# REV Demonstration Project:
# Commercial Battery Storage

## 2018 4Q Quarterly Progress Report

**Dated: January 31, 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 2018, the Company focused on the implementation of the Project, customer acquisition and construction.

## 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 if, and 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 2018, Con Edison and GI Energy continued development of customer acquisition and site selection activities, construction and commissioning for first two sites, and communications integration. The team obtained additional permits for remaining project site. 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

- Customer Acquisition: Project team continued to identify additional sites for participation based on uncertainty regarding one of the sites which received permitting approval in Q2 2018. The Project team also executed a site lease for the third project site.
- Construction/Commissioning and Integration:
    - Completed work on Factory Acceptance Testing as well as installed and configured communication equipment for coordination between GI Energy, the batteries, and Con Edison.
    - Obtained additional permits for the second and third site from the Fire Department of New York ("FDNY") and the New York City Department of Buildings ("DOB") and completed testing for UL9540A certification.
    - Delivered and installed all equipment for first two sites and began construction for the third site.
- Market Participation: Continued work with the New York Independent System Operator ("NYISO") to navigate fluctuating battery participation rules.

### 2.1.2 Activities Overview

Phase 1, Customer Acquisition: The Project team and the Department of Sanitation ("DSNY") and Department of Citywide Administrative Services ("DCAS") were working on a DSNY site was identified in the initial customer acquisition activities in 2017, received FDNY and DOB conditional permits in Q2 2018 with the other installed sites, and completed interconnection approval in Q3. During Q4, 2018, these discussions stalled over differences in the lease contract terms. . As a result, the team restarted customer acquisition activities to replace this site in the same network or one with greater grid support needs. The Project team gained some valuable lessons learned from this experience, reported below. The team also executed site lease for the third site which received FDNY and DOB permits during Q4, 2018.

Phase 2, Construction/Commissioning and Integration: The Project team continued to respond to information requests for previously obtained permits and recently acquired permits. All equipment has been delivered and installed for the first two project sites and released construction work on the third site. All communications equipment and

procedures have been installed and established and the User Interface draft presented to Con Edison.

Phase 4, Market Participation: The Project team continued dialogue with the NYISO in Q4 on the evolving participation models for energy storage, including dual participation. The team engaged with NYISO staff on these new models to inform the Dispatch Optimization (Phase 3) and Market Participation (Phase 4) strategies. The team also continued conversations on participation in the NYISO Pilot Program and how the Project may be used to advocate for and advance desired energy market participation models.

### 2.1.3 Key Metrics

In Q4, the Project team continued customer acquisition activities and made significant progress on 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: 471 / 200 (target)
- Customers Approached: 396 / 471
- Customer Intake Forms Collected: 47 / 396
- Walkthroughs Conducted: 35 / 47
- Sites Selected for permitting: 5 / 4 (target)
- Sites with interval data: 5/ 20

### 2.1.4 Next Quarter Forecast

In Q1 2019, the Project team will complete commissioning on the first two project sites and submit one additional permitting package to the FDNY and DOB for the fourth site to replace the previously permitted DSNY location. The Project team will complete final permitted activities with the first two sites with FDNY and DOB. The team will also continue analysis of the Project model scalability compared with traditional behind the meter (“BTM”) models.

The Project Team will complete communications integration build-out with the goal of extending access and control of the assets into the utility control centers in Q2 2019. Construction work (Phase 2) will begin for the third and fourth sites, with a target

operations of Q2 2019 for the third site which has already received conditional permits and Q3 2019 for the fourth site. Final permitting will be completed for the first two sites once commissioning has been completed in early Q1 2019.

Dispatch Optimization (Phase 3) will begin with the enrollment of the first two assets into the NYISO Pilot Program.

### 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<br>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 |

### 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 asses 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 MW/ 4 MWh installed storage across four sites

**Actual by Phase 2 Midpoint:** N/A

**Solutions/strategies in case of results below expectations:** The Project team will work to proactively manage any permitting restrictions that 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:** Red

**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

There were no changes to the project design in Q4.

