NEW RIVER LIGHT AND POWER COMPANY
DOCKET NO. E-34, SUB 46

TESTIMONY OF EVAN D. LAWRENCE

ON BEHALF OF THE PUBLIC STAFF
NORTH CAROLINA UTILITIES COMMISSION

December 20, 2017

Q. PLEASE STATE YOUR NAME, BUSINESS ADDRESS, AND PRESENT POSITION.

A. My name is Evan D. Lawrence. My business address is 430 North Salisbury Street, Dobbs Building, Raleigh, North Carolina. I am a Utilities Engineer with the Electric Division of the Public Staff – North Carolina Utilities Commission.

Q. BRIEFLY STATE YOUR QUALIFICATIONS AND DUTIES.

A. My qualifications and duties are included in Appendix A.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. The purpose of my testimony is to present the Public Staff's analysis and recommendations concerning: (1) the cost of service study (COSS) filed by New River Light and Power Company (NRLP or Company) in this case; and (2) NRLP's advanced metering infrastructure (AMI) system. The Public Staff's recommendations are based on a review of the application filed by NRLP, the direct

testimony and exhibits of NRLP's witnesses, a site visit to NRLP's service territory, and NRLP's response to Public Staff data requests.

Q. PLEASE SUMMARIZE YOUR TESTIMONY.

A. My review of the NRLP cost of service study focused on the derivation of demand related factors and changes to customer billing data. For this cost of service study, NRLP used data that was largely estimated for determining the non-coincident peak (NCP) and coincident peak (CP) demands for each customer class. NRLP compared energy usage at each of its substations to that of individual customer classes to determine the peak demands for each customer class. This methodology is imprecise and introduces errors into customer data, as all substations serve multiple classes of customers. I am recommending that NRLP complete a more accurate load study using AMI data and file an updated cost of service study using this data.

I also reviewed NRLP's newly installed AMI system. The AMI system allows NRLP to collect data that enables it to better inform and serve its customers, and to respond to system events and emergencies more efficiently. While NRLP completed a less than robust cost-benefit analysis as an early step in its decision to install the updated metering system, the Public Staff agrees with its ultimate decision to implement the AMI system.

COST OF SERVICE

Q. HAVE YOU REVIEWED NRLP'S COST OF SERVICE STUDY IN THIS PROCEEDING?

A. Yes.

Q. WHAT IS THE PURPOSE OF A COST OF SERVICE STUDY?

A. The purpose of any cost of service study is to determine the appropriate share of revenues, expenses, and plant related to the provision of electric service to be paid for by individual jurisdictions and customer classes. Typically, these studies are developed based on billing determinant data such as number of customers, customers' direct-metered energy sales (kWh) and registered demand (kW). When direct usage data is not available, load research is necessary to determine the appropriate levels of kWh and kW for each customer class. Cost of service studies then use this data to assign the system and jurisdictional revenues, expenses, and plant to the various customer classes. Development of the cost of service study is the first step in a general rate case, and is necessary in order to appropriately establish cost-based rates for electric service.

Q. IS NRLP'S COST OF SERVICE STUDY IN THIS PROCEEDING SIGNIFICANTLY DIFFERENT FROM THOSE FILED BY NRLP IN PREVIOUS GENERAL RATE CASES?

A. Yes. NRLP filed a cost of service study (Exhibit REH-3) that was specifically developed for this proceeding. The last general rate case filed by NRLP was in 1996 (Docket No. E-34, Sub 32). Since then, NRLP's system has changed significantly, including its customer base and how these customers consume energy. As part of this case, NRLP has proposed the following: (1) the creation of a high load factor customer class rate schedule (Schedule GLH); (2) a significant alteration of the rate design for Schedule ASU; and (3) the closure of the industrial customer class rate schedule (Schedule I). The customers to be served by Schedule GLH are currently served under the Commercial Demand schedule (Schedule GL).

Q. WHY HAS NRLP PROPOSED THE CLOSURE OF THE INDUSTRIAL CLASS RATE SCHEDULE?

A. In 2012, NRLP's sole industrial customer ceased operation in NLRP's service territory. Because this customer ramped down operations over several years, NRLP avoided a sudden loss of revenue, allowing for a smoother adjustment to the loss of this customer and its associated revenue. Currently, there are no expectations for any new industrial customers in the NLRP territory.

Q. WHAT CUSTOMER-RELATED DATA WAS USED IN NRLP'S COST OF SERVICE STUDY?

A. My review of NRLP's application, testimony, exhibits, and formal data responses indicates that the data available for use in the cost of service study for individual customer classes was customer count and metered kWh sales data, and metered energy and demand at the delivery substation level was also used. Demand data was available for the Commercial Demand customers (Schedule GL), but only the proposed Commercial Demand High Load Factor rate class (Schedule GLH) used this information in the cost of service study.

