STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
PUBLIC UTILITIES COMMISSION

The Narragansett Electric Company
d/b/a National Grid — Docket No. 4513

RE: Establishment of Pilot Metering Program for Municipal-Owned Streetlights

PREFILED DIRECT TESTIMONY OF

Gregory L. Booth, PE
President, PowerServices, Inc.
On Behalf of Rhode Island Division of Public Utilities and Carriers

January 29, 2019

Prepared by:
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Prefiled Direct Testimony of

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On Behalf of Rhode Island Division of Public Utilities and Carriers
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DIRECT TESTIMONY OF GREGORY L. BOOTH, PE

I. INTRODUCTION

Q. PLEASE STATE YOUR NAME AND THE BUSINESS ADDRESS OF YOUR EMPLOYER.

A. My name is Gregory L. Booth. I am employed by PowerServices, Inc. ("PowerServices"), located at 1616 E. Millbrook Road, Suite 210, Raleigh, North Carolina 27609.

Q. ON WHOSE BEHALF ARE YOU TESTIFYING IN THIS MATTER?

A. I am testifying on behalf of the Rhode Island Division of Public Utilities and Carriers ("Division").

Q. WHAT DOES YOUR POSITION WITH POWERSERVICES, INC., ENTAIL?

A. As President of PowerServices, Inc., an engineering and management services firm, I am responsible for the direction, supervision, and preparation of engineering projects and management services for our clients, including the corporate involvement in engineering, planning, design, construction management, and testimony.

Q. WOULD YOU PLEASE OUTLINE YOUR EDUCATIONAL BACKGROUND?

A. I graduated from North Carolina State University in Raleigh, North Carolina in 1969 with a Bachelor of Science Degree in Electrical Engineering, and was inducted into the North Carolina State University Department of Electrical and Computer Engineering Alumni Hall of Fame in November 2016. I am a registered professional engineer in twenty-three (23) states, including Rhode Island, as well as the District of Columbia. I am a registered land surveyor in North Carolina. I am also registered under the National Council of

Examiners for Engineering and Surveying. My curriculum vitae is included in Appendix GLB-1.

Q. ARE YOU A MEMBER OF ANY PROFESSIONAL SOCIETIES?

A. I am an active member of the National Society of Professional Engineers ("NSPE"), the Professional Engineers of North Carolina ("PENC"), the Institute of Electrical and Electronics Engineers ("IEEE"), American National Standards Institute ("ANSI"), American Public Power Association ("APPA"), American Standards and Testing Materials Association ("ASTM"), the National Fire Protection Association ("NFPA"), and Professional Engineers in Private Practice ("PEPP"). I have also served as a member of the IEEE Distribution Subcommittee on Reliability and as an advisory member of the National Rural Electric Cooperative Association ("NRECA)"-Cooperative Research Network, which is an organization similar to Electric Power Research Institute ("EPRI").

Q. PLEASE BRIEFLY DESCRIBE YOUR EXPERIENCE WITH ELECTRIC UTILITIES.

A. I have worked in the area of electric utility and telecommunication engineering and management services since 1963. I have been actively involved in all aspects of electric utility planning, design and construction, ranging from generation, transmission and distribution through customary service including, but not limited to, metering and communication systems. I have provided services to many regulatory agencies, and hundreds of electric utilities. My experience includes work on grid modernization planning and design and implementation ranging from Advanced Metering Infrastructure ("AMI"), Geographic Information System ("GIS") and self-healing circuits to micro-grid installations with battery storage systems. My experience spans metering from electromechanical meters to digital meters, automated meter reading (AMR) systems, and

advanced metering infrastructure and the communications options and infrastructure. Our sister companies manufacture and install a wide range of LED lights and controls from commercial and industrial applications to utility applications. These include major energy efficiency applications such as conversion to LED lighting with dimming and off/on controls for light consumption optimization. I have assisted utility clients in their selection of LED lights for enhanced energy efficiency and cost reduction, along with street and area lighting rate designs. I have been providing services in Rhode Island and other portions of New England for over 30 years.

Q. HAVE YOU PREVIOUSLY TESTIFIED AS AN EXPERT BEFORE THE RHODE ISLAND PUBLIC UTILITIES COMMISSION?

A. Yes. I have testified before the Rhode Island Public Utilities Commission on numerous matters, including Docket Nos. 2489, 2509, 2930, 3564, 3732, 4029, 4218, 4237, 4307, 4360, 4382, 4473, 4483, 4539, 4592, 4614, 4682, 4770/4780, 4783, D-11-94, and D-17-45. My testimony in Rhode Island has included filed and live testimony on previous Electric Infrastructure, Safety and Reliability Plan Fiscal Year Proposal filings by National Grid in Docket Nos. 4218, 4307, 4382, 4473, 4539, 4592, 4682, and 4783.

Q. HAVE YOU PREVIOUSLY TESTIFIED AS AN EXPERT BEFORE STATE UTILITY COMMISSIONS AND OTHER REGULATORY AGENCIES?

A. Yes. I have testified on numerous occasions before the FERC, including pre-filed testimony in both wholesale rate matters as well as in electric utility reliability matters and facility connection standards, including Duke Energy and Dominion Energy dockets. I have also testified before the Connecticut Public Utilities Regulatory Authority, Delaware Public Service Commission, Maine Public Utilities Commission, Maryland Public Service Commission, Massachusetts Department of Public Utilities, Minnesota Department of

Public Service Environmental Quality Board, New Jersey Public Utilities Commission, North Carolina Utilities Commission, Pennsylvania Public Utility Commission, Rhode Island Public Utilities Commission, and the Virginia State Corporation Commission. My testimony before most of these Commissions has been provided on numerous occasions.

Q. HAVE YOU BEEN ACCEPTED AS AN EXPERT BEFORE STATE OR FEDERAL COURTS?

A. Yes. I have been accepted as an expert in the area of electrical engineering and electric utility engineering, construction and reliability matters and the National Electrical Safety Code ("NESC"), National Electrical Code ("NEC"), Occupational Health and Safety Administration ("OSHA"), Electromagnetic Field ("EMF"), and forensic engineering, including standard and customary utility operation practices in the electric utility industry and the electric industry before 17 state and federal courts.

Q. HAVE YOU BEEN INVOLVED DIRECTLY IN STREETLIGHT EVALUATIONS AND/OR IMPLEMENTATIONS FOR OTHER ELECTRIC UTILITIES?

A. Yes, I have. I have completed numerous street lighting designs throughout my career, including on Department of Transportation projects. As previously stated above, our parent company manufactures and installs a wide variety of LED lights and controls, and I have performed studies for clients on the applications of LED lighting and controls together with the design of lighting rate schedules as part of cost of service studies and rate designs.

II. PURPOSE OF TESTIMONY

Q. HAVE YOU REVIEWED THE REPORT AND TESTIMONY OF NARRAGANSETT ELECTRIC COMPANY D/B/A NATIONAL GRID ("NATIONAL GRID" OR "COMPANY") IN THIS MATTER?

A. Yes, I have reviewed the documents the Company has filed in Docket No. 4513, including its Report, testimony and responses to data requests.

