Karla M. Corpus
Senior Counsel
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July 31, 2018

VIA ELECTRONIC DELIVERY

Honorable Kathleen H. Burgess
Secretary
New York State Public Service Commission
Three Empire State Plaza, 19th Floor
Albany, New York 12223-1350

RE: Case 14-M-0101 – Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision (REV)

NIAGARA MOHAWK POWER CORPORATION d/b/a NATIONAL GRID: COMMUNITY RESILIENCE REV DEMONSTRATION PROJECT – Q2 2018 REPORT

Dear Secretary Burgess:

Niagara Mohawk Power Corporation d/b/a National Grid ("National Grid") hereby submits for filing its quarterly update to the Community Resilience REV Demonstration Project Implementation Plan covering the period of April 1, 2018 through June 30, 2018 ("Q2 2018 Report") as required by the REV Demonstration Project Assessment Report filed by the New York State Department of Public Service Staff ("Staff") with the Commission on February 10, 2016 in Case 14-M-0101.

Please direct any questions regarding this filing to:

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National Grid looks forward to continuing to work collaboratively with Staff as it proceeds with the implementation of the Community Resilience REV Demonstration Project.

Respectfully submitted,

/s/ Karla M. Corpus

Karla M. Corpus
Senior Counsel

Enc.

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Community Resilience

REV Demonstration Project

Potsdam, New York

Q2 2018 Report

July 31, 2018

Table of Content

1.0 Executive Summary

Under the New York Public Service Commission's ("PSC") Reforming the Energy Vision ("REV") proceeding, this Community Resilience Demonstration Project (the "Project") consist of developing financial and engineering plans for a community microgrid that, once constructed, improves the local resiliency during severe weather events in the remote Village of Potsdam ("Potsdam") in upstate New York. Potsdam and surrounding St. Lawrence County have experienced multi-day power outages as a result of microbursts and winter ice storms; most notably the "Ice Storm of 1998" which left over 100,000 customers without power for up to 3 weeks in the North Country and recently, in December of 2013, another ice storm isolated over 80,000 customers for several days.

Image 1.1 – Photo of upstate New York after the 1998 Ice Storm[1]

Niagara Mohawk Power Corporation d/b/a National Grid ("National Grid" or the "Company") has partnered with GE Energy Consulting ("GE"), OBG (formerly O'Brien & Gere) , Nova Energy Specialists, LLC ("Nova Energy") and Clarkson University ("Clarkson") to develop an engineering design and an investment grade financial model to build and operate a community resilience microgrid for Potsdam. The microgrid plan consists of a robust underground distribution network and coordination of new and existing distributed energy resources ("DER"), which may include natural gas generators, hydroelectric generators, and a large photovoltaic ("PV") solar array. Essential infrastructure that is expected to remain operational during prolonged power grid outages and which are planned to be connected to the microgrid include a hospital, the local police and fire departments, water and wastewater treatment plants, Village of Potsdam government offices, two (2) higher education institutions, a high school, a bank, a drug store, a grocery store, hotel, and a

[1] Image was taken during the aftermath of 1998 Ice Storm.

gas station. The Project includes developing a new economic model for community microgrid projects which involves hybrid ownership and operation of assets between the utility and DER owners, as well as a unique tiered tariff design that recovers the cost of the utility's assets from the community segments that benefit from the microgrid's operation.

Concurrently, the project involves National Grid developing and evaluating new utility services and business model that may be required for further microgrid deployment in New York State. The four (4) services to be developed are:

1. Tiered recovery for storm-hardened, underground wires;
2. Central procurement for DER;
3. Microgrid control and operations; and
4. Billing and financial services.

While National Grid is leading the Project, this Project consists of a close-knit partnership effort between GE, Clarkson and National Grid. OBG and Nova Energy are also contributors via subcontracts under GE. Moreover, this project requires significant input from other major Potsdam stakeholders, such as the Village of Potsdam government, the Canton-Potsdam Hospital, and the State University of New York at Potsdam ("SUNY Potsdam").

