



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

**Quarterly Report – Q4 2019**

January 31, 2020

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# 1.0 Executive Summary

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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 its *Northeast 80x50 Pathway*, the Reforming the Energy Vision (“REV”) objectives, and the State’s clean energy agenda, including the Climate Leadership and Community Protection Act (“CLCPA”). 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 2019, the Company successfully converted 96 percent of the street lights in Phase 1 to efficient LEDs with NLC nodes. The Project facilitated many single-trip installations during LED conversions to install Zone B smart city technologies at various approved locations. The Company continued to conduct field surveys to confirm whether existing pole conditions can accept the smart city technology and if the technology would introduce any compliance issues. Additional achievements include the installation of the multipurpose Internet of Things (“IoT”) network in Zone A, technology training to multiple city departments, and co-hosting four community engagement events in December. At the close of the quarter, the Project installed 221 smart city technology devices. The Project continued to make progress with lab testing of the NLC node chip meters and began to engage with the American National Standards Institute (“ANSI”) working group for ANSI standard C136.50 – American National Standard for Roadway and Area Lighting Equipment. Finally, the Company continued progressing Project workstreams to finalize Phase 1 deployment tasks and begin Phase 2 planning with the City.

## 2.0 Highlights Since Implementation Plan Filing

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The tables included 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 eight significant tasks during the fourth quarter of 2019. First, the Company continued LED conversions to include NLC nodes, communication networks, and smart city technologies in both zones of the Phase 1 deployment. Before deployment in Zone A, the Company conducted a final bench test of the multipurpose IoT network to ensure the NLC nodes and smart city devices could communicate on the network. With the successful bench test, the Company proceeded with LED conversions in Zone A. At the conclusion of the quarter, approximately 2,165 (96 percent) of the street lights were successfully converted to LEDs with NLC nodes.

Second, vendor partners held multiple training sessions the Company and the City. Vendor partners for Zone B conducted webinar training sessions to the Project team on the LightGrid® lighting platform (figure 1) and CityIQ™ platforms. Additionally, vendor partners provided in-person technology training to multiple City departments, including Police, Fire, Building, Engineering, Development, and Public Works.

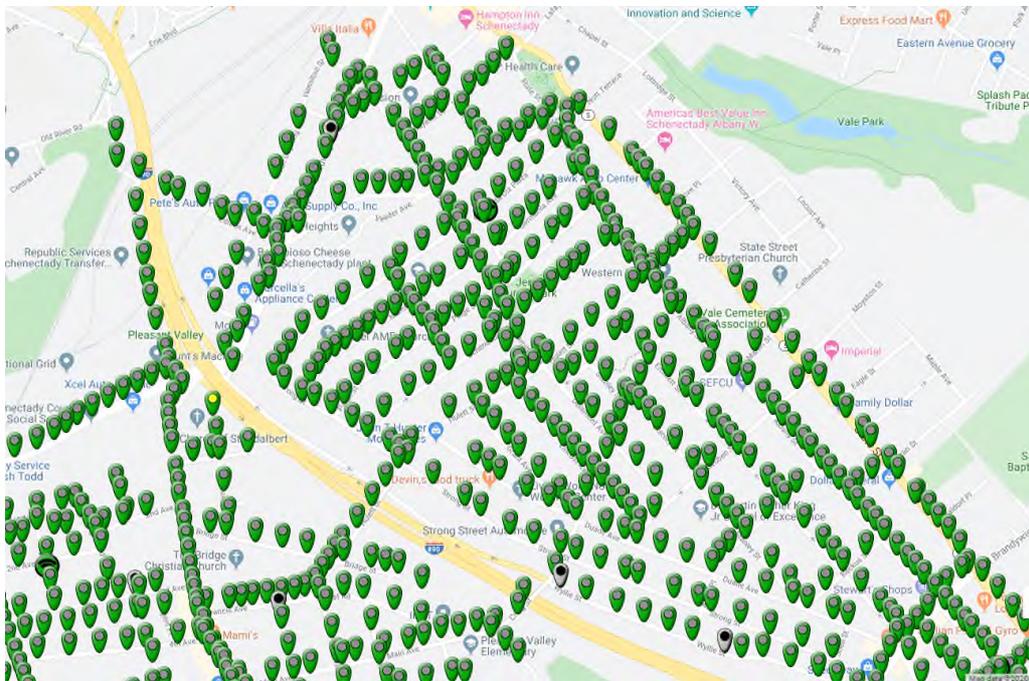


Figure 1. A map-view of LightGrid® lighting platform in Zone B.

