Karla M. Corpus
Senior Counsel
NY Regulatory

January 31, 2019

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: FRUIT BELT NEIGHBORHOOD SOLAR REV DEMONSTRATION PROJECT – Q4 2018 REPORT

Dear Secretary Burgess:

Niagara Mohawk Power Corporation d/b/a National Grid ("National Grid") hereby submits for filing its quarterly update to the Fruit Belt Neighborhood Solar REV Demonstration Project Implementation Plan covering the period of September 30, 2018 to December 31, 2018 ("Q4 2018 Report") as required by the REV Demonstration Project Assessment Report filed by the New York State Department of Public Service Staff ("Staff") with the Commission on December 2, 2015 in Case 14-M-0101.

Please direct any questions regarding this filing to:

Anntonette Alberti
Manager, Complex Demo
National Grid
1125 Broadway
Albany, NY 12204
Tel.: 518-433-5213
Mobile: 518-369-2100
Email: anntonette.alberti@nationalgrid.com

National Grid looks forward to continuing to work collaboratively with Staff as it proceeds with the implementation of the Fruit Belt Neighborhood Solar REV Demonstration Project.

Respectfully submitted,

/s/ Kara M. Corpus

Karla M. Corpus
Senior Counsel

Enc.

cc: Tammy Mitchell, DPS Staff, w/enclosure (via electronic mail)
Marco Padula, DPS Staff, w/enclosure (via electronic mail)
Denise Gerbsch, DPS Staff, w/enclosure (via electronic mail)
Michael Summa, DPS Staff, w/enclosure (via electronic mail)
Melanie Littlejohn, w/enclosure (via electronic mail)
Cathy Hughto-Delzer, w/enclosure (via electronic mail)
Anntonette Alberti, w/enclosure (via electronic mail)
Carlos Nouel, w/enclosure (via electronic mail)
Fouad Dagher, w/enclosure (via electronic mail)
Jonathan Nickerson, w/enclosure (via electronic mail)
Pamela I. Echenique, w/enclosure (via electronic mail)
Carol Teixeira, w/enclosure (via electronic mail)
Jason Eno, w/enclosure (via electronic mail)
Janet Audunson, w/enclosure (via electronic mail)

Fruit Belt Neighborhood Solar
REV Demonstration

Q4 2018 Report

January 31, 2019

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1.0 Executive Summary

The Niagara Mohawk Power Corporation d/b/a National Grid ("National Grid") Fruit Belt Neighborhood Solar REV Demonstration Project ("Demonstration Project" or "Project"), through the partnership with Buffalo Niagara Medical Campus ("BNMC"), Solar Liberty, and the New York State Energy Research and Development Authority ("NYSERDA"), provides solar-generated energy and financial benefits to low-to-moderate income ("LMI") customers.

The LMI customer segments have a very low penetration of solar photovoltaic ("PV") systems due to various economic barriers. National Grid is promoting utility-owned "in front of the meter" solar PV equipment mounted on residential roofs and roofs of faith-based and community non-profit buildings located within the Project area, and is passing on the economic benefits directly to solar PV host customers through a monthly electric bill credit for the lifespan of the solar PV system. Additionally, fifty (59) non-hosting LMI residential customers selected through a lottery system are also receiving a bill credit for two (2) years.

The Project consists of installing residential solar PV systems ranging in size from 3.1kW to 18.5kW, and non-profit organization solar PV systems ranging in size from 15.9 to 28.0 kW per system, totaling 500 kW (or 0.5 MW) of solar PV generation capacity within a single LMI neighborhood. This approach provides a real life scenario for exploring the technical aspects of enhancing grid efficiency. The Project also explores the social aspects of building positive relationships within the Fruit Belt community resulting from the effort to increase energy awareness and Project participation.

