

May 29, 2019

**VIA HAND DELIVERY & ELECTRONIC MAIL**

Luly E. Massaro, Commission Clerk  
Rhode Island Public Utilities Commission  
89 Jefferson Boulevard  
Warwick, RI 02888

**RE: Docket 4513 – Street light Metering Pilot Proposal  
Responses to PUC Data Requests – Set 4**

Dear Ms. Massaro:

I have enclosed National Grid's<sup>1</sup> responses to the fourth set of data requests issued by the Rhode Island Public Utilities Commission in the above-referenced docket.

Thank you for your attention to this matter. If you have any questions regarding this filing, please contact me at 401-784-7288.

Very truly yours,



Jennifer Brooks Hutchinson

Enclosure

cc: Docket 4513 Service List  
John Bell, Division  
Christy Hetherington, Esq.  
Leo Wold, Esq.

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<sup>1</sup> The Narragansett Electric Company d/b/a National Grid.

Certificate of Service

I hereby certify that a copy of the cover letter and any materials accompanying this certificate was electronically transmitted to the individuals listed below.

The paper copies of this filing are being hand delivered to the Rhode Island Public Utilities Commission and to the Rhode Island Division of Public Utilities and Carriers.



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Joanne M. Scanlon

May 29, 2019  
Date

**Docket No. 4513 - National Grid – Streetlight Metering Pilot Proposal  
Service List updated 1/29/2019**

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PUC 4-1

Request:

On page 92 of the Company's final report dated November 21, 2017, the Company stated:

"In order to gain additional flexibility, National Grid's billing system can be expanded to accommodate a limited increase in the number of unmetered schedules to reflect a different series of operating hours and/or dimming levels."

In Docket 4770, the Amended Settlement Agreement included an additional operating schedule allowing customer-owned light-emitting diode (LED) streetlights to operate at an output level that would result in 3,080 operating hour equivalents.

- a) Has the Company looked at this issue after the execution of the Settlement Agreement?
- b) Has the Company considered any other unmetered schedules to reflect a different series of operating hours and/or dimming levels?

Response:

- a) After the Public Utilities Commission's August 24, 2018 approval of the Amended Settlement Agreement and compliance filing in Docket No. 4770, the Company investigated whether National Grid's billing system could be expanded to include additional defined operating hour equivalent annual schedules. As a result of that investigation, the Company determined that only one additional annual operating hours equivalent schedule could be added to National Grid's billing system without incurring significant Information System development and programming costs. Any addition to the Rate S-05 Hours of Operation schedule array would require the Company to perform an impact assessment of all existing customer-owned lights that currently are on designated schedules with annual operating hour equivalent values that are adjacent to the additional schedule. Based upon current customer specified operating hour schedules or defined annual operating hour equivalent values of existing lights, the energy billing of those existing lights may be affected if an additional operating schedule is adopted in the future.
- b) The Company has not considered alterations to the current unmetered operating schedules since the recent addition of the Dimming-50% option, nor has it received any customer requests to do so.

PUC 4-2

Request:

On page 93 of the Company's final report dated November 21, 2017, the Company stated:

“National Grid recommends further testing of the network lighting controls to address increased knowledge on power factor, total harmonic distortion, parasitic load, accuracy of power consumption of different dimming control protocols (i.e., digital addressable lighting interface, also known as “DALI”), and correlation of dimming control with actual illumination output. Thus, National Grid recommends continuing to complete the analysis of the Information System integration study related to achieving a cost and schedule for the data integration.”

- a) What does the Company mean by “further testing”?
- b) What efforts, if any, have been undertaken by the Company to complete the analysis of the Information System integration study related to achieving a cost and schedule for the data integration.”

