nationalgrid

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July 31, 2017

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 2017 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, 2017 through June 30, 2017 ("Q2 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

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Enc.

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Community Resilience

REV Demonstration Project

Potsdam, New York

Q2 2017 Report

July 31, 2017

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") focuses on improving the local resiliency during severe weather events in the remote Village of Potsdam ("Potsdam") in Upstate New York with the creation of a community microgrid. Potsdam and surrounding St. Lawrence County have experienced a number of 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 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 Clarkson University in order to develop a community resilience microgrid for Potsdam with an underground distribution network and coordination of new and existing distributed energy resources ("DER"). Concurrently, the Company will develop and test new utility services that may be required for further microgrid deployment in New York State.

The four services to be developed and tested are:

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

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

While National Grid is leading the Project, this demonstration is actually a close-knit partnership effort between Clarkson University and National Grid. Moreover, it will require 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, Canton-Potsdam Hospital)

During the second quarter of 2017 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 Q2 2017 surrounded initial Report writing for tasks within New York State Energy Research & Development Authority (“NYSERDA”)’s NY Prize Stage 2 Scope of Work (“SOW”). The Project team, including partners GE Energy Consulting (“GE”), OBG (formerly O’Brien and Gere), Nova Energy Specialists, LLC (“Nova Energy”), and Clarkson University, met regularly to discuss each partner’s responsibilities for Phase 2 as well as updates on their progress. In addition, the second quarter 2017 activities involved continued business model exploration and adjustments to the tiered recovery model and its effect on the financial analysis based on a proposed staged roll-out of the microgrid.

2.0 Highlights Since Previous Quarter

National Grid and the key Project partners have made steady progress in the second quarter of 2017, with all parties continuing to push for expected outcomes laid out in the Project Implementation Plan.[2] For a reference timeline emphasizing the major milestones and accomplishments, please see Figure 2.1. Changes and additions are highlighted in yellow and are described in additional detail in Section 3.1.

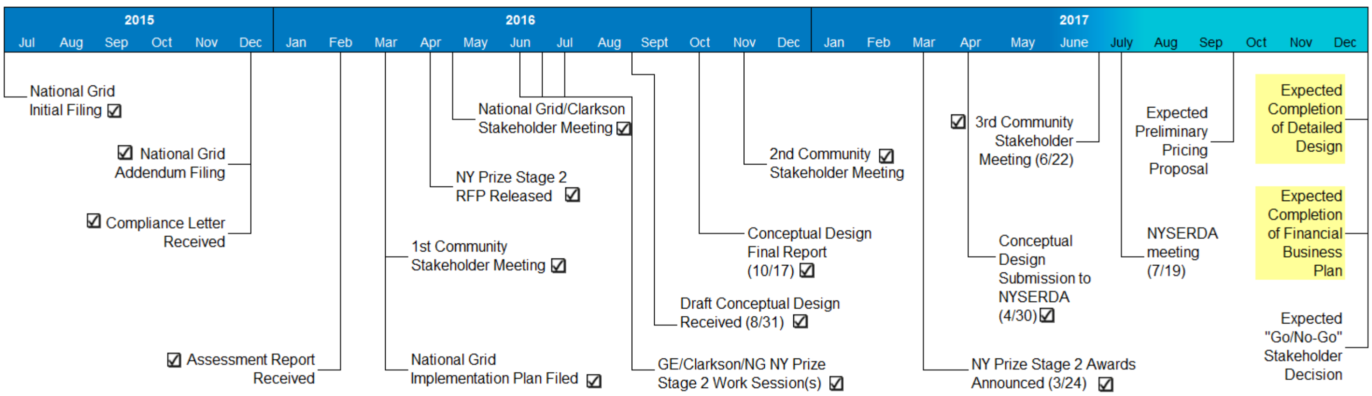

Figure 2.1 – Achievements and Milestones Timeline

2.1 Major Task Activities

1. **Stage 2 Report Writing**
   The Project team continues to use the NY Prize Stage 2 SOW as a guide to execute the Detailed Engineering Design and Financial and Business Plan phase (Phase 2) of the Project. Documentation based on each subtask of the SOW is being created to ultimately form a cohesive document explaining all aspects of the microgrid. This document will serve as the basis for the eventual NY Prize Stage 3 (Project Build-Out RFP) application, expected to be released by NYSERDA in May 2018. A task tracking document was created during the contracting and scoping phase of the Project to establish a timeline and aid in the monitoring of deliverables.

   In general, the task deliverables focused on describing the basic capabilities of the microgrid such as site characteristics, fuel specifications, current generation sources, future generation needs, as well as other general information. This information was based on results from Phase 1 of the Project. Other areas that were addressed include the load profiles from OBG's analysis and the existing and proposed DER Analysis. Drafts of Reports due in Q2 2017 were received, with several being delivered on June 30, 2017. The Project team is reviewing the information provided and offering team members' revisions and suggestions.

