
Orange and Rockland Utilities, Inc.
Optimal Export REV Demonstration
Q3 - 2019 Report

Reporting Period: July 1, 2019 – September 30, 2019

October 30, 2019

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1.0 Executive Summary

This report covers Orange and Rockland Utilities, Inc.'s ("O&R" or the "Company") Reforming the Energy Vision ("REV") Optimal Export demonstration project ("Project") activities and costs for the third reporting period of 2019, *i.e.*, July 1, 2019 - September 30, 2019 (Q3-2019).

The Project proposes to use advanced control and inverter functionality, along with supporting technologies, to optimize the export of photovoltaic ("PV") generation to the Company's distribution system ("System"). By employing a combination of new protection methods and advanced technologies to increase hosting capacity on circuits while maximizing the size and export capability of DERs, the Company anticipates that the Project will result in new business models providing customers with alternatives to incurring significant system upgrade costs to interconnect to the Company's distribution system.

1.1 Background

Large DER applications, *i.e.*, 0.75MW to 5 MW in size, may face significant upgrade costs to interconnect to the utility's distribution system. This Project will demonstrate whether advanced inverter functionality and third-party control hardware and software technology will maximize the proposed DER project's ability to export without negatively impacting reliability, power quality, and/or distribution system performance.

For the projects that are smaller in size, *i.e.*, between 0.050MW and 0.75MW, the Company will explore if third-party equipment can be integrated with the Company's distribution system to provide monitoring and control capability to the Company's control center resulting in interconnection cost savings for smaller-sized projects.

Through this Project, the Company will validate the use of these new technologies on the O&R distribution system and will also gain valuable insight into the value proposition and developer willingness to employ such technologies as an alternative to traditional interconnection arrangements.

The Company commenced this Project in June 2018 and filed an Implementation Plan in August 2018; it will continue for approximately three years.

The test population is broken out into two classes:

- 1) Large Projects, which are 0.75 MW to 5 MW in size; and
- 2) Mid-Sized Projects, which are 0.050 MW up to 0.75 MW in size.

During this reporting period, the Company continued its outreach efforts to the eligible developers that have been identified as potential candidates for this Project in Q2 - 2019.

2.0 Demonstration Highlights

For Large Projects, the Company has partnered with Smarter Grid Solutions, Inc. (“SGS”) to test the ability to deploy advanced interconnection technology to optimize PV export, and to reduce interconnection costs by avoiding otherwise necessary system upgrades. SGS uses an active network management (“ANM”) element to optimize and curtail when required by the System PV export. The element also provides an alternative to traditional system upgrades and protection costs to interconnect to the Company’s distribution system. The Company is looking to apply ANM element technology to 3-5 projects which would normally be required to pay for a system upgrade or reduce the size of the project to interconnect under a traditional, firm interconnection agreement.

For Mid-Sized Projects, the Company is exploring different options for low-cost monitoring and control equipment and its functionality. The Company is considering various technologies to understand how they can be integrated into the Company’s distribution system, while maintaining a low level of cost for developers and a high level of reliability and safety for the Company and its customers. The Company will partner with third-party technology providers to identify and test potential solutions to reduce interconnection costs by avoiding the installation of a recloser at the point of interconnection (“POI”).

The Company continued discussions with other New York State utilities surrounding smart inverter technologies. Through the Joint Utilities Smart Inverter working group, the Company is gaining valuable experience on the capabilities and functionality of smart inverters. The Company anticipates that smart inverters may be able to provide a cheaper means of monitoring and control to the Company, compared to other third-party technologies. The Company is also working with the New York State Energy Research & Development Authority (“NYSERDA”) to understand how smart inverters can be successfully implemented and integrated with the Company’s distribution system.

2.1 Major Tasks Completed

The Project is being conducted in the following three phases:

- Phase 1 – Analysis and Engagement;
- Phase 2 – Deployment; and
- Phase 3 - Evaluation and Scaling.