Image 1.2 – The major stakeholder partners of the Community Resilience demonstration (clockwise, from top left: Clarkson University, SUNY Potsdam, Village of Potsdam Offices, and Canton-Potsdam Hospital)

During Q2 2018, the National Grid Project team continued the major efforts of the Detailed Engineering Design and Financial and Business Plan phase (Phase 2) of the Project. The majority

of the activities during this quarter focused on completing the draft GE reporting text, then conducing reviews and subsequent updating of text sections. Additionally, in preparation for conducting the connected customer feedback on the four (4) proposed microgrid services, a customer engagement survey was drafted.

The Project team held several team calls, mostly on a bi-weekly basis, to discuss the status of each partner's report responsibilities and progress.

2.0 Highlights Since Previous Quarter

National Grid and the key Project partners made steady progress in Q2 2018. Figure 1-1 provides a reference timeline for 2017-2018 emphasizing the major milestones and accomplishments to date. Changes and additions are highlighted in yellow and are described in additional detail below in Section 3.1.

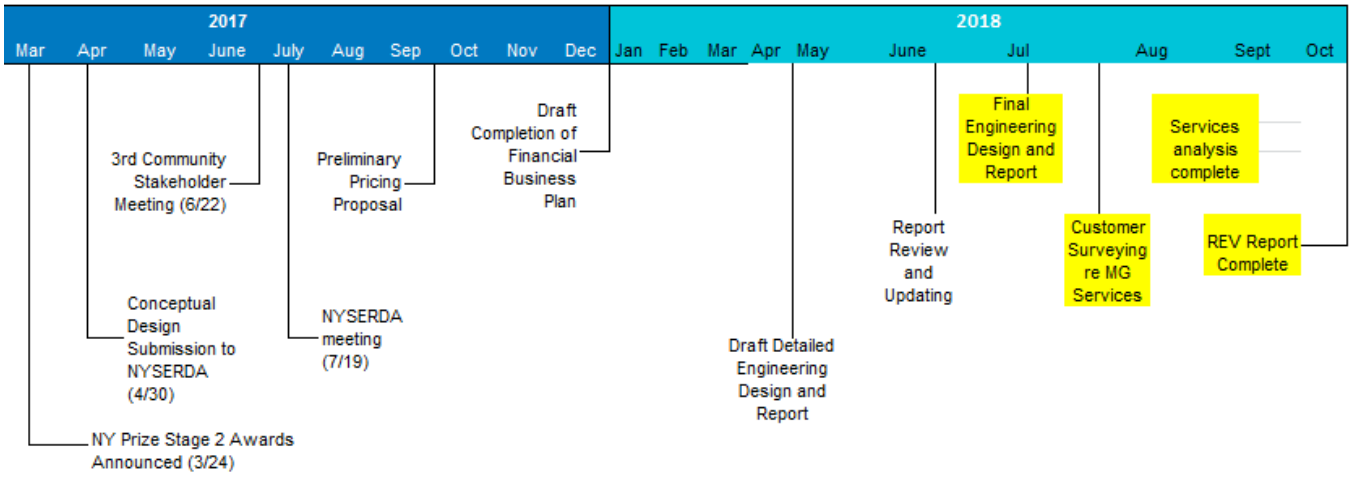


Figure 1.1 –2017-2018 Major Milestones Timeline*

**Note: The Project schedule stated in the Project Implementation Plan was predicated on the Project Conceptual Design, performed under a NYSERDA PON, being completed in mid- 2016. The conceptual design was completed approximately one year later, resulting in the need to extend this Project's schedule beyond the originally-planed completion date of Q2 2017.*

2.1 Major Task Activities

1. **Stage 2 Report Preparation**
   The Project development team led by GE completed their draft report, and submitted it to National Grid for comment. National Grid completed detailed reviews of the report sections, and provided the resulting report comments back to GE. GE then commenced, and completed most of the revision process. Several conference calls were held among reviewing parties and authors to discuss various review the feedback received and to select the best approach to address each comment.