[2] Case 14-M-0101, *Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision* ("REV Proceeding"), National Grid Implementation Plan for Community Resilience REV Demonstration Project, Potsdam, New York (filed March 11, 2016).

2. Final Energy Audits

As stated in the Q1 2017 Report, OBG completed the Preliminary Energy-Use Analysis (“PEA”) and walk-through survey for three (3) customers of the microgrid; Clarkson University (Hill Campus), SUNY Potsdam, and Canton-Potsdam Hospital during February and March 2017. The ultimate purpose of the energy audits is to estimate the potential impact on microgrid asset sizing from energy efficiency (“EE”) improvements and demand response (“DR”) by the largest energy loads in the microgrid. Recent load analysis indicated these entities comprise 90% of the load profile within the microgrid.

OBG completed their analysis during Q2 2017 and presented formal Energy Audit Reports to the Project team in May 2017. All three (3) Reports were extensive and included the requirements NYSERDA stipulated in the NY Prize Stage 2 scope of work. The OBG audit team provided detailed energy conservation measures (“ECMs”) and DR measures that would help reduce the load demands these customers exert onto the microgrid.

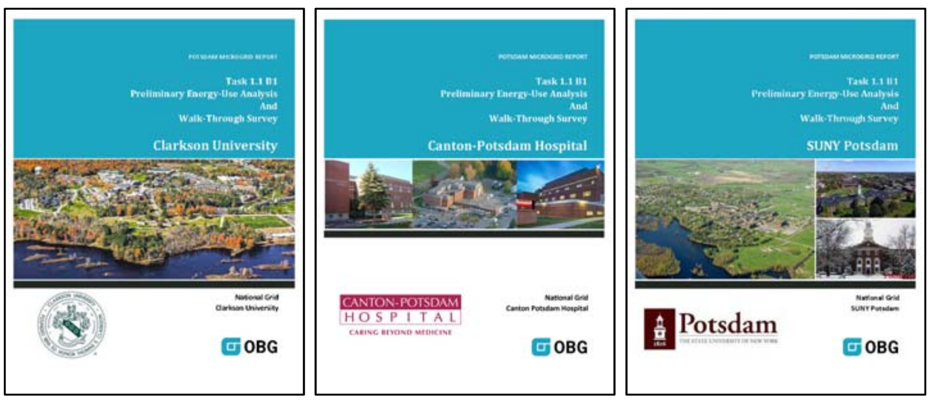

Figure 2.2 – Energy Audit Reports

Each of the Energy Audit Reports describes measures for individual customers specific to their buildings and energy needs. The Energy Audit Reports found nearly 1.3 MW of combined ECMs in the three (3) institutions ranging from light-emitting diode (“LED”) retrofitting; heating, ventilation, and air conditioning (“HVAC”) occupancy sensors; and existing building commissioning. OBG also provided the customers with estimated costs of the EE measures and potential payback periods. The Energy Audit Reports also found over 900 kW in DR options for these customers; mainly using proposed control systems to reduce lighting power in non-essential buildings, as well as temperature control for the HVAC systems. A summary of the ECM and DR reduction can be found in Table 2.1 below.

	ECM (kW)	DR (kW)	Total (kW)
Clarkson University	612	479	1,091
SUNY Potsdam	580	427	1,007
Canton-Potsdam Hospital	105	26	131
Total	**1,297**	**932**	**2,229**

Table 2.1 – Energy Conservation Measures and Demand Response Results from Energy Audit Reports

The Project team took this opportunity to connect with these customers individually to review the findings. In the Project timeline, these meetings are considered the 3rd Community Stakeholder meeting and took place on June 22 with representatives from National Grid and other team members present. The meetings went well, and all three (3) customers appreciated the very detailed Energy Audit Reports provided by OBG.

During the meetings, the Project team learned more about each customer's future energy plans and how they could affect the development of the microgrid. Canton-Potsdam Hospital is moving forward with construction of an ambulatory and surgery center addition, (estimated to commence in the spring of 2018), and a new bed tower (estimated to start in 2-3 years). Additionally, construction of a new physical plant to incorporate the thermal needs of the hospital's campus is being considered. SUNY Potsdam has recently installed meters in all individual buildings and is using a remote portal to monitor usage. Clarkson University is also in the process of installing meters throughout their campus. This will give both colleges better data to make educated energy decisions on their respective campuses. The representative from Clarkson University also mentioned they were approached by a solar photovoltaic ("PV") developer to consider installing solar PV panels on the Hill campus buildings. No detailed information was provided, but Clarkson University will keep National Grid informed of any developments.