Third, the Company continued to identify poles with clearances required for the Zone B smart city technology, which is governed by the National Electric Safety Code (“NESC”) rule H238B-2 for antenna devices on street light distribution poles. Despite the challenge, the Project team was successful in installing 216 CityIQ® nodes in Zone B during the quarter. The Company plans to install thirty-four additional CityIQ® nodes in the next quarter, which may require make-ready work. Following the LED conversion and NLC node installations in Zone A, the Company installed five smart city devices. The installation of smart city devices will continue into the first quarter of 2020, when the Company anticipates completing the installation of approximately 70 such devices.

Fourth, using the dimming capabilities of the deployed NLC nodes, the Company measured lighting output on a section of Congress Street in Zone B (Figure 2). The measurements were useful in creating dimming schedules to optimize energy savings, as well as vehicle and pedestrian safety. The information collected will also be used to compare the dimming settings for Zone A, where the Company will separately measure lighting in the first quarter of 2020.



Figure 2. National Grid employee Chong Lin measured light output using a lux meter on Congress Street.

Fifth, the Company and the City co-hosted four scheduled community engagement events in December to solicit Project feedback from residents. Despite a snowstorm ahead of the events, approximately one hundred stakeholders attended. The Company advertised the events through direct-mail postcard invitations to all National Grid customers in the City of Schenectady. Additionally, the City released a public press-release in advance to various media outlets. Appendix C includes the postcard mailer and Project one-pager used as part of the event.

Sixth, the Company continued to test NLC nodes to verify vendor product specifications and chip-metering accuracy. Additional lab tests of GE LightGrid® NLC showed positive test results (Table

1). Although a metering standard for NLCs is not yet approved nationwide, the Company is actively participating in the proposed ANSI C136.50 standard working group for revenue-grade energy measurement for roadway and area lighting equipment. Participating in the working group allows the Company to share valuable utility knowledge and bring the latest insights back to the Company during lab testing.

Table 1. Lab test results from four GE LightGrid® NLCs. The Company performed five separate tests under full-load, light-load, and part load.

<b>ID:026D</b>					
	Test #1	Test #2	Test #3	Test #4	Test #5
FL	99.78	99.84	99.88	99.90	99.91
LL	99.75	99.78	99.83	99.83	99.84
PF	100.10	100.16	100.20	100.25	100.22
<b>Pass/Fail</b>	Pass	Pass	Pass	Pass	Pass
<b>ID: 0605</b>					
	Test #1	Test #2	Test #3	Test #4	Test #5
FL	99.86	99.91	99.89	99.93	99.89
LL	99.84	99.86	99.86	99.87	99.88
PF	100.17	100.21	100.20	100.26	100.25
<b>Pass/Fail</b>	Pass	Pass	Pass	Pass	Pass
<b>ID: 03FC</b>					
	Test #1	Test #2	Test #3	Test #4	Test #5
FL	99.84	99.84	99.91	99.92	99.88
LL	99.80	99.83	99.85	99.86	99.87
PF	100.15	100.15	100.19	100.19	100.22
<b>Pass/Fail</b>	Pass	Pass	Pass	Pass	Pass
<b>ID: 0267</b>					
	Test #1	Test #2	Test #3	Test #4	Test #5
FL	99.75	99.76	99.79	99.79	99.78
LL	99.68	99.71	99.74	99.74	99.76
PF	100.07	100.06	100.13	100.08	100.13
<b>Pass/Fail</b>	Pass	Pass	Pass	Pass	Pass

Seventh, the Company worked with the City to progress the design proposal for City-owned smart city device attachments. Under the proposed design, the Company can provide attachment and energy services to the City using the luminaire 7-pin connector as the energy source (Figure 3). Additionally, with the NLC node metering capability, energy use by the attachment will be metered. The Project team understands the proposed configuration is unique to the Project and the metering is not being used for billing purposes. However, the Company believes this is a valuable learning opportunity to understand the technical feasibility of the chip metering technology. If the configuration proves a success, along with successful lab testing of NLC node chip meters, the

Company will review existing attachment fees and propose updates to the tariff and third-party attachment agreements. The Project team will continue to work with the City through the attachment process in the next quarter.

