Draft Workshop Notes

New York State Reliability Council (NYSRC) Distributed Energy Resources (DER)

Date: 11-7-2018, 10:00 AM-4:00 PM

Location: New York Independent System Operator (NYISO) Offices – Rensselaer, NY

Workshop Materials Link: http://www.nysrc.org/workshops.html

Commented [HS1]: Roger
I recommend the filenames shown on the NYSRC website be modified to have at least the author name in them, rather than just the agenda item number.

See above link for presentations delivered by the presenters at the workshop

Workshop Objective – To raise awareness of possible adverse reliability impacts of widespread DER penetration

Agenda

Introduction (Roger Clayton – NYSRC Executive Committee Chair)

1. Regulatory Status
    1.1. National (Dana Walters, NYISO)
    1.2. Regional (Quoc Le, NPCC)
    1.3. New York (Liz Grisaru, New York Department of Public Service)
2. DER Penetration into New York Control Area (current & future)
    2.1. Retail (net metered) (Paul Haering, Central Hudson)
    2.2. Wholesale (REV DSP) (Gia Mahmoud, National Grid)
    2.3. Wholesale (NYISO queue) (Art Maniaci, NYISO)
3. Technical Considerations
    3.1. Fundamentals (John Undrill, Consultant)
    3.2. Operations (Vijay Ganugula, Thinh Nguyen, NYISO)
    3.3. Planning (Pramila Nirbhavane, NYISO)

4 – Interconnection Technical challenge - Developer Perspective
    4.1 Developer Perspective-Technical challenges (Michael Ruppert, JEM Engineering)

5. Panel Discussion – Panelists Emilie Nelson, NYISO; Zachary Smith NYISO; Paul Haering, Central Hudson

Introductions

Roger Clayton provided a short overview of the workshop and its objective which is to raise awareness of possible adverse reliability impacts of widespread DER penetration.

Commented [HS2]: Roger, you can fill in your highlights here.

1 Regulatory Status

Presenters provided details status of various proceedings on the National level, regional level and New York State level identifying sources of information regarding DER activities related to electric storage and aggregation, netting of output. Connection rules, inverter based resources, and research from the US National Laboratories.

NPCC noted the recent analysis of impact of DER on Underfrequency Load shedding schemes concluding:

> "The impact of DER on the UFLS program was not significant in simulations that modeled the DER riding through the voltage and frequency excursions in the island of 2018 summer peak conditions."

NY DPS provided background on the REV initiative and related state targets as follows:

- 40% reduction in GHG emissions from 1990 levels
- 50% electricity supply from renewable sources by 2030
- 600 trillion Btu increase in statewide energy efficiency from 2012 levels

Energy Storage target for New York of 1.5 GW by 2025 is under consideration.
New York Sun Program offering incentives for commercial and residential solar valued at $1 Billion with a statewide goal of 3 GW by 2023.
NY DPS provides a DPS inventory website and reviewed the related processes.
NY DPS provides a website for DG/DER developers showing the varioi8su policy and other documents needed to participate in the DER development process.

Key linked documents for Workshop Part 1
FERC Order 841
NERC DER Connection Modelling and Reliability Considerations
DPS SIR Inventory Website
DPS DG/DER Website

2. DER Penetration into New York Control Area (current & future)

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Presenters provided details status of interconnection queue procedures, under federal (via the NYISO), state (via the NYS SIR) and utility specific interconnection processes.
A key observation is that there is no centrally accessible repository for comprehensive statewide information regarding the interconnection status for those DER project developers working directly with utilities. Only the NYISO and NYS SIR processes have global visibility.

Interconnection procedures are not consistent. For example:

- SIR and Utility procedures require full deliverability
- NYISO procedure is a minimum interconnect standard

Projects may be dependent on upgrades paid for by developers in other interconnection processes
No ability to share upgrade costs between Interconnection processes
In many cases the same project may be venue shopping and have applied through both NYISO and Utility Procedures.

A queue coordination group was formed to address some of these foregoing issues. But that group is not tasked with addressing operational issues such as:

– Load forecasting – SIR projects currently treated as load modifiers by TOs
– Lack of monitoring and control for many SIR projects
– Rules regarding precedence for curtailment of resources for system security

National Grid provided an overview of its DER REV demonstration projects piloting methods for managing distribution system upgrades, interconnection and operations in selected locations.

NYISO provided details on how it has evolved its DER renewable resource forecast output method for use in system operations. Details on the status of projects in the NYISO queue were provided.

3. Technical Considerations

A tutorial regarding the impact of electronically coupled distributed resources on the bulk power system was provided by John Undrill. He noted:

"Electronically coupled equipment is evolving faster than understanding"

Through his analysis John Undrill observed:

- The availability and prompt delivery of primary frequency response is critical today.
- The timing of delivery will need to be quicker as the fraction of electronically coupled equipment increases.
- The frequency sensitivity and voltage sensitivity of loads are as important as the characteristics of generation.

