Smart City
REV Demonstration Project
City of Schenectady, New York
Case 14-M-0101

Quarterly Report – Q4 2020

January 29, 2021

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1.0 Executive Summary

Niagara Mohawk Power Corporation d/b/a National Grid ("National Grid" or the "Company") has partnered with the City of Schenectady ("Schenectady" or the "City") to demonstrate a smart city solution. Using the Company's outdoor lighting infrastructure as a platform for advanced outdoor lighting services, the Company and the City are deploying smart city technologies and testing the business models that will animate the advanced outdoor lighting and the smart city markets (the "Project").

The Project is intended to identify innovative smart city solutions that will help the City expand the breadth and efficiency of the services it provides to its residents. This approach aligns with the Company's efforts to test, scale, and deploy clean energy solutions in line with the Reforming the Energy Vision ("REV") objectives, the State's clean energy agenda, including the Climate Leadership and Community Protection Act ("CLCPA"), and National Grid's own clean energy ambitions. Specifically, the partnership between the Company and the City will test whether the Company's outdoor lighting infrastructure can facilitate the adoption of smart city technologies by deploying approximately 4,275 efficient light-emitting diodes ("LED") outdoor lighting fixtures, network lighting control ("NLC") nodes, and smart city technologies. The upgrades will effectively turn Schenectady into a smart city, capable of saving energy, more efficiently providing municipal services, and opening the door to further innovation.

During the fourth quarter of 2020, the Company advanced several aspects of the Project, including:

- Performed troubleshooting at 54 locations for NLC and streetlights issues.
- Installed five additional smart city sensors through the make-ready process and replaced four smart city sensors in Zone B.
- Replaced 30 acoustic sensors and performed gunshot testing in Zone A.
- Resolved network connectivity issue and stabilized the mesh network in Zone A.
- Implemented a Virtual Private Network ("VPN") connection to Itron's datacenter.
- Delivered Cisco® Kinetic for Cities platform and provided training to City staff.
- Completed cybersecurity testing of Phase 1 technologies and shared findings with vendor partners.
- Progressed Rensselaer Polytechnic Institute ("RPI") lighting research to survey development.
- Continued lab testing of NLCs and participated in American National Standards Institute ("ANSI") C136.50 standards drafting.
- Contracted with Phase 2 vendor Ubicquia® LLC and began solution planning workshops.

Finally, the Company performed engineering reviews of Phase 2 technologies to utility requirements and standards.

2.0 Highlights Since Implementation Plan Filing

The tables in Sections 2.1 and 2.2 below provide detailed descriptions of the major activities completed in the last quarter, as well as the challenges, lessons learned, and risk mitigation strategies from this work.

2.1 Major Task Activities

The Company worked on 11 significant tasks during the fourth quarter of 2020. First, the Company performed work at 54 locations for NLC and streetlight issues using the outage identification functionality within the lighting platforms. However, once NLCs lose power or connectivity, the platforms can only provide historical data for remote troubleshooting. This limitation requires the Company to service outages to diagnose whether it is a streetlight or an NLC issue. The majority of repairs during the quarter involve troubleshooting and replacing failed NLCs that experienced driver faults or firmware issues beyond what could be resolved remotely on application platforms. At several NLC outage locations, the Company was able to diagnose and remediate electric service issues. This finding illustrates NLCs are valuable in outage detection and service restoration because streetlight outages today rely on customer reporting. Being able to identify streetlight outages proactively enhances the Company's ability to address the outages. Nevertheless, the Company also observed premature NLC failures with both NLC solutions deployed, and has engaged with the manufacturers to replace the failed NLCs and requested further review of the failed units.

Second, the Company installed five additional Ubicquia® CityIQ nodes through the make-ready process, completing the installation of all smart sensors in Zone B. The Company also replaced four Ubicquia® CityIQ nodes in Zone B due to device failures and returned them to the manufacturer for refurbishment. With the observed failure rate, the Company communicated to Ubicquia® the need to have additional spares on hand for replacement should failures continue.