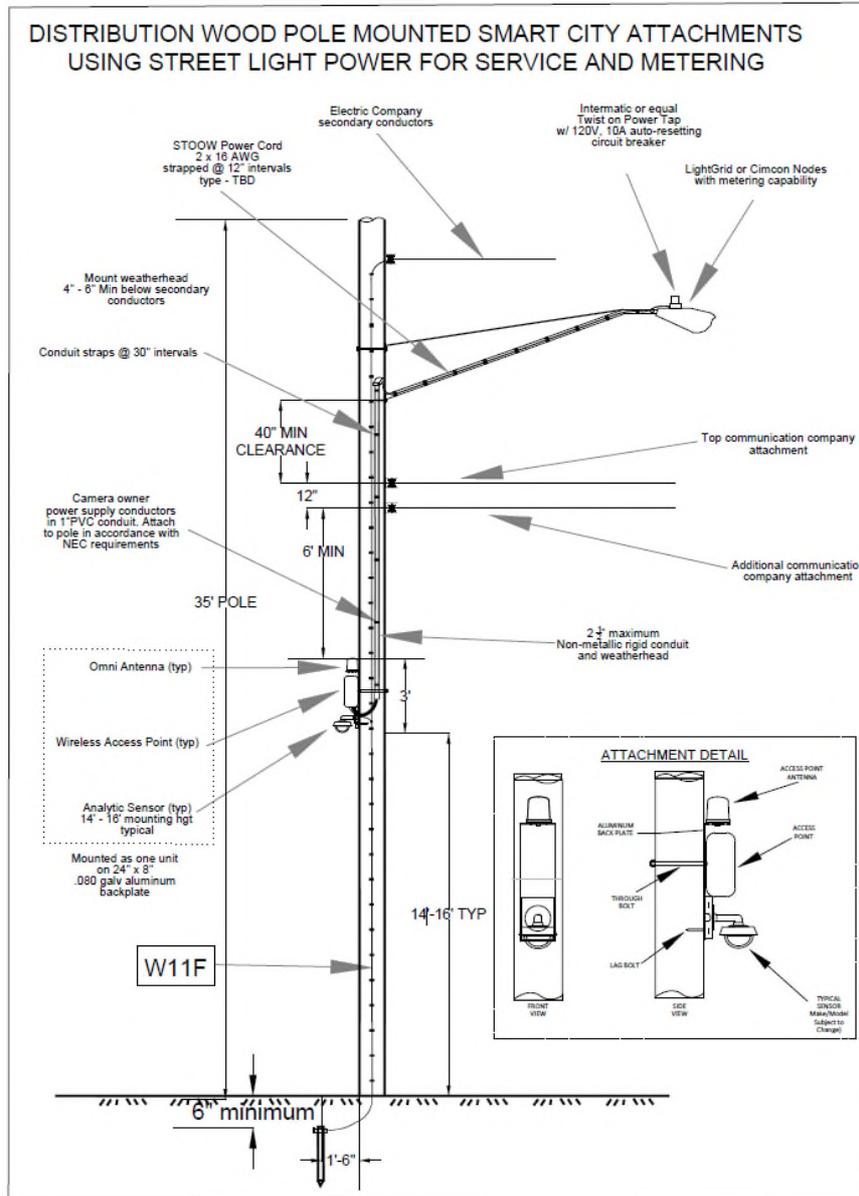


Figure 3. The proposed city-owned attachment design on distribution poles. The NLC node will be able to meter the attachment load, in addition to the street light load.

Finally, the Company and the City discussed new use cases for the City to consider as part of Phase 2 testing in Zones C, D, and E. The discussions will inform a request for proposal (“RFP”) that the Company expects to release in the first quarter of 2020. Although the RFP is a new task introduced during the quarter, the Project team believes this will provide an opportunity for emerging technologies to participate in this innovative Project.

The updates are included as part of the revised work plan included as 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 February 2019	Install LED & NLC Nodes (Zone A & B; Approx. 2,300 Fixtures) Compare vendor solutions	Delayed Completion	
October 2018 to December 2019	October 2019 to March 2020	National Grid Install Smart City Sensor Nodes (Zones A & B)	Delayed Completion	
July 2019 to June 2021	January 2020 to June 2021	LED and NLC Node Steady State (Evaluate operational capabilities)	On Track	
July 2019 to December 2019	April 2020 to June 2020	Install LED and NLC Nodes (Zones C, D, & E; Approx. 2,000 fixtures)	On Track	
June 2019 to March 2020	January 2020 to June 2020	National Grid Install Smart City Sensor Nodes (Zones C, D, and E; Max. 100 nodes)	On Track	
October 2018 to June 2020	January 2020 to June 2020	City Install Smart City Device Attachments to Smart City Sensor Nodes (All Zones)	On Track	
October 2018 to March 2019	October 2018 to October 2019	National Grid Implement Multi-Purpose Internet of Things (“IoT”) Mesh Network	Completed	
October 2018 to December 2019	September 2019 to June 2020	National Grid Install IoT Mesh Network Sensors, and Meters	On Track	