   Additionally, GE also oversaw their two (2) Project subcontractors, Clarkson University and Nova Energy specialists. During Q2 2018 these contractors updated their respective report sections based on the review feedback they received. Both contractors also participated in conference calls with National Grid to review National Grid comments.

Lastly, OBG, National Grid's contractor responsible for several equipment-related report sections, completed and submitted its draft report sections to National Grid. National Grid subsequently reviewed the sections and provided feedback to OBG.

2. DER-CAM Analysis

The Distributed Energy Resources Customer Adoption Model ("DER-CAM")2 is an economic, energy balance, and environmental model that is used for determining optimum sizing of DER assets in grid-connected and off-grid microgrid systems. A more detailed description of the DER-CAM model is provided in the Q2 2017 Project report.

There were no updates made to the DER-CAM analysis during this quarter.

3. Microgrid Configuration and Design

Staged Roll-out

There were no changes made this quarter to the Staged Rollout configuration or design. As noted in the Q2 2017 report, while the originally-envisioned community microgrid footprint involved supporting all critical services in the Town of Potsdam, the cost of the full microgrid was determined to be economically infeasible and a staged approach to microgrid construction was subsequently developed. As noted in the Q3 2017 quarterly report, the decision was made by team members to adopt the staged roll-out approach, with Stages 1, 1b, and 2 all being constructed under Construction Phase 1; also termed 'the smaller footprint.' This approach allows the construction investment to occur over an extended period of time. Once selected, this decision was communicated to all members of the Project Team so that they could proceed with their tasks accordingly.

Data in Table 2.1 below describes the staged approach, while Figure 2.3 that follows provides a geographic location of each stage.

[2] *See* Distributed Energy Resources Customer Adoption Model ("DER-CAM"), available at: https://building-microgrid.lbl.gov/projects/der-cam.

Stage	Start/Finish Point	Route (Streets)	Load Connections	Generation Connections
Stage 1	Clarkson University (feeder 51) to Village Civic Center	Maple St. -> Main St.	Clarkson University, Kinney Drug Store, Stewart's Shops Gas Station, The Clarkson Inn, North Country Savings Bank, IGA Grocery, Civic Center/Rescue Squad	West Dam Hydro and Clarkson's new DERs, one available
Stage 1b	Maple St. to East Dam Hydro	Market St. -> Raymond St.	Stage 1 + Water Treatment Plant	West Dam Hydro + East Dam Hydro
Stage 2	Village Civic Center to Canton-Potsdam Hospital ("CPH")	Park St. -> Elm St. -> Lawrence Ave. -> Leroy St.	Stage 1 + Potsdam High School and CPH	West Dam Hydro + East Dam Hydro
Stage 3	CPH to Wastewater Treatment Plant	Grove St. -> Cherry St. -> Lower Cherry St.	Stage 2 + Wastewater Treatment Plant	West Dam Hydro + East Dam Hydro
Stage 4	Village Civic Center to SUNY Potsdam	Main St. -> SUNY at Morningside Dr.	Stage 3 + SUNY Potsdam	West Dam Hydro + East Dam Hydro + SUNY CHPs
Stage 5	SUNY Potsdam to solar PV via overhead line	Morningside Dr. -> Elm St.	Stage 4 + PV	West Dam Hydro + East Dam Hydro + SUNY CHPs + PV
Stage 6	Clarkson to National Grid Service Center	Pine St.	Stage 5 + National Grid Service Center	West Dam Hydro + East Dam Hydro + SUNY CHPs + PV

Table 2.1 – Staged Roll-Out Approach

Figure 2.2 – Staged Roll-Out Approach Map

Engineering Design of Staged Roll-out
There were no changes to the staged roll-out made this quarter. As stated in the Q4 2017 report, one-line diagrams for the large (full build-out) microgrid and small footprint (staged approach footprint through Stage 2) microgrid were previously developed and updated.