Response:

- a) During the term of the Pilot, the Company experienced or became aware of conditions, issues, and technology, as previously referenced, that potentially may impact metrology accuracy and/or performance. Therefore, the Company recommended additional investigation associated with these concerns. This recommendation could be addressed by the Public Utilities Commission (PUC) as an extension of the Company's PILOT initiative. Alternatively, manufacturers might address these additional concerns when complying with technical specification requirements during the procurement process.
- b) Since the March 10, 2017 PUC-directed suspension of the information system integration study, the Company has not engaged in any specific work effort to complete the investigation. The Company, however, plans to identify network lighting control technology and its associated metering capability as a potential future use case in its Updated Advanced Metering Functionality (AMF) Business Case that the Company plans to file with the PUC within the next several months.

PUC 4-3

Request:

On page 93 of the Company's final report dated November 21, 2017, the Company stated: National Grid recommends further testing of the network lighting controls to address increased knowledge on power factor, total harmonic distortion, parasitic load, accuracy of power consumption of different dimming control protocols (i.e., digital addressable lighting interface, also known as "DALI"), and correlation of dimming control with actual illumination output.

- a) Please explain with specificity what the Company means by "further testing of the network lighting controls."
- b) Does the Company believe that some of an additional PILOT is warranted? If so, please explain.

Response:

- a) The Company was aware of integrated circuit (IC) metering technology use in standard revenue grade meters. The Company, however, recognized that the IC meter technology use within the network lighting controls (NLCs) was relatively new and extensive performance testing was unavailable during the Pilot. Therefore, the Pilot primarily focused on performing tests that complied with industry-established metering standards. The referenced issues raised concerns regarding their potential impacts on the quality of recorded metrology information. Additionally, the Company continues to express concerns regarding the NLC metrology associated with varied electrical load conditions caused by varied lighting and other ancillary device circuit configurations and operating characteristics. These electric load and configuration concerns are becoming evident within "Smart City" deployments utilizing an array of lighting, sensors, and other technologies arranged to be metered by a single NLC. Therefore, the Company's expression for further testing embodies the need to investigate and verify the metrology performance limitations associated with the referenced electrical conditions. This testing would utilize both established standard testing protocols and the possible development of custom protocols to assimilate electrical, physical, and environmental conditions that could occur with the continued advancement of smart city technology and its applications. For each referenced case, the testing would assess the effects associated with metrology accuracy and the potential impacts upon the performance of the NLC and/or the integrity of the meter data transmission within the communication network. The investigation effort fundamentally would consider several equipment configuration models and operating conditions to exemplify possible varied electrical loading and performance conditions impacting the NLC. In this manner, designated power factor

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settings and varied induced harmonic conditions would provide impact feedback. A comparison and assessment of analog (0-10V) versus digital (DALI) dimming controls which was not part of the original Pilot would provide further metrology quality detail in addition to the establishment of an acceptable energy consumption correction model to address the nonlinear relationship between electric load and dimming level correlation. Testing may also address the parasitic (continuous) load of the NLC device in conjunction with an assessment of both line-side metering and load-side metering.

- b) The Company believes that the findings and associated commentary provided in the Final Report of the Pilot raised industry awareness of the NLC's performance and metrology issues and concerns. At present, it is recognized that many of the NLC manufacturers now provide consumers with documentation from independent third-party testing organizations to support their metrology accuracy claims and/or compliance with ANSI C12.20 standards. This supplemental information was unavailable from the manufacturers during the Pilot.

Although manufacturers now provide qualification documentation on their products, the utility industry continues to perform pre-qualification testing of procured meter products in compliance with established regulatory guidelines associated with revenue grade meters. If the Public Utilities Commission deems that additional study of current NLC devices is appropriate and costs should be borne by a designated customer group and in recognition of Mr. Booth's recommendations provided in his testimony dated January 29, 2019, the Company could perform similar testing on the same manufacturer's latest NLC versions to affirm their stated metrology accuracy.

Additionally, the Company and the street lighting industry acknowledge that there remain many unanswered questions regarding the NLC technology as referenced in questions PUC 4-2a and 4-3a. Presently, the Company has no plans to pursue testing of the referenced concerns; however, testing to address these individual issues could be incorporated within an additional Pilot in conjunction with the aforementioned metrology accuracy testing.