Anticipated Start /End Date	Adjusted Start/End Date	Checkpoint/ Milestone	Status	
		(Gas ERTs; Temperature Sensors; Environmental Sensors; Etc.)		
January 2019 to June 2020	October 2019 to June 2020	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	
September 2019 to June 2021	December 2019 to June 2021	Steady State Review and Evaluations	On Track	

## 2.2 Challenges, Changes, and Lessons Learned

Below is a high-level description of lessons learned the Company will use to inform its ongoing work and future smart city deployments:

1. Because smart city technologies are non-traditional attachments to utility infrastructure, technology providers must provide product specification drawings and mounting methods in order for the Company to ensure code compliance before installation.
2. Once the utility provides installation guidelines, a field survey must be conducted on 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.
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 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 month 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-point 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. The Company believes ANSI standard C12.20 is a reasonable proxy to test NLC nodes during the Project, while ANSI standard C136.50 is being designed. Additional time will be needed for lab testing of NLC nodes to incorporate the components of both ANSI standards.

The above challenges and lessons learned are also captured in the table below, which identifies the corresponding adjustment to the Zone A and B deployment schedule:

Issue or Change	Strategies to Resolve	Resulting Change to Project Scope/Timeline?	Lessons Learned
Current by GE CityIQ® nodes create deployment complexities adhering to the NESC rule H238B-2.	The Company will continue to work with the City to determine which (of the approximately thirty-four) cityIQ® locations requires make-ready work.	Additional delays anticipated for installing smart city technologies. The Project team will pursue the make-ready process to determine the timeline.	Utilities play a vital role in enforcing safety and adherence to governing electrical standards.
Vendor partners are not familiar with the distribution pole attachment process.	National Grid's Standards Engineering worked closely with vendor partners to provide guidance and installation designs in adherence to the NESC.	Numerous consultation was required to advance towards smart city technology deployment.	Attachments' requests require engineering review and approval to ensure safety and code adherence.
A national standard for revenue grade energy metering for NLCs has not been finalized. Lab testing of NLC nodes requires additional time to determine the appropriate testing parameters.	The Company is actively participating in the ANSI C136.50 working group. The Project team will continue to test NLC nodes while coordinating with the	Additional time is needed to perform lab tests. The Company anticipated lab tests to be completed in the next quarter.	While ANSI C12.20 is an acceptable standard to test the metering accuracy of NLCs, ANSI C136.50 is the standard currently being designed specifically for the technology. Therefore,

	national working group.		attention to standards development is essential.
Public engagement is vital during the smart city transformation.	The Company co-hosted four public engagement events to interact and listen to the voice of stakeholders.	N/A	The general public perception and expectations of the Project were positive. Stakeholders are excited about the new energy-efficient LEDs and deployment of smart city technologies to improve the quality of life in the community.

### 2.3 Stakeholder Engagement and Knowledge Sharing

The Company and the City co-hosted four open houses in December to engage stakeholders:

1. Mont Pleasant Library, 1036 Crane Street, December 3, 2019, 5:30 PM to 7:30 PM
2. Electric City Barn, 400 Craig Street, December 5, 6:30 PM to 8:00 PM
3. Schenectady County Public Library, 99 Clinton Street, 5:30 PM to 7:30 PM
4. McClellan Street Health Center, 600 McClellan Street, 5:30 PM to 7:30 PM

Together with the City, the team created a stakeholder Project one-pager to provide additional Project details. Also, the City created one-pagers to highlight the technology benefits under the four categories: public safety, transportation and mobility, environmental sustainability, and digital connectivity.

### 3.0 Next Quarter Forecast

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In the first quarter of 2020, the Company expects to complete the following tasks:

- Complete remaining street light deployments in both zones A and B;
- Evaluate the deployed technologies in Phase 1;
- Pursue make-ready work for the remaining smart city technologies in Zones A and B;
- Conduct light measurements in Zone A then compare values with Zone B;
- Determine the smart city solution for Zones C, D, and E;
- Shortlist solution providers for Phase 2; and
- Complete lab testing of NLC nodes and prepare recommendations.

Also, based on the continued growth of the NLC market and the Company’s own experience, the Company believes NLC nodes can offer an array of both customer and utility benefits. As part of its existing LED conversion program, the Company will seek to work with the Department of Public Service (“DPS”) Staff to identify additional opportunities for incorporating NLC nodes into

customer offerings, driving more significant energy savings and contributing to the State’s energy goals.