3. DER-CAM Analysis

The Distributed Energy Resources Customer Adoption Model ("DER-CAM")[3] is an economic and environmental model that evaluates adoption of DER assets in grid-connected and off-grid microgrid systems. This model has been in development at Lawrence Berkeley National Laboratory since 2000. DER assets may include distributed generation ("DG"), energy storage, DR, combined heat and power ("CHP") systems, and CHP- based absorption chillers. The model can be used for individual customer sites or multiple facilities connected through a microgrid.

The model performs the following principal tasks:

- Determine the least-cost portfolio of DER assets (*i.e.,* DG, renewable energy, energy storage, and DR) required to meet the microgrid's electrical and thermal loads.

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

- Determine the hourly dispatch and operation of DER (in 12 Month x 24 Hour matrix form) with outputs that include generation in kWh, fuel consumption, and emissions.
- Determine the annualized cost of the microgrid DER (including installed capital costs, fixed operation and maintenance ("FO&M") costs, variable operation and maintenance ("VO&M") costs, and fuel costs.

Key inputs for the model include:

- Microgrid sites' end-use load profiles, including any electrical and thermal loads (including heating, cooling, hot water, and refrigeration loads) in 12 month x 24 hour profiles.
- Microgrid customers' default electricity tariff, natural gas prices, and other relevant prices.
- Capital, operation and maintenance ("O&M"), and fuel costs of the various available technologies, together with the interest rate on customer investment.
- Basic physical characteristics of alternative generating, heat recovery and cooling technologies, including the thermal-electric ratio that determines how much residual heat is available as a function of generator electric output.

Outputs of the model include:

- Capacities of DER, DG, and CHP technology or combination of technologies to be installed.
- When and how much of the capacity installed will be running.
- Total cost of supplying the electric and heat loads.
- Annualized costs of the microgrid.
- DER electrical and thermal generation.
- DER fuel consumption.
- DER greenhouse gas ("GHG") and criteria pollutant emissions.

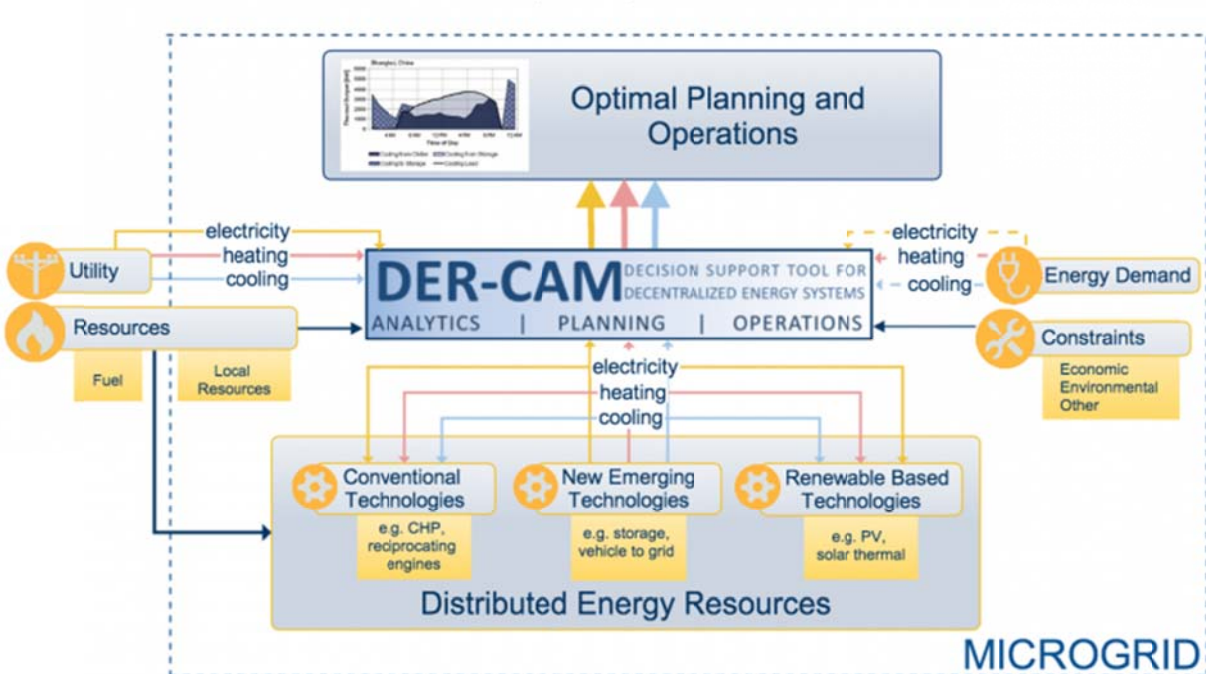

Figure 2.3 – DER-CAM Schematic

DER-CAM can consider microgrid operation in grid-connected, islanded, and in fully off-grid mode.

