



REV Demonstration Project:
Commercial Battery Storage

2017 4Q Quarterly Progress Report

Dated: January 29, 2018

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1.0 EXECUTIVE SUMMARY

Consolidated Edison Company of New York, Inc. (“Con Edison” or the “Company”) submits this quarterly report on the progress of the Commercial Battery Storage REV demonstration project (the “Project”) it is implementing as part of the Reforming the Energy Vision (“REV”) proceeding, as required by the *Order Adopting Regulatory Policy Framework and Implementation Plan*, issued by the New York State Public Service Commission (“Commission”) on February 26, 2015.

1.1 PROGRAM ACHIEVEMENTS

On January 20, 2017, Con Edison submitted the Project for approval by Department of Public Service Staff (“DPS Staff”); on May 18, 2017, DPS Staff approved the Project. Con Edison filed an implementation plan for the Project with the Commission on June 15, 2017. In Q4 2017, the Company focused on the implementation of the Project, specifically contract execution and customer acquisition activities.

1.2 CYBERSECURITY AND PERSONALLY-IDENTIFIABLE INFORMATION PROTECTION

Consistent with corporate instructions and Commission policy related to cybersecurity and the protection of personally-identifiable information (“PII”), each partner agreement executed for the implementation of the Project includes specific protections related to cybersecurity and PII. Assurance of this protection is critical in encouraging customers to sign up with new and innovative services offered by utilities.

1.3 ACCOUNTING PROCEDURE ESTABLISHED

On February 16, 2016, in Case 15-E-0229, Con Edison filed an accounting procedure for the accounting and recovery of all REV demonstration project costs. This accounting procedure establishes a standardized framework that will govern how the Company categorizes and allocates the costs of the REV demonstration projects, and will facilitate analyzing each project to determine the overall financial benefits of the program to customers.

1.4 COSTS, BENEFITS, AND OPERATIONAL SAVINGS

Budget information for all of the Company's REV demonstration projects is being filed confidentially with the Commission, concurrently with the filing of this document. All costs filed are incremental costs needed to implement the projects. To date, no tax credits or grants have been available to reduce the net costs of the projects, but Con Edison will take advantage of such offsetting benefits when they are available. Due to the early stage of implementation for the Project, there are no operational savings to report at this time.

1.5 COMMERCIAL BATTERY STORAGE

The Project is designed to demonstrate how distributed, front of the meter ("FTM") energy storage can be utilized to provide transmission and distribution ("T&D") support, earn wholesale market revenues, and increase the market size of participating customers by aligning the interests of the Company, customers, and third-party developers. Con Edison is executing the Project in partnership with GI Energy and Smarter Grid Solutions.

In Q4 2017, Con Edison and GI Energy continued their development of the final contract agreements, customer acquisition and site selection activities, and communications integration. Stakeholders from across the Company have collaborated to advance the Project.

2.0 COMMERCIAL BATTERY STORAGE – QUARTERLY PROGRESS

2.1 DEMONSTRATION HIGHLIGHTS

2.1.1 Since Previous Quarter - Major Task Completion

- **Project Planning:** Continued contract terms development and transaction document development
- **Customer Acquisition:** Project team continued to identify and engage additional sites for participation based on uncertainty regarding first four sites submitted for permitting and interconnection.
- **Construction/Commissioning and Integration:**
 - Continued work on requirements specification documentation and data flow configurations
 - GI Energy and Con Edison submitted site permits to Fire Department of New York (“FDNY”) and New York City Department of Buildings (“DOB”) Office of Technical Certification and Review (“OTCR”)
 - Initiated interconnection process with Con Edison Energy Services for same sites submitted to OTCR
- **Market Participation:** Continued work with the NYISO to determine optimal strategy for coordination with New York Independent System Operator (“NYISO”) systems

2.1.2 Activities Overview

Phase 0, Project Planning: The Project team continued work under the Limited Notice to Proceed which allows the following work on Phases 0, 1, 2 and 4 to proceed in parallel. This allows more lead time for Phase 0 contract development, Phase 1 customer acquisition, Phase 2 Commissioning Activities and Phase 4 NYISO integration. With respect to Phase 0 activities, the Project team conducted several in-person contract discussions and continues to make progress on reaching final terms.