Cost Estimates of Staged Roll-out
Based on the final DER-CAM analysis completed in Q1 2018, a final amount of additional generation was determined. Prices for that generation equipment were then obtained. The updated cost estimates for each stage will be presented in the Q3 2018 report as part of the overall cost estimate presentation.

Regulatory Developments
Pursuant to the PSC's Value of Distributed Energy Resources ("VDER") proceeding[3], the Project team continued to monitor development of value stack determinations and filings by NY PSC during this quarter as they relate to implications for the Potsdam Community Microgrid. There were no significant VDER-related developments by the PSC identified this quarter.

Customer Base - Tiered Recovery
The Project team developed two (2) detailed cost estimates for the smaller foot print microgrid (Stages 1, 1b and 2) in Q3 2017. There were no further activities conducted under this task during this quarter.

4. Financial Model Development
There were no updates made to the Project's financial model. Final cost and pricing data were received for most generation and system equipment. The staged-rollout pricing model will be updated based on this new data and presented in the Project's final report. The preliminary pricing proposal will provide the Company the opportunity to explain the pricing of each of the four (4) proposed services to Project partners and stakeholders. The final version of the tiered recovery of the underground wires network will also be included.

While the Tiered Recovery financial model addresses the grid materials and equipment costs, generation costs were expected to be recovered through other means. During Q1 2018, National Grid started developing a cost compensation model for DER owners. Development of this model was terminated in Q2 2018 due to the suite of data that was identified as essential to model development, and which will remain undetermined until microgrid governance is finalized and a DER developer commits to providing power to the proposed microgrid.

5. Stakeholder Outreach
The task of obtaining Tier 1A and 1B customer (which are the connected customers) opinions on whether or not they would choose National Grid to provide microgrid-related services began. A survey presenting an explanation of each microgrid

[3] *See* Case 15-E-0751 *et al*., *In the Matter of the Value of Distributed Energy Resources* ("VDER Proceeding") *et al.*, Order on Phase One Value of Distributed Energy Resources Implementation Proposals, Cost Mitigation Issues, and Related Matters (issued September 14, 2017)("VDER Phase One Order").

service under consideration was drafted and reviewed internally. A survey form was also drafted and circulated for internal review. This document will be finalized in Q3 2018 and utilized for customer data collection.

2.2 Challenges, Changes, and Lessons Learned

The following issues or changes occurred during Q2 2018.

Issue or Change	What was the resulting change to Project scope/timeline?	Strategies to resolve	Lessons Learned
The contractor's report updating process took longer than expected.	The engineering analysis report was not completed in Q2 2018.	Maintain even greater communication with contractors and their subcontractors.	Involve contractors in the schedule planning process so that a feasible and realistic schedule is developed at the start of the Project. Also, institute contract penalties for missing deadlines.

3.0 Next Quarter Forecast

Two (2) primary tasks will be conducted in Q3 2018. First, outreach to the Tier 1A and Tier 1B Project stakeholders will be conducted. The Project cost findings will be presented to them, and they will be asked to state their position on the following four (4) microgrid services proposed to be provided by the utility:

1. Tiered recovery for storm-hardened, underground wires;
2. Central procurement for DER;
3. Microgrid control and operations; and
4. Billing and financial services.

Second, the draft financial analysis and engineering design report will be finalized. GE and OBG will finalize the respective portions of the report for which they are responsible and will submit them to National Grid. Report highlights will be presented in the Q3 2018 Project quarterly report. The report will not be a complete parallel to the New York Prize Stage 2 report due as several data gaps that will remain primarily as a result of there being no formally-accepted governance plan, and correspondingly, no written commitment from each of the Tier 1A and Tier 1B customers.

