

Reforming the Energy Vision

Demonstration Project Q4 2016 Report

Flexible Interconnect Capacity Solution



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1.0 Executive Summary

New York State Electric & Gas (“NYSEG” or “the Company”) submits this quarterly report on the progress of the Flexible Interconnect Capacity Solutions (FICS) demonstration project. The FICS demonstration project tests a new model for interconnecting distributed energy resources (DERs) to the distribution grid using Active Network Management (ANM) rather than firm capacity. ANM technology allows the utility to manage DER within grid constraints (e.g., voltage, overloads, etc.) using real-time sensing and controls, avoiding more expensive upgrades. This model provides the potential to save on interconnection costs with minimal curtailment on DER, aiding economic viability. In addition, ANM provides the potential for greater penetration of DER.

Two proposed DERs in the NYSEG service territory have been identified as the demonstration sites for the initial FICS scope. Using ANM, a portion of the interconnection costs for each DER will be deferred by managing network constraints identified in NYSEG’s interconnection analysis. The DERs include a 2 MW solar photovoltaic (PV) farm and a 450 kW farm waste generator.

During Q4 2016, a change order was executed and work commenced to review additional interconnection projects’ applicability of ANM. In addition, a change order deliverable is to document a recommended process for incorporating FICS into NYSEG’s business-as-usual interconnection process flows.

Also during Q4 2016, NYSEG / AVANGRID, Smarter Grid Solutions (SGS), Eaton, and Clean Power Research (CPR) developed a joint NYSERDA PON 3977 proposal for an integrated DER interconnection solution proposal.

Plans for 1Q 2107 include:

- Install and configure servers, panels, and firewall for DER #1 at NYSEG
- Interconnection agreement for DER #2
- Further evaluation of additional FICS candidate projects
- File NYSERDA PON proposal

The following report provides a progress update on the tasks, milestones, checkpoints, and lessons learned to date.

2.0 Demonstration Highlights since the Previous Quarter

2.1 Activity Overview

Activity and results during Q4 2016 included:

- Shipment of DER #1 servers and production panels to NYSEG
- Order of remaining, power supplies, firewalls, and jump server for DER #1 integration at NYSEG
- Update of DER #1 test procedures for SAT
- Screening additional interconnection requests for applicability of ANM.
- Multiple demonstrations of CPR's PowerClerk for interconnection application administration
- Configuration of PowerClerk sandbox for testing and evaluation at NYSEG

2.1.1 FICS DER #1

On June 28, 2016 the 2 MW PV farm developer executed a FICS agreement with NYSEG. On July 21, 2016 NYSEG was informed that the 2 MW PV farm project was on hold until March 2017 pending a grasslands bird study. As the agreement has been executed for this project, NYSEG has continued to progress the project factory acceptance test (FAT) and a modified site acceptance test (SAT) in preparation for resumed field activities.

Progress during 4Q 2016 on DER #1 includes:

- Shipment of DER #1 servers and production panels to NYSEG
- Order of remaining, power supplies, firewalls, and jump server for DER #1 integration at NYSEG
- Update of DER #1 test procedures for SAT

2.1.2 FICS DER #2

On November 29, 2016 NYSEG received word from the DER #2 developer that this project would proceed with a planned start of construction in Spring 2017 and operation commencing in Fall 2017. To date, interconnection discussions have not resumed on this project. As the customer has not executed the agreement on this project, NYSEG has deferred construction, configuration, and testing the ANM platform for this project pending execution of the FICS agreement.

2.1.3 Screening for Additional Projects

On October 26, 2016 NYSEG executed a change order with Smarter Grid Solutions (SGS) to provide expertise in screening and planning of DER projects for flexible interconnection. Priorities during this activity will include:

- Evaluate and prioritize additional potential FICS DER projects;
- Develop a strategy for a long-term FICS process;
- Create a strategy for long-term FICS process automation;
- Document and disseminate flexible interconnection screening techniques and strategies to help with the DER interconnection demand, including presentations and workshops as necessary; and
- Utilize findings for a possible NYSERDA funding proposal.

2.1.4 Integrated Solution Proposal

NYSEG / AVANGRID is participating in a NYSERDA PON3397 proposal to integrate interconnection functionality between Smarter Grid Solutions, Clean Power Research, and CYME. If the proposal is selected we will embark on a proof-of-concept project to integrate SGS, CYME, and PowerClerk to facilitate the interconnection process for NYSEG.