Q. HOW HAVE YOU ORGANIZED YOUR TESTIMONY?

A. Section I of my testimony provides an introduction and a summary of my background and experience. Section II addresses the purpose of my testimony. Section III provides an overview of my analyses and a summary of my position on the Company's Report and Pilot Program, Section IV addresses some of the unresolved utility industry issues associated with network light control integrated circuit metering, Section V addresses the meter testing and analysis, Section VI discusses how the S-05 tariff currently offers a path to the desired economic benefits of NLC deployment and street light dimming, and Section VII outlines my conclusions.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. My testimony is intended to provide the Rhode Island Public Utilities Commission with additional information concerning streetlight network lighting control ("NLC") devices, integrated metering issues and existing concerns, together with my view of the future for NLCs and streetlight metering. I will also address certain aspects of the testimony of the Company witness and intervenor witnesses. My testimony is not intended to criticize the obvious differences in opinions of the parties, but rather to outline a balanced position recognizing the proposed NLC technology with integrated metering is very early in its development and advancement cycle.

III. OVERVIEW

Q. WOULD YOU PROVIDE A BRIEF OVERVIEW OF YOUR TESTIMONY AND WHAT YOU PERCEIVE AS THE STATE OF THE PILOT AND APPLICATION OF NLCs?

A. Yes. The Company completed an initial pilot of NLC functionality and metering accuracy which Intervenors are contending was deficient, incomplete or failed to produce an outcome which would permit municipalities the opportunity of using this evolving technology to generate significant energy savings of potentially 6.6 million kWh annually. My observation is that vendors competing in markets where technology is immature, such as NLCs with integrated metering, have products of varying accuracy and functionality. There are no industry standards in place to guide development. It is reasonable that the results of the Company's initial pilot produced inconsistent results among the vendors tested. Additionally, the testimony of the witnesses would lead to a conclusion that, even among the vendors evaluated, in the interim there have been advancements made in the product since the initial pilot. Thus, the pilot did not evaluate the latest and potentially best technology available. In the areas of electronics and technology, this is most often the case due to the rapid development of new initiatives. I am aware of eight (8) viable vendors of NLCs. Some of these products with integrated meters fail to actually meter all the load imposed on the utility. Until the vendors offering this advanced technology are able to ascertain the accuracy, robustness, and cost effectiveness of individual streetlight meters, the utility industry will continue using street lighting rate schedules developed through a series of analyses and cost of service methods to bill for the various street and area lights connected to its system without the use of revenue meters. This is not because rate schedules are the most accurate method, but rather the most cost effective and reasonable method considering the available alternatives. This method is used across the industry, and

has been verified many times to provide an acceptable level of accuracy. Until the application of new metering technology into a utility's system includes equipment with standards for design, manufacturing, and testing, and which can be cost effectively integrated into a utility's metering, communications, accounting, and billing systems, rate schedules are the optimal alternative. My assessment indicates the Company's pilot program and report is an acceptable first step in testing the accuracy and adaptability of current technology, which would not necessarily be the end of the analysis or process.

Q. WHAT ARE SOME OF THE CHALLENGES FACING THE COMPANY IN INCORPORATING THE NLCs METERING INTO ITS SYSTEMS?

A. The Company and the industry is encountering a paradigm shift in metering, including the NLC integrated metering technology. This shift to AMI or AMF metering has been underway for some time. The challenges include a significant lack of standards and consistency of the products among the vendors. The vendors are improving and are expected to continually improve the products. During these cycles of technology transformations, utilities are faced with many iterations of products, each requiring specific infrastructure for system integration and support. At minimum, a utility must be certain that streetlight metering data can be certified as revenue grade, be transmitted into the utility's current billing system, and be converted into standard billing format. The communication, accounting, billing and testing challenges, combined with personnel efforts and cost of integrating special equipment and data into package software and billing systems are significant without a clear cost benefit. Some of the NLC vendors and utilities appear to be developing solutions to these challenges, but those solutions simply don't apply to all utilities. Every utility has unique requirements. Furthermore, utilities and commissions may need to adopt some special or appropriate methods if the customer is

permitted to own revenue metering equipment, which has not been customary across the industry. The precedent of such a change would pervade well beyond street lighting, including to EV charging and many other applications. The Company's pilot is potentially only a first step, which establishes a platform for further assessment and enhancements in testing and study in order to develop a more complete study with documentation to develop a meaningful cost benefit.

Q. COULD THE COMPANY'S IMPLEMENTATION OF ADVANCE METERING FACILITIES AND AMI METERS HAVE ANY IMPACT ON THE FUTURE FOR STREET LIGHTING METERING?

A. This is certainly one of the future advancements that may dramatically impact the use of NLC integrated metering. Currently, the Company primarily uses a hybrid AMR metering technology at customer sites, which has limited functionality and communications capabilities. The Company is evaluating future AMF for AMI deployment which will offer greater flexibility to integrate system devices, such as sensors, monitors, and NLCs, with integrated meters. One of the widely adopted AMI metering vendors, Sensus, offers a NLC product. The logical next step would be for AMI vendors, such as Sensus, to have their NLC metering products seamlessly integrated into the AMI metering system. Sensus is providing both an individual light and aggregated light internal consumption data in standard billing format and also which is incorporated into its AMI product. As NLC technology matures, standards and advancements developed by other vendors and standards associations would logically mean the NLC metering would be much more readily incorporated without special integration requirements. This has occurred across many other areas such as GIS, CIS, SCADA and load flow software. Therefore, it is natural to expect technology to advance to a point that street lighting control and metering will be much more easily incorporated into the normal business process for the utilities. The

technology and its advancements are likely to be a moving target, with some vendors in the AMI business moving to a much more seamless product than others. The question at this point is whether it is premature for the Company to adopt a technology today that is known to be rapidly improving and will likely offer greater reliability and compatibility with system infrastructure in the future. To be sure, integrating NLC technology now would be imprudent, given that the Company's overall strategy for advanced metering is in early development. I contend that the open dialog and active consideration of AMI meter deployment by the Company and the Commission should be the platform for the next stage of assessment for incorporation of the NLC integrated meter consideration. Immediate integration of NLC Integrated Circuit ("IC") metering will most likely result in early obsolescence of the Company's equipment and software deployment, and the associated waste of capital and staff time.

Q. WHY WOULD AMI METERING DEPLOYMENT BY THE COMPANY HAVE A BEARING ON A DISCUSSION AT THIS TIME?

A. As the AMI metering vendors create a platform for seamless incorporation of NLC integrated metering data, the need for special communications, billing, accounting software, and special efforts by utility staff become de-minimus. It is much more cost effective for the Company to consider NLC technology as part of a broader AMI package in the future than to integrate standalone NLC products today, particularly when the technology is evolving. While some utilities are in the early stages of AMI and NLC pilots, the major questions still remain regarding device ownership, review and validation of the network lighting system, consumption based lighting tariff implementation, and a mechanism for seamless incorporation of metering data through the utility's billing and accounting processes.

Q. ARE YOU SAYING THE NLC INTEGRATED METERING SHOULD BE A PART OF THE AMI METER DEPLOYMENT DECISION?

A. Yes. I believe the decision on AMI meter deployment, which the Company is evaluating as part of its AMF and grid modernization plans, will dramatically shape much of the direction and decisions going forward with the incorporation of NLC integrated metering into the utility metering and billing systems.

IV. UNRESOLVED UTILITY INDUSTRY ISSUES

Q. DO YOU BELIEVE UTILITIES, SUCH AS GEORGIA POWER, ARE ADOPTING THE NLC TECHNOLOGY AS SUGGESTED BY SOME OF THE WITNESSES?

A. Yes, but there is a significant difference in what is done at Georgia Power and what is being proposed in the northeast by some of the witnesses. I have had communications with Mr. Fitzmaurice, Lighting Principal, and Mr. Hutto, Lighting Services Business Unit Manager, of Georgia Power to confirm that Georgia Power owns, tests, validates, installs, operates and maintains the networked lighting controllers installed as revenue meters in LED luminaires that Georgia Power owns, operates and maintains. Georgia Power ensures, via testing in their meter engineering test labs, that the metrology of the NLCs meets the same accuracy requirements as specified by the Georgia Public Service Commission (PSC) for electric meters used throughout the Georgia Power system.