Third, Cimcon®, at its expense, replaced 30 acoustic sensors with an alternative manufacturer because of product defects with the initial manufacturer. With the support of the City and, in particular, the Schenectady Police Department, Cimcon® replaced three acoustic sensors in three neighborhoods within Zone A on November 12. At each location, the sensor was calibrated by discharging three blank rounds from a starting pistol. The remaining 27 acoustic sensors were installed later in December by applying the same calibration settings from the initial three replacements. Gunshot testing was not required for the remaining 27 acoustic sensors. The replacement of 30 acoustic sensors marks the completion of Phase 1 smart city deployment in Zone A.

Fourth, the Company worked collaboratively with Zone A vendor partners to resolve the mesh connectivity issue. Troubleshooting steps included antenna swap outs, NLC replacements, and a router replacement. The network has stabilized since early December with more than 98 percent endpoint connectivity. The vendor partners will submit a root cause analysis to the Company in the next quarter. With the network stabilized and lighting functionality restored, this marks the completion of Phase 1 smart lighting deployment in Zone A.

Fifth, the Company implemented a VPN connection to Itron's Datacenter to access the backend Cisco® Internet of Things ("IoT") Field Network Director ("FND") application platform. The VPN provides a

secure communication tunnel between data centers to manage the multipurpose field area network in Zone A for network connectivity and bandwidth availability. The platform can also monitor third party IoT sensors operating on the same communication frequency and meeting the security requirements.

Sixth, Zone A vendor partners delivered additional use case domain integrations to the Cisco® Kinetics for Cities ("CKC") platform. The platform provides City staff with a "single pane of glass" to collect and integrate data collected from all sensors deployed in Zone A. Currently, the CKC platform provides the City with smart lighting integration (for NLCs), urban mobility (people count, vehicle count, and speed of vehicles), safety and security (suspicious object detection, gunshot detection, and alarm detection), and environmental monitoring (pollution monitoring). Remote user training was provided to City staff, which marks the delivery of all software platforms in Zone A.

Seventh, the Company's IT team and an independent cybersecurity testing vendor, Securicon®, concluded penetration testing of both technology solutions deployed in Phase 1. The test included a thorough architectural review for vulnerabilities and attempts to hack each type of sensor in the City. Findings were then shared with each appropriate vendor partners to devise a plan to bolster security protections.

Eighth, the Project team made progress on the development of a resident survey in collaboration with RPI. The team has gathered initial customer data in the two proposed test areas and is now determining what will be the best way to administer the survey. The COVID-19 pandemic has presented challenges regarding in-person focus groups. Therefore, the team is exploring alternatives to in-person surveys.

Ninth, the Company's Standards Lab continued NLC evaluations on the two NLCs deployed in Phase 1 against the latest draft version of the ANSI C136.50 standard for NLC energy measurement. The Company also performed the same tests on the Ubicell 2.0 NLCs, which is the current NLC product offered by Ubicquia®. With the available testing equipment at National Grid, the Company performed six of the 11 testing parameters and found deficiencies with all three NLCs. The Cimcon® NLCs used in the lab lacked an optical test output port, a requirement under ANSI C136.50, preventing the ability to perform any test. Current® by GE NLCs passed five of the six tests performed. Upon testing Ubicell 2.0 NLCs, the Company found it to be Class 2 as opposed to a Class 10 product (see Table 1). The Company shared this finding with Ubicquia® to correct for deficiencies in the Ubicell UG version. Prior to deploying Ubicell UG NLCs in Q2 2021, the Company will validate correction of those deficiencies before product acceptance.

Table 1. NLC tests were performed in accordance with the latest draft version of ANSI C136.50.