Preliminary DER-CAM Results
A preliminary DER-CAM analysis was performed in order to (a) determine the appropriate size of additional DER needed to provide resiliency for the Potsdam microgrid during prolonged outages, and (b) to determine the dispatch profile of the DER during grid-connected (normal days) and islanded (emergency/outage periods) modes.

The microgrid hourly loads in the normal grid-connected days are based on the historical 2015 data. 2015 data was selected since 2015 hourly loads were somewhat greater than the 2016 load data. For the appropriate sizing of the microgrid DER, the emergency week (*i.e.,* the fictional week when the power grid experiences outages) was assumed to occur during the week of highest microgrid load. Based on the 2015 historical data, the microgrid's peak load is 10,889 kW during the month of September.

During the initial run, none of the existing generation resources were integrated into the DER-CAM model, resulting in a total of 10,000 kW of reciprocating engines for inclusion in the microgrid. However, if some of the existing larger, natural gas-based generation units are included in the microgrid, then the DER-CAM model selects only 4,300 kW of additional generation resources. During Phase 1 of the Project the preliminary DER-CAM analysis resulted in 4,000 kW of additional generation required to cover the load of the microgrid. Table 2.2 below displays the results of the DER-CAM analysis.

	Energy (kW)	
	Peak Load:	**10,889**
New Generation	4,300	
Existing Generation	4,440	
ECM	1,297	
DR	878	
	Total DER:	**10,915**
	Net Surplus Generation:	**26**

Table 2.2 – DER-CAM Results

Under present electric rate and fuel price assumptions, the new DER generation almost never dispatches during normal days. This is mainly due to the combination of relatively higher natural gas prices and lower electricity prices, which causes the microgrid DER generation to be less economical compared to power purchases from the grid.

To evaluate the impact of natural gas prices on the operation of the microgrid, a model run was made with relatively lower natural gas prices. Consequently, the DER generation relative to the total annual microgrid load increased from 2.56% to

33.75%. This is a strong indication of the significant impact of electricity and natural gas price drivers on the economic viability of the microgrid and its DER assets.

4. **Tiered Recovery**

After utilizing 2016 meter data for the load analysis of microgrid customers (Tiers 1a and 1b), the Project team made the decision to complete an updated tiered recovery analysis using 2016 customer usage data for Tiers 2-5 as well. Previous tiered recovery analysis used 2014 and 2015 meter data.

During this analysis it was discovered that previous iterations included inactive accounts and street lighting accounts. Given the nature of the proposed microgrid surcharge, it was advised that any analysis should remove inactive accounts and street lighting accounts for the most accurate representation of possible recovery effects. Therefore, the customer count figures are reduced from those displayed in previous Quarterly Reports. Table 2.3 below describes the tiers and provides the updated customer count figures.

	Customer Tier Parameters[1]	Criteria	Customer Accounts
Tier 1a	Clarkson University, SUNY Potsdam, Village of Potsdam	Connected Generators	3
Tier 1b	Canton-Potsdam Hospital, The Clarkson Inn, North Country Savings Bank, IGA Grocery, Kinney Drug Store, Stewart's Shops Gas Station, PVRS, Potsdam High School, National Grid Service Center	Connected Load only	9
Tier 2	Village of Potsdam Border	Police	2,575
Tier 3	Town of Potsdam Border	Fire	3,425
Tier 4	Village of Norwood, Town of Pierrepont, Town of Colton, Town of Stockholm (portion), Town of Norfolk (portion)[2]	Rescue Squad	3,595
Tier 5	Zip codes: 13625, 13695, 13639, 13635, 13684, 13652, 13630, 13687, 13672, 13617, 13676, 13699, 13660, 13668, 13696, 13697, 12965, 12967, 13613, 13667, 13621, 13694, 12922, 12927, 13677, 13647, 13678	Hospital	14,130
	Total Customer Accounts:		**23,737**

[1] *All tiers are exclusive of previous tier's customers.*
[2] *Tier 4 based on Potsdam Volunteer Rescue Squad's ("PVRS") service territory, which covers portions of the Towns of Stockholm and Norfolk.*

Table 2.3 – Tiered Approach Parameters

In addition, the new data showed a slight increase in usage of the surrounding area. This, along with the reduction in total customer accounts, resulted in an increase in potential bill impact figures for customers in the Potsdam area. On average, the connected participant would experience an increase of ten (10) percent on their delivery charge, while the surrounding supportive tiers would see decreasing levels of impact ranging from seven (7) to three (3) percent increase on their total bill. Table 2.4 below displays the potential bill increase figures by customer class.