This Demonstration Project is testing the following hypotheses:

- Leveraging a utility ownership model to bring solar PV to an underserved LMI segment will expand and animate the market for third-party solar installers;
- Providing solar bill credits to participants in a LMI neighborhood, as well as partnering with NYSERDA to deliver energy efficiency ("EE") programs to further drive energy bill savings, will have a positive impact on bill payment behavior and enable customers to better manage their arrears; and
- Concentrating distributed solar PV resources with reactive power support within an area served by a common substation (versus scattered deployment of conventional solar PV) will deliver measurable grid efficiency benefits.

The Project also aims to develop an understanding of the drivers for cost efficiency and scalability for a utility-owned model, the corresponding economic and job creation impact, and the overall LMI customer perception of renewables, energy efficiency, and the customer-utility relationship. The Project has demonstrated an important environmental justice objective, making renewable energy accessible to a LMI community.

Progress to Date

Solar Installations:
Activities this quarter consisted of upgrading the metering at one (1) location served by a 3-phase service, and making adjustments to the electronic data loggers. Installation of all solar PV systems was previously completed in Q3 2018.

Customer Engagement:
There were no customer engagement activities conducted this quarter.

Bill Credit Lottery:
Previously-selected bill credit lottery recipients continued to receive the monthly electric bill credit during this quarter

Arrearage Analysis:
Monitoring of the previously-developed arrearage customer database continued to determine the bill credit effect on the customers' choice to pay down their arrearage.

Grid Impact Analysis by GE:
General Electric Global Research ("GE") completed evaluating solar PV installation impacts on feeder performance, comparing results of the baseline performance with the performance after solar PV generation began. They drafted and submitted their task report to National Grid.

Energy Efficiency Implementation by NYSERDA:
NYSERDA provided a summary of their customer outreach and engagement for provision of EE services in the Project area. No additional EE projects were undertaken

Program Scale-Up:
National Grid continued developing a plan for a new program consisting of a scale-up of LMI solar deployment based upon the lessons learned on this Project. As previously described in the Q2 and Q3 2018 quarterly reports, the proposed program would be made available to National Grid LMI customer home owners located in the Company's upstate New York electric service territory. A third-party contractor selected and hired in Q2 2018 to conduct a benefit-cost analysis ("BCA") completed its analysis of and submitted its findings to National Grid. Concurrently, National Grid continued with the financial modeling and analysis process.