ANSI 136.50 Test Number	Description Of Certification Test	Test Result [Pass (P), Fail (F), or Not Performed (NP)]		
		Cimcon NLC (10/19/20)	Ubicell 2.0 NLC (10/21/20)	GE-LightGrid NLC (11/24/20)
Test #1	No Load	NP	P	F
Test #2	Load Performance	NP	F*	P
Test #3	Effect of Variation of Power Factor	NP	F*	P
Test #4	Effect of Variation of Voltage	NP	F*	P
Test #5	Effect of Variation of Frequency	NP	F*	P
Test #6	Effect of Variation of Ambient Temperature	NP	F*	P
Test #7	Voltage Interruptions	NP	NP**	NP**
Test #8	Effect of High Voltage Line Surges, Electrical Fast transients (EFT)	NP	NP**	NP**
Test #9	Effect of Electrostatic Discharge (ESD)	NP	NP**	NP**
Test #10	Effect of Operating Temperature	NP	NP***	NP***
Test #11	Effect of Relative Humidity	NP	NP***	NP***
(*) - expected result due to limited output-current of Ubicell 2.0 (Current Class 2). Schenectady Pilot 'Phase 2' will use revised model of Ubicquia NLC.				
(**) - test not performed in 'Phase 1' due to lack of testing equipment; usually not required for PSC Witness Test.				
(***) - test not performed in 'Phase 1' due to extensive labor/cost; usually not required for PSC Witness Test.				

Tenth, the Company reached an agreement with Ubicquia® LLC, an integrated smart city solution provider offering both NLCs and smart city technologies. The partnership will deploy some of the latest technology from Ubicquia®, which includes Ubicell® UG NLCs, UbiAir® environmental sensors, and UbiHub® AI smart city sensors. The Company held a kickoff meeting with the City to align goals and expectations for the upcoming Phase 2 deployment. Additionally, the three parties commenced weekly workshops for deployment planning.

Finally, the Company performed an engineering compliance review for the three types of devices planned for Phase 2 in accordance with the National Electrical Safety Code ("NESC"). Drawing from the experience gained with Phase 1 sensors, the Company identified several installation and clearance requirements for each sensor type. These requirements will govern the solution deployment planning process to balance locational value while avoiding congested poles.

With the completion of several significant tasks and all smart city sensor installations planned for Phase 1 in Q4 2020, the Company will transition its focus to construction planning activities for Phase 2. Due to delays with the City in its application process for third-party attachments, the Company anticipates establishing service connections in Q1 2021. The Company will continue to explore additional IoT sensors utilizing the deployed networks and phase 2 technologies, extending the task "National Grid Install IoT Mesh Network Sensors and Meters" into Q2 2021. The updates are included as part of the revised work plan included in Appendix A. Also, the Company provides a further description of general Project milestones below:

Anticipated Start /End Date	**Adjusted Start/End Date**	**Checkpoint/ Milestone**	**Status**	
October 2018 to December 2018		Install LED (Proof-of-Concept Stage; Max. 20 Fixtures)	Completed	
October 2018 to June 2019	October 2018 to June 2020	Install LED & NLC Nodes (Zones A & B; Approx. 2,250 Fixtures) Compare vendor solutions	Completed	
October 2019 to June 2020	October 2019 to October 2020	National Grid Install Smart City Sensor Nodes (Zones A & B)	Completed	
July 2019 to June 2021	January 2020 to December 2021	LED and NLC Node Steady State (Evaluate operational capabilities)	On Track	
July 2020 to October 2020	April 2021 to June 2021	Install LED and NLC Nodes (Zones C, D, & E; Approx. 2,000 fixtures)	On Track	
July 2020 to October 2020	April 2021 to May 2021	National Grid Install Smart City Sensor Nodes (Zones C, D, & E)	On Track	
January 2020 to July 2020	January 2020 to March 2021	City Install Smart City Device Attachments to	Delayed Completion	