2.2 Metrics and Checkpoints

Table 1: Checkpoints

Check Point	Description
Selection of the FICS Option	<p>Measure: The number and percentage of FICS-qualified projects that elect the FICS option expressed as both the number of projects and MWs.</p> <p>When: Execution of interconnection contracts with participating developers is targeted for Q2 2016, therefore progress updates will be provided in the Q4 2015 and Q1 2016 reports.</p> <p>How: FICS qualification is based on preliminary screening of DER interconnection applications, where ANM can enable incremental DER generation capacity that would otherwise require network reinforcement to accommodate the full proposed capacity.</p> <p>Expected Target: At least two DER developers in the NYSEG territory will elect the FICS option during the demonstration term.</p> <p>Strategy if Results are Below Expectation: If less than two developers provide a show of interest in the FICS option during initial outreach to be conducted in Q4 2015, NYSEG will review options for next steps in site selection with</p>

Check Point	Description
	<p>Staff.</p> <p>Results: One FICS DER #1 has elected the FICS option and FICS DER #2 plans to pursue the option. Additional projects are being screened.</p>
Interconnection Cost	<p>Measure: The total utility infrastructure cost per MW interconnected and the avoided cost of network reinforcement that would otherwise be required. The original project metric proposed included Interconnection Timeframe, but comparing the interconnection period during the demonstration term to that of a firm interconnection may be misleading since the timeline to deliver the ANM system does not accurately represent the timing of deploying ANM at additional DERs following the demonstration term.</p> <p>When: ANM system go live is targeted for Q4 2016, therefore a review of the final interconnection cost for participating sites will be included in the Q4 2016 report.</p> <p>How: The total cost per MW interconnected will be available following completion of the interconnection. The avoided cost of network reinforcement will be determined in the CESIR process based on an estimate developed by NYSEG.</p> <p>Expected Target: ANM projects in the U.K. have reduced interconnection costs by up to 90 percent. Interconnection costs for current and historical DER projects governed by the New York Standardized Interconnection Requirements vary by location depending on a number of factors, including size of the project, existing network topology, and required network reinforcement. Therefore, it is challenging to project expected cost avoided through FICS at this time. NYSEG will propose reasonable comparative assumptions for Staff review.</p> <p>Strategy if Results are Below Expectation: Developers will likely not participate in FICS unless there is a cost savings in completing their interconnection. NYSEG will identify scenarios/opportunities where FICS could provide a more economical solution.</p> <p>Results: FICS DER #1 results in an estimated deferral of 57% of the interconnection costs. FICS DER #2 results in an estimated 98% reduction in interconnection costs compared to an interconnection for firm capacity.</p>
Additional MW Exported and Share of Generation Curtailed	<p>Measure: The additional generation exported by participating DER installations (versus projected generation of the baseline firm interconnection capacity offered) and the share of generation curtailed expressed as a comparison between actual curtailment and forecasted curtailment.</p> <p>Timeline: ANM system go live is targeted for Q4 2016, therefore generation and operational curtailment levels will be included in the Q4 2016 report.</p> <p>How: Additional DER generation exported will be measured starting during operations in Q4 2016 and compared to participating developers' generation projections. The share of generation curtailed due to constraint management will be measured during operations in Q4 2016 and compared to Smarter Grid</p>

Check Point	Description
	<p>Solutions’ forecasted curtailment (as an annualized percentage). Curtailment due to communications failures and network outages will be highlighted and differentiated from curtailment due to constraint management.</p> <p>Expected Target: Additional DER generation exported will vary by project and site. The average DER project curtailment has been approximately five percent annually in the U.K.</p> <p>Strategy if Results are Below Expectation: If actual curtailment in Q4 2016 exceeds the forecasted level on an annualized basis, NYSEG and Smarter Grid Solutions will reexamine modeling results to refine the curtailment forecast.</p> <p>Results: FICS DER #1 is a 2 MW rated photovoltaic generator. FICS DER #2 is a 450 kW farm waste generator. These sites are not yet operational.</p>
<p>Total FICS Utility Revenue</p>	<p>Measure: Utility revenues from platform-as-a service fees in the aggregate and on a per-MW basis for participating projects.</p> <p>When: Execution of FICS-based interconnection contracts with participating developers is targeted for Q2 2016, therefore progress updates will be provided in the Q4 2015 and Q1 2016 reports.</p> <p>How: Platform-as-a-service fee included in interconnection contracts executed with participating developers, which may be based on a shared risk structure.</p> <p>Expected Target: The area of commercials development for the platform-as-a-service business model is a primary focus for testing. NYSEG is aiming to obtain robust lessons learned on effective development of revenue opportunities from FICS. In the July 1 FICS proposal filing, NYSEG examined various fee options that would cover the revenue requirements of adopting FICS capabilities, with analysis indicating that a annual fee charged to each DER would cover the revenue requirements of ANM at scale with DERs contracted.</p> <p>Strategy if Results are Below Expectation: Capture robust lessons learned on developing revenue opportunities from FICS should be the primary indicator of successful testing for the project. NYSEG will identify barriers preventing revenue generation and assess potential alternative revenue models.</p> <p>Results: The FICS DER #1 contract did not include platform service fees, but used a cost deferral calculation instead. The draft FICS DER #2 agreement options include a platform fee of \$23,000 or \$12,000, depending upon the option chosen.</p>
<p>Customer Satisfaction</p>	<p>Measure: Key drivers and obstacles of FICS adoption among targeted DER developers.</p> <p>Timeline: Execution of FICS-based interconnection contracts with participating developers is targeted for Q2 2016, therefore surveying results of targeted developers that decided not to go forward with FICS will be presented in the Q2 2016 report and surveying results of participating projects will be presented in the Q4 2016 report.</p>