3.1 Checkpoints/Milestone Progress

	Checkpoint/Milestone	Anticipated Start-End Date	Revised Start-End Date	Status	
1	Clarkson University NYSERDA PON Study *(Conceptual Design)*	10/2015 – 6/30/16	10/2015 – 10/31/16	🟢	Complete
2	Initial Engineering Design Recovery Plan *(Tiered Recovery Plan)*	4/6/2016 – 7/26/16	5/1/2016 – 9/30/16	🟢	Complete
3	Preliminary Service Proposal & Pricing *(Pricing Proposal)*	7/01/16 – 11/01/16	11/01/16 – 8/31/18	🟢	Ongoing
4	Phase 2 Completion *(Detailed Engineering Design and Business Plan)*	3/16/16 – 6/30/17	10/1/16 – 7/31/18	🟢	Ongoing
5	Go/No Go Testing	5/1/18 – 9/30/18	Unchanged	🟢	Underway

Key

🟢 On-Track

🟡 Delayed start, at risk of on-time completion, or over-budget

🔴 Terminated/abandoned checkpoint

1. Clarkson University NYSERDA PON Study – Task 4 *(Conceptual Design)*

Status: ● - Complete
Start Date: 10/2015
End Date: 10/31/16

Given all research tasks associated with the NYSERDA study are now compete, the Project team considers this Conceptual Design checkpoint complete. The Clarkson team completed the final Report on April 30, 2017. A final close-out meeting with NYSERDA was held on July 19, 2017.

2. Initial Engineering Design Recovery Plan *(Tiered Recovery Plan)*

Status: ● - Complete
Start Date: 5/1/16
End Date: 9/30/16

While continued adjustments of the microgrid design will ultimately affect the results of the tiered recovery, the approach and design of the recovery mechanism is not expected to change during the Project. Therefore, the Project team considers this checkpoint complete.

3. Preliminary Service Proposal and Pricing *(Pricing Proposal)*

Status: ● - Ongoing
Start Date: 11/1/16
End Date: Revised from 5/31/18 to 8/31/18

This milestone consists of presenting the preliminary service and pricing offerings to stakeholders. The Project team has continued to form and analyze a pricing strategy for the microgrid during Q1 2018. This task is predicated on completion of the Project report by GE. The adjusted timeline shifts this task to Q3 2018.

4. Phase 2 Completion *(Detailed Engineering Design and Financial and Business Plan)*

Status: ● - Ongoing
Start date: 10/1/16
End date: Revised from 6/30/18 to 7/31/18

National Grid partnered with GE and OBG to develop a Detailed Engineering Design and Financial and Business Plan Assessment consistent with NY Prize Stage 2. GE is subcontracting with Clarkson and Nova Energy to perform some of the tasks that are outside of GE's area of expertise.

The Project team originally anticipated most of this milestone to be completed by the end of 2017, which they were, with drafts of most Project report sections being completed. Report preparation, internal review, and finalization will be completed in early Q3 2018. The end objective of this Project continues to be collection and compilation of the data necessary to enable preparing a compelling

NY Prize Stage 3 funding application. However, absence of a developer prevents completion of particular sections paralleling the NY Prize Stage 2 reporting. Until a developer assumes control of this Project, there will be insufficient data available to apply for NY Prize Stage 3 funding. Based on information currently published on the NYSERDA website, NYSERDA has moved its NY Prize Stage 3 RFP announcement to the end of 2018. Therefore, the Project team still expects to complete this REV Demonstration Project in advance of the Stage 3 RFP announcement.

5. Go/No Go Decision

Status: ● - Ongoing
Start date: 4/1/18
End date: 9/30/18

The culmination of the preceding efforts conducted under this Project will be a go/no go decision made based on survey responses from the proposed Potsdam Microgrid connected customers. This task consists of conducting stakeholder engagement efforts to determine which of the four (4) services offered under this Project the customers will accept from National Grid. National Grid plans to present the findings of these analyses in the overall final REV Project quarterly report, which it plans to complete in Q3 2018.