Anticipated Start /End Date	Adjusted Start/End Date	Checkpoint/ Milestone	Status	
		Smart City Sensor Nodes (All Zones)		
October 2018 to March 2019	October 2018 to October 2019	National Grid Implement Multi-Purpose IoT Mesh Network	Completed	
September 2019 to October 2020	September 2019 to June 2021	National Grid Install IoT Mesh Network Sensors and Meters (Gas ERTs; Temperature Sensors; Environmental Sensors; Etc.)	Delayed Completion	
January 2019 to June 2020	June 2021 to December 2021	Explore potential Third-Parties Sensors (Smart-Home Devices; Electric Vehicle ("EV") Chargers; Water Leak Sensors; Water Shutoff Valves; Water Meters; Vacant-Home Sensors; Parking Management Sensors; Etc.)	On Track	
November 2020 to June 2021	June 2021 to December 2021	Steady State Review and Evaluations	On Track	

2.2 Successes, Challenges, Changes, and Lessons Learned

Below is a high-level description of lessons learned which the Company is using to inform its ongoing work and future smart city deployments:[1]

1. Because smart city technologies are non-traditional attachments to utility infrastructure, technology providers must provide product specification drawings and mounting methods for the Company to ensure code compliance before installation.
2. Once the utility provides installation guidelines, a field survey must be conducted at the proposed location to ensure existing conditions can safely accommodate the installation. The NESC H238B-2 requirement for the Current® by GE Digital Infrastructure node added complexity to the Project. However, this important lesson learned is a testament to the Company's strong culture of doing business through safety-by-design principles.
3. After starting to deploy street lights with NLC nodes, the Company and the City recognized the potential benefits offered through the technology. The lighting platform provides the City with greater control, convenience, and the potential to unlock additional energy savings through

[1] Item number 16 and beyond are new lessons learned during the quarter.

platform capabilities. The Company also recognized the value the technology can bring to enhance outdoor lighting services, deliver more carbon savings, and increase customer convenience.

4. Some smart city technologies are manufactured abroad, resulting in longer product lead times. This has created approximately three months of delays due to manufacturing and overseas transport. The Company used this lead time to conduct additional due diligence and prepare for the installation process.
5. Depending on the advanced network lighting solution, the installation needs to follow the optimal deployment scheme for the technology. Whether it is a point-to-many-points solution, cellular, or mesh technology, the deployment scheme should involve close communication and guidance with the manufacturer. This allows the technology to function as desired from the start.
6. Currently, there is no approved national metering accuracy standard for NLC nodes. While ANSI standard C136.50 is being developed, the Company believes ANSI standard C12.20 is a reasonable proxy to test NLC nodes for the Project. Additional time will be needed for lab testing of NLC nodes to incorporate the components of both ANSI standards.
7. The initial observations of the Project have identified a variety of NLC technology benefits that provide opportunities to enhance outdoor lighting services and provide operating efficiencies.
8. Continued involvement in the ANSI C136.50 NLC industry committee will build on the Company's meter testing experience for preliminary tests. The knowledge gained will enable the Company to formulate business models for various technology applications to provide customers with alternate service options and rate structures.
9. NLC metering accuracy specifications and industry-accepted testing requirements are needed before NLC meter data can be used for billing purposes. In addition, the integration of NLC meter data into the Company's billing system may require system upgrades.
10. The multipurpose mesh technology installed in Zone A has experienced numerous endpoint connectivity issues since installation in Q4 2019. The vendor group has reached out to Cisco® for support and to conduct a root cause analysis.
11. The Project has seen several replacements of both NLCs and smart city technologies due to product defects or premature failures. Failed pieces of equipment are being returned to the vendors for further diagnosis and investigation. Furthermore, vendors should provide spares to reduce lead times required for field replacements. The Company is taking this learning into the Phase 2 deployment and will explore options to minimize return trip expenses.
12. During the September 30th storm that impacted Schenectady County and the broader capital region, both smart city solutions deployed in Zone A and B required manual intervention to ensure functionality is restored after a power outage.
13. Technologies deployed in Zone B can also be used to enhance public safety. The data collected by the smart city technologies and accessed by City officials can help respond to dangerous incidents or circumstances and promote public safety. Toward realizing this benefit, the City will expand access to more staff members and provide additional internal training.
14. The cost of 4G LTE is decreasing, improving the cost-effectiveness of cellular networks for smart city technologies requiring high bandwidth for connectivity. Cat-M1 is an increasingly popular low cost, low power connectivity option for IoT devices. The project will deploy lighting controllers operating on a cellular provided Cat-M1 for connectivity.