Rate Class	Customer Bill Impact (%)					
	Residential	Sm. Com (Non-Demand)	Sm. Com (Demand)	Lg. Com (Primary)	Lg. Com (Trans)	
	SC1	SC-2ND	SC-2D	SC-3Pri	SC-3A Tran	*AVG.*
Tier 1a[1]	N/A	N/A	N/A	11.10%	N/A	11.10%
Tier 1b[1]	N/A	N/A	12.40%	6.16%	N/A	9.75%
Tier 2	4.93%	4.97%	7.39%	11.26%	N/A	7.14%
Tier 3	4.22%	4.25%	5.31%	7.49%	6.71%	5.59%
Tier 4	4.03%	4.06%	5.21%	4.43%	N/A	4.43%
Tier 5	2.30%	2.31%	3.07%	3.87%	5.12%	3.34%

[1] *Tier 1a and 1b represent delivery only bill impact figures, while the other tiers represent total bill impact figures.*

Table 2.4 – Customer Monthly Bill Impact Percentages

Previous analyses showed that the tiered recovery model could recover up to $12M of the utility's investment and still result in bill increase figures congruent with other capital projects. The most recent analysis used the same $12M benchmark for the underground investment. However, as stated in previous Quarterly Reports, the full underground distribution system is estimated to cost roughly $23M (including both equipment and installation costs).

While the tiered recovery model appears to be an appropriate mechanism for localized asset recovery, the results of this continued analysis leads to further speculation as to the effectiveness of the tiered recovery approach on this specific population. The microgrid design requires adaptation to reduce the investment costs, or the remaining deficit will need to be recovered from sources other than the local customer base in Potsdam, such as from outside funding (*e.g.,* state or federal loan and/or grants).

5. Staged Roll-out

Further analysis and adaptation of the microgrid is required in order for the investment to become more economic. While the originally envisioned, large community microgrid involved multiple critical services, a smaller, more cost-effective version may be necessary. During Q2 2017, the Project team began their analysis of a possible staged roll-out of the microgrid. This approach would allow the investment to occur over a period of time with the costs associated with each stage spread out into the future.

Table 2.5 below describes the stages of this approach, while Figure 2.4 that follows provides a geographic representation of each stage.

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

[1] *All load data based on 2016 meter data.*
[2] *All generation data based on nameplate capacity of generating asset.*

Table 2.5 – Staged Roll-Out Approach

Figure 2.4 – Staged Roll-Out Approach Map

This approach presents some additional challenges to the Project execution and will ultimately change which entities are connected to the microgrid as well as how much new generation is required for islanding.

The initial stage (Stage 1), as proposed, would include the majority of the critical services included in the original Project Implementation Plan,[4] specifically, the Potsdam fire department, police department, and rescue squad. In addition, this initial stage would also include a number of commercial enterprises including the North Country Savings Bank, Kinney Drugs, The Clarkson Inn, IGA grocery store, and Stewart's Shops gas station. Clarkson University and its net-metered West Hydro facility would also be included.

While this initial stage was developed because of its simplistic route via Maple Street and Main Street, the Village-owned East Hydro facility and Village water treatment plant's proximity allows for a smaller tangential stage (1b) being included as the next apparent stage. Both Stage 1 and 1b would most likely be developed simultaneously.

[4] Case 14-M-0101, *supra* note 2.

Tiered Recovery with Staged Roll-out
As described in previous Quarterly Reports, the tiered recovery model was developed based on access to critical infrastructure and services. The Project team collected data on the territories of each critical service that would potentially offer services through the microgrid during an emergency. Each tier is based on these service territories, with decreasing availability as they expand outward from the microgrid itself.

With the addition of the staged roll-out approach, each stage provides different critical services throughout the incremental development. Therefore, while the investment costs decrease with a scaled-back microgrid, so does that of the recovery mechanism developed with the tiered recovery model. However, as described above, the initial stage does include a majority of the critical services allowing for recovery of the investment through Tier 4, based on the service territory of the rescue squad as well as other Village and Town services, such as the water filtration plant and fire/rescue/police services. Fortunately, based on the service territory of Canton-Potsdam Hospital, the staged roll-out approach can take advantage of the full tiered recovery model during Stage 2.

Cost Estimates of Staged Roll-out
With the establishment of the six (6) stages, the next part of the staged roll-out approach will be to include cost estimates of each stage. This will include more precise estimates of duct and cable footage, number of manholes and switchgear, and labor costs. Full financial analysis of each stage will be included in subsequent Quarterly Reports based on these cost estimates.

2.2 Challenges, Changes, and Lessons Learned

The issues or changes chart has been updated to reflect those occurring during the current calendar year with previous learnings being retired from the list.