Q. ARE YOU AWARE OF UTILITIES ALLOWING THE CUSTOMER TO OWN THE METER?

A. Yes. PECO, in Philadelphia, is introducing a new consumption based rate that anticipates customer owned metering through the lighting controllers. PECO would require that it review and validate the network lighting system.

Q. WHAT ARE SOME OF THE REASONS THE UTILITY WOULD WANT TO MAINTAIN OWNERSHIP AND CONTROL?

A. Beyond the obvious need for quality controls and accountability, such as testing and reporting, there is the issue of whether the integrated circuit (IC) metering records or accounts for all the energy consumption. It has been determined some metering does not account for loads such as driver load, communications module load, RF radio load, or motion sensor load. The amount of load not metered can be a significant portion of the total

load. As an example, Phillips indicates it could be 13% of the lamp wattage, and could reach even higher amounts. The lack of consistent specifications, designs, and accuracy of the IC meter, coupled with the absence of standards for the utility to apply, create a problem for the utility if accepting a NLC with metering into its system that is owned by others. Much like the solar industry equipment integration into the electric utility system, standards were developed and adopted by the industry and have been refined over time. The pilots completed by the Company certainly begin to establish the issues and guidelines to be considered for NLC adoption. However, there are too many unanswered questions arising from the Company's pilot to ignore the preponderance of concerns with the technology reliability and with a non-utility owning the metering at this time. Furthermore, as I will discuss later, the Company's existing street lighting tariff affords the municipalities an opportunity to achieve comparable savings to their claims in this proceeding by using a dimming program.

Q. ARE YOU SUGGESTING THAT AN EXISTING TARIFF IS A LONG TERM SOLUTION, AS OPPOSED TO IMPLEMENTING NLC WITH INTEGRATED METERING?

A. No. As I will explain in more detail later in my testimony, the Company's existing S-05 Tariff provides a municipality the economic benefits of a streetlight dimming program without the need for metering. It is available now at no additional cost to municipalities. This means there is not a tremendous urgency to adopt a policy for the Company to immediately accept metering data from NLCs, since most, if not all, the economic benefit desired by municipalities can be achieved with the tariff. Therefore, while municipalities enjoy economic benefits of an alternate tariff, the Company, Commission, and stakeholders are afforded adequate time to evaluate a much broader program which will be dramatically influenced if the Company deploys an AMI system. A decision otherwise would

potentially be a wasted step with additional cost to both municipalities and the Company prior to knowing the disposition of AMI.

V. METER TESTING AND ANALYSIS

Q. MR. WALTER, ON PAGE 13 OF HIS TESTIMONY, EXPLAINS WHY THE COMPANY ELECTED TO UTILIZE ANSI C12.20 METERING STANDARD FOR THE TESTING OF THE INTEGRATED METERING CIRCUITS USED WITHIN THE NLCS BY THE MANUFACTURERS. DO YOU CONCUR WITH THE UTILIZATION OF THIS STANDARD FOR THE TESTING?

A. Yes, particularly given that there is no industry standard currently adopted which specifically incorporates the testing of the metering circuits in the NLCs. This presents a dilemma for the industry and specifically the electric utilities. Customarily electric utilities incorporate equipment, including meters, into their systems that have a comprehensive set of industry adopted standards for design, manufacturing and testing. That is not the case for the NLCs. Since this technology is still maturing, there are multiple variables among the many vendors offering NLCs with metering circuits incorporated. In order to fairly evaluate the broad spectrum of offerings, the Company made a logical choice when it selected the ANSI C12.20 metering standard as the testing protocol. The Company appropriately used latitude to reduce the test current to match the integrated meter specifications consistent with ANSI C12.20. Their report results and basis for the meter test results are clear and based on an industry standard protocol. Until such time as there are industry standards for these NLC integrated circuit meters, ANSI C12.20 represents the only viable testing standard. I am aware that some lighting controllers are certified as revenue grade using ANSI C12.20, 0.5% accurate class meters by the test lab (TESCO), which was the same testing vendor used by the Company. It appears ANSI C12.20 is being used by other utilities and test labs as a proxy for a NLC integrated circuit meter test standard.

Q. DID THE COMPANY FOLLOW THE ANSI/NEMA C12.20 STANDARDS WHEN PERFORMING THE TEST?

A. Yes. The Company's Report, in paragraph 4.1.2, listed the Final Test Specification full load testing was done at 15 amps on each device. Table 1 on page 24 of the Company's Report lists the maximum switching capacity for Vendor A and B as 15 amps, Vendor C as 10 amps and Vendor D as not listed with the Power Range listed as 1,800 VA. For a pilot, it is reasonable that the Company and its testing company selected a consistent 10 and 15 amps for testing, within the range of the listed capacities for products tested. It is, however, important to note that ANSI/NEMA Standard C12.20 in paragraph 4.3 has a documented Table 1 with current class and test amperes with the note: "Other values of test amperes may be used as recommended by the manufacturer". The Company did not make this adjustment to its testing protocol since testing at 10 and 15 amperes was either within the listed specifications for each vendor's product, or, if not listed, was not otherwise provided by the vendor. Those very vendors were the stakeholders that participated in the testing with the Company, at which time they had ample opportunity to request testing adjustments consistent with ANSI/NEMA Standard C12.20. The fact that the vendors did not provide guidance otherwise indicates that the Company's use of a 10 and 15 ampere testing range was appropriate and consistent with the standards. Also, considering that ANSI C12.20 has not contemplated the integrated metering on a street lighting node controller, it is reasonable to select a consistent testing level for an initial pilot.

Q. IS THE METERING ACCURACY AND TESTING CURRENT LEVEL THE ONLY ISSUE WITH THE APPLICATION OF THE NLCS AND INTEGRATING METERING?

A. This is certainly not the only issue or item for consideration. I have discussed some of the concerns associated with a lack of standards and consistency between vendor products. I will discuss further considerations later in my testimony. Hopefully, ANSI will produce new standards which will address, more specifically, the appropriate testing protocols for

the NLC integrated meters. This should provide guidance to the manufacturers and utilities which would mitigate the current disputes and apparent lack of agreement between the vendors and the Company. Such a straightforward issue as testing should not become a point of contention in a docket. Either a meter passes, or it does not pass the test, and the test parameters should not be manipulated to create a pass or fail. They should be defined and adhered to in the testing. Equally as important is the need for the NLC integrated meter circuit to be designed so it records the consumption for all the load, not just a portion of the load.

VI. METER READING UTILIZATION VS. CONTINUING APPLICATION OF S-05 TARIFF

Q. HAVE YOU REVIEWED THE NARRAGANSETT ELECTRIC COMPANY STREET AND AREA LIGHTING – CUSTOMER OWNED EQUIPMENT TARIFF S-05?

A. Yes. Based on the focus of this docket, my primary attention was on the LED portion of the tariff, which identifies nominal voltage ranges, billable wattage, and various kWhs delivered based on an estimate of the hours the light is illuminated.

Q. HOW DO THE KWH SAVINGS FROM DIMMING UNDER THE S-05 TARIFF COMPARE TO KWH SAVINGS FROM NLC APPLICATIONS, AS INDICATED IN THE SEPTEMBER 12, 2018 PRE-FILED TESTIMONY OF MR. WHITE?

