Mike Conway, Borrego
John Texeira, NGrid
John Bonazoli, Unitil
Paul Krell, Unitil
Nancy Stevens, DPU
Brian Ritzinger, DPU
Ghebre Daniel, DPU
Tim Roughan, NGrid
Mike Brigandi, Eversource (NSTAR)
Keith Jones, Eversource (NSTAR)
Jeannie Piekarz, NGrid
Mike Coddington, NREL
Reid Sprite, SourceOne
Dave Forrest, NE ISO
Justin Woodard, NGrid
Gerry Bingham, DOER
Chris Riffle, Unitil
Cindy Janke, Eversource (WMECO)

Via phone:
Erica McConnell, IREC

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

Nancy - TSRG was formed by order - should be further along by now. IOU's need to be well represented, and must make more progress than we're currently making. Semi-annual meetings are not currently sufficient - DPU suggestion to move to quarterly meetings and work to make more progress.

TSRG will move to quarterly meetings
Three more meetings this year

2) Status updates on National Grid's Solar Phase II program 9:10 AM-9:40 AM

Justin Woodard - Construction sluggish due to weather conditions. Targeting locations creates an interesting challenge in terms of permitting/siting. All sites designed with advanced inverter capability. 1/3 of sites testing azimuth adjustments for peak shaving. Some peak shaving is East-facing. Tie in cap-bank controls with Var support from PV system. Using Impact Study results to develop test plan / R&D plan for each site.

Gerry - Does this increase hosting capacity on each feeder?
Babak - Volt/VAr control may increase hosting capacity by mitigating voltage effects - mostly flicker
Gerry - % of projects that are looking at voltage effects?
Justin - every project has capability, but SIS results will dictate
Ghebe - Are all systems non-coincident with system peak?
Babak - Loading was used to pick feeders light load vs peak loaded feeders

Justin - Feeders that were closer to capacity (load capacity) - Can DG refer the investment in upgrades due to load capacity
Mike Coddington - static or dynamic setpoints for volt/var controls - any risk for hunting/ringing?
Justin - both capabilities are available, case-by-case solution for each feeder
Babak - inverters will be coordinated between different sites
Gerry - care should be taken to make sure sites can still qualify for frequency regulation
Dave F - Var support when sun is not out - Q at night? - Not yet but it's not off the table

3) Residential applications on high penetration feeders
Nancy - Unitil residential customers being affected by high penetration. Unilaterally turning down applicants is not acceptable per the Tariffs.
John B - In large part - miscommunication between Unitil and customers/DG developers
John B presents slides on current load:generation relationship on Unitil system
Smaller customers (1MW over 100 apps) have necessitated regulator controls and 3V0
For simplified apps - 15% peak load screening was waived since base Gen:load was past the 15% screen

DG vs typical customer - commercial customer: usually has to pay for line extension. For residential: based on average value on calculated basis - but shows some bias towards residential

Group study retro-active cost sharing gets very complicated - it's probably cleaner to use an average value cost basis

Mike Coddington - how other utilities handle it:

- Some utilities holding a significant reserve for residential customers
- If a system upgrade can raise the hosting capacity (3V0/regulator in this case), what financing mechanism can be used? Rate-based? On-going rate for future residential DG applicants

Paul Krell - where do you make that investment? How do you know which substations to target? Follow the development trends?
Reid - are new substations outfitted with 3V0 PTs and/or bi-directional reg controls. In the future - does this become a rate issue?
Cindy - only about 1% of customers are installing generation, so 99% can't justify being rate-based

Dave F - Is 3V0 best practice for new construction?
Gerry - Can that additional cost be recognized through Grid Mod

Nancy - Sharpening the focus, what is the role of the TSRG in solving the Unitil issue? Form a task force - schedule a sub-committee meeting for this issue.
Action item - **each utility to send a summary to Nancy on how close they are to running up against this issue**

Babak - closing comment: assumption is under min load, 1 or 2 days a year - keep in context
John B - may be more than 1 or 2 days, could be entire shoulder months

4) Substation transformer backfeed. 9:40AM-10:10AM
Further discussions with NSTAR regarding substation transformer backfeed