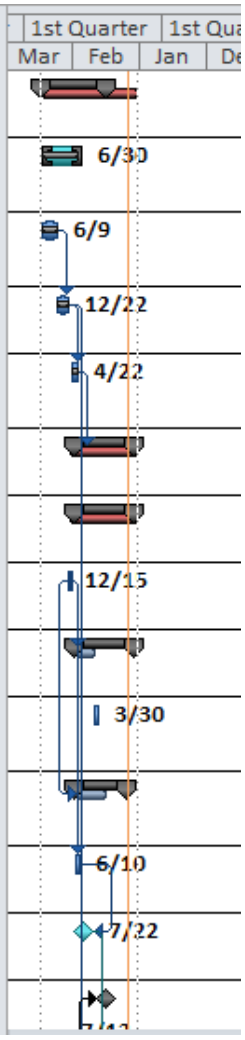
4.0 Work Plan & Budget Review

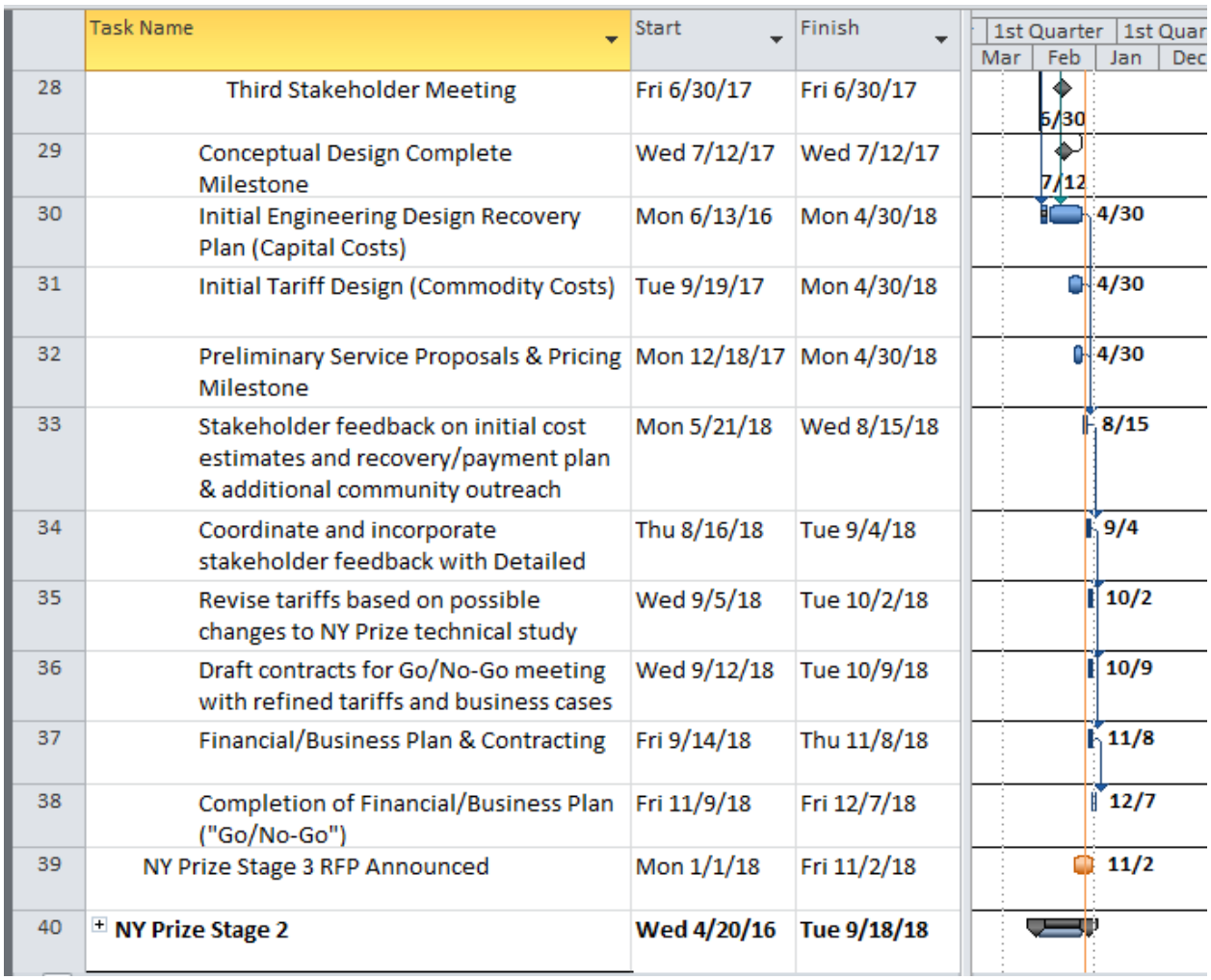
4.1 Updated Work Plan

Based on discussions with PSC Staff, the Project schedule is extended to the end of Q4 2018. However, Project completion and final quarterly reporting is targeted to be completed in Q4 2018. An updated Project completion schedule is presented below in Table 4.1:

Table 4.1: Project Schedule

	Task Name	Start	Finish
1	**NYSERDA PON Feasibility Study**	**Wed 10/1/14**	**Tue 7/11/17**
2	Project Management and Reporting	Wed 10/1/14	Thu 6/30/16
3	Define Loads and Required Generation	Wed 10/1/14	Tue 6/9/15
4	Engineering Design	Wed 5/13/15	Tue 12/22/15
5	Equipment Specification and Cost Analysis	Mon 1/4/16	Fri 4/22/16
6	**Report Writing**	**Tue 3/15/16**	**Fri 9/28/18**
7	**REV Demonstration**	**Tue 3/15/16**	**Fri 9/28/18**
8	Demonstration Approval	Tue 12/15/15	Tue 12/15/15
9	**General Project Management**	**Mon 3/21/16**	**Fri 9/28/18**
23	Benefit Analysis for Stakeholder Engagement	Mon 1/2/17	Thu 3/30/17
24	**Stakeholder engagement and community outreach**	**Tue 3/15/16**	**Fri 6/15/18**
25	Initial Stakeholder Engagement	Tue 3/15/16	Fri 6/10/16