A. In Mr. White's testimony, page 23, he stated that the average wattage of 16,945 lights installed in Providence is 106.4 for nameplate wattage, 75.05 for full operating wattage (at dusk and dawn), and dimmed at 50% for six hours per night. That would be 29% reduction. The Company's S-05 Tariff provides similar data for LEDs of varying wattage. Examination of the tariff indicates that the Company estimates a wattage reduction of 26% at each level of LED wattage when dimmed 50%, which is a very similar reduction to that of Mr. White's example. I provide a comparison Mr. White's data to the S-05 Tariff in Appendix GLB-2. The results of this analysis suggest that a municipality with LED streetlights on a 50% dimming schedule would be able to utilize the S-05 Tariff to achieve nearly identical energy savings as those estimated by Mr. White. The tariff offers savings to the municipality while allowing the Company, and potentially other ratepayers to avoid the additional cost of communication system interface, accounting and billing system special software edits, and additional personnel time for special billing system efforts. Therefore, as previously stated, the municipalities can achieve a benefit of nearly 6.6

million kWh energy usage reduction in its street lighting bills without relying on the Company to make significant system changes.

Q. HOW ACCURATE IS THE S-05 TARIFF WHEN COMPARED TO METERING EACH STREETLIGHT?

A. The tariff is not as precise as metering individual streetlights but, as previously explained, it is currently the most prudent method since, the cost of integrating special metering equipment into a utility's communication and billing infrastructure can be excessive, particularly when first generation technology becomes obsolete and subsequent upgrades are necessary. The Company has not quantified the most likely cost for the full NLC data integration. With many variable NLC integrated circuit meters, such quantification would be difficult because the Company would need to have a platform allowing at least eight vendor products and data to be integrated.

Q. DO YOU HAVE ANY RECOMMENDATIONS FOR POSSIBLE CHANGES TO THE S-05 TARIFF?

A. The S-05 Tariff has a "Nominal Voltage" range for LED lights. Rather than having a nominal voltage range, I would recommend it be changed so that it is consistent in structure to the S-05 High Pressure Sodium ("HPS") Light structure. The HPS has six (6) specific wattages, and using five (5) or six (6) specific LED options should resolve the concerns identified by Mr. White on page 19 of his testimony, where he expresses concern with the Company's range of wattages and potential for error rates.

Q. WOULD HAVING SPECIFIC LED WATTAGES IN THE S-05 TARIFF CREATE ANY ISSUES FOR THE MUNICIPALITIES IN PURCHASING FROM VARIOUS VENDORS OFFERING LIGHTING OPTIONS?

A. No. LED suppliers have been providing specific wattages for electric utilities to meet various tariff schedules. Many LED suppliers design the fixtures to easily meet a specific wattage without requiring a unique design.

Q. DO YOU CONCUR WITH MR. WALTER'S REBUTTAL TESTIMONY, PAGES 11-13, CONCERNING THE S-05 TARIFF AND UNMETERED BILLING METHODOLOGY?

A. Yes. To date, primarily due to the cost to revenue ratio of metering streetlights, the utility industry has developed tariffs for streetlights based on usage pattern estimates and empirical data and test results. I agree with Mr. Walter that, until it can be demonstrated and validated that an alternative street lighting energy consumption metering model can be more economical and provide better quality, reliability, and accurate energy consumption data, the presently accepted industry standard methodology should be relied upon.

Q. DO YOU HAVE ANY FURTHER OBSERVATIONS RELATING TO THE CURRENT S-05 TARIFF ESTIMATING METHODOLOGY?

A. Yes. Although metering accuracy and billing accuracy are important in the customer revenue and billing process, the cost-of-service and rate class average cost concepts should not be ignored. The S-05 Tariff and methodology is a long accepted approach, not only for streetlights, but throughout ratemaking and billing processes. PRISM, the Municipalities and their witnesses present an argument regarding the precision of measurement (metering versus not metering), but fail to understand that rates are developed based on cost-of-service allocations and average cost per rate class principles, which is exactly what the S-05 Tariff has utilized. Nearly 6.6 million kWh per year of energy savings argued in the Motion can be achieved should municipalities use the existing S-05 Tariff. The municipalities would realize savings without the Company and, potentially, other ratepayers incurring significant cost to implement changes and special procedures in

the utility's billing and communication system. This strategy can be implemented during a time when the NLC technology is in a rapidly changing state, allowing the Company to avoid premature investment in technology that is difficult to integrate and likely to reach early obsolescence. In addition, it provides adequate time for the industry to adopt design, manufacturing, and testing standards that bring consistency and accuracy to future NLC products. Appendix GLB-2 demonstrates the economic equivalence utilizing the S-05 Tariff until such time as the NLC industry has reached an acceptable level of maturity.

VII. CONCLUSION

Q. DO YOU FIND THE COMPANY'S REPORT ACCEPTABLE?

A. Yes. As the first pilot, I find the analysis process and report results are acceptable.

Q. DO YOU BELIEVE FURTHER WORK IS NECESSARY?

A. Yes. The outcome of the pilot indicates that a great deal more analysis should be performed before full adoption of NLCs with integrated circuit metering. The technology is not only evolving and adaptable to streetlights, it enhances many areas of energy efficiency. Just as the grocery store businesses are transitioning from fluorescent to LED lighting, they are also implementing light controllers (absent the metering). The refrigerated food displays light as the customer approaches and turns off once a customer is not in the area. The improved sophistication of street lighting is following a similar model. The dilemma is the desire of a customer to own a non-standard integrated meter which has not been customary in the utility industry. Additionally, the meters currently lack consistent specifications for design, manufacturing and testing. The accuracy is questionable and there is a clear indication that some meters may not be registering all of the energy consumption.

Q. DO YOU HAVE ANY RECOMMENDED NEXT STEPS?

A. I recommend that the S-05 tariff be adjusted to more clearly reflect specific wattages of LED lights that are utilized in street lighting applications, similar to the Company's HPS and Mercury light tariffs. The tariff could then be adjusted to more accurately reflect the dimming benefits based on the latest data from the pilot and other potential sources. This would make the use of the tariff more customer-friendly, while further enhancing the accuracy of the economic benefit associated with dimming programs. Then a continuation of the collaborative pilot process could move to a "Stage 2", evaluating the latest generation

of technology and incorporating those enhancements endorsed by stakeholders. Next, a comprehensive adoption of NLC IC metering should be considered as part of the Company's evaluation of an AMF system for AMI. .A new AMF system may much more effectively and economically interface with the newest NLC technology. Thus, the NLC IC metering needs to be incorporated in the AMI deployment analysis rather than prematurely implemented to avoid unnecessary integration costs and early technology obsolescence. This will also allow adequate time for the industry to adopt clear standards by which the utility, the vendors, and the manufacturers can be measured. Lastly, the Commission will need a policy regarding who owns the meter and, if other than the utility, how the utility can validate the network lighting system.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes it does.

AFFIDAVIT OF GREGORY L. BOOTH, PE

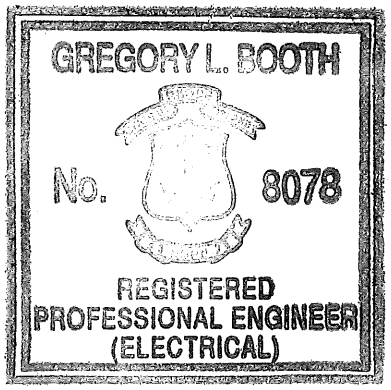
Gregory L. Booth, does hereby depose and say as follows:

I, Gregory L. Booth, on behalf of the Rhode Island Division of Public Utilities and Carriers, certify that testimony, including information responses, which bear my name was prepared by me or under my supervision and is true and accurate to the best of my knowledge and belief.