Phase 1, Customer Acquisition: In Q4 the Project team received notification from two of the final four sites that the site’s own capital upgrades would now conflict with the Project’s construction schedule. The team immediately launched into customer acquisition activities again to determine if previously identified sites can be suitable for this project and identify new sites based on emerging network needs.

Phase 2, Construction/Commissioning and Integration: The Project team submitted four permits to FDNY and DOB staff for approval, corresponding to the original four primary sites selected during Q3 2017. Interconnection applications were submitted to Con Edison for same sites that were submitted for permitting. The team also continued work on the requirements specifications documentation and information technology architecture schemes needed to integrate the storage assets into Con Edison's system and the Network Operations Center ("NOC"). The Project team expects to complete these documents and to begin work on the user interface and design specifications in Q1 2018.

Phase 4, Market Participation: The Project team continued dialogue with the NYISO in Q4 on the evolving participation models for energy storage. In Q4 2017, the NYISO released a State of Storage report that outlines new participation categories for storage to be implemented during the demo period. The team engaged with NYISO staff on these new models to inform the Dispatch Optimization (Phase 3) and Market Participation (Phase 4) strategies.

2.1.3 Key Metrics

In Q4, the Project team re-engaged on customer acquisition activities and made significant progress on transaction documents and communications integration activities. The following data supports these Phase 1 metrics (targets were set as 200 potential sites identified, 30 viable project sites, and four final project sites).

- Potential Sites Identified: 312 / 200 (target)
- Customers Approached: 304 / 312
- Customer Intake Forms Collected: 44 / 304
- Walkthroughs Conducted: 32 / 44
- Sites Selected for permitting: 2 / 4
- Sites with interval data: 5/ 20

2.1.4 Next Quarter Forecast

In Q1 2018, the Project team will complete additional permitting packages, submit them to the OTCR, and complete the walkthroughs with FDNY and DOB on sites submitted during Q4. The Project team will also continue analyzing the differences in number of eligible customers and storage system size for particular sites under the

behind-the-meter (“BTM”) and FTM business models for the viable customers with interval data.

The Project team will continue any and all activities possible to prepare for Phase 2, however battery construction and commissioning cannot begin until receipt of final permits from the OTCR, anticipated in Q1 2018.

2.1.5 Checkpoints/Milestone Progress

Checkpoint/Milestone	Timing*	Status
Customer Acquisition	Phase 1 Midpoint / End	
Construction/Commissioning and Integration	Phase 2 Midpoint / End	
Dispatch Optimization	Phase 2 End Phase 3 Midpoint/End	
Market Participation	Phase 4 Quarterly	

*Detailed descriptions of the Phases can be found in the Appendices.

Legend

On Schedule	Delayed w/out Major Impact	Delayed or Stopped – Project Goals Impacted
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2.1.6 Planned Activities

2.1.6.1 Customer Acquisition

Status: Yellow

Expected Target by Phase 1 Midpoint: Identification of 30 viable customer sites and a minimum of 20 sites for BTM vs. FTM analysis

Actual by Phase 1 Midpoint: 30 viable customer sites identified, waiting on customer interval data to assess sites for BTM vs. FTM analysis

Solutions/strategies in case of results below expectations: In line with root-cause analysis, actions may include reassessing target, increasing marketing and outreach efforts, or adjusting monetization strategies to encourage improved customer acquisition efforts.

2.1.6.2 Construction/Commissioning and Integration

Status: Yellow

Expected Target by Phase 2 End: 4.2 MW/ 4.4 MWh installed storage across four sites

Actual by Phase 1 Midpoint: N/A

Solutions/strategies in case of results below expectations: The Project team will work to proactively manage any permitting restrictions which might delay construction and commissioning of project sites. The team will continually evaluate progress and adjust to back-up project sites if there is a site-specific issue.