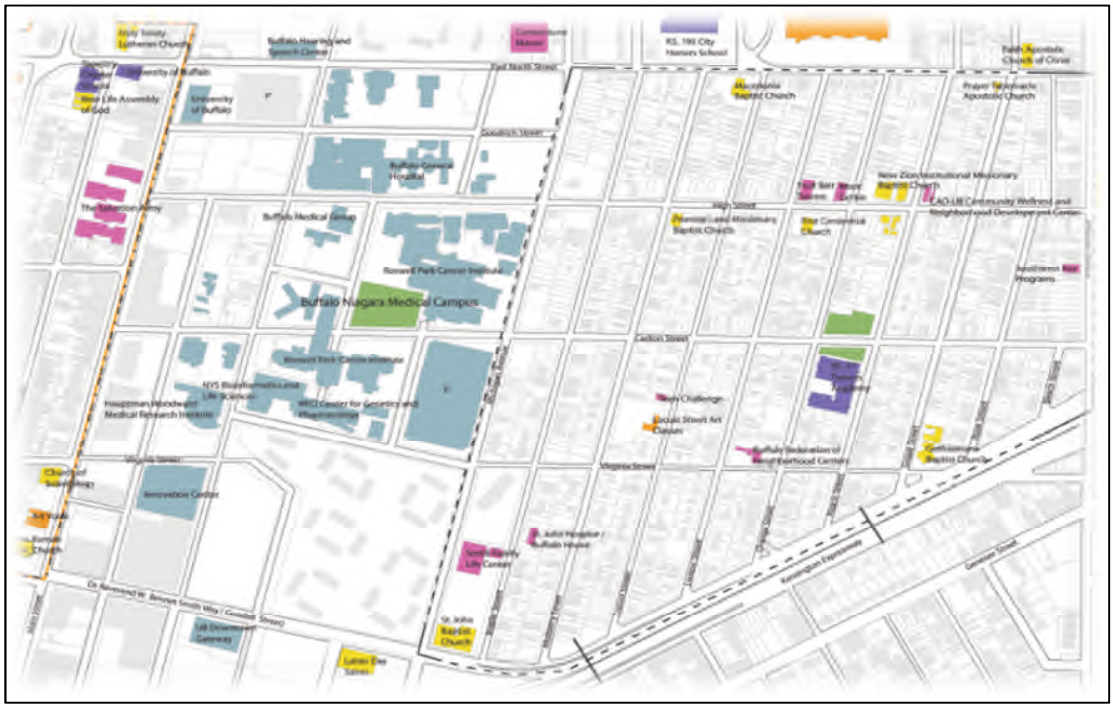

Figure 1-1: Location of the Fruit Belt Neighborhood (dashed perimeter), located adjacent to the Buffalo Niagara Medical Campus

2.0 Highlights Since Previous Quarter

2.1 Major Tasks Completed

- Regulatory Filings:
    - The Q3 2018 Quarterly Report was prepared and filed with the New York State Public Service Commission on October 31, 2018.
- Community Engagement:
    - Customer stewardship efforts were not conducted this quarter.
- Internal Engagement:
    - National Grid's Account Maintenance and Operation team continued to issue bill credit riders on customer accounts upon solar PV system commissioning, and to issue the bill credit rider to accounts selected through the second part of the bill credit lottery.
    - Arrearage analysis continued, again reviewing customers in arrears who were bill credit recipients and/or solar hosts.
- Data Evaluation, Measurement & Verification ("EM&V"):
    - Enphase, Inc. continued to send generation data twice monthly; each deliverable containing either the first fifteen (15) days or second fifteen/sixteen (15/16) days of the previous month's generation data. National Grid's New York Electric Pricing Group calculated and published the bill credit amount each month of the quarter.
    - The quarterly analysis of the bill credit administration system was completed. The automated bill credit system was determined to be delivering the correct credit amount to the bill credit recipients, which during this quarter consisted only of solar PV hosts. Sixty-nine (69) residents and three (3) faith-based non-profit organization buildings were receiving bill credits by the end of Q3 2018. In addition, two (2) non-profit organization buildings were also generating credits, but due to their service class, the organizations do not receive a bill credit. Although not receiving bill

credits, non-profit organization leadership of these two buildings chose to participate as a method of contributing to the sense of community within the neighborhood.

- The previously-identified issue of the electronic metering at a non-profit organization building served by 3-phase power was addressed. The manufacturer-designed mitigation approach involving replacing the existing meter with one (1) developed specifically for 3-phase power connection was implemented.

- Benefit Cost and Financial Analyses:

  - The contractor hired to conduct a benefit cost analysis ("BCA") of this Project completed its analysis. The BCA contractor concluded:
    - Solar panel unit cost has the greatest effect on the net present value ("NPV") of a residential solar PV system located in Buffalo, NY.
    - Additionally, the analysis also concluded the NY Sun incentive amount holds the second largest impact on the NPV.

  - National Grid completed its financial analysis of the Project, which explored the financial impact on stakeholders.

- Partner Participation:

  - Solar Liberty:
    - Installed the 3-phase system metering equipment; and
    - Made adjustments to other electronic metering equipment

  - NYSERDA:
    - Pursuant to the partnership agreement between NYSERDA and National Grid, NYSERDA completed delivering no-cost energy efficiency improvements to residents of the Fruit Belt neighborhood. Table 2-1 provides solar PV system host and non-host EE Project participant data.
    - Of the fifty-two (52) completed energy efficiency projects, eighteen (18) projects received electric reduction services while thirty-four (34) received comprehensive energy efficiency improvements, at an average cost of $2,300 per project. Ten (10) of those projects were later identified as being outside the Fruit Belt Project study area, but within the Fruit Belt neighborhood.
    - NYSERDA reported that, to date, on average, households receiving energy efficiency services are estimated to save 29.6 decatherms ("Dth") of gas and 430kWh of electricity annually.
    - NYSERDA reviewed their many outreach efforts completed to date and, based on the amount of enrollment achieved, they determined conducting one (1) additional round of outreach under this Project would be helpful.