Signed under the penalties of perjury this the 29th day of January, 2019.

Gregory L. Booth

I hereby certify this document was prepared by me or under my direct supervision. I also certify I am a duly registered professional engineer under the laws of the State of Rhode Island, Registration No. 8078.



Gregory L. Booth, PE

APPENDIX
GLB-1

(WT) = Written Testimony
(TE) = Oral Testimony
(HE) = Hearing

RESUME OF
GREGORY L. BOOTH, PE, PLS
President
PowerServices, Inc.

Gregory L. Booth is a registered professional engineer with engineering, financial, and management services experience in the areas of utilities, industry private businesses and forensic investigation. He has been representing over 300 clients in some 40 states for more than 50 years. Mr. Booth was inducted into the North Carolina State University Electrical and Computer Engineering Alumni Hall of Fame in November of 2016 based on his accomplishments in the field of engineering.

Mr. Booth has been accepted as an expert before state and federal regulatory agencies, including the Federal Energy Regulatory Commission, the Delaware Public Service Commission, the Florida Public Service Commission, the Minnesota Department of Public Service Environmental Quality Board, the Maine Public Utilities Commission, the Massachusetts Department of Public Utilities, the New Jersey Board of Public Utilities, the North Carolina Utilities Commission, the Pennsylvania Public Utility Commission, the Rhode Island Public Utilities Commission, and the Virginia State Corporation Commission. He has been accepted as an expert in both state and federal courts, including Colorado, Delaware, District of Columbia, Florida, Georgia, Kansas, Maryland, Minnesota, Missouri, New Jersey, New York, North Carolina, Ohio, Oklahoma, Pennsylvania, Puerto Rico, South Carolina, Texas, Virginia, West Virginia, Virgin Islands, and Wisconsin, and numerous Federal Court jurisdictions. Mr. Booth has provided expert witness services on over 500 tort case matters, and over 50 regulatory matters. Investigation and testimony experience includes areas of wholesale and retail rates, utility acquisition, territorial disputes, electric service reliability, right-of-way acquisition and impact of electromagnetic fields and evaluation of transmission line options for utility commissions.

Additionally, Mr. Booth has extensive experience serving as an expert witness before state and federal courts on matters including property damage, forensic evaluation, fire investigations, fatality, and areas of electric facility disputes and Occupational, Safety and Health Administration violations and investigations together with National Electrical Code and National Electrical Safety Code and Industry Standard compliance.

The following pages provided are the education and experience from 1963 through the present, along with courses taught and publications.

(WT) = Written Testimony
(TE) = Oral Testimony
(HE) = Hearing

RESUME OF
GREGORY L. BOOTH, PE, PLS

Mr. Booth is a Registered Professional Engineer with engineering, financial, and management experience assisting local, state, and federal governmental units; rural electric and telephone cooperatives; investor owned utilities, industrial customers and privately owned businesses. He has extensive experience representing clients as an expert witness in regulatory proceedings, private negotiations, and litigation.

PROFESSIONAL EDUCATION:	NORTH CAROLINA STATE UNIVERSITY; Raleigh NC, Bachelor of Science, Electrical Engineering, 1969
PROFESSIONAL HONORS:	Inducted into North Carolina State University Department of Electrical and Computer Engineering Alumni Hall of Fame in November 2016.
REGISTRATIONS:	Registered as Professional Engineer in Alabama, Arizona, Colorado, Connecticut, Delaware, District of Columbia, Florida, Georgia, Kansas, Maryland, Minnesota, Mississippi, Missouri, New Hampshire, New Jersey, North Carolina, Oklahoma, Pennsylvania, Rhode Island, South Carolina, Texas, Commonwealth of Virginia, West Virginia, and Wisconsin Professional Land Surveyor in North Carolina Council Record with National Council of Examiners for Engineering and Surveying

EXPERIENCE:

1963-1967 Booth & Associates	Transmission surveying and design assistance, substation design Technician assistance; distribution staking; construction work plan, long-range plan, and plan, and sectionalizing study preparation assistance for many utilities, including Cape Hatteras EMC, Halifax EMC, Delaware Electric Cooperative, Prince George Electric Cooperative, A&N Electric Cooperative; assistance generation plant design, start-up, and evaluations.
1967-1973 Project Engineer Booth & Associates	Transmission line and substation design; distribution line design; long-range and construction work plans; rate studies in testimony before State and Federal commissions; power supply negotiations; all other facets of electrical engineering for utility systems and over 30 utilities in 10 states.
1973-1975 Engineer 1975-1994 Executive Vice President Booth & Associates	Directed five departments of Booth & Associates, Inc.; provided Professional engineering services to electric cooperatives and other public Booth & Associates power utilities in 23 states; provided expert testimony before state regulatory commissions on rates and reliability issues; in accident investigations and tort proceedings; transmission line routing and designs; generation plant designs; preparation and presentation of long-range and construction work plans; relay and sectionalizing studies; relay design and field start-up assistance; generation plant designs; rate and cost-of-service studies; reliability studies and analyses; filed testimony, preparation and teaching of seminars; preparation of nationally published manuals; numerous special projects for statewide organizations, including North Carolina EMC. Work was provided to over 130 utility clients in 23 states, PWC of the City of Fayetteville, NC, Cities of Wilson, Rocky Mount and Greenville are among the utilities in which I have provided engineering services in North Carolina during this time frame. Services to industrial customers include Texfi Industries, Bridgestone Firestone, Inc and many others.
1994-2004 President	Responsible for the direction of the engineering and operations of Booth & Associates, Inc. for all divisions and departments. The engineering work during

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Booth & Associates	this time frame has continued to be the same as during 1974 through 1993 with the addition of greater emphasis on power supply issues, including negotiating power supply contracts for clients; increased involvement in peaking generation projects; development of joint transmission projects, including wheeling agreements, power supply analyses, and power audit analyses. The work during this time frame includes providing services to over 200 utility clients across the United States, including NCEMC and NRECA.
2004-Present President Gregory L. Booth, PLLC	Providing engineering and management services to the electric industry, including planning and design. Providing forensic engineering, product evaluation, fire investigations and accident investigation, serving as an expert witness in state and federal regulatory matters and state and federal court.
2005-Present President PowerServices, Inc.	Providing engineering and management services to the electric industry, including planning and design and utility acquisition. Providing forensic engineering, product evaluation, fire investigations and accident investigation, serving as an expert witness in state and federal regulatory matters and state and federal court.

WORK AND EXPERTISE:

ELECTRIC UTILITIES:
(more than 300 clients)

- All aspects of utility planning, design and construction, from generation, transmission, substation and distribution to the end user.
- Utility acquisition expert, including providing condition assessment, system electrical and financial valuation, electrical engineering assessment, initial Work Plan and integration plans, acquisition loan funds, testimony, assessment and consulting services for numerous electric utility acquisitions. Utility clients for acquisition projects include Winter Park, FL acquisition of Progress Energy, FL, system in the City limits, A & N Electric Cooperative acquisition of the Delmarva Power & Light Virginia jurisdiction, Shenandoah Valley Electric Cooperative acquisition of Allegheny Energy Virginia jurisdiction, Rappahannock Electric Cooperative acquisition of Allegheny Energy Virginia jurisdiction, and numerous other past and currently active electric utility acquisitions.
- System studies, including long-range and short-range planning, sectionalizing studies, transmission load flow studies, system stability studies (including effects of imbalance and neutral-to-earth voltage), environmental analyses and impact studies and statements, construction work plan, power requirements studies, and feasibility studies.
- Fossil, hydro, microgrid, wind, and solar generation plan analysis, design, and construction observation.
- Transmission line design and construction observation through 230 kV overhead and underground, including interface with DOT and other utilities.
- Switching station and substation design and construction observation through 230 kV.
- Distribution line design and staking, overhead and underground, including interface with DOT and other utilities.
- Design of submarine cable installations. (Transmission and distribution)
- Supervisory control and data acquisition system design, installation and operation assistance.
- Load management system design, installation and operation assistance.