PUC 4-4

Request:

On page 93 of the Company's final report dated November 21, 2017, the Company stated: "National Grid further recommends industry collaboration of node vendors, network service providers, utilities, end-users, and regulatory entities to address the following issues: industry standard testing protocols, definitive metrology performance requirements, data format and transmission quality standards, and software platform standards for data retrieval/export and retention."

- a) Please describe whether the Company is aware of any further "industry collaboration of node vendors, network service providers, utilities, end-users, and regulatory entities" and please describe the Company's level of participation in such collaboration.

Response:

The Company is aware of the following professional organizations, associations, or societies that provide a forum for various entities within the lighting and controls industries to collaborate on product standards and/or application practices:

- ANSI – American National Standards Institute
- CEC – California Energy Commission
- CIE – International Commission on Illumination
- IEEE – The Institute of Electrical and Electronics Engineers
- IES – Illuminating Engineering Society
- NEMA – National Electrical Manufacturers Association
- NIST – National Institute of Standards and Technology

The status of several relevant standards applicable to solid-state lighting applications or network lighting control technology is provided below:

ANSI C12 Accredited Standards Committee for Electricity Metering

C12.20-2015; American National Standard for Electricity Meters – 0.1, 0.2 and 0.5 Accuracy Classes

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ANSI C136 Roadway and Area Lighting Committee

C136.41-2013; Dimming Control Between an External Locking Type Photocontrol and Ballast or Driver

C136.48-2018; Wireless Networked Lighting Controllers

Proposed C136.50; Revenue Grade Energy Measurement within a Locking Type Control Device

Proposed C136.52; LED Drivers with Integral Energy Measurement Means

Proposed C136.54; tentatively entitled, Occupancy Sensors for Roadway and Area luminaires

ANSI C137 Lighting Systems Committee

Proposed C137.1; 0-10V Dimming Interface for LED Drivers, Fluorescent Ballasts, and Controls

C137.2-2019; Cybersecurity Requirements for Lighting Systems for Parking Facilities

C137.3-2017; Minimum Requirements for installation of Energy Efficient Power over Ethernet (PoE) Lighting Systems

Proposed C137.4; Digital Interface with Auxiliary Power

National Grid maintains memberships to IEEE and IES, with employees actively participating on various subcommittees. At present, National Grid is participating on the ANSI C136.50 subcommittee, which is tasked with developing a standard to describe methods and requirements for the measurement of energy consumption and the reporting of the consumption for outdoor lighting applications to meet revenue grade requirements using a solid-state device integrated into a control device. National Grid also participates in the following utility industry outdoor lighting focused groups: the Electric Utilities Outdoor Lighting Council and the Investor-Owned Utilities Outdoor Lighting Group.

PUC 4-5

Request:

On page 93 of the Company's final report dated November 21, 2017, the Company stated: "Finally, National Grid recommends that regulatory compliance standards associated with street light metering, to establish a common industry baseline, be required for integrated circuit meter standardization."

- a) Is the Company aware of any regulatory compliance standards associated with street light metering at any other location within the United States?
- b) Does the Company have any employees currently assigned to working towards eventually integrating/implementing revenue grade meters for streetlights? If so, how many employees? If not, why not?

Response:

- a) The Company is aware of Georgia Power's Time of Use – Energy for Outdoor Lighting Service Schedule: TOU-EOL-3 (Pilot) electric service tariff applicable to all company-owned outdoor lighting (limited to a maximum 100 customer accounts) with Smart Lighting Control devices. See <https://www.georgiapower.com/content/dam/georgiapower/pdfs/business-pdfs/rates-schedules/9.30-tou-eol.pdf>

A similar Pacific Gas and Electric (PG&E) Company limited pilot program referenced as Advice 3415-G/4285-E, effective October 24, 2013 utilized customer-owned remotely programmed network control systems to monitor, log, and report energy consumption street light data. See [https://www.pge.com/tariffs/tm2/pdf/ELEC\\_FORMS\\_79-1129.pdf](https://www.pge.com/tariffs/tm2/pdf/ELEC_FORMS_79-1129.pdf)