In Q3 - 2019, the Project team continued Phase 1 Analysis activities to identify Large Project candidates and began customer outreach to the identified developers. O&R's Distributed Generation ("DG") team continues to review with SGS additional completed Coordinated Electric System Interconnection Review ("CESIR") studies, to identify additional projects which may benefit from leveraging SGS' advanced control and inverter technology, to optimize PV export. The Company identified four customers and is in discussion with three of them. The Company began the customer outreach for the fourth identified customer and plans to continue these efforts in Q4-2019. The Company plans to move into Phase 2, the deployment portion of the project, once prospective customers agree to move forward and agree to be part of the demonstration project. The Company anticipates this Project to move into Phase 2 in Q1- 2020.

Also, in Q3 - 2019, O&R continued to look for candidates for the mid-sized projects. The Company worked closely with NYSERDA and the Joint Utilities Smart inverter working group to understand smart inverter functionality and how it may affect the hypothesis for the mid-sized project bucket. With the evolution of smart inverter functionality, along with declining prices, the Company anticipates that smart inverters may play a major role in providing low-cost monitoring and control to utilities. The Company is working to understand whether smart inverters can be integrated with the Company's distribution system to perform the functions to be tested as part of the mid-sized project.

The section below highlights this Project's milestones and activities completed in Q3 - 2019.

2.1.1 Large Projects

- The Company and SGS had discussions with three candidates identified from O&R's interconnection queue in Q3-2019. During these discussions, SGS explained the opportunity and technology to the developers to gain interest. All

three developers were interested in moving forward in the process and exploring how the ANM element could benefit their projects. Outreach efforts were also initiated to a fourth developer. The Company is currently awaiting the reply from this fourth developer.

- The Company completed CESIR reviews for all potential projects.
- The Company conducted additional interconnection queue reviews to identify newly completed CESIR studies that may qualify.

2.1.2 Mid-Size Projects

- The Company continued to search their interconnection queue to identify a developer who would be willing to participate for the Mid-Sized Project. So far, the Company has still not been able to locate a customer that fits the requirements for participation as a Mid-Sized Project.
- The Company worked with its Joint Utilities peers as part of the Joint Utilities Smart Inverter stakeholder forum to further understand smart inverter functionalities and how smart inverters can be integrated with the Company's distribution system.

2.2 Activities Overview

2.2.1 Large Projects:

The Company conferred with SGS to identify metrics that could be used to identify candidates that would benefit from this Project. These metrics include voltage flicker, overvoltage and thermal violation. The Company worked internally with its Distributed Energy Resources ("DER") interconnection team and SGS to analyze various projects from the Company's DER interconnection queue that failed the CESIR process due to the criteria/metric mentioned above. A change in the New York State Interconnection Requirements ("NYSIR") provided additional guidance to an updated methodology to calculate voltage flicker. Due to the changes in the flicker calculations, the Company re-defined its evaluation process resulting in a broader pool of candidates.

The Company and SGS identified four candidates that could benefit from the ANM element and meet the new screening criteria as part of the NYSIR update. The Company and SGS contacted three of the four developers and received positive feedback and interest in exploring this interconnection option.

In addition, the Company began working with SGS on the customer outreach efforts. This began with the Company initiating e-mail communication to identified developers. After that SGS followed-up with outreach calls to provide additional detail about this Project.

The Company continues to work with SGS to identify additional eligible candidates in O&R's interconnection queue. The Company completed evaluation of the existing interconnection queue and is reviewing newly completed CESIR studies as they become available.

The Company continued to engage its internal Systems Engineering team to minimize overlap between this Project and future ADMS functionality. The Company's ADMS platform will act as a central dispatch system that will give the operators monitoring and control capability of the local DER assets. This will further help the operators to leverage the local DERs for system benefits and also optimize the DERs for participating in multiple markets. The ANM element will provide monitoring and control capability to the Company's Operations Centre via the ADMS platform once the platform is implemented.