## 4.0 Work Plan and Budget Review

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### 4.1 Updated Work Plan

The Company made updates to 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 Project work plan to capture the following components:

1. Extend LED and NLC installation to February 2020;
2. Extend smart city sensor installation into March 2020;
3. Included Phase 2 RFP in the Project timeline;
4. Extend lab test NLC nodes into March 2020; and
5. Continue to assist the City with City-owned attachments into January 2020.

The updated work plan is included in Appendix A.

### 4.2 Current Budget

Project Task	4th Quarter Actual Spend	Project Total Spend to Date	Project Budget	Remaining Balance
<b>CapEx</b>				
Smart Lighting	\$176,010	\$176,010	\$2,170,000	\$1,993,990
Network	\$146,570	\$235,180	\$390,000	\$154,820
Smart Sensor	\$1,190,591.66	\$1,190,592	\$3,100,000	\$1,909,408
Project Support	\$0	\$158,997	\$100,000	(\$58,997)
Lighting System Evaluations	\$ 9,463	\$9,463	\$150,000	\$140,537
Smart city Data Analytics	\$0	\$0	\$100,000	\$100,000
Data Platform	\$ 115,616	\$118,996	\$250,000	\$131,004
Network Management	\$0	\$0	\$250,000	\$250,000
<b>OpEx</b>				
Smart Lighting	\$0	\$41,167	\$180,000	\$138,833
Network	\$0	\$0	\$715,000	\$715,000
Smart Sensor	\$0	\$0	\$180,000	\$180,000
<b>Total</b>	<b>\$1,638,251</b>	<b>\$1,930,405</b>	<b>\$7,585,000</b>	<b>\$5,654,595</b>

## 5.0 Quarterly Report Template

<b>Quarterly Report Template</b>	
<b>Milestones:</b>	
Project Milestones Accomplished:	Completed 96 percent of the LED conversion in Zones A & B with NLC nodes for Phase 1. Installed the multipurpose IoT network in Zone A. The Company co-hosted four community engagement events.
Next Project Milestone:	Release Phase 2 RFP and shortlist vendor solution. Evaluate the deployed technologies for Phase 1 to inform Phase 2. Pursue make-ready work and complete smart city sensor deployment in Zones A and B. Complete lab testing of NLC nodes and report findings.
<b>Tasks/Timeline:</b>	
Completed Project Tasks Since Last Quarterly Report:	Completed most of the street light conversion and installation of NLC nodes. Held technology training for City staff. Installed 216 CityIQ® nodes in Zone B and 5 CityIQ® nodes in Zone A. Field measurement of street lights in Zone B on Congress Street. Continued lab testing of NLC nodes and participated in the standards working group for ANSI 136.50. Supported the design proposal for City-owned attachments to use NLC nodes as the “meter” to provide service.
Changes or Impacts to Schedule Since Last Quarterly Report:	Extended CityIQ® nodes installation into March 2020 Added Phase 2 RFP to the Project timeline Extended lab testing of NLCs into March 2020 Continue to assist the city for city-owned attachments into January 2020
Lessons Learned:	Utilities play a vital role in enforcing safety and compliance with governing electrical standards. To ensure safety and code adherence, the attachment request requires an engineering review and approval. While ANSI C12.20 is an acceptable standard to test the metering accuracy of NLCs, ANSI C136.50 is currently being designed specifically for the technology. Therefore, attention to standards development is essential. Based on the community engagement events, the general public perception and expectations of the Project are positive to date. Residents are excited about the new energy-efficient LEDs and deployment of smart city technologies to improve the quality of life in the community.
Work Stream Coordination:	Coordination occurring among the Company’s Electric, Customer, and IT business units for engineering design, review, and deployment.

<b>Quarterly Report Template</b>	
<b>Risks:</b>	
Identified Risks:	Make-ready work for poles with the necessary clearances could increase deployment cost and impact the Project timeline. The public may not be fully aware of the benefits of a smart city.
Risk Mitigation Plan:	The Company will work closely with the City to identify low-cost make-ready installations to complete smart city sensor deployment in Zones A and B. The Company will explore additional public engagement opportunities during the Project to educate and inform stakeholders.
<b>Finance:</b>	
Total Spend to Date:	\$1,930,405
Target Budget Spend:	\$1,961,938
Actual Incremental Spend:	\$1,638,251
Variance:	\$292,154
In-Kind and Grant Support (Specifically for REV Demo):	Estimated \$150,000 from vendors.
<b>Additional Notes:</b>	