(WT) = Written Testimony
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- Computer program development.
- Load research and alternative energy source evaluation.
- Field inspection, wiring, and testing of facilities.
- Relay and energy control center design.
- Mapping and pole inventories.
- Specialized grounding for abnormal lightning conditions.
- Ground potential rise protection.
- Protective system/relay coordination.
- Grid Modernization Plan development, regulatory testimony, and implementation
- Pole Attachment Agreements, rate design, and testimony

UTILITY OPERATIONS:

- Storm assessment services., including interface with DOT and other utilities
- Regulatory testimony on storm response.
- Storm Response Plan development.
- Operations, including outage management and Call Centers.
- Outage management and operations enhancement services and testimony.

GENERATION DESIGN / FAILURE ANALYSES:

- Intermediate and peaking generation (gas and oil fired to 400 MW).
- Peaking generation (diesel and gas through 10,000 kW)
- Wind generation.
- Solar (PV) generation.
- Hydroelectric generation.
- Microgrid, including energy storage.

TELECOMMUNICATION: UTILITIES:

- Subscriber and trunk carrier facilities design.
- Stand-by generation and DC power supplies
- DC-AC inverters for interrupted processor supplies.
- Plant design and testing.
- Fiber optics and other transmission media.
- Microwave design.
- Pole attachment designs and make-ready design.
- Pole Attachment Agreements and rental rates calculations.
- Regulatory testimony.

FINANCIAL SERVICES:

- Long-term growth analyses and venture analyses.
- Lease and cost/benefit analyses.
- Capital planning and management.
- Utility rate design and service regulations.
- Cost-of-Service studies.
- Franchise agreements.
- Corporate accounting assistance.
- Utility Commission testimony (State and Federal)

FORENSIC ENGINEERING:

- Compliance with NESC, NEC, OSHA, IEEE, ANSI, ASTM and other codes and industry standards, including DOT standards.
- Equipment and product failure and analysis and electrical accident investigation (high and low voltage equipment).
- Stray voltage, electrical shocking, and electrocution investigations.

(WT) = Written Testimony
(TE) = Oral Testimony
(HE) = Hearing

- Building code investigations.
- New product evaluation.
- MCC, MDP failure analysis and arc flash analysis
- Electrical fire analysis

INDUSTRIAL/ELECTRICAL ENGINEERING:

- Building design (commercial and industrial).
- Building code application and investigation. (NFPA and NEC)
- Electric thermal storage designs for heating, cooling, and hot water.
- Standby generation and peaking generation design.
- Electric service design (residential, commercial, and industrial).

INSTRUCTIONAL SEMINARS AND TEXT:

- Seminars taught on arc flash hazards and safety, including National Electrical Safety Code regulations for utilities.
- Courses taught on Distribution System Power Loss Evaluation and Management.
- Courses taught on Distribution System Protection.
- Text prepared on Distribution System Power Loss Management.
- Text prepared on Distribution System Protection.
- Seminars taught on substation design, NESC capacitor application, current limiting fuses, arresters, and many others electrical engineering subjects.
- Courses taught on accident investigations and safety.
- Courses taught on Asset Management.
- Courses taught on OSHA and Construction Safety.

TESTIMONY AS AN EXPERT:

- Concerning rate and other regulatory issues before Federal Energy Regulatory Commission and state commissions in Connecticut, Delaware, Florida, Maine, Maryland, Massachusetts, Minnesota, New Jersey, New Hampshire, North Carolina, Pennsylvania, Rhode Island, and Virginia.
- Concerning property damage or personal injury before courts in Colorado, Delaware, District of Columbia, Florida, Georgia, Kansas, Maryland, Minnesota, Missouri, New Jersey, New York, North Carolina, Ohio, Oklahoma, Pennsylvania, Puerto Rico, South Carolina, Texas, Virginia, West Virginia, Virgin Islands, and Wisconsin.

FIELD ENGINEERING:

- Transmission line survey and plan and profile.
- Distribution line staking.
- Property surveying.
- DOT highway relocation design.
- Relay and recloser testing.
- Substation start-up testing.
- Generation acceptance and start-up testing.
- Ground resistivity testing.
- Work order inspections.
- Operation and maintenance surveys.
- Building inspection and service facility inspection.
- Construction Management
    - Generation
    - Transmission
    - Substation
    - Distribution

(WT) = Written Testimony
(TE) = Oral Testimony
(HE) = Hearing

- Building Electrical Installations
- GSA construction projects
- NASA construction projects
- University construction projects

PROFESSIONAL ORGANIZATIONS:

a. National Society of Professional Engineers (NSPE)
b. Professional Engineers in Private Practice (PEPP)
c. National Council of Examiners for Engineering & Surveying (NCEES)
d. Professional Engineers of North Carolina (PENC)
e. National Fire Protection Association (NFPA)
f. Associate Member of the NRECA
g. NRECA Cooperative Network Advisory Committee (NRECA-CRN)
h. The Institute of Electrical and Electronics Engineers (IEEE) (Distribution sub-committee members on reliability)
i. American Standards and Testing Materials Association (ASTM)
j. Occupational Safety and Health Administration (OSHA) Certification
k. American Public Power Association (APPA)
l. American National Standards Institute (ANSI)

(WT) = Written Testimony
(TE) = Oral Testimony
(HE) = Hearing

ACTIVE AND HISTORIC REGULATORY CASES
BY GREGORY L. BOOTH, PE, PLS

Commonwealth of Virginia State Corporation Commission

Rappahannock Electric Cooperative, 247 Industrial Court, Fredericksburg, VA 22408

Case No. PUE-2009-0010 (HE)

2007

Delmarva Power & Light System Acquisition Purchase for A & N Electric Cooperative, Post Office Box 290, 21275 Cooperative Way, Tasley, VA 23441 and Old Dominion Electric Cooperative, 4201 Dominion Boulevard, Glen Allen, VA 23060

Case Nos. PUE-2007-00060, 00061, 00062, 00063, and 00065 (HE)

2009

Potomac Edison/Allegheny Energy System Acquisition Purchase for Shenandoah Valley Electric Cooperative, 147 Dinkel Ave., Hwy 257, Mt. Crawford, VA 22841

Case No. PUE-2009-00101 (HE)

2011

Virginia, Maryland & Delaware Association of Electric Cooperatives Commonwealth of Virginia at the relation of the State Corporation Commission in the Matter of Determining Appropriate Regulation of Pole Attachments and Cost Sharing in Virginia

Case No. PUE-2011-00033 (HE)

2013

Northern Virginia Electric Cooperative Pole Attachment Dispute with ComCast

PUE-2013-00055 (HE)

Connecticut Public Utilities Regulatory Authority

2017

The Connecticut Light and Power Company d/b/a Eversource Energy to Amend its Rate Schedules

Docket No. 17-10-46

2018

PURA Investigation into Distribution System Planning of the Electric Distribution Companies

Docket No. 17-12-03

Delaware Public Service Commission

Delaware Electric Cooperative, Inc., Retail Rate Case and Reliability Cases

(HE)

(WT) = Written Testimony
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(HE) = Hearing