26	Initial Stakeholder Meeting	Fri 7/22/16	Fri 7/22/16
27	Second Stakeholder Meeting	Wed 7/12/17	Wed 7/12/17





	Task Name	Start	Finish
28	Third Stakeholder Meeting	Fri 6/30/17	Fri 6/30/17
29	Conceptual Design Complete Milestone	Wed 7/12/17	Wed 7/12/17
30	Initial Engineering Design Recovery Plan (Capital Costs)	Mon 6/13/16	Mon 4/30/18
31	Initial Tariff Design (Commodity Costs)	Tue 9/19/17	Mon 4/30/18
32	Preliminary Service Proposals & Pricing Milestone	Mon 12/18/17	Mon 4/30/18
33	Stakeholder feedback on initial cost estimates and recovery/payment plan & additional community outreach	Mon 5/21/18	Wed 8/15/18
34	Coordinate and incorporate stakeholder feedback with Detailed	Thu 8/16/18	Tue 9/4/18
35	Revise tariffs based on possible changes to NY Prize technical study	Wed 9/5/18	Tue 10/2/18
36	Draft contracts for Go/No-Go meeting with refined tariffs and business cases	Wed 9/12/18	Tue 10/9/18
37	Financial/Business Plan & Contracting	Fri 9/14/18	Thu 11/8/18
38	Completion of Financial/Business Plan ("Go/No-Go")	Fri 11/9/18	Fri 12/7/18
39	NY Prize Stage 3 RFP Announced	Mon 1/1/18	Fri 11/2/18
40	**NY Prize Stage 2**	**Wed 4/20/16**	**Tue 9/18/18**