Qtr. 2017	Issue or Change	What was the resulting change to Project scope/timeline?	Strategies to resolve	Lessons Learned
Q1	NYISO developing new DER pricing model and aggregation guidance.	Market changes could alter the microgrid's potential participation in electricity market activities and how that participation is compensated.	Meet with NYISO to work through changes. Anticipate pricing options during financial analysis.	The changing landscape of DER in New York could have measurable effect on integration into the market.
Q1	OBG load analysis showed higher load in proposed microgrid.	This may require additional generation on site (more than anticipated) and/or removal of some sites from consideration.	Compare 2013-2014 load analysis to 2015-2016 to locate shifts in usage by load site.	Analysis must consider increased demand from customers and build microgrid to accommodate.
Q1	The PSC issued an order in the Value of DER ("VDER") Proceeding, providing immediate improvements in granularity in understanding and compensating for the value of DER to the electric system while setting the foundation for continual improvement.[5]	Market changes could alter the microgrid's potential participation in market activities and how that participation is compensated.	Work with the PSC and National Grid Regulatory group to monitor changes in DER valuation.	The changing landscape of DER in New York could have measurable effect on integration into the market.
Q1	The Project team became aware that the ownership of the IGA Grocery Store is changing.	The new owners may not see the benefit of the microgrid and withdraw interest.	The Project team is reaching out to the new owners to discuss the Project.	The changing ownership (or governance) of partners complicates stakeholder relations.
Q1	The NY Prize Stage 2 competition is behind its original schedule, including a longer timeline and an altered scope of work.	There may need to be changes in the Project timeline as new requirements may add activities and require a revised schedule.	The Project team is reviewing NYSERDA's changes to gauge impact to the Project timeline. The Project Manager will contact NYSERDA to discuss the changes.	Investigate any changes to the NY Prize competition which may impact the Project timeline.

[5] Case 15-E-0751 *et al.*, In the Matter of the Value of Distributed Energy Resources ("VDER Proceeding") *et al.*, Order on Net Energy Metering Transition, Phase One of Value of Distributed Energy Resources, and Related Matters (issued March 9, 2017).

Qtr. 2017	Issue or Change	What was the resulting change to Project scope/timeline?	Strategies to resolve	Lessons Learned
Q2	Change in Project Leadership	Carlos Nouel replaces Phil Austen as Interim Project Sponsor, effective 4/1/17. Jon Nickerson to replace Michael Duschen as Project Manager, effective 8/1/17.	Transition plan developed by the former Project Manager to facilitate the shift in responsibilities.	Strong communication between all stakeholders is needed in order to maintain direction.
Q2	Rob Miller (Energy Manager) left position and James DiTullio (Facilities Manager) retired from SUNY Potsdam.	No change in scope or timeline but needs monitoring.	Project team reaching out to new energy manager to discuss the Project.	Changing leadership of partners complicates stakeholder relations.
Q2	Canton-Potsdam Hospital informed Project team of upcoming expansion plans.	No change in scope or timeline but may change required generation needs.	Adapt DER-CAM analysis and include possible increased load profile to ensure adequate generation for microgrid.	Capital investment plans by participants may increase load profile of microgrid, resulting in need for more generating assets.
Q2	Updated DER-CAM analysis shows more generation needed than originally planned.	Increased generation results in an increased cost of the microgrid.	Continue investigation of staged roll-out to reduce load profile and investment cost of the microgrid.	A large, multi-stakeholder community microgrid may provide too complex for economic model.

3.0 Next Quarter Forecast

In the third quarter of 2017, the Project team will continue its efforts on the business modeling and detailed engineering design with its partners using the NYSERDA NY Prize SOW as a guide. Detailed explanation of the proposed provisions of the microgrid, such as fuel specifications, current generation sources, future generation needs, as well as other general information will be documented for the NY Prize Stage 3 RFP response, expected in May 2018. In addition, the Project team will meet with NYSERDA in July 2017 to officially close Clarkson University's PON project that funded the conceptual design phase of the Project.

As the Project continues, it becomes increasingly clear that the scope and cost of this community microgrid exceeds the possible return the partners and community can reap from its installation. Therefore, the emphasis entering Q3 2017 will be to investigate a scaled-back microgrid, as described in Section 2.1.5 above, with additional examination of the staged roll-out of the microgrid. With the move to a smaller microgrid, many assumptions and calculations used during Phase 1 will require adjustment moving forward. Cost estimates for each individual stage will need to be calculated based on the new configurations. This includes estimated footage of ducts and cables, number of manholes and switchgear, and labor costs. Current load profiles of microgrid customers, using 2015-2016 meter data, can be utilized for the new analysis.

The new staged roll-out version of the microgrid will potentially eliminate stakeholders already committed to the Project's success. The Project team will be tasked with mitigation of issues that arise once customers are advised that they may be excluded from the initial build-out. Once the microgrid scale is finalized, additional stakeholder meeting(s) will convey costs and benefits of the staged roll-out to the customers.