2.1.6.3 Dispatch Optimization

Status: Green

Expected Target by Phase 2 End: Demonstrated aggregation and dispatchability of storage capacity

Actual by Phase 2 End: N/A

Solutions/strategies in case of results below expectations: In-line with root-cause analysis, actions may include systems upgrades, modified systems integration, and/or process review.

2.1.6.4 Market Participation

Status: Green

Expected Target by Phase 3 End: enrollment of batteries into NYISO markets

Actual by Phase 3 End: N/A

Solutions/strategies in case of results below expectations: The Project team will work with NYISO and other relevant stakeholders to identify alternative forms of battery participation, such as pilot projects. If no other suitable means exist, assets will continue to be dispatched to shadow NYISO markets and demonstrate the potential for revenues.

2.2 CHANGES TO THE PROJECT DESIGN

During Q4, the Project team learned that Urban Electric Power (“UEP”) would not receive the required fire-safety certifications in time to submit its planned 200 kW/ 400 kWh system to OTCR with other lithium-ion batteries. The Company decided to move forward with the 4 MW/4 MWh of NEC lithium-ion batteries for this demonstration project with the hope of working with UEP in the future.

The challenges associated with implementing a first-of-its-kind business model extended Phase 1 customer acquisition activities beyond Q4. For this reason, battery commissioning has been moved to Q3 2018.

2.3 WORK PLAN & BUDGET REVIEW

2.3.1 Phase Review

2.3.1.1 Phase Progress

The Project team has made progress on Phase 0 (Project Planning), Phase 1 (Customer Acquisition) and Phase 2 (Construction/Commissioning and Integration). The Project team anticipates Phase 0 will be completed with contract signing in Q1 2018 and Phase 1 will advance in Q1 2018 with receipt of OTCR permits and submission of additional permit sites.

2.3.2 Work Plan

Number	Task	Lead	2017				2018				2019				2020			
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
1	Phase 1: Customer Acquisition																	
1.1	Project Management	Con Edison																
1.1.1	Public Service Commission Approval	Con Edison																
1.1.2	Limited Notice to Proceed Negotiated/Executed	Con Edison																
1.1.3	Refine Scope of Work	Con Edison																
1.1.4	Draft GIE/Con Edison Partnership Contract	Con Edison																
1.1.5	Finalized Partnership Contract Executed	Con Edison/GI Energy																
1.2	Customer Acquisition	GI Energy																
1.3	Market Analysis (BTM/FTM Study)	GI Energy																
2	Phase 2 - Permitting, Construction, Commissioning, & Integration																	
2.1	Project Management	Con Edison																
2.2	Equipment Procurement/Site Construction/System Design	GI Energy																
2.2.1	Batteries Released for Construction	GI Energy																
2.2.2	System Design	GI Energy																
2.2.2.1	Control System Design	GI Energy/SGS																
2.2.2.2	Interconnection Design	GI Energy																
2.2.2.3	Civil Design	GI Energy																
2.2.3	Design Approved	Con Edison/GI Energy																
2.2.4	Construction Documents Complete	GI Energy																
2.2.5	Permitting	Con Edison/GI Energy																
2.2.6	Secondary Equipment Ordered	GI Energy																
2.2.7	Site Work	GI Energy																
2.2.8	All Equipment Delivered	GI Energy																
2.2.9	Battery Installation Complete	GI Energy																
2.3	Communications Integration	GI Energy/SGS																
2.4	Overall System Startup/Testing	GI Energy																
2.5	System Full Site Commissioning Complete	GI Energy																
2.6	Training	GI Energy/Con Edison																
3	Phase 3 - Dispatch Optimization																	
3.1	Project Management	Con Edison																
3.2	Dispatch Testing	GI Energy/Con Edison																
3.3	Dispatch for Load Relief	GI Energy/Con Edison																
3.4	Ongoing O&M	GI Energy																
4	Phase 4 - Market Participation																	
4.1	Project Management	Con Edison																
4.2	Battery Enrollment in NYISO Markets	GI Energy																
4.2.1	Annex 1 Forms	GI Energy																
4.2.2	Annex 2 Forms	GI Energy																
4.2.3	NYISO Review	GI Energy																
4.2.4	NYISO Class Year Study (If Necessary)	GI Energy																
4.3	Batteries Participate in Secondary Markets (Real or Virtual)	GI Energy																
4.4	Report Submitted on Annual Secondary Market Earnings	GI Energy																

2.3.3 Updated Budget

Budget information is being filed confidentially with the Commission.