Check Point	Description
	<p>How: Post-interconnection survey of all targeted developers, including those that decided not to go forward.</p> <p>Expected Target: NYSEG is aiming to obtain robust lessons learned from non-participating developers to inform future FICS site selection and outreach efforts and to gather lessons learned from participating developers to inform how ongoing ANM operations can meet developers’ needs.</p> <p>Strategy if Results are Below Expectation: NYSEG will evaluate how to improve engagement efforts to increase future participation in FICS and meet participating developers’ needs.</p> <p>Results: Section 4.0 of this report discusses observations from discussions with targeted developers.</p>
External Engagement	<p>Measure: Lessons learned and opportunities for scaling FICS based on feedback from external, non-developer stakeholders with a role in DER development and interconnection in New York.</p> <p>Timeline: NYSEG will provide updates in each quarterly report on engagement outcomes with the Joint Utilities, NYSERDA, etc.</p> <p>How: Description of stakeholder engagement lessons learned.</p> <p>Expected Target: NYSEG will engage NYSERDA with the aim to gauge the statewide baseline interconnection record for funded DERs, to effectively develop the platform-as-a-service business model, and identify opportunities for other ANM applications to increase DER interconnections in New York. NYSEG will engage the Joint Utilities to review current interconnection challenges and alternative interconnection solutions being developed in New York.</p> <p>Strategy if Results are Below Expectation: NYSEG will utilize interconnection records as its base data set for reviewing and comparing interconnection outcomes and challenges.</p> <p>Results: We continue to gain insights from the FICS demonstration project and we are investigating tools and options to facilitate FICS as a business-as-usual process. We are evaluating Clean Power Research’s PowerClerk tool for interconnection administration and we are a partner to a NYSERDA PON proposal to integrate FICS, PowerClerk, and CYME.</p>

3.0 Work Plan

3.1 Budget Review

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3.2 Updated Work Plan

Table 2: Work Plan

Activity	Q1 2017	Q2 2017	Q3 2017	Q4 2017
Site Acceptance Test (Site 1)				
Construction (Site 1)				
Operation (Site 1)				
Agreement Execution (Site 2)				
Acceptance Tests (Site 2) ¹				
Construction (Site 2) ²				
Operation (Site 2) ³				

3.3 Next Quarter Planned Activities

In Q1 2017, the project team aims to complete the following tasks:

- Install and configure DER #1 servers, panels, and firewalls at NYSEG
- Commission DER #1 system at NYSEG
- Perform DER #1 Site Acceptance Tests (SAT) and integration testing with NYSEG meters and controllers. Field devices will be commissioned later when the site is ready.
- Screen additional interconnection requests for applicability of ANM
- Execute FICS agreement for DER #2
- Start implementation of integrated interconnections solution if NYSERDA proposal is accepted

¹ Assumes agreement execution 1Q2017

² Assumes agreement execution 1Q2017

³ Assumes agreement execution 1Q2017

4.0 Conclusion

To date, over seven hundred interconnection applications have been evaluated to arrive at the candidate projects described above. As expected, many of the applications do not have grid constraints and many others have steady-state or flicker constraints that would not be resolved by ANM. However, this review of applications has resulted in the additional observations noted below.

- The portability of solar PV development poses challenges. Developers can choose alternative sites where firm capacity is available.
- Additional FICS candidate selection is inhibited by the large number of queued projects. Feeder DG capacity is already consumed by projects in queue, although some may ultimately be cancelled.

Applications are concentrated among a few developers with substantial PV capacity already cleared for interconnection.