Based on the scaled-down version, the Project team will continue to work on the business and governance model to present a clear and compelling case that the benefits to the community, stakeholders, and utility outweigh associated costs and risks. Most of the structure of the already developed model can easily be altered as the microgrid scope is condensed. The financial analysis model currently being developed will be the basis of the value proposition developed by the Project team in Q3 2017. Key to the value proposition will be National Grid's Preliminary Pricing Proposal, currently on hold until the scope and size of the microgrid is finalized. Expected completion of this deliverable has shifted into the fall of 2017. 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 wire network will also be included.

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 – 9/30/17	Ongoing
4	Phase 2 Completion *(Detailed Engineering Design and Business Plan)*	3/16/16 – 6/30/17	10/1/16 – 12/31/17	Ongoing

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 University team completed the final Report on April 30, 2017 and has set up a final close-out meeting with NYSERDA to take place in July 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 will, most likely, not change moving forward. 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: 9/30/17

In the Project Implementation Plan,[6] National Grid offered this milestone as an opportunity to present 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 and Q2 2017, but the pricing options have yet to be finalized in a manner to be conveyed to stakeholders. The adjusted timeline shifts the emphasis of this task into the third quarter of 2017, with a presentation of findings to stakeholders anticipated in the fall of 2017.

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

Status: ● - Ongoing
Start date: 10/1/16
End date: 12/31/17

National Grid continues to partner with GE and OBG to work on the Detailed Engineering Design and Financial and Business Plan Assessment in line with NY Prize Stage 2. GE is subcontracting with Clarkson University and Nova Energy to perform some of the tasks that are outside of GE's area of expertise.

As mentioned in previous Quarterly Reports, the Project team anticipates this milestone to be completed by the end of 2017. The end objective of this Project is to apply for NY Prize Stage 3 funding. It is anticipated that NYSERDA will announce the Stage 3 RFP in May 2018. This allows the Project time to complete the tasks associated with Stage 2 and develop the Detailed Engineering Design and Financial and Business Plan Assessment.

[6] Case 14-M-0101, *supra note 2.*

4.0 Work Plan & Budget Review

4.1 Updated Work Plan

Updated Gantt chart from Project Implementation Plan is below:

Task Name	Duration	Start	Finish
REV Demonstration	**557 days**	**Tue 12/15/15**	**Wed 1/31/18**
Demonstration Approval	1 day	Tue 12/15/15	Tue 12/15/15
General Project Management	**335 days**	**Mon 3/21/16**	**Fri 6/30/17**
Benefit Analysis for Stakeholder Engagement	3.2 mons	Mon 1/2/17	Thu 3/30/17
Stakeholder engagement and community outreach	**402 days**	**Wed 12/16/15**	**Fri 6/30/17**
Initial Stakeholder Engagement	64 days	Wed 12/16/15	Mon 3/14/16
Initial Stakeholder Meeting	0 days	Mon 3/14/16	Mon 3/14/16
Second Stakeholder Meeting	0 days	Mon 10/24/16	Mon 10/24/16
Third Stakeholder Meeting	0 days	Fri 6/30/17	Fri 6/30/17
Conceptual Design Complete Milestone	0 days	Mon 10/17/16	Mon 10/17/16
Initial Engineering Design Recovery Plan (Capital Costs)	4 mons	Mon 6/13/16	Fri 9/30/16
Initial Tariff Design (Commodity Costs)	6 mons	Mon 9/12/16	Fri 2/24/17
Preliminary Service Proposals & Pricing Milestone	87 days	Thu 6/1/17	Fri 9/29/17
Stakeholder feedback on initial cost estimates and recovery/payment plan & additional community outreach	1 mon	Mon 10/2/17	Fri 10/27/17
Coordinate and incorporate stakeholder feedback with Detailed Design Study team	1 mon	Mon 10/30/17	Fri 11/24/17
Revise tariffs based on possible changes to NY Prize technical study	1 mon	Mon 11/27/17	Fri 12/22/17
Draft contracts for Go/No-Go meeting with refined tariffs and business cases	1 mon	Mon 12/4/17	Fri 12/29/17
Financial/Business Plan & Contracting	1 mon	Wed 12/6/17	Tue 1/2/18
Completion of Financial/Business Plan ("Go/No-Go")	0 days	Tue 1/2/18	Tue 1/2/18
NY Prize Stage 3 RFP Announced	23 days	Mon 1/1/18	Wed 1/31/18