15. LoRaWAN® is also becoming an increasingly popular low power IoT network connectivity option. The Project received a LoRaWAN® gateway from Phase 1 vendor partner Presidio®. The Company and the City will explore demonstration opportunities during Phase 2.
16. Several electric service related issues (*e.g.*, voltage and neutral) or premature NLC device failures (*e.g.*, communication module and internal relay) can lead to the NLC losing network connectivity. Once NLCs are offline, a truck-roll is required for further troubleshooting and repair.
17. The third-party attachment process involving co-owned utility poles requires attachers to submit individual applications to the owners. The application process can involve establishing new agreements, which can introduce delays in the attachment process.
18. Based on the current draft of the ANSI C136.50 standard, the Company can perform six of the 11 test parameters with the testing equipment available at National Grid. Additional ANSI C136.50 tests can be attempted by the Company; however, it would require additional time and resources to complete. With the limited testing equipment at National Grid and the national standard for NLC energy metering still in development, the Company plans to cease lab testing in Q2 2021.

The table below highlights the successes, challenges, and lessons learned in Q4 2020 and identifies the corresponding adjustment to the Phase 1 deployment and Phase 2 startup schedules:

Success, Issue, or Change	**Strategies to Resolve**	**Resulting Change to Project Scope/ Timeline**	**Lessons Learned**
NLCs can become offline due to power or device issues, which limits remote troubleshooting and requires field visits.	The Company will continue to monitor both NLC platforms for issues and address offline NLCs through field repair or replacement.	N/A	Once NLCs become offline, the NLC platform can only provide historical information contributing to the outage. A truck-roll will ultimately be required for further troubleshooting and service restoration.
The third-party attachment process involves the application to both owners of the utility pole (*e.g.*, telecom and utility).	Continue to work with the City for attachments. For joint-owned poles, the Company will establish a service connection once the approval is received from Verizon®.	Delay the task "City Install Smart City Device Attachments to Smart City Sensor Nodes" to March 2021	The attachment application process for co-owned utility poles can involve establishing new legal agreements with each pole owner. Establishing new legal agreements can be time-consuming for third-party attachers.
The Company has limited testing equipment to complete all test parameters required in the latest draft of the national NLC standard for energy metering.	The Company will continue to be involved in the development of the ANSI C136.50 standard. Further testing will require additional lab equipment and resources.	End lab testing of NLCs in Q2 2021.	Based on the current draft of the ANSI C136.50 standard, the Company can perform six of the 11 test parameters with the testing equipment available at National Grid. The Company can attempt additional ANSI C136.50 tests; however, it would require significant additional time and resources to complete. Once ANSI C136.50 is adopted and published, NLC manufacturers would need to undergo certification through independent laboratories regardless of the project results. Subsequently, standards and requirements would need to be adopted by the PSC, including the development of new processes and procedures for witness testing.

2.3 Stakeholder Engagement and Knowledge Sharing

In collaboration with the City, National Grid presented an overview of the Project and lessons learned at the Smart Regions Innovation, Recovery, & Resilience Workshop on October 29. The workshop focused on sharing best practices and experiences in building more resilient communities.