# Appendix A – Updated Work Plan

Smart City - Implementation Plan			CY 2018												CY 2019												CY 20						
Activities	Timing		Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19	Apr-19	May-19	Jun-19	Jul-19	Aug-19	Sep-19	Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20									
	Adjusted Start	Adjusted End																															
1.00	IG install LED Proof of concept																																
1.10	Install LED Max 20, 3k vs 4k																																
2.00	NIC & LED Installation Phase 1																																
2.10	Develop survey, release survey, analyze	Jan-2019	Apr-2019																														
2.20	Finalize results and provide survey to City	Apr-2019	Apr-2019																														
2.2.1	Miscellaneous City Decision Point	Apr-2019	Apr-2019																														
2.2.2	City signs City Agreement and SOW	Apr-2019	May-2019																														
2.30	Plan, Design, Procure, Legal	Oct-2018	Jun-2019																														
2.40	NG Install LED and NIC Nodes Zones A and B, install and co	Oct-2018	Dec-2019																														
2.4.1	Sign Contract	May-2019	May-2019																														
2.4.2	Vendor Kickoff Meetings with the City	Jul-2019	Jul-2019																														
2.50	Field Installation LED and NIC	Jul-2019	Feb-2020																														
2.60	Evaluate	Jul-2019	Dec-2019																														
2.70	Lab test meters and NIC	Aug-2019	Mar-2020																														
2.80	Cost Recovery A & B	Jul-2019	Sep-2019																														
3.00	Smart City Sensor Phase 1																																
3.10	NG Install smart city sensor nodes Zones A and Zone B Max	Oct-2018	Mar-2020																														
3.20	Plan, Design, Procure, Legal	Oct-2018	Jun-2019																														
3.2.1	Sign Contract	May-2019	Jun-2019																														
3.30	Pilot Test Install 20 max	Jul-2019	Jul-2019																														
3.3.1	Request Permission from City to proceed	Jul-2019	Jul-2019																														
3.40	Zone A & B Field Install	Aug-2019	Mar-2020																														
3.50	Test the first 5 for image quality with Dimming	Aug-2019	Mar-2020																														
4.00	Multipurpose network Phase 1																																
4.10	NG Implement Multipurpose network	Oct-2018	Sep-2019																														
4.1.1	Plan, Design, Procure, Legal	Oct-2018	Sep-2019																														
4.1.2	Network Test ****	Jul-2019	Aug-2019																														
4.1.2	Network Field Installation	Oct-2019	Oct-2019																														
4.20	NG Install IoT Mesh network, Sensor, and Meters	Oct-2018	Dec-2019																														
4.2.1	Plan, Design, Procure, Legal	Oct-2018	Jul-2019																														
4.2.2	City Acquisition for test sites	Apr-2019	Aug-2019																														
5.00	Energy and attachment as a service Phase 1																																
5.10	Scoping	Oct-2018	Dec-2018																														
5.20	Assist the City for 3rd party or City owned attachments	Oct-2018	Jan-2020																														
5.30	Cost Recovery	Jul-2019	Jan-2020																														
5.40	Evaluate and Decision to move forward Phase 2	Dec-2019	Jan-2020																														
6.00	NIC & LED Installation Phase 2																																
5.10	NG Install LED and NIC nodes Zones C, D, E	Jan-2020	Jun-2020																														
5.20	Plan, Design, Procure, Legal; RFP	Jan-2020	Mar-2020																														
5.30	Field Installation LED and NIC	Apr-2020	Jun-2020																														
5.40	Cost Recovery All Zones	Apr-2020	Jun-2021																														
5.50	Steady State	Jan-2020	Jun-2021																														
5.60	Energy Calculations and credit; Penetration testing; final eval report	Jan-2020	Jun-2021																														
7.00	Smart City Sensor Phase 2																																
7.10	Install Smart City Sensor Nodes Zones C, D, And E	Jan-2020	Jun-2020																														
7.20	Cost Recovery for smart city sensor node	Jan-2020	Mar-2020																														
7.30	Plan, Design, Procure, Legal	Jan-2020	Feb-2020																														
7.40	Zone C,D,E Field Install Smart City Technologies	Mar-2020	Jun-2020																														
7.50	City Smart City Device Attachment to Smart-City Sensor N	Oct-2018	Jun-2019																														
7.60	City Planning and Procurement	Oct-2018	Mar-2019																														
7.70	City Field Installation	Apr-2019	Mar-2020																														
7.80	City Data, Software, Platform Integration	Apr-2019	Jun-2020																														
8.00	Multipurpose network Phase 2																																
8.10	IoT Mesh Network - third party sensors and meters	Jan-2020	Jun-2020																														
8.20	Plan, Review and Coordination	Jan-2020	Mar-2020																														
8.30	Field Installation	Mar-2020	Jun-2020																														
8.40	Cost recover for network and data as a service	Oct-2019	Dec-2019																														
9.00	Smart City Sensor Phase 3																																
9.10	Steady State																																
9.20	Review and refine as needed Final Eval report																																