ACTIVE AND HISTORIC REGULATORY CASES
BY GREGORY L. BOOTH, PE, PLS

Delaware Public Service Commission

2018

In The Matter of the Petition of the Public Service Commission Staff and Delaware Division of the Public Advocate to Establish a Regulation for Distribution System Investment Plans for Delaware Electric and Natural Gas Utilities

18-0935

Federal Energy Regulatory Commission

Public Works Commission of the City of Fayetteville, NC v. Carolina Power & Light Company

ER76-, ER77-, ER78, ER81-344, ER84- (HE)

2000

North Carolina Electric Membership Corporation v. Duke Energy Corporation and Duke Electric Transmission

ER01-282-000 and ER01-283-000 (HE)

2000

North Carolina Electric Membership Corporation v. Virginia Electric Power Company dba North Carolina Power

EL90-26-00-000 (HE)

2015

Application for Authorization Pursuant to Section 203(a)(1)(A) and 203(a)(2) of the Federal Power Act and Request for Waivers of Certain Filing Requirements

Dkt EC15-___-000

Florida Public Service Commission (PSC)

2007

Municipal Utility Underground Consortium Pre-Filed Testimony for Storm Hardening and Undergrounding Assessment

Docket Nos. 07023-EI, 080244-EI, and 080522-EI (HE)

2007

Gulf Power Company's Storm Hardening Plan Pre-filed Testimony on Behalf of City of Panama City Beach, Florida

Florida PSC Docket No. 070299-EI (HE)

(WT) = Written Testimony
(TE) = Oral Testimony
(HE) = Hearing

ACTIVE AND HISTORIC REGULATORY CASES
BY GREGORY L. BOOTH, PE, PLS

Maine Office of the Public Advocate

2016

Efficiency Maine Trust Request for Examination of Voltage Optimization Pilot Program Docket No. 2016-00162

Dkt. 2016-00162

2017

Investigation into the Designation of Non-Transmission Alternative (NTA) Coordinator

Docket No. 2016-00049 (WT)

2017

Investigation of Inclusion of Acadia Substation Investment in Rates Pertaining to Emera Maine

Docket No. 2017-00018

Massachusetts Department of Public Utilities

2012

Massachusetts Office of Attorney General Commonwealth of Massachusetts Department of Public Utilities Massachusetts Electric Company and Nantucket Electric Company d/b/a National Grid Review for Storm Response and Recovery of 2008 Storm Costs

DPU 11-56 (WT) (HE)

2012

Massachusetts Office of Attorney General Western Massachusetts Electric Company, Northeast Utilities System, Review for Recovery of Storm Costs

DPU 11-102/DPU 11-102A (WT) (HE)

2013

Massachusetts Office of Attorney General Nstar Review for Recovery of Storm Costs

DPU 13-52 (WT) (HE)

2014

Massachusetts Office of Attorney General National Grid Solar Generation Phase II Program Assessment

D.P.U. 14-01 (WT)

2014

Massachusetts Office of Attorney General Western Massachusetts Electric Company, Review of Storm Recovery Reserve Cost Adjustment "SRRCA"

D.P.U. 13-135 (WT) (HE)

(WT) = Written Testimony
(TE) = Oral Testimony
(HE) = Hearing

ACTIVE AND HISTORIC REGULATORY CASES
BY GREGORY L. BOOTH, PE, PLS

Massachusetts Department of Public Utilities

2016

MA Elec. Co. and Nantucket Elec. Co. d/b/a National Grid, Fitchburg Gas and Electric Light Co. d/a/a Unitil and NSTAR Elec. Co. and Western MA Elec. Co. d/b/a Eversource for Approval by the DPU of their Grid Modernization Plan

DPU 15-120, 15-121, 15-122/15-123 (HE)

2017

Nstar Electric Company and Western Massachusetts Electric Company d/b/a Eversource Energy Petition for Approval of a Performance-Based Ratemaking Mechanism and General Distribution Revenue Change

DPU 17-05 (WT) (HE)

2017

Petition of Massachusetts Electric Company and Nantucket Electric Company each d/b/a National Grid for Pre-Approval of Enhanced Vegetation Management Pilot Program

DPU 17-92

2018

Massachusetts Eversource Performance Based Ratemaking Mechanism Performance Metrics

DPU 18-50

2018

Massachusetts Electric Company and Nantucket Electric Company each d/b/a National Grid Storm Cost Recovery

DPU 18-94

2019

Massachusetts Attorney General's Office National Grid Rate Case

DPU 18-150

Minnesota Department of Public Service/Environmental Quality Board

Transmission Line Assessment Minnesota Department of Public Service and Minnesota Environmental Quality Board

(HE)

New Hampshire Public Utilities Commission

2004

City of Bedford v. Public Service of New Hampshire

(WT) = Written Testimony
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(HE) = Hearing

ACTIVE AND HISTORIC REGULATORY CASES
BY GREGORY L. BOOTH, PE, PLS

New Jersey Public Service Commission

Sussex Rural Electric Cooperative Retail Rate Cases

(HE)

2004

New Jersey Board of Public Utilities, Focused audit of the planning, operations and maintenance practices, policies and procedures of Jersey Central Power & Light Company

Docket No. EX02120950 (HE)

2015

Jersey Central Power & Light Company ("JCP&L") and Mid-Atlantic Interstate Transmission, LLC ("MAIT") FERC 7 Factor Test Evaluation

BPU Docket No. EM15060733 (WT)

2016

Atlantic City Electric Company for Approval of Amendments to its Tariff to Provide for an Increase in Rates and Charges For Electric Service Pursuant to NJSA 48:2-21 and JJSA 48:2-21.1

DPU Docket No. ER16030252 OAL Docket No. PUC 5556-16

North Carolina Utilities Commission

Larry Eaves, et. al. v. Town of Clayton

(HE)

Poly-Loc v. Town of Tarboro

(HE)

1990

Delora Dennis, et. al. v. Haywood EMC

E-7, Sub 474, EC-10, Sub 37, E013, Sub 151 (HE)

2001

Wake EMC Right of Way Acquisition

(TE)

(WT) = Written Testimony
(TE) = Oral Testimony
(HE) = Hearing

ACTIVE AND HISTORIC REGULATORY CASES
BY GREGORY L. BOOTH, PE, PLS

North Carolina Utilities Commission

2002

Progress Energy Carolinas, Inc., v. E.M. Harris, Jr. Family Limited Partnership, Edward M. Harris, III and wife Pamela M. Harris, Gene K. Harris and wife Linda Harris, Camille H. Cunnup and husband Timothy J. Cunnup Siler City Transmission Line Issues

General Court of Justice Superior Court Division, File No. 03 CVS SP 251, 252, 253, 254, 255 (WT) (HE)

2004

John Wardlaw, et. al. Interveners v. Progress Energy Carolinas

Docket No. E-2, Sub 855 (HE)

2011

Frontier Communications of the Carolinas, Inc. v. Blue Ridge Mountain Electric Membership Corporation

11-CVS-17175

2017

Jones-Onslow Electric Membership Corporation; Surry-Yadkin Electric Membership Corporation; Carteret-Craven Electric Membership Corporation; Union Electric Membership Corporation, d/b/a Union Power Cooperative v. Time Warner Cable Southeast, LLC

NCUC Docket Nos. EC-43 5888, EC-49 555, EC55 570 and EC-39 S44

2017

Blue Ridge Electric Membership Corporation

Docket No EC-23, SUB 50

Pennsylvania Public Utility Commission

2004

Investigation regarding the Metropolitan Edison Company Pennsylvania Electric Company and Pennsylvania Power Company Reliability Performance