3.0 Next Quarter Forecast

With Phase 1 technology deployment and commissioning complete, the Project will shift its focus to planning and design activities for Phase 2. The Company will adopt an agile approach to continually assess COVID-19 related risks and adjust project timelines as needed. In the first quarter of 2021, the Company expects to perform the following tasks:

- Continue evaluation of the deployed technologies in Phase 1;
- Work collaboratively with the City on Phase 1 project costs and cost of service;
- Continue to support the City attachment process and prepare for service connection;
- Progress lighting research with RPI;
- Conclude lab testing of NLC nodes after testing Ubicell UG;
- Advance Phase 2 solution design and planning activities leading to deployment; and
- Conduct Phase 2 product installation training to internal and external resources.

4.0 Work Plan and Budget Review

4.1 Updated Work Plan

The Company updated the work plan outlined in the Project Implementation Plan to reflect changes in the status and ongoing workstreams. Given the complexities encountered on the Project, the Company updated the work plan to capture the following components:

1. Extend lab test NLC nodes into Q2 2021;
2. Continue to assist the City with City-owned attachments into Q2 2021; and
3. Continue to explore LoRaWAN® with the City into Q4 2021.

The updated work plan is included in Appendix A.

4.2 Current Budget

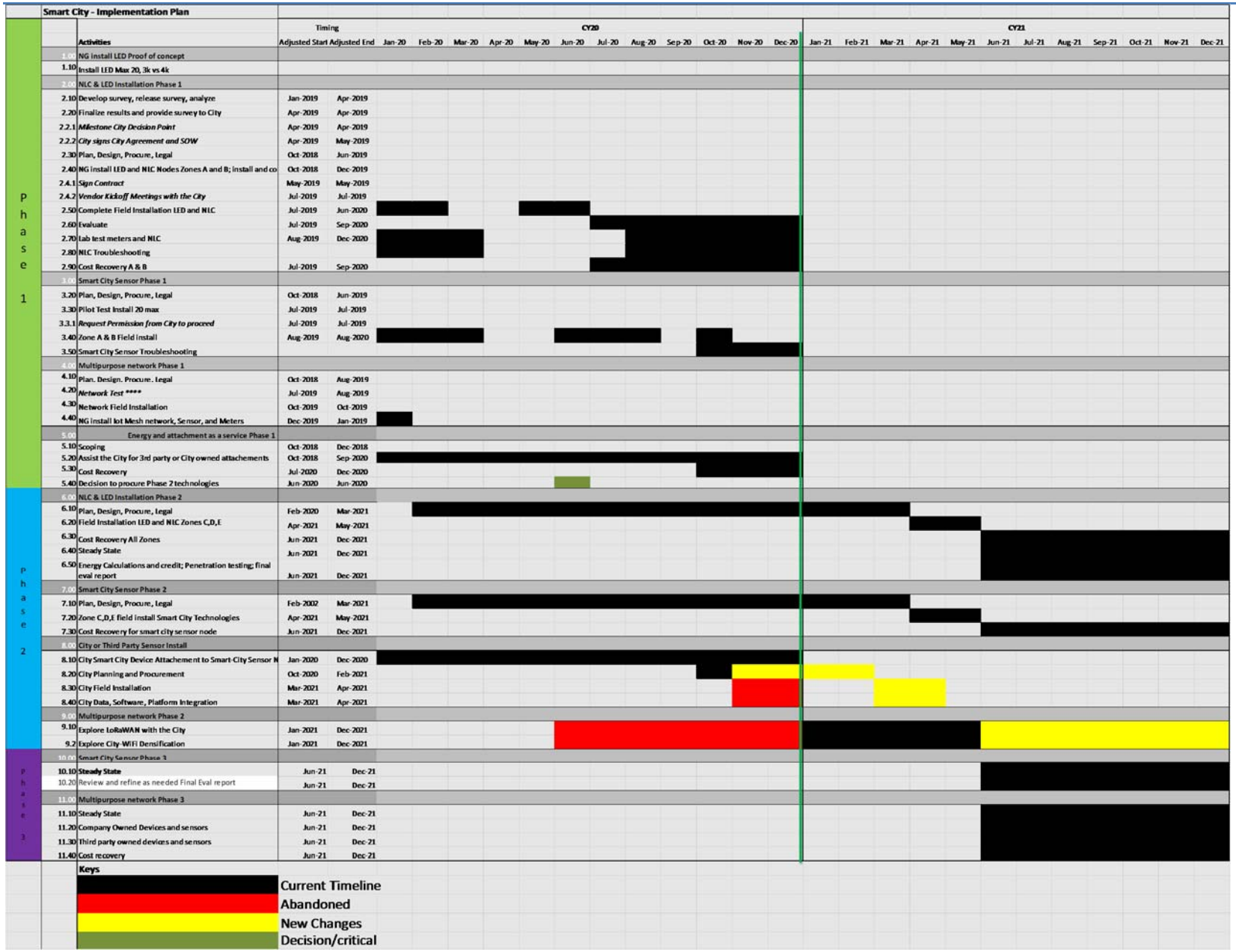
Project Task	Quarter Actual Spend	Project Total Spend to Date	Project Budget	Remaining Balance
CapEx				
	$356,615	$4,083,440	$6,510,000	$2,426,560
OpEx				
	$141,593	$141,593	$1,075,000	$933,407
Total	**$498,208**	**$4,225,033**	**$7,585,000**	**$3,359,967**