# Appendix B – Summary One Pager



Smart city Schenectady REV Demo

Q4 2019

Overall Status (Active)

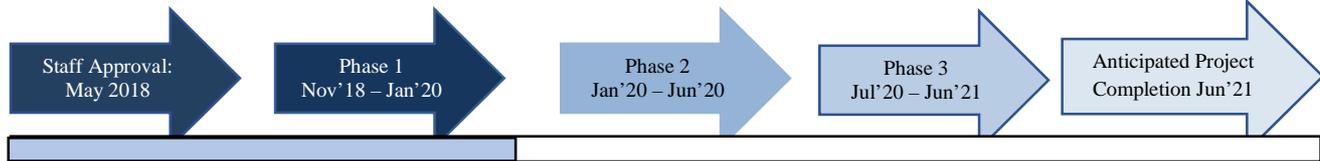
**Project Start Date:** 05/24/2018

**Project End Date:** 06/30/2021

**Budget:** \$7,585,000

**Current Quarter Spend:** \$1,638,251

**Cumulative Spend:** \$1,930,405



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

Cumulative Lessons Learned		
The Customer	Market Partners	Utility Operations
<ul style="list-style-type: none"> <li>• 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.</li> <li>• The City and the Company understand the need to engage and inform residents of the Project. The Project team hosted four community open-house events in the fourth quarter of 2019.</li> <li>• Conversion to smart LED street lights with NLC nodes provides greater control, convenience, and opportunity for additional GHG savings that help meet 80 X 50 climate goals.</li> </ul>	<ul style="list-style-type: none"> <li>• Partners are customizing their solutions to meet the needs of both the City and the Company.</li> <li>• Standardization and market advancements would improve network interoperability between smart-city devices.</li> <li>• Upfront costs are high. However, the cost of future deployment may be lower as the Project expands into other zones.</li> <li>• New and disruptive smart-city technologies are emerging in the market. The Project can benefit from new market entrants to offer additional choices and new products.</li> </ul>	<ul style="list-style-type: none"> <li>• Smart city is a complex deployment of diverse smart technologies. Utility involvement consolidates smart cities into a packaged solution.</li> <li>• Installation costs are high. Therefore, deployment cost reductions can be achieved by combining smart city installation with LED upgrades.</li> <li>• An internal engineering review of smart city solutions is essential. Adequate time is needed to fully ensure the solution meets standard code compliance, data security, and data privacy requirements. Field surveys are also required before installation to measure clearances.</li> </ul>

**Application of lessons learned:** The Company believes NLC nodes offer a range of customer benefits and provide opportunities to enhance outdoor lighting services. With sufficient lab testing results, the Company will review and make tariff proposals to offer NLCs as an offering. Experience gained on smart city attachments is being applied to other municipality attachment applications.

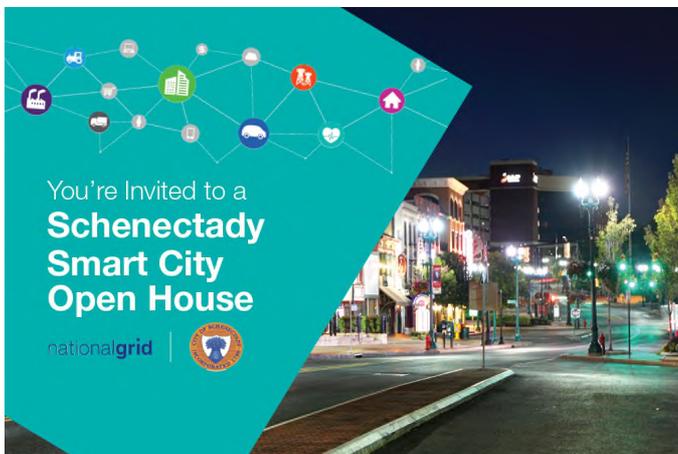
**Issues Identified:** Specific smart city sensors require more clearance, which may require make-ready work. Additional design and installation process is needed.

**Solutions Identified:** The Company will work closely with the City to seek low-cost make-ready locations and continue to deploy smart city sensors in Zones A and B.

**Recent Milestones/Targets Met:** The Company completed most LED conversion with NLC nodes in Zones A and B. The multipurpose IoT network was installed in Zone A. Finally, the Company co-hosted four community events with the City.

**Upcoming Milestones/Targets:** Release Phase 2 RFP and shortlist vendor solution. Complete smart city sensor deployment in Zones A and B. Complete lab testing of NLC nodes and report findings.