The Company anticipates that smart inverters may be able to provide a cheaper means of monitoring and control to the Company, compared to third-party equipment that may have issues with integrating with the Company's system. The Company is working with NYSERDA to understand how smart inverters can be successfully implemented and integrated with the Company's distribution system. The Company is in early stages of this Project with NYSERDA. The Company continued discussions with internal groups into how the hypothesis of this Project would affect the NYSERDA smart inverter initiative. It is important for other internal stakeholders to understand the hypothesis of this Project, so that efforts are not duplicated within the Company.

2.2.2 Mid-Sized Projects:

The Company continued its efforts to identify mid-sized vendors that will be a good fit for the demonstration hypothesis and to collaborate with these vendors to understand how smart inverter functionality may affect the mid-sized projects. For the mid- to small-sized projects, the Company will decide if smart inverter functionality will make the hypothesis of the demonstration project obsolete and if continuing the Mid-Size Project is feasible. Developers may opt to procure a smart inverter to provide monitoring and control to the Company rather than utilizing third-party owned

equipment that is difficult to implement and integrate with the Company’s distribution system.

2.3 Next Quarter Forecast

O&R plans to continue outreach efforts with the identified developers. During the next quarter, the Project team will continue discussions with the prospective pool of developers. The Project team plans to begin work on the next milestone of detailed technical analysis for priority developments. This would also include working on a curtailment assessment for the developers. O&R and SGS will continue to review new projects in the interconnection queue in order to identify a fifth vendor.

2.3.1 Checkpoints/Milestone Progress

Checkpoint/Milestone	Timing	Status
1.1 Develop Implementation Plan & Execute Vendor Contract	Phase 1	  
1.2 Market Engagement and Initial Interconnection Assessment	Phase 1	  
1.3 Technical Assessment of Interconnection Applications	Phase 1	  
1.4 Customer Outreach for High Priority Developments	Phase 1	  
1.5 Detailed Technical Analysis of Priority Developments	Phase 1	  
 Complete  In Progress  Delayed		

3.0 Work Plan & Budget Review

3.1 Phase Review

The Project team has continued progress on Phase 1 – Analysis and Engagement.

In Q3-2019, the majority of the Project team’s efforts were spent on Milestone 1.3 Technical Assessment of Interconnection Applications as well as Milestone 1.4 – Customer Outreach for High-Priority Developments. The Project team and SGS worked on the outreach efforts and continued to evaluate potential candidates in the interconnection queue. The Project team will continue to move forward with this phase and plans to move on to the Phase 2 by the beginning of next year.

3.2 Work Plan

Work plan for 2018-2020

ID	Task	Lead	2018												2019												2020											
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Phase 1 - Analysis and Engagement																																						
1.1	Develop Implementation Plan & Execute Vendor Contract	O&R	█																																			
1.2	Market Engagement and Initial Interconnection Assessment	O&R													█																							
1.3	Technical Assessment of Interconnection Applications	SGS													█												█											
1.4	Customer Outreach for High-priority Developments	O&R													█												█											
1.5	Detailed Technical Analysis of Priority Developments	SGS													█												█											
1.6	Financial Analysis of Priority Developments	SGS													█												█											
Phase 2 - Deployment																																						
2.1	Execute Interconnection Agreements	O&R																									█											
2.2	Factory Acceptance Testing of ANM Elements	SGS																									█											
2.3	Site Acceptance Testing and Deployment of ANM Elements	SGS																									█											
2.4	Commissioning of DER Site(s)	O&R																									█											
Phase 3 - Evaluation and Scaling																																						
3.1	Evaluation of Deployments	O&R																									█											
3.2	Market Dissemination	O&R																									█											
3.3	Identify Additional Deployments	O&R																									█											
3.4	Integration of Interconnection Screens	O&R																									█											

3.4 Budget Review

The Company spent \$121,365.64 on this Project during the Q3-2019 reporting period. To date, the Company has spent a total of \$391,846.64 on this Project. This Project's costs are associated with contractor labor, consulting fees, vendor contract milestone payments, and project management. The charges include Large and Mid-Sized Project costs, internal design and management, and contingency. The total Project cost estimate is \$1.3 million and has not changed since the last report.