5.0 Quarterly Report Template

Quarterly Report Template	
Milestones:	
Project Milestones Accomplished:	1. Completed smart city technology installation planned in Phase 1. 2. Executed contract with Phase 2 vendor Ubicquia®. 3. Commissioned and validated operations of Phase 1 NLC solutions.
Next Quarter Project Milestones:	1. Advance Phase 2 solution design and planning activities leading to deployment. 2. Conduct Phase 2 product installation training to internal and external resources.
Tasks/Timeline:	
Completed Project Tasks Since Last Quarterly Report:	1. Performed troubleshooting at 54 locations for NLC and streetlights issues. 2. Installed five additional smart city sensors through the make-ready process and replaced four smart city sensors in Zone B. 3. Replaced 30 acoustic sensors and performed gunshot testing in Zone A. 4. Resolved the network connectivity issue and stabilized mesh network in Zone A. 5. Implemented a Virtual Private Network ("VPN") connection to Itron's datacenter. 6. Delivered Cisco Kinetic for Cities platform and provided training to City staff. 7. Completed cybersecurity testing of Phase 1 technologies and shared findings with vendor partners. 8. Progressed Rensselaer Polytechnic Institute ("RPI") lighting research to survey development. 9. Continued lab testing of NLCs and participated in American National Standards Institute ("ANSI") C136.50 standards drafting. 10. Contracted with Phase 2 vendor Ubicquia® LLC and began solution planning workshops. 11. Performed engineering reviews of Phase 2 technologies to utility requirements and standards.
Changes or Impacts to Schedule Since Last Quarterly Report:	1. Extend lab test NLC nodes into Q2 2021. 2. Continue to assist the City with City-owned attachments into Q2 2021. 3. Continue to explore LoRaWAN® with the City into Q4 2021.
Lessons Learned:	Please refer to section 2.2 Challenges, Changes, and Lessons Learned above.

Quarterly Report Template		
Work Stream Coordination:	Coordination occurring among the Company's electric and gas functions, procurement, communications, marketing, customer organization, energy efficiency, grid & network communications, metering and billing, grid modernization, AMI, and IT groups for engineering design, review, and deployment.	
Risks:		
Identified Risks:	COVID 19 can potentially delay product supply chain and field construction activities.	
Risk Mitigation Plan:	Work with Phase 2 suppliers and the installation contractor to ensure resources are aligned. Weekly meetings will allow parties to communicate potential delays and issues.	
Finance:		
Total Spend to Date:		$4,225,033
Target Budget Spend:		$4,519,531
Actual Incremental Spend:		$0
Variance:		$294,498
In-Kind and Grant Support (Specifically for REV Demo):		Estimated $150,000 from Phase 1 vendors. Estimated $156,000 from Ubicquia®
Additional Notes:		