As a participation eligibility prerequisite of the PG&E pilot (See "Attachment C" within [https://www.pge.com/tariffs/tm2/pdf/ELEC\\_FORMS\\_79-1129.pdf](https://www.pge.com/tariffs/tm2/pdf/ELEC_FORMS_79-1129.pdf)), the "Customer's control/monitoring system must include revenue-grade data loggers capable of meeting Rule 17 and Direct Access Standards for Metering and Meter Data (DASMMD) standards for operational accuracy". See <https://www.pge.com/includes/docs/pdfs/mybusiness/customerservice/startstop/newconstruction/greenbook/dasmmd.pdf>

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The Company is also aware of the utilization of customer-owned network lighting control (NLC) meter readings by San Diego Gas & Electric based on their Lighting – Street and Highway – Customer-Owned Dimmable Installations, Schedule LS-2 DS, Advice Letter No. 3237-E, effective August 1, 2018. Within this Schedule, the NLC (or referenced “Node”) must be “approved by the Utility for the specific purpose of revenue-grade metering applications” and “comply with SDG&E’s metering specifications”. This Schedule identifies the use of accepted metered energy consumption values that are applied only to the commodity portion of the total billable electric charge. See [http://regarchive.sdge.com/tm2/pdf/ELEC\\_ELEC-SCHEDS\\_LS-2\\_DS.pdf](http://regarchive.sdge.com/tm2/pdf/ELEC_ELEC-SCHEDS_LS-2_DS.pdf)

- b) The Company plans to identify network lighting control technology and its associated metering capability as a potential future use case in its Updated Advanced Metering Functionality (AMF) Business Case that the Company plans to file with the Public Utilities Commission within the next several months. Additionally, as a point of reference, the Company’s upstate New York affiliate, Niagara Mohawk Power Corporation, is engaged in a “Smart City” technology pilot utilizing NLC systems within the City of Schenectady as part of, and funded through, the New York State Reforming the Energy Vision comprehensive energy strategy. This pilot will include an evaluation of NLC metering associated with street lighting and ancillary devices. Although no designated employees are focused solely on the integration/implementation of the NLC technology, numerous employees from various groups, such as Information Technology, Metering, Wireless Communications, and Outdoor Lighting, are involved in providing background research and application information used in the scoping and planning documents and prospective application development initiatives.

PUC 4-6

Request:

At page 6 of John E. Walter's rebuttal testimony, he states:

"The Company determined that, at this time, it would be more economical and efficient to employ additional unmetered billing metrics to the existing billing system and utilize individual static dimming or part-night photoelectric control operating schedules to achieve an acceptable energy consumption determination for the applicable customer desired luminaire operating schedule."

- a) Does Mr. Walter have any more specific recommendations for other individual static dimming or part-night photoelectric control operating schedules?

Response:

- a) The Company would consider an additional Operating Hours Schedule to Rate S-05 if directed by the Public Utilities Commission, subject to and as described in the Company's response to PUC 4-1.

Please note that there are photocontrols that are pre-programmed by the manufacturer to specific static schedules and others that allow the customer to pre-program the application of a dynamic weekly schedule including independent dimming and part-night operations per day. For static manufacturer programmed controls, only minor modifications to the existing Operating Hours Schedules within the S-05 tariff would be required.

Utilizing a lighting control that allows a dynamic weekly schedule, the customer could program their lights in a manner that maximizes their desired operation without the added costs of the network lighting control (NLC) nodes, the associated network infrastructure, software, and communication charges. These control options provide the operational flexibility desired by the customer at a lower initial cost and no continuous operating costs, thus eliminating the need for NLC metering.

The Company, however, acknowledges the value-added benefits of the NLC system, including: remote functional communications, real-time operational status, maintenance diagnostics, and GPS coordinate tracking, to name a few.