Programs / Projects	July-19	Aug-19	Sep-19	TOTAL
Implementation Vendor	\$28,250.00	\$57,850.00	\$32,594.00	\$118,694.00
Labor (\$)	\$840.80	\$990.01	\$840.83	\$2,671.64
TOTAL (\$) spent for 2019	\$29,090.80	\$58,840.01	\$33,434.83	\$121,365.64

4.0 Conclusion

4.1 Lessons Learned

- Participant identification:** The Company conferred with SGS to identify metrics that could be used to identify participants that would benefit from the Project. These metrics include voltage flicker, overvoltage and thermal violation. The Company worked internally with its DER interconnection team and SGS to analyze various projects from the Company's DER interconnection queue that had failed the CESIR process due to the criteria/metrics above. However, a change in the NYSIR resulted in an updated methodology to calculate voltage flicker during the screening process. Due to changes in the flicker calculations the Company re-defined its screening process for project participants. The biggest lesson learned for the team was to stay flexible and re-adjust the screening criteria as it evolves. The Project team had to engage internal stakeholders to understand the new guidance from NYSIR and update their evaluation process for participant identification. The Project team had to change their strategy

mid-stream to increase the pool of candidates that may be eligible to participate in this Project.

- **Customer outreach:** The Company’s screening process resulted in the identification of four potential candidates requiring that a fifth developer would have to come from a new project as applications made their way through the CESIR process. As a result, the Company worked with its partner, SGS, to develop a customer outreach process to identify potential participants. This demonstrated the importance that customer outreach has for new initiatives and the role that utilities can play in identifying customers that could potentially benefit from new technologies.
- **Integration of new technologies:** As part of the Mid-Sized Project, the Company sought to integrate third-party equipment with the Company’s distribution and Supervisory Control and Data Acquisition (“SCADA”) systems. Through the solicitation and evaluation of potential technology providers, the Company learned that its SCADA system was not able to accommodate one of the proposed new technologies due to the technology’s bandwidth requirements. Understanding new technology needs and potential limitations as well as constraints on the Company’s distribution and SCADA systems will be critical for both integrating new technologies and also designing a future system in order to facilitate integration of new potentially beneficial grid technologies.
- **Evolution of alternative technologies:** As part of this Project, the Company sought to understand the range of new technologies available for monitoring and control of mid- to low-sized PV projects. However, with the evolution of smart inverter functionality and declining smart inverter prices, the Company determined that smart inverters will play a major role in providing low-cost monitoring and control to utilities and may replace the other technologies under consideration. The evolution of smart inverters and their impact on the technologies being evaluated as part of the Mid-Sized Project will require the Company to reassess the need to demonstrate alternative low-cost technologies for mid- to low-sized projects.

4.2 Recommendations

For the Mid-Sized Project category, the Company plans to review all lessons learned to date and decide if continuing a mid-size project initiative is feasible. This is especially necessary since the Company has yet to find a project within the Mid-Sized Project category that can be a fit for the demonstration project. Due to the evolution of smart inverter functionality, the Company anticipates that monitoring and control functionality of a smart inverter is a far better option for

developers in the mid-sized category than a third-party owned equipment that is difficult to integrate with the Company's SCADA system.

For the Large Project category, the Company continues work to identify new projects that are an ideal fit for this demonstration project. The Company completed evaluation of the completed CESIR studies to identify potential candidates for the project and will now evaluate new CESIR as they become available. The Company also continued to take necessary steps to understand how the Smart Inverter Functionality will affect the overall hypothesis of this Project. As the Company transitions into working with third-party developers who are willing to participate in the Project, the Company and SGS will try to understand and identify the various metrics that may produce additional value for the third-party developer.