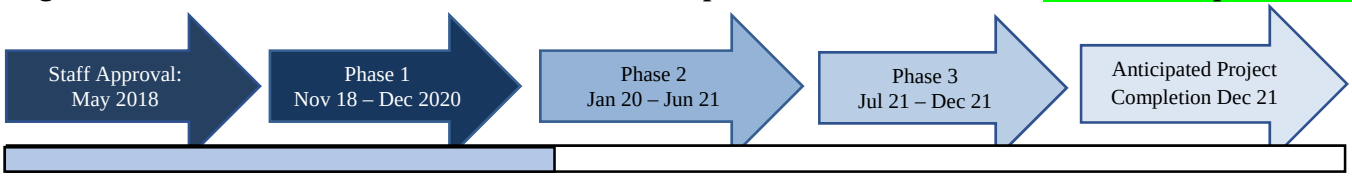
Appendix A – Updated Work Plan



Appendix B – Summary One Pager

nationalgrid **Smart City Schenectady REV Demo** **Q4 2020** **Overall Status (Active)**

Project Start Date: 05/24/2018 **Project End Date:** 12/30/2021
Budget: $7,585,000 **Current Quarter Spend:** $498,208 **Cumulative Spend**: $4,225,033



Project Summary: The Project is designed to test whether the Company's outdoor lighting infrastructure can serve as a platform for advanced services through the deployment of a multipurpose IoT network to enable smart-city technologies and to develop viable business models to animate the advanced outdoor lighting and smart city markets.

Cumulative Lessons Learned		
The Customer	**Market Partners**	**Utility Operations**
• Cities want more than smart lighting alone. The City of Schenectady intends to improve public services, increase public safety, and find ways to save money in the process. • The City and the Company understand the need to continue to engage with stakeholders as the Project progress. • Conversion to smart LED street lights with NLC nodes provides greater control, convenience, and opportunity for additional GHG savings that help meet clean energy and CLCPA goals. • Protecting citizen privacy and practicing cybersecurity are core towards a successful smart city deployment. • Installation costs are high. However, deployment cost reductions can be achieved by combining smart city installation with LED upgrades.	• The definition of a Smart City is different for each city. Technology solutions must be customized to meet the needs of the city. • Standardization and market advancements would improve network interoperability between smart-city devices. • New and disruptive smart-city technologies are emerging in the market. • The cost of smart lighting and IoT connectivity is decreasing. • The third-party attachment application process for co-owned utility poles can involve establishing new legal agreements with each pole owner. • Once ANSI C136.50 is adopted and published, NLC manufacturers would need to certify products through independent laboratories.	• Building a smart city entails a complex deployment of diverse smart technologies. Utility involvement consolidates smart cities into a packaged solution to manage complex deployments and provide long-term service. • Adequate time is needed to fully ensure the solution meets standard compliance and cybersecurity requirements. Initial field surveys are also required to ensure code compliance and clearances. • NLC nodes offer a range of customer benefits and provide opportunities to enhance outdoor lighting services. • NLC standards and requirements would need to be adopted by the PSC, including the development of new processes and procedures for witness testing.

Application of lessons learned: The Company is taking the learning gathered to inform its ongoing work and applying smart city attachment experience for other municipal applications.

Issues Identified: Ongoing COVID-19 pandemic may impact product supply chain and deployment schedules.

Solutions Identified: Work with Phase 2 suppliers and the installation contractor to ensure resources are aligned. Weekly meetings will allow parties to communicate potential delays and issues.

Recent Milestones/Targets Met: Completed smart city technology installation planned in Phase 1. Executed contract with Phase 2 vendor Ubicquia®. Commissioned and validated operations of Phase 1 NLC solutions.

Upcoming Milestones/Targets: Advance Phase 2 solution design and planning activities leading to the deployment. Conduct Phase 2 product installation training to internal and external resources.