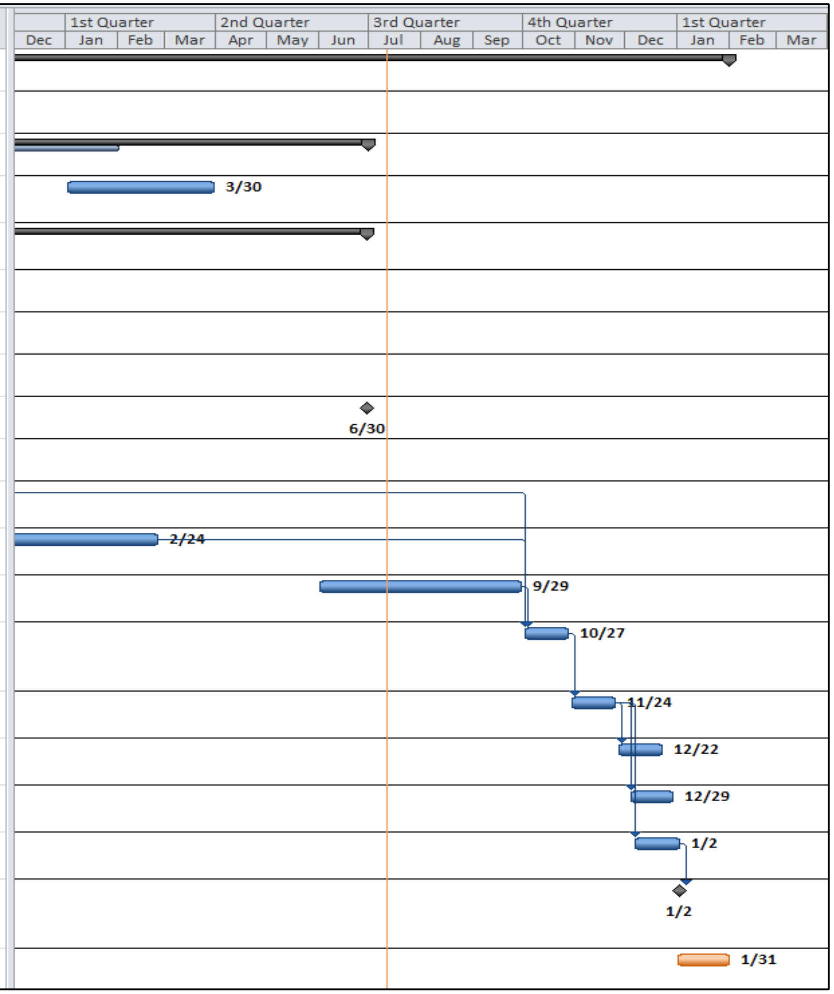

Figure 4.1 – Updated Gantt Chart from Project Implementation Plan.

4.2 Updated Budget

Table 4.1 below displays the updated total expenditures through June 30, 2017.

Task	Budget	Quarterly Spend	Spend to Date	Remaining Balance
Project Administration and Planning	$131,000	$11,084	$230,565	($99,565)
Marketing and Community Engagement	$200,000	$4,679	$81,656	$118,344
Implementation	$275,000	$24,112	$75,634	$199,366
Audit Grade Detailed Engineering Design	$1,000,000	$196,030	$220,430	$779,570
Totals:	**$1,606,000**	**$235,905**	**$608,285**	**$997,715**

Table 4.1 – Updated Budget

The incremental costs associated with the Project as of June 30, 2017 total $193,727. Continued monitoring and reporting of incremental costs will be included in subsequent Quarterly Reports.

As the Project moves from the initial planning and Conceptual Design phase and into the Detailed Engineering Design and Implementation phase, the budget has shifted reliance to the latter's expense line items. While the majority of 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.

5.0 Progress Metrics

The size and number of participants in the microgrid will dramatically change the projected cost and configuration of the microgrid construction. This section will track the current projected cost range of the microgrid depending on the most recent engineering 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 not changed from Q1 2017, as displayed in Table 5.1. However, the new staged rollout approach will change the timing of the expenditures and ultimately affect 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
Projected Cost Range of Microgrid Construction	\$35M - \$60M[1]	\$26.4M - \$61.3M[2]	\$26.4M - \$61.3M[2]
Underground Wire Cost Range	\$11.3M - \$11.8M	\$7.4M - \$12.0M	\$15.4M - \$23.8M[3]
Projected Resiliency Duration	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.

Table 5.1 – Cost of Microgrid

5.2 Tiered Recovery Population

The National Grid team used revised 2016 data in the tiered recovery model resulting in the customer counts displayed in Table 5.2. The total customer counts in each tier decreased slightly due to the removal of inactive accounts in target population as well as street lighting accounts. Previous iterations used total customer counts, including inactive and street lighting accounts in the Company's billing system.

	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 Customers

Other metrics may be added to subsequent Quarterly Reports as they become more relevant as the Project progresses.