JOINT UTILITIES

Interconnection Technical Working Group

June 21st, 2016

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Agenda

- ❑ Background
- ❑ Monitoring & Control
- ❑ Cybersecurity
- ❑ Gap analysis and discussion
- ❑ Update on JU experiences with the new SIR

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Monitoring & Control: Background

- As increasing amounts of solar PV are connected to the grid, there becomes a need to have a more precise understanding of their impacts for operational and system planning purposes.
- Standards and requirements for monitoring data vary between utilities based on system size and communication protocol, due to inherent differences in their system configurations and level of PV penetration.
- Monitoring and control of distributed generation during system outages and planned maintenance can help to ensure that line sections are appropriately de-energized to ensure worker and crew safety.
- "The DSP distribution grid operator will need to have the ability to monitor and measure key aspects of system operation including…DER status including voltage, current, and generation on a near real-time basis for DERs of a capacity higher than some nominal amount or that are in locations where likely to impact distribution grid performance criteria." - PSC chair Audrey Zibelman

Source: Audrey Zibelman, "Reving Up The Energy Vision in New York", IEEE Power and energy magazine -Volume 14 – May/June 2016 issue – page 23

Monitoring & Control: JU Approach

- PV **1MW or above** will require remote monitoring and control for:
  - Operational requirements during abnormal system configurations such as feeder reconfiguration during emergency conditions
  - Maintaining system stability, voltage and flicker within standard ranges
  - Further studies to monitor PV output in order to facilitate greater penetration of PV
- PV **less than 1MW** may require monitoring and control for:
  - Feeders whose minimum loads are abnormally low
  - Similar reasons to above
    - The JU Grid Operations stakeholder engagement group meetings on Monitoring and Control will kick-off in July, and this will be a topic of discussion
- Data collection intervals for the remote monitoring devices vary by utility
- During an abnormal system condition the utility reserves the right to disconnect PV
- Utilities are currently evaluating future PV control approaches

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Cyber-Security: Background

- **Current Issues with Cyber-Security:**
  - Cybersecurity standards and protocols must be maintained as data monitoring needs for PV systems expands.
  - Direct communication between PV inverters and SCADA raises potential cyber-security concerns over vulnerability and system integrity.
- **Current Approach by JU:**
  - JU currently monitor and control through a separate RTU/recloser.
  - JU companies are currently exploring cybersecurity options from a very high level.
  - Current cybersecurity standards are general frameworks that would be applied for all the information exchanges occurring in the grid.
  - JU uses ISO/IEC 27002 as a base. ISO 27002 is an internationally recognized standard designed for organizations to use as a reference for implementing and managing information security controls.

Control & Cyber-Security: Gaps for Future Requirements

- Additional cybersecurity efforts are required to pursue direct monitoring and control of inverters.
- Roadmap of functional requirements must be developed
  - The JU Grid Operations stakeholder engagement group meetings on Monitoring and Control will kick-off in July
- Frequency and latency of data will become more critical as the penetration of solar PV increases.
- Standardization of inverter data accuracy and communication protocols will be necessary to meet future cybersecurity requirements.
- Smart inverter installation standards may avoid costly retrofits to maintain safety and reliability of the utility system, avoid utility system upgrades associated with solar PV, and prepare for REV market participation.
  - Germany has spent $300 million in retrofits for 315,000 inverters.
- As solar PV penetration increases, additional coordination will be required with the NYISO.

Source: EPRI: Germany faces $20 billion in inverter upgrades – Smart Grid Today 12.23.2014

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Questions/Discussion with Developers

- What size systems do you currently remotely monitor?
- What is the frequency of polling, latency and communication medium for inverter data currently?
- What concerns do developers have with utilities directly monitoring and/or controlling the inverters?
- Do you currently transfer data to any utilities? If yes, please discuss how the data is transferred, what communication medium and protocol is used, and how it is integrated with the utility system.
- How do you maintain confidentiality of the data?
- What alternatives to telemetry are available for smaller scale resources (and what threshold is considered smaller scale)?
- Does the potential elimination of the electronic recloser requirement outweigh those concerns?

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JU's Experience with the New SIR Implementation

April 29th – May 30th Only

JU Companies	Total Number of All Interconnection Applications	Total kW of All Interconnection Applications	Number of Large Project Applications (>300kW)	Number of pre-application reports requested for large projects (> 300kW)	Ratio of Large Project Applications (>300kW) to Total Applications - Number	Ratio of Large Project Applications (>300kW) to Total Applications - kW
Central Hudson Gas & Electric	166	8,160	4	2	2%	85%
Consolidated Edison	553	8,801	3	3	1%	37%
National Grid	459	107,662	55	0	12%	96%
Orange and Rockland Utilities, Inc	144	9,373	4	7	3%	85%
AVANGRID	227	233,323	107	25	47%	99%
Total	**1,549**	**367,318**	**173**	**37**	**13%**	**81%**

- Some pre-application reports were withdrawn once developers were made aware of the fee.
- AVANGRID is the only utility that has experienced pre-application reports being converted into a full application within 15 business days.
- Joint Utilities have received minimal pre-application report requests prior to a full application submittal by developers.