Q. PLEASE EXPLAIN HOW NRLP DEVELOPED ITS DEMAND-RELATED ALLOCATION FACTORS IN THE COST OF SERVICE STUDY.

A. NRLP used a combination of NCP demand and CP demand in its cost of service study. The NCP at the substation level is known and measured on a monthly basis. The NCP by customer class is estimated based on a number of factors, discussed below. The NRLP CP is also known and measured at the substation level each month, but as with the NCP, the annual CP for each individual customer class is estimated.

For the Residential, Commercial Non-demand, and Commercial Demand rate classes, the NCP was estimated by first analyzing

billed energy by month, by rate class, and then comparing it to the energy measured at each of the five substations that serve NRLP customers. NRLP asserts that this methodology enabled it to determine which customer class had an energy consumption profile that most closely matched that of a particular substation. For the Residential rate class, the Oak Grove Substation profile was the closest match; for the General Commercial and Commercial Demand rate classes, the Winkler's Creek Substation profile was the closest match; and for the ASU rate class, the Campus Substation profile was the closest match. Next, NRLP analyzed the test year NCP at the substation level to determine the best match for each customer class. Finally, the Annual NCP Load Factor was calculated by dividing the total energy consumption at the substation by the product of the NCP and 8,760 annual hours.

The CP load factor is determined similarly to the NCP load factor, but utilizes the yearly average of the peak demands coincident with the Duke Energy Carolinas (DEC) Transmission Peak.

The CP load factor for the Commercial Demand High Load Factor customer class (Schedule GLH) was calculated using a different method than the one described above. NRLP analyzed the individual customer demand billing determinants for this class and summed them for each month. The highest demand month for this individual class was then used for the annual NCP. Next, this NCP demand

was combined with the yearly energy consumption for the rate class to calculate the class NCP load factor. Finally, to determine the CP load factor, NRLP utilized a calculation for the LGS customer class from the Duke Energy Progress (DEP) general rate case, Docket No. E-2, Sub 1142. NRLP divided the Winter CP for the DEP LGS customer class by the NCP for this same class to calculate what they have termed a "Coincident Factor" (CF). The CF was multiplied by the NCP of the NRLP Commercial Demand High Load Factor customer class to determine its CP.

Q. ARE THERE ANY CONCERNS WITH THE WAY THAT NRLP CALCULATED THE DEMAND RELATED FACTORS IN THE COST OF SERVICE?

A. Yes. Comparing the billed energy for individual customers to the total energy consumption measured at a substation level is a very imprecise way of determining class demand factors because no substation serves only individual class customers. While higher energy consumption often implies higher demands, this is not a universal truism, and can lead to skewed results. And while in this case, NRLP used the Oak Grove Substation as its proxy for the Residential rate class, because, in 2016, its customer makeup was on average 81% Residential customers, 17% General Commercial customers, and 2% Commercial Demand customers, the billed energy consumption for the customers served from this substation

was only 52% from Residential customers, 16% from General Commercial customers, and 32% from Commercial Demand customers.

Because of this significant deviation between customers served and customer energy consumption, and because only a small percentage of NRLP's customer base was served with demand-type meters during the test year, it is impossible to determine the accuracy of the demands estimated by NRLP under this "substation to rate case" matching methodology.

Q. GIVEN THE PROBLEMS AND THE INFORMATION AVAILABLE, DO YOU HAVE ANY CHANGES THAT YOU WOULD MAKE A THIS TIME TO THE METHODS UTILIZED IN THIS CASE?

A. No. Given the information that NRLP had available to it at the time of the study, I do not recommend any changes at this time.

Q. DO YOU HAVE ANY RECOMMENDATIONS REGARDING THE METHODOLOGIES TO BE USED IN FUTURE COST OF SERVICE STUDIES?

A. Yes. NRLP has now completed installation of its AMI metering system. One of the benefits of this system is the capability to track and record individual demand data for all customers. With this capability available, it should no longer be necessary to estimate

demand data in future cost of service studies. In addition, full time-of-use (TOU) data will be available for both customer and NRLP use. This information should assist NRLP in developing its customer class cost analyses in ways that more accurately reflect the costs to serve both existing and new customers and customer classes.

Q. WHAT CHANGES HAVE YOU MADE TO THE COST OF SERVICE STUDY?

A. I have made changes that affect the calculation of two allocation factors. The first is for maintenance of underground lines. The allocation factor applied to this category of cost, as filed by NRLP, was based on a weighting of customer count and NCP demand. After discussions with the Company, it was determined that this allocation factor should instead match the calculation of that for the maintenance of overhead lines, which, as filed by NRLP, was based only on NCP demand.

I have also changed the allocation of interest expense on consumer deposits from a customer count basis to directly assignment. While these changes don't impact the overall level of costs to NRLP, they do impact individual class levels of costs. It is my understanding that the Company is in agreement with these two changes.