## 2.3 WORK PLAN & BUDGET REVIEW

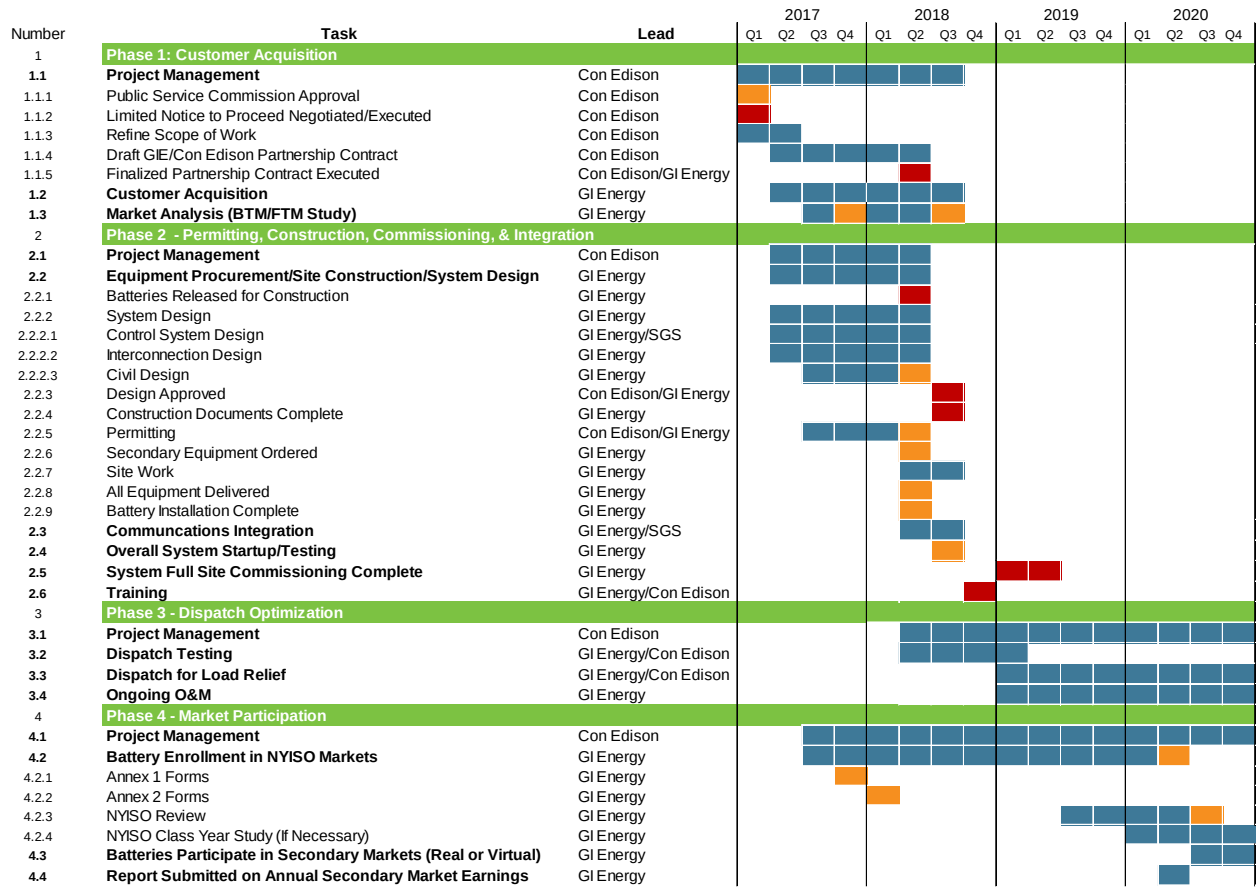
### 2.3.1 Phase Review

#### *2.3.1.1 Phase Progress*

The Project team has completed Phase 0 (Project Planning) and continues to make progress on Phase 1 (Customer Acquisition), Phase 2 (Construction/Commissioning and Integration) and Phase 3 (Dispatch Optimization). The Project team anticipates Phase 1 will be completed in Q1 2019 with receipt of applicable permits for final site. Phase 2 will begin for third and fourth sites which received or will receive permitting approval in Q4 2018 and Q1 2019.

Phase 4 has been materially delayed by the NYISO's response to FERC Order 841 which delays battery market participation and dual participation to *no earlier than* May 2020 and applies Buyer Side Mitigation to storage resources below 2 MW.

### 2.3.2 Work Plan




| Number | Task | Lead |
|---|---|---|
| 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** | **Communcations 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. However, the team encountered delays and difficulties in completed a site lease with DCAS the owner for the DSNY project site. While the team was unable to execute a lease due to the contract impasse, the Company continues to engage the City on a potential resolution for future projects. DCAS is a major land owner within the Con Edison service territory and could provide many beneficial sites for future storage projects.

The team continues work on the analysis of BTM economics applied to the sites identified to this FTM project, as outlined in the Project Filing. The measurement of this metric has been delayed due to difficulty obtaining interval data and ongoing customer acquisition activities. 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.

The market participation rules for battery storage continue to evolve throughout 2018 and will continue in 2019. The Project team continues to work with NYISO and other storage stakeholders to understand and inform these evolves rules. To this end, the Project Team has volunteered to be a test case for Q3 2020 battery aggregation rules. If chosen, this collaboration will benefit not only the Project, but also enable the creation of battery market in New York.

### 2.4.2 Recommendations

The Company recommends maintaining focus on permits required to complete Phase 1 and launch primary Phase 2 construction activities.

## 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

**Appendix A: Commercial Battery Storage Description of Phases**

| Phase | 0. Project Planning | 1. Customer Acquisition | 2. Construction/ Commissioning and Integration | 3. Dispatch Optimization | 4. Market Participation |
|---|---|---|---|---|---|
| **Milestone (Stage Gate to Next Phase)** | *Negotiations to be Completed*<br>• DPS approval<br>• Partner contracts signed | *Successfully execute leases for four customer sites*<br>• Final site selection<br>• Execute customer lease contracts | *Install and commission 4.2 MW/4.4 MWh*<br>• Design approval<br>• Obtain permits<br>• Battery installation<br>• System commissioning | *Dispatch for load relief*<br>• Cyber-secure communication architecture<br>• HMI functionality<br>• Established NOC | *Assets participate in wholesale markets*<br>• Earn revenues in all market products available for battery participation |
| **Key Elements** | • Letter of No Objection<br>• Developer contracted<br>• Third-party financing identified and contracted | • Customer lead identification<br>• Complete site Walkthroughs<br>• Complete viable site identification<br>• Final site selection<br>• Market analysis for FTM vs. BTM | • Interconnection and civil design<br>• Interconnection application and study<br>• Permitting<br>• Communications integration<br>• System testing and training | • Assets can be dispatched individually or in aggregate by each party<br>• Fully integrated into SCADA with HMI functionality<br>• Calculate T&D benefit values | • Enroll in NYISO markets allowed today<br>• Continue participation in DER roadmap proceedings to increase participation for ELRs<br>• Quantify market revenues achievable under stacked value model |
| **DER Categories** | N/A | N/A | • Battery Storage | • Battery Storage<br>• DER Aggregation | • Battery Storage<br>• DER Aggregation |