Table 2-1: Metrics for Energy Efficiency Component by Participant Type - as of 12/31/18

Status	Solar Hosts	Bill Credit Lottery Recipients	Non-Hosts	Total*
Customers contacted [a]	26	59	189	274
Customers who responded [b]	13	12	56	81
Enrollments (projects currently in process) [c]	1	1	3	5
Projects completed [d]	10	8	34	52*

a. *Customers contacted:* Unduplicated number of customers responding to National Grid outreach efforts indicating that they are interested in energy efficiency services as of 12/31/18.
b. *Customers who responded*: Quantity of customers that have returned an application for energy efficiency services to NYSERDA as of 12/31/18.
c. *Enrollments:* Quantity of energy efficiency projects in process as of 12/31/18.
d. *Projects completed:* Quantity of energy efficiency projects that have been completed as of 12/31/18.
**Ten (10) of the addresses which received NYSERDA EE projects were found to be located within the Fruit Belt Neighborhood area, but outside of the Project study area.*

- GE:
  - GE completed conducting their grid efficiency analysis and prepared a report on their task.
- BNMC:
  - BNMC did not conduct activities in support of the Project during this quarter.

- Community Participation:
  - There were no community participation activities undertaken this quarter.

2.2 Key Metrics

Table 5-1 presents the Key Metric Reporting Matrix. Q4 2018 activities consisted primarily of contractors completing their tasks.

2.3 Challenges, Changes, and Lessons Learned This Quarter

Challenge or Change	What was the Resulting Change to Scope/Timeline?	Strategies to Resolve	Lessons Learned
Tenants of a solar host house that isn't owner-occupied moved out, leaving the house unoccupied. Power theft was subsequently identified. Power to the house was cut off at the pole to prevent power theft.	Power generated by the solar array was no longer feeding into the local grid. Reconnection can't be scheduled until the house is re-occupied, which the owner reported will occur in the spring of 2019.	Reconnecting power service at the pole is not acceptable due to power theft, and installing a separate service line dedicated to the PV isn't code-compliant. The resolution is to await re-occupancy.	In addition to equipment failure, host house occupancy is another factor affecting a solar PV system's power contribution to the grid.

3.0 Task Completion Status

Annotated below is the status of the open checkpoints and milestones stated in the January 4, 2016 Implementation Plan, with dates as of this Q4 2018 Report. All tasks intended to be completed during this Project have been completed. Bill crediting will continue for the 25-year lifespan of the solar PV systems.

Table 3.1 Checkpoints/Milestone Progress

	Checkpoint/Milestone	Anticipated Start/End Date Stated in Q3 2018 Report	Revised Start-End Date as of the end of Q2 2018	Status
1	Finalize contracts with Partners	Completed	*Completed*	
2	Customer/Stakeholder Outreach: Phase 1: Community Meetings	Completed	*Completed*	
3	Customer/Stakeholder Outreach: Phase 2: Enrollment	Completed	*Completed*	
4	Customer/Stakeholder Outreach: Phase 3: Installation	Completed	*Completed*	
5	Solar PV Assessments	Completed	*Completed*	
6	Site Selection and Design	Completed	*Completed*	
7	Meter Installation	Completed	*Completed*	
8	Permitting	Completed	*Completed*	
9	Solar PV Installation	Completed	*Completed*	
10	Interconnection	Completed	*Completed*	
11	Bill Credits Administrated	08/16 - ongoing	*Ongoing*	
12	Solar Workforce Hiring	Completed	*Completed*	
13	GE Grid Efficiency Analysis	10/16 – Q1 2019	*Completed*	
14	Internal Systems Capability	Completed	*Completed*	

11: Bill Credits Administered.