Q. DID YOU MAKE ANY OTHER CHANGES THAT AFFECT THE COST OF SERVICE STUDY?

A. Yes. In response to data requests, NRLP provided the Public Staff with billing data for three customers that had been incorrectly billed for a long period of time. This involved a Commercial Demand customer and a Commercial Non-demand customer that were overcharged, and a Commercial Non-demand customer that was undercharged. During the test year, NRLP provided one-time refunds to two of the customers and back billed the third. NRLP included the usage associated with the billing errors and adjustments in its test year totals for energy and demand. The result was an understatement of test period sales and revenues, while maintaining test year levels of associated expenses. To remove the effects of these billing variations on the test year, I increased test year energy sales for the Commercial Non-demand rate class by 269,053 kWh and the usage and demand for the Commercial Demand rate class by 1,791,703 kWh and 3,331 kW, respectively.

In addition, NRLP's COSS included one customer in the commercial demand high load factor rate class that would not be eligible for the GLH rate schedule. I moved the billing determinants related to this customer from GLH to the GL rate group. Removing this customer from the commercial demand high load factor rate class also resulted in the lowering of the annual NCP demand for this rate class to

3,127.6 kW. Due to the way that the NCP is calculated for other rate classes, no additional changes were necessary.

Q. DO YOU HAVE ANY FURTHER RECOMMENDATIONS REGARDING THE COST OF SERVICE?

A. Yes. As previously discussed, NRLP has implemented an AMI metering system. As part of this system functionality, NRLP should file an updated cost of service analysis on an annual basis, beginning with the first full calendar year of data collection, which will be 2018. Thus I recommend that NRLP make its first filing as soon as possible in 2019, based on 2018 calendar year data, but no later than June 30, 2019.

Advanced Metering Infrastructure

Q. PLEASE DISCUSS THE COMPANY'S INITIATIVE TO UPDATE ITS METERING SYSTEM WITH THE ADVANCED METERING INFRASTRUCTURE.

A. NRLP first began its initiative in 2014 with a pilot program to upgrade its metering infrastructure. During the 2016 and 2017 calendar years, the Company began full deployment of AMI, and is currently beginning utilization. The total cost to install the AMI system was $2,217,519.99 as of October 2017, which is shown in Exhibit SLB-2R of the Company's Supplemental Testimony. The system will

also require yearly licensing, maintenance, and data hosting, totaling an additional $27,058 per year.

Q. WHAT NEW FUNCTIONS OR SERVICES WILL AMI METERS ALLOW THE COMPANY TO PERFORM?

A. My review of this issue along with discussions that took place with the Company provided a basic understanding of what NRLP will be able to do with the new system. The functionalities of the AMI metering are summarized as follows:

1. Two-way communication that will assist with detection of outages and voltage quality;
2. Bi-directional power flows;
3. Remote connections and disconnections;
4. Tampering and theft detection;
5. More detailed usage data (hourly and daily);
6. More accessibility for consumers; and
7. Home Area Network capabilities via Zigbee radio.

NRLP has the ability to see all information down to the individual customer meter level. Using the aggregation of certain meter and customer-related information in an area, NRLP can observe activity on the grid, which can aid NRLP in preventing outages and power quality issues due to failing equipment. For example, NRLP is able to see the voltage at the premise and along the feeder itself. By

measuring the voltage differential at the customer meter versus at the transformer itself, NRLP can tell if the transformer is failing. Once it is known that a transformer is failing, NRLP is able to choose a time and develop a plan that is best suited for correcting the situation, instead of having to replace the transformer as an emergency response after failure of the transformer. Using the same voltage information, NRLP is able to see voltage sags on its system at every location, allowing NRLP to optimize usage of its demand side management capabilities while avoiding situations where voltage drops below required levels. Whenever an outage does occur, the system will automatically alert NRLP. With the information available, NRLP will be able to diagnose the location of the problem, as well as the actual problem more accurately, allowing for a more timely response.

From a consumer standpoint, they will be able to see information regarding their specific usage, including in real time. Peak demand usage, real time demand and energy usage, historical demand and energy usage, and the total bill amount at any time can all be seen on the customer portal. A smartphone application will be paired with the customer portal, allowing customers to access nearly all information available on the full website portal.

Q. DID THE COMPANY PROVIDE A COST-BENEFIT ANALYSIS IN THIS CASE?

A. Yes. The Company provided a cost-benefit analysis in response to a Public Staff data request. This analysis not only monetized the AMI functions, but included other benefits related to reductions in labor for billing expenses. The study was completed in 2012, well before the start of the pilot AMI program in 2014. The results of the cost-benefit analysis indicated that net savings would be realized 8.3 years from the deployment date.

Q. DO YOU HAVE ANY CONCERNS WITH THE COST-BENEFIT ANALYSIS USED BY THE COMPANY TO JUSTIFY THE DEPLOYMENT OF THE AMI SYSTEM AT THIS TIME?

A. Yes. The Company largely relied on estimates for direct costs associated with many of the study variables. I believe that the Company could have utilized more fully developed costs by tracking current activities, such as the time to manually read meters, as well as vehicle and fuel costs incurred.

Approximately one quarter of the yearly savings estimates were identified to be from “Voltage Reduction” and “Voluntary Demand Side Management,” both of which