## Appendix C – Additional Attachments



Join National Grid and the City of Schenectady for a  
**Smart City Open House**

We're working together on the **Reforming the Energy Vision Smart City Demonstration** project.  
We'll share the plan to build a smarter, safer, and more sustainable Schenectady including installing advanced LED street lighting.

**Smart City Open Houses:**

**Tuesday, December 3rd | 5:30pm – 7:30pm**  
Mont Pleasant Library  
1096 Crane Street

**Thursday, December 5th | 6:30pm – 8:00pm**  
Electric City Barn  
400 Craig Street

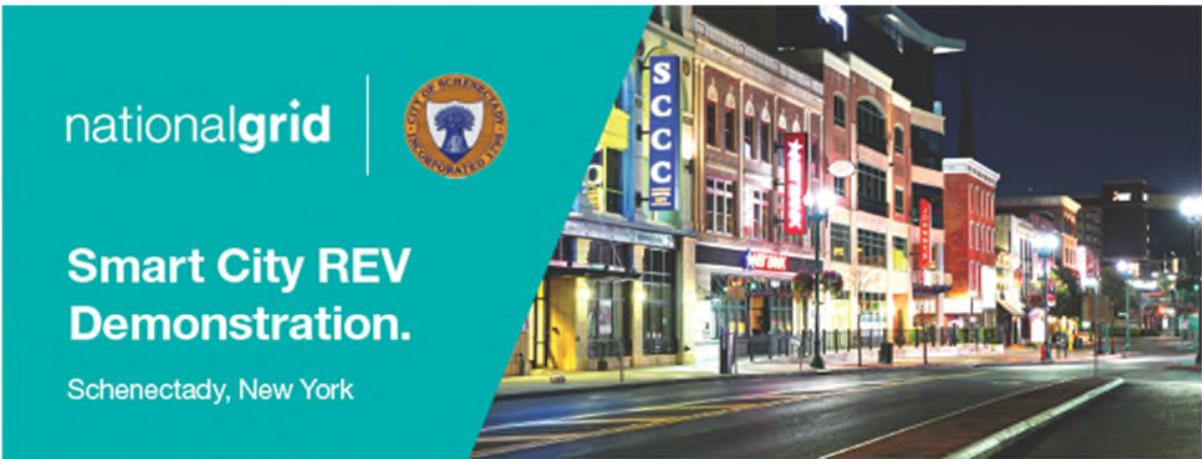
**Tuesday, December 10th | 5:30pm – 7:30pm**  
McCrashy Room at the Schenectady County Public Library  
99 Clinton Street

**Thursday, December 12th | 5:30pm – 7:30pm**  
Walter Rabe Auditorium at the McClellan Street Health Center  
600 McClellan Street

**nationalgrid**  
1125 Broadway  
Albany, NY

Name  
Street Address  
City, State, Zip

Figure 1. The open house invitation postcard mailer. The invitation was mailed to approximately 23,000 customers.



**This is the first city-wide Smart City Deployment in New York State providing our communities with the tools and technologies capable of saving energy and opening the door to further innovation.**

The City of Schenectady has partnered with National Grid to pilot a Reforming the Energy Vision (REV) demonstration project. REV is Governor Andrew M. Cuomo’s New York energy strategy, aimed at developing new energy products and services, helping energy consumers make more informed choices, creating jobs, and protecting the environment.

The REV demonstration project will use connected smart technologies and a low bandwidth wireless network to deploy smart city technology and services through enhanced street light infrastructure. National Grid will be replacing approximately 4,200 streetlights in the City with LED lights, which will subsequently be retrofitted with smart technology and controls. The upgrades will effectively transform Schenectady into a smart city, capable of saving energy, more efficiently providing municipal services, and opening the door to further innovation.

This project also offers the City of Schenectady an opportunity to explore how smart technology can improve municipal services and quality of life for City residents. National Grid aims to learn and identify new innovative products and solutions that are replicable and scalable to meet the needs of communities across the state.

**Benefits of a Smart City**

Building a smarter, safer, and more sustainable Schenectady

- **Improving the Quality of Life** – smart city deploys technologies to allow the City to gather data on its intersections, sidewalks, and crosswalks in order to design safe and walkable neighborhoods. Environmental sensors allow the City to identify local environmental hazards and introduce interventions to promote public health across all segments of the community.
- **Public Safety** – smart city technologies will provide law enforcement and emergency responders with the tools need to address citizens needs today and tomorrow.
- **Improving Municipal Services** – smart city technologies will provide the City with more tools and technologies to improve the efficiency of city operation and services, leading to cost savings.



Figure 2. The one-pager designed for open house events.