Docket No. I-00040102 (WT) (HE)

2006

Investigation regarding Pennsylvania Rural Electric Association / Allegheny Electric Cooperative Rates

Docket Nos. R-00061366, R-0061367, et. al. (WT) (HE)

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(HE) = Hearing

ACTIVE AND HISTORIC REGULATORY CASES
BY GREGORY L. BOOTH, PE, PLS

Pennsylvania Public Utility Commission

2007

Wellsboro Electric Company participants Included C&T Enterprises, Inc., comprised of Wellsboro Electric Company, Claverack Rural Electric Cooperative, Inc., Tri-County Rural Electric Cooperative, Inc., and Citizens Electric

Docket No. P-2008-2020257 (WT) (HE)

2014

PREA 2014 Intervention Assistance, Analysis of Service Reliability Concerns Regarding West Pennsylvania Power Company, Pennsylvania Electric Company, Metropolitan Edison Company (First Energy Company)

Docket Nos. R-2014-2428742, -2428743, -2428744, -248745 (WT)

2014

Pennsylvania Rural Utility Commission West Penn Power Company, Pennsylvania Electric Company, Pennsylvania Power Company and Metropolitan Edison Company

R-2014-2428742, R-2014-2428743, R-2014-2428744, R-2014-2428745 (WT)

2015

MAIT and PENELEC for Authorizing the Transfer of Certain Transmission Assets from MET-Ed & PENELEC to MAIT

A-2015-2488903 (cons.)

Rhode Island Public Utilities Commission

1997

Testimony before the Rhode Island Utilities Commission, on behalf of Rhode Island Division of Public Utilities and Carriers, May 15, 1997

Docket No. 2489 (WT) (HE)

2003

Testimony before the Rhode Island Utilities Commission on behalf of Rhode Island Division of Public Utilities and Carriers, December 2003

Docket No. 2930 (WT) (HE)

2004

Issuance of Advisory Opinion to Energy Facility Siting Board Regarding The Narragansett Electric Company's Application to Relocate Transmission Lines Between Providence and East Providence, 2004

Docket No. 3564 (WT) (HE)

(WT) = Written Testimony
(TE) = Oral Testimony
(HE) = Hearing

ACTIVE AND HISTORIC REGULATORY CASES
BY GREGORY L. BOOTH, PE, PLS

Rhode Island Public Utilities Commission

2006

Issuance of Advisory Opinion to Energy Facility Siting Board Regarding the Narragansett Electric Company d/b/a National Grid's Application to Construct and Alter Major Energy Facilities, 2006

Docket No. 3732 (WT) (HE)

2007

Issuance of Advisory Opinion to RIDPUC in the Matter of the Joseph Allard Fatality Involving Verizon and National Grid

2008

Issuance of Advisory Opinion to Energy Facility Siting Board Regarding the Narragansett Electric Company d/b/a National Grid's Application to Construct and Alter Major Energy Facilities, 2008

Docket No. 4029 (WT) (HE)

2010

Rhode Island Division of Public Utilities and Carriers Narragansett Tariff Investigation

Docket No. R.I.P.U.C. 4065

2010

National Grid Proposed Electric Infrastructure, Safety and Reliability Plan for FY 2012 Submitted Pursuant to R.I.G.L. § 39-1-27.7.1

Docket No. 4218 (WT) (HE)

2012

National Grid Electric FY 2013 Electric Infrastructure, Safety and Reliability Plan

Docket No. 4307 (WT) (HE)

2012

National Grid Hurricane Irene Response Assessment, 2012

Docket No. D-11-94 (WT) (HE)

2012

Public Utilities Commission Review of Storm Contingency Funds of Electric Utilities

Docket No. 2509 (WT) (HE)

(WT) = Written Testimony
(TE) = Oral Testimony
(HE) = Hearing

ACTIVE AND HISTORIC REGULATORY CASES
BY GREGORY L. BOOTH, PE, PLS

Rhode Island Public Utilities Commission

2012

Commission's Investigation Relating to Stray and Contact Voltage

Docket No. 4237 (WT)

2012

Rhode Island Public Utilities Commission Interstate Reliability Assessment

Docket No. 4360 (WT) (HE)

2012

National Grid Electric Infrastructure, Safety, and Reliability Plan for 2014

Docket No. 4382 (WT) (HE)

2014

National Grid Electric Infrastructure, Safety, and Reliability Plan 2015 Proposal

Docket No. 4473 (WT) (HE)

2014

National Grid's FY 2016 Electric Infrastructure, Safety and Reliability Plan

Docket No. 4539 (WT) (HE)

2015

Division's Investigation into Verizon's Vegetation Management Practices

2015

Wind Energy Development, LLC (WED) and ACP Land, LLC Petition for Dispute Resolution Relating to Interconnection

Docket No. 4483 (WT)

2015

National Grid Electric Infrastructure, Safety, and Reliability Plan FY 2017

Docket No. 4592 (WT) (HE)

2016

PUC Advisory Opinion Regarding Need of The Narragansett Electric Co. d/b/a National Grid to Construct and Alter Certain Transmission Components in the Towns of Portsmouth and Middletown (Aquidneck Island Reliability Project)

Docket No. 4614

(WT) = Written Testimony
(TE) = Oral Testimony
(HE) = Hearing

ACTIVE AND HISTORIC REGULATORY CASES
BY GREGORY L. BOOTH, PE, PLS

Rhode Island Public Utilities Commission

2016

National Grid Electric Infrastructure, Safety, and Reliability Plan FY 2018

Docket No. 4682 (WT)

2017

National Grid Electric Infrastructure, Safety, and Reliability Plan FY 2019

Docket No. 4783

2017

Narragansett Electric Company d/b/a National Grid's October 2017 Storm Response

Docket No. D-17-45

2018

The Narragansett Electric Company d/b/a National Grid's Electric Proposed Power Sector Transformation (PST) Vision and Impementation Plan

Docket No. 4780

2018

National Grid Electric Infrastructure, Safety and Reliablility Plan FY 2020

Docket No. 4915

2018

RIDPUC Streetlight Pilot Metering Program Docket 4513

Docket No. 4513

2019

Adoption of Performance Incentives for The Narragansett Electric Company d/b/a National Grid Pursuant to R.I. Gen. Laws Section 39-1-27.7.1(e)(3) to Apply to the Electric Infrastructure, Safety, and Reliability Plans

Docket No. 4857

(WT) = Written Testimony
(TE) = Oral Testimony
(HE) = Hearing

APPENDIX
GLB-2

APPENDIX GLB-2

S-05 Tariff Equivalence

Page 23 -William A. White III Testimony	
Providence Lights Installed	16,945 kWh
Average Nameplate Rating	106.4 kWh
50% Dimming	75.05 kWh
Average Reduction	31.35 kWh
Percent Reduction	29% kWh

Solid State Lighting (SSL) Sources

Light Source Type: Light Emitting Diode (LED)

Annual Billable kWh Delivered
Operating Schedule

Nominal Wattage (Range)	Billable Wattage	Continuous	Dusk-to Dawn	Dimming-50%	kWh Reduction	% Reduction
0.1 to 20.0	10	88	42	31	11	26%
20.1 to 40.0	30	263	125	92	33	26%
40.1 to 60.0	50	438	209	154	55	26%
60.1 to 100.0	80	701	334	246	88	26%
100.1 to 140.0	120	1,051	501	370	131	26%
140.1 to 220.0	180	1,577	752	554	198	26%
220.1 to 300.0	260	2,278	1,086	801	285	26%

Highlighted data from S-05