Keith - Policy discussion for Eversource overall is underway. New station transformers are capable (HICO with finite element analysis completed, with Beckwith control)

- (8) GE reps have transformer records for old units - GE will produce a full study for $18,000
- (6) SPX/Waukesha/ ABB / Fed Pacific - change LTC controls - Install 59F volts/Hz over-excitation relay
  - Contact dispatcher, who then can manual control LTC? or trip the DG - thru a DTT?
  - 59F relay? secondary side PTs?
  - Volts/Hz typically on generator itself
  - Overexcitation is a function of both voltage and frequency
  - Dealing with voltage rise through transformer?

-For older manufacturers, a policy decision will need to be made
5 or 6 substations in Southeast are unknown manufacturer

Babak - Timeline for policy?
Cindy - Upper engineering management is discussing over the next couple weeks
Babak - Can HICO report be shared?
Action item: Eversource to deliver HICO report

Reid, Babak - limiting nameplate rating in reverse direction can be used to avoid that 59F relay, avoid excitation
Babak, John T - multiple ways of tripping the DG for overexcitation - DTT straight to DG?

Action item: Eversource to target a policy decision by the next TSRG meeting
Document to be circulated 1 week before the next TSRG meeting for non-utility comments

Nancy - DPU emphasizes that this issue needs to be closed out by next meeting

6) ISO OP-14 applicability to projects over 5-MW 10:25AM-11AM

Text provided by Reid Sprite for further elaboration: As of May 2014, ISO-NE revised its Operating Procedure 14: Technical Requirements for Generators, Demand Resources, Asset Related Demands and Alternative Technology Regulation Resources (OP-14). The revised procedure mandates that any generation interconnected below 115 kV and is 5 MW or greater must register as a Generator (as defined in OP-14). This designation, which has historically applied to large, merchant plants on the wholesale market, creates a significant hurdle for large-scale DG projects in terms of operational requirements. Additionally, OP-14 creates a conflict with Massachusetts' net metering policy with respect to the settling of net metering credits in the ISO energy market; OP-14 requires that a Lead Market Participant register the asset as a generator, but in the case of net metering, the Lead MP is the local distribution company. At this point, both NU and National Grid have indicated that they will not be the Lead MP and not be responsible for registering the generation asset. Therefore, a net-metered generator cannot be registered and is in violation of OP-14.

Reid: Who registers as LMP? In net metering - it would be utility. Utility is pointing to customer to register
Nancy: Net metering site owners have no interest in being LMP/Designated Entity, but don't have a problem with complying with the controls

Dedicated feeders with aggregate DG over 5MW must designate an LMP/DE

Dave F: ISO won't retroactively require new metering for sites that have generation added to the dedicated feeder to exceed 5MW

OP14 requirements:
NEPOOL membership committee, fees
Real-time metering via dedicated ISO meter
Entity with 24hr contact for curtailment orders from ISO

Dave F: Next rev of OP14 will specifically address DG
A**ction item**: **Dave to share draft of OP14 rev with TSRG for comments**

7) Lunch 12PM-1PM

8) Wrap up the ride through discussions with ISO-NE 11AM-12PM
Babak slides
LVRT - ISO doesn't want to see active power loss for these scenarios
No ISO recommendations for OVRT - this is a distribution issue
81u - follow NPCC D12 curve
81o - follow IEEE1547

Dave F:
LVRT categories
Basic - ridethrough can be supported by synch generator
Advanced - ridethrough can be supported by inverter-based generation (excluding fuel cell and some wind - focused mostly on solar)
V < 45% - 'cease to energize' but to no trip offline. When voltage comes back - it immediately starts generation (inverter stop-gating)

Mike B: amendment doesn't allow for V < 45% to ridethrough longer than .1 sec - will be corrected in full IEEE1547 revision

Babak: UL Certification aspect of setting LVRT this loose - UL also working with CA SIWG - first draft out in August.
Implementation time - may not be able to go into effect tomorrow because UL procedure won't be ready til August - testing on inverters may no t be done on specific inverter units until Q4 2016

Gerry - exposure for retro-fitting existing installations?
Dave F - no anticipation that this will be retroactive

9) Question for National Grid on the possibility of revising the technical requirements thresholds to match with the DER manufacturer nameplate ratings. 1PM-1:15PM

For example require redundant relaying for DG>500kW instead of DG>=500kW.
Or, require RTU for DG>1MW non-IPP instead of DG>=1MW non-IPP.