Status: **[Ongoing]**
The billing system to calculate and distribute the bill credits was created in Q1 2016. The system has been used each month since its first implementation in Q2 2016.

Targets/Actuals in Q4 2018:

- Target: Continue to distribute all bill credits for the previous month's solar PV credit using the designed bill credit system.
  - Actual: Monthly bill credits are being generated and issued for each of the solar PV systems installed and commissioned to date.

Note: This process is scheduled to continue for the 25-year lifespan of the solar PV systems.

13. GE Commissioning and Grid Monitoring.

Status: [Completed]
GE grid efficiency analysis consists of feeder modeling and simulation, controls integration, and grid testing.

Targets/Actuals in Q4 2018:

- Target: Complete the economic impact analysis of the PV installation on the Fruit Belt feeders.
  - Actual: Continued performance analysis of feeders connected to solar PV systems. As part of the PV generation impact analysis, validation of the simulation using field data collected at Station 34 for the period of June-August 2018. Time-series simulations were completed to calculate hourly feeder and transmission losses with and without PV system connection were also performed. The costs of system losses under different power factor settings were also calculated.

- Target: Target: Prepare and submit the final report of the performance validation.
  - Actual: GE completed and submitted its report on the benefits anticipated from the deployment of the solar PV systems on the Fruit Belt neighborhood feeders.

14. Internal Systems Capability.

Status: [Completed]
The toll-free number discontinued operation in Q4 2018.

Targets/Actuals in Q3 2018:

- Target: Discontinue operation of the toll-free number.
- Actual: National Grid discontinued operation of the toll-free number.

4.0 Work Plan & Budget Review

4.1 Updated Work Plan

As stated in the Q1 2018 report, the Project schedule was anticipated to extend to the end of Q1 2019. However, National Grid determined that the Project would conclude at the end of Q4 2018. An updated Project completion schedule is forth in Table 4-1, below:

Schedule Milestone*	Implementation Plan Date	Actual/ Projected Date	Reasons for Extension
Project Start Date:	Nov-15	Jan-16	DPS final approval received two (2) months from initial approval required to complete the project.
Host Sites Selection Completed:	Aug-16	Dec-17	Customer enrollment strategy was revamped after initial enrollment efforts were deemed ineffective.
500 kW of solar PV Installed:	Nov-17	Sept-18	Adverse weather conditions, customer delays, customers' roofing contractor delays, and customer decision making process delays.
Total Project Completion:	Aug-17	Dec-18	Time required for a grid monitoring period of sufficient duration to conduct the grid effect analysis and complete residential energy efficiency projects.

Table 4-1: Project Milestone Planned and Extended Dates

*As noted in the Q4 2017 report, schedules of six (6) tasks (Customer/Stakeholder Outreach – Community Meetings, Installation, Permitting, Meter Installation, Solar PV Installation, and Interconnection) were extended due to the late Q4 2017 addition of new participants, and due to weather conditions adverse to solar PV system construction. See Appendix A, Table A-1.

4.2 Updated Budget

There were no new items identified this quarter that may adversely impact the Project budget. Conversely, NYSERDA reported they spent $4,558.80 of the $150,000 pre-payment National Grid had made to support their implementation of EE efforts that were external to HEAP-program funding. The difference ($145,441.20) was credited back to this Project's Opex budget. The Project budget and spending data are presented below in Table 4-2.