John Undrill concluded:

- It will be necessary for electronically coupled generation to contribute primary frequency response.
- The effects on frequency control of replacing rotating generation with electronically coupled DER are system wide.
- The effects on voltage control of replacing direct connected equipment with electronically coupled equipment may be mainly local (but not always so).
- Proper use of primary response of electronically coupled generation can be expected to improve quality of frequency and voltage control.

NYISO reviewed the status for FERC Orders 827, 828, 842 and provided an assessment of the impact of DER on NYISO Operations. NYISO provided details on the processes used for managing wholesale DER and non-wholesale DER. The NYISO is conducting a pilot program and has a DER roadmap to address:

- Alignment of compensation with system requirements
- Align with the REV goals
- Enhance measurement and verification.

Commented [HS4]: I do not think we need any detail here. There was not anything that was actionable for reliability in this part 3.2A .

NYIOS has a DER Pilot program which received 10 proposals for more than 12MW from which 3 were selected for pilot implementation.

NYISO continues to monitor and evaluate if any additional changes are required to reliably integrate DER along the following topical areas, many of which have reliability implications:

- Regulation requirements
- Operating reserve requirements
- Solar PV forecasting
- Load forecasting
- Behind-the-meter (non-wholesale) DER
- Price responsive load
- Geographical granularity

- Transmission security requirements
- Voltage support requirements
- Black start requirements
- Future market design efforts to incent resource flexibility and dispatchability

Key linked documents for Workshop Part 2

NYISO DER Roadmap

4. – Interconnection Technical challenge - Developer Perspective

Developer Mike Ruppert identified three technical challenges in Over voltage (Ground Fault Overvoltage, Load Rejection Overvoltage, 3Vo[1]), Flicker, Monitoring & Control. He identified historical solutions, relevant standards and current standard development and research work-related to these issues. He further noted that inverters have local protection functions and that all that is needed is guidance as to what limits should be applied. The 3Vo issue can be costly to resolve due to the need for high side instrument transformers and 59N relays.

Flicker issues are not identified in the CESIR study process and can be and after the fact, costly issue to resolve.

Monitoring & control with on-off capability provided to the utility triggers telecommunications costs. This is embedded in the question of whether control system rules to provide acceptable local control can be created

[1] 3Vo-– 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.

5. Panel Discussion – Panelists Emilie Nelson, NYISO; Zachary Smith NYISO; Paul Haering, Central Hudson

During the course of the workshop, topics for the panel discussion were accumulated.

Topic 1 – Use of load modifiers to model DER vs. the need for detailed DER models and detailed simulation.
It was the conclusion of all panelists and the workshop attendees that this historical approach of using load modifies is no longer viable. As DER penetrations increase, direct modelling of operational behavior of DER is essential to the reliable operation of the power system. Therefore managing queues, obtaining a complete understanding of projects that will go through to completion is essential. Modeling the performance of equipment is essential.

Topic 2 – Knowing the schedule for DER project implementation
This was important for forecasting resource adequacy of the system. Similar to Topic 1 the panelists agree that consolidating the queues and understanding the types of resources slated for completion is essential for reliable operation of the power system. The question is where to do it. The ITWG is one option.

Topic 3- Full visibility of all DER generator queues
The fact that utilities each have their own queues for projects, some of which may include duplicate projects with those in the NYISO and NYS SIR queues creates uncertainty for forecasting load, generation and therefore future reliability performance of the power system. It was the consensus of the panelists and workshop attendees that this is an important issue to be resolved in the near term.

Topic 4 – DER owner contract certainty needs
DER developers need better understanding of their interconnection cost earlier in the process. This is a contributing factor to uncertainty of project implementation. It drives behavior, such as simultaneous participation in multiple queues.

Topic 5-Why can't DER take local control action
There was consensus that it may be possible to allow DER to exercise local control action to reduce telecommunication needs (and costs). Frequency triggered local action is perhaps possible. But local voltage control action (VAR dispatch) requires operator coordination with the connecting utility or the NYISO.

Topic 6 – conflict in Objectives of DER dispatch
The panel identified a natural conflict between dispatch of DER for power system reliability (e.g. the head room issue) and DER self-dispatch for maximizing revenue to the DER business owner. No consensus on this issue was reached among the attendees.

Topic 7-Gap in IEEE 1547

The panelists and attendees noted a gap in IEEE 1547 related to the allowance of aggregation of DER projects. Modeling and actual operational performance would have to be guaranteed by someone to assure reliable operation of the power system. There was consensus that DER project owners and utility system operators both have goal congruency in favor of keep the power system reliably functional.

Conclusion

There was consensus that there are several areas of cooperation and additional work needed to preserve the reliable operation of the power system and address the identified reliability risk issues. The status queue in terms of interconnection queue management lack of post commissioning operational coordination is likely to lead to reliability issues at high penetrations of DER being driven by public policy.

Commented [HS5]: This is my impression and what my take away is.

What we did not do is set out some action items.