4.2 Updated Budget

Table 4.2 below displays the updated total expenditures through June 30, 2018.[4]

Project Task	2nd Quarter Total Spend	Project Total Spend to Date	Incremental Project Budget	Incremental Spend To Date	Incremental Remaining Balance
CapEx					
	$0	$0	$0	$0	$0
Grants Credited Against Incremental Capital Costs					
n/a	n/a	n/a	n/a		
OpEx					
Project Administration and Planning	$7,413	$341,594	$131,000		
Marketing and Community Engagement	$2,196	$61,724	$200,000		
Implementation	$14,081	$95,070	$275,000		
Audit Grade Detailed Engineering Design	$199,042	$870,314	$1,000,000		
Total	**$222,732**	**$1,368,702**	**$1,606,000**	**$737,519**	**$866,481**

Table 4.2 – Updated Budget

The 'Project Total Spend to Date' values listed in Table 4-2 are the combined incremental and non-incremental costs. The incremental costs associated with the Project as of June 30, 2018 total is $737,519 leaving a remaining Project budget balance of $868,481.

This quarter the consultants submitted invoices for work that had been completed to date. As noted in previous quarterly reports, while the Project Administration and Planning budget has been depleted, the Project team will continue to record expenses in this category to track categorical administrative expenses of the Project.

[4] The Company updated the Project budget to reflect incremental costs, and to illustrate costs that are capital or operating expenses.

5.0 Progress Metrics

The Project participant load size, participant quantity, and linear length of the microgrid dictate the projected cost and configuration of the microgrid construction. This section of the Quarterly Report tracks the current projected cost range of the microgrid depending on the most recent engineering design estimates, as well as the projected resiliency duration of the detailed design.

5.1 Total Cost of Microgrid

The total estimated cost of the microgrid has changed from Q1 2018, as displayed in Table 5.1 below. The staged rollout approach (described in Section 2 above) changes the timing of the expenditures and ultimately affects the successful business plan of the microgrid. Explanation of the staged rollout can be found in Section 2.1. Updated costs for each stage will be conveyed in future Quarterly reports.

Metric	As of Q3 2016	As of Q4 2016	As of Q1 2017	As of Q3 2017 – Stages 1, 1B, and 2	As of Q4 2017 – Stages 1, 1B, and 2	As of Q2 2018 – Stages 1, 1B, and 2
Projected Cost Range of Microgrid Construction	$35M - $60M[1]	$26.4M - $61.3M[2]	$26.4M - $61.3M[2]	Not Determined	<$25M	$19-25M[5]
Underground Wire Cost Range	$11.3M - $11.8M	$7.4M - $12.0M	$15.4M - $23.8M[3]	$8.79M – $13.465M	$8.79M – $13.465M[4]	$19-21M[5]
Projected Resiliency Duration	14 Days	14 Days	14 Days	14 Days	14 Days	14 Days

[1] *Range includes three (3) generation equipment options and two (2) distribution equipment options.*
[2] *Range includes three (3) generation equipment options and three (3) distribution equipment options.*
[3] *Range includes cost of equipment and installation. Previous estimates only included equipment costs.*
[4] *Range includes cost of equipment installation.*
[5] *Based on using one (1) generation equipment option and one (1) distribution equipment option.*

Table 5.1 – Cost of Microgrid

5.2 Tiered Recovery Population

There were no changes to the tiered recovery population as stated in the Q4 2017 quarterly report. Customer counts are displayed in Table 5.2.

	Commercial	Residential	Total
Tier 1	12	0	12
Tier 2	404	2,171	2,575
Tier 3	480	2,945	3,425
Tier 4	235	3,360	3,595
Tier 5	1,394	12,736	14,130
Total	2,513	21,212	23,725

Table 5.2 – Tiered-Recovery Customer Quantities