Project Task	Quarterly Actual Spend	Project Total Spend to Date	Project Incremental Cost Budget[1]	Incremental Cost to Date	Total Remaining Incremental Budget Balance
CapEx					
	$51,804	$1,908,283	$2,468,868	$1,908,283	$560,585
Grants Credited Against Incremental Capital Costs					
n/a	n/a	n/a	n/a	n/a	($) n/a
OpEx					
Project Administration and Planning	$2,083	$931,546	$30,000		
Marketing and Workforce Development	$0	$156,590	$250,000		
Incentives	$806	$15,051	$0		
Implementation	$2,352	$139,938	$718,332		
Evaluation and Analysis	$59,556	$282,493	$325,000		
Total:	**$64,797**	**$1,525,618**	**$1,323,332**		
Grand Total:	**$116,601**	**$3,433,901**	**3,792,200**	**$3,108,661**	**$683,539**

Table 4-2: Quarterly Project Cost Data

Note: Project *costs* reported in Table 4-2 consist of the total of the incremental and the non-incremental costs incurred. However, the Project *budget* values listed consist only of incremental costs. The Project's total incremental cost as of December 31, 2018 was $3,108,661, leaving a remaining incremental budget of $683,539. Only the incremental costs are assessed to the Project budget.

[1] An internal review of the Project budget revealed certain costs (*e.g.*, installation costs) were incorrectly categorized as operational costs (Opex), when in fact they are capital costs (Capex). The budget was revised starting in the Q4 2017 quarterly report to reflect this re-categorization, and to include incremental costs. However, the total Project budget has not changed.

5.0 Progress Metrics

Table 5-1 presents key Project metric tracking data available as of the end of Q4 2018.

Time Frame		Outreach	Residential Customer Tier						Solar Installation Progress (Houses and Non-profit Buildings)					Generation and Credits (Residential and Non-profit Organization Buildings)			
Project Quarter	Calender Year	Residential Expressions of Interest (Calls Received, Canvass Response)	Tier 1 EE Eligibility	Tier 1 EE Enrollment	Tier 2 EE Eligibility	Tier 2 EE Enrollment	Tier 3 EE Eligibility	Tier 3 EE Enrollment	Roof Assessments Completed	Structural Assessments Completed	Electrical Assessments Completed	Rootop Systems Installed	Roortop Systems Connected	kW Online Added	kWh generated	Quarterly Bill Credit Distributed [$]	Total Residential Bill Credit Recipient Qty
1	Q1 2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	$0.00	0
2	Q2 2016	34	5	1	0	0	14	0	14	10	14	1	0	0	0	$0.00	0
3	Q3 2016	28	10	1	0	0	16	0	26*	9	5	1	2	12.22	2,408	$33.96	2
4	Q4 2016	78	16	2	0	0	34	0	54	21	24	2	2	10.92	2,631	$116.99	3
5	Q1 2017	14	40	2	0	0	14	0	13	19	16	3	2	12.74	5,670	$268.10	7
6	Q2 2017	12	8	2	0	0	13	0	9	13	13	31	2	13.00	14,112	$361.36	8
7	Q3 2017	8	-1	2	0	0	6	0	19	18	18	15	28	194.219	52,581	$615.00	14
8	Q4 2017	2	-8	0	34	8	10	30	3	9	9	15	20	85.132	31,335	$2,610.00	52
9	Q1 2018	0	-1	4	0	0	82	7	0	0	0	4	7	85.79	56,276	$4,170.00	94
10	Q2 2018	0	0	0	25	0	0	0	0	0	0	1	10	70.885	138,544	$4,560.00	100
11	Q3 2018	0	0	-3	0	1	0	0	0	0	0	1	1	15.95	153,517	$5,790.00	129
12	Q4 2018	0	0	0	0	0	0	-5	0	0	0	0	0	0	46,951	$5,899.08	136
	Totals:	**176**	**69**	**11**	**59**	**9**	**189**	**32**	**112**	**99**	**99**	**74**	**74**	**500.856**	**504,025**	**$24,424.49**	**136**

* = Five added after changing minimum roof system size from 4.0 kW to 3.0 kW.

Notes:

1 Although Tier 1 and Tier 2 customers are eligible for the energy efficiency offerings, the customers may not necessarily enroll to receive these offerings.

2 The quarterly bill credit distributed is a function of an algorithm that accounts for participant quantity and the seasonal fluctuation in kWh generated.