2.4 CONCLUSION

2.4.1 Lessons Learned

The team was successful in identifying nearly 150 percent of the customer identification target and successfully converted these leads to meet the viable site goal. As this is a new business model for energy storage, the Project team is encouraged by this success. However, the process to achieve these goals took longer than anticipated and many sites were deemed unsuitable for final site selection after considerable engagement. Additionally, the long lead time for identifying, procuring and evaluating each site led to the conflict in construction schedules which eliminated two of the final sites submitted for permitting. The Project team has worked together to increase specification around desired site criteria and reduce feedback turnaround times on site viability to improve the quality of sites selected and reduce customer acquisition activities.

The team continues work on the analysis of BTM economics applied to the sites identified for this FTM project, as outlined in the Project Filing. The measurement of this metric has been delayed due to difficulty obtaining interval data from the 44 customers who completed the customer intake form. These delays can be attributed to customers who have not yet provided account numbers, empty lots which do not currently have service, and sites too small to qualify for interval data. The analysis will help evaluate the first two key hypotheses on scalability of and value provided by FTM vs. BTM systems. The lack of interval data for the majority of viable project sites is an early indication that FTM model can be applied and scaled in locations that are unavailable for a BTM model.

2.4.2 Recommendations

The Company recommends maintaining focus on OTCR permits required to complete Phase 1 and launch primary Phase 2 activities. While the Project team has continued dialogue with the permitting agencies, the timeline for approval has varied greatly for previous projects. The Project team will continue to work on all integration activities, including communications architecture and interconnection applications, to ensure a swift start to Phase 2 upon receipt of permits.

2.5 INCLUDED APPENDICES

The following appendices are included at the end of this Quarterly Progress Report:

Appendix A: Commercial Battery Storage Description of Phases

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Phase	0. Project Planning	1. Customer Acquisition	2. Construction/ Commissioning and Integration	3. Dispatch Optimization	4. Market Participation
Milestone (Stage Gate to Next Phase)	<i>Negotiations to be Completed</i> <ul style="list-style-type: none"> • DPS approval • Partner contracts signed 	<i>Successfully execute leases for four customer sites</i> <ul style="list-style-type: none"> • Final site selection • Execute customer lease contracts 	<i>Install and commission 4.2 MW/4.4 MWh</i> <ul style="list-style-type: none"> • Design approval • Obtain permits • Battery installation • System commissioning 	<i>Dispatch for load relief</i> <ul style="list-style-type: none"> • Cyber-secure communication architecture • HMI functionality • Established NOC 	<i>Assets participate in wholesale markets</i> <ul style="list-style-type: none"> • Earn revenues in all market products available for battery participation
Key Elements	<ul style="list-style-type: none"> • Letter of No Objection • Developer contracted • Third-party financing identified and contracted 	<ul style="list-style-type: none"> • Customer lead identification • Complete site Walkthroughs • Complete viable site identification • Final site selection • Market analysis for FTM vs. BTM 	<ul style="list-style-type: none"> • Interconnection and civil design • Interconnection application and study • Permitting • Communications integration • System testing and training 	<ul style="list-style-type: none"> • Assets can be dispatched individually or in aggregate by each party • Fully integrated into SCADA with HMI functionality • Calculate T&D benefit values 	<ul style="list-style-type: none"> • Enroll in NYISO markets allowed today • Continue participation in DER roadmap proceedings to increase participation for ELRs • Quantify market revenues achievable under stacked value model
DER Categories	N/A	N/A	<ul style="list-style-type: none"> • Battery Storage 	<ul style="list-style-type: none"> • Battery Storage • DER Aggregation 	<ul style="list-style-type: none"> • Battery Storage • DER Aggregation