Ngrid ESB changes are going to address this - leave more utility discretion for when a recloser is required

13) Status update on the utility specific interconnection standard 3:30PM-3:40PM

LAST MEETING

- 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). Working on combined standard for Eversource

NGRID - ESB756-C ready to be published with some changes - administrative checks remaining, **within 2 months**

- Customer secondary protection (59N relay for delta secondary)
- Strengthened 'utility discretion'
    - Volume of 500kw - 1MW applications is very high now; utility needs more discretion over requirements

Unitil - draft is complete, under review. Timeline next meeting
Action: **Unitil standard, 1 week prior to next meeting to be released for TSRG review**

NSTAR - going into internal review this Friday 4/3
Action: NSTAR to deliver by next meeting, 1 week prior to next meeting for TSRG review

WMECO - Cindy sent out draft standards for review in Early Feb (missing protection)
Action: Will try to have it by next meeting

Gerry - TSRG Common Guideline Matrix - to be updated as utility standards are revised
Action: Mike to review and update common matrix

11a) Significant vs Moderate Changes - move to utility-specific discussion?
Babak - this topic is currently **on hold**
Tentative decision was: utility discretion plus several examples
Babak - TSRG to discuss the technical aspects of these changes - does DPU want TSRG to go back after Significant/Moderate?
Nancy- Yes
Action: Significant/Moderate to go on next agenda

12) Supplemental Review Voltage/PQ and Safety/Reliability Screens 2PM-3:30PM
• Babak will present the minutes of the Sep 17, 2014 meeting on this topic.
• The team will continue the discussions.
• Input from other States?

11) Flicker limits on the distribution feeders 1:30PM-2PM
• Each utility representative will be asked to talk about the flicker limits on the distribution circuits.
• Questions from the non-utility members.
• Non- members' comments.

Babak presents slides - summary of last meeting's notes on this topic
Action: Cindy to find out what load flow program WMECO is using

Ngrid - At what penetration level do we start to see voltage issues
John T - proximity to substation matters more than penetration level

In SGIP, distance to substation is considered (impedance based)
John T - distance/impedance simply leads to stiffness test, which NSTAR is using

Stiffness factor = (PCC available fault duty) / (inverter full load amps)

- 250
- 100
- 50-100
- 20-50
- <20, Impact study required

John T

- Voltage flicker -- Full On to Full Off voltage change in Cym
  Multiple sites in Cym create difficult permutations
  If it's close - they use Cym Long Term Dynamics
- Protection Review/Grounding
- 3V0 Screen
- Islanding screen

Unitil- John B - no changes to Unitil screens
Action: Unitil to present detailed info on stiffness factor and generator ratios at next meeting

WMECO - Cindy - to provide at next meeting
Action: WMECO to present detailed info on their screening methods (or those of their subcontractors)

NSTAR - Keith

- Stiffness factor is primary
- Propensity for backflow - feeder or substation
- Stiffness of 100 or less goes to Impact Study
- Applications going to Impact Study based on existing generation

Action: NSTAR to present detailed info of screens at next meeting - proximity to sub, stiffness factor, etc

Action: Mike to send out Sandia Distributed Effect paper
Action: Babak to share EPRI flicker whitepaper

GE curve -based on 1950's or 1960's, 40W incandescent lighting
CFLs and LED lights are far less of an issue

10) IEEE 1547 revision status update 1:15PM-1:30PM
Goal - draft to be sent out at end of 2016
Babak presents slides

Categories for ridethru

1 - any gen can meet (synchronous machines)
2 - remaining DER types

IEEE1547 WG at National Grid June 1-3

Next Meeting: July 8, 2015
Location: TBD - Tentatively - Boston at DPU