3 Not all enrolled customers choose to fully participate in the EE program.

Table 5-1

Appendix A

Appendix A: Updated Gantt Chart (as of the end of Q4 2018)

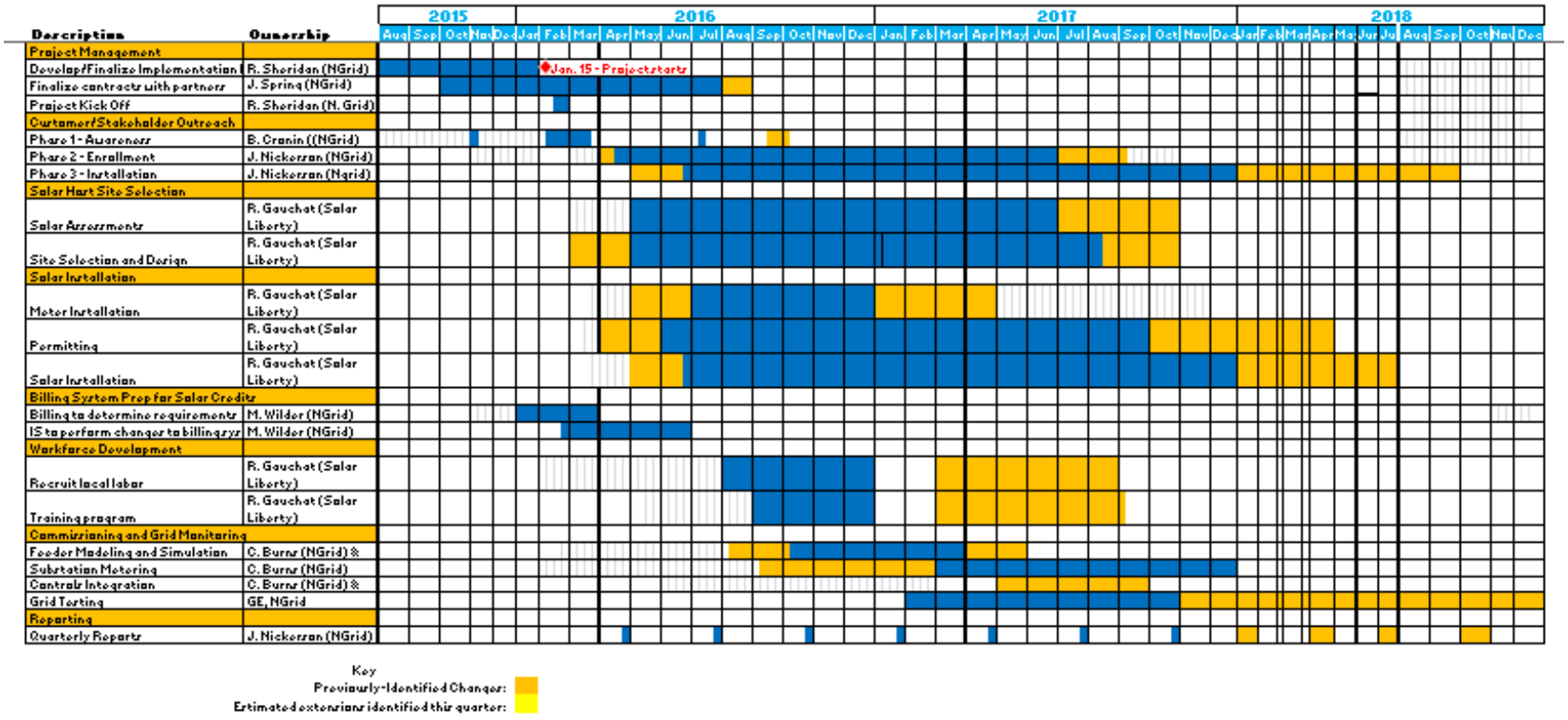

Table A-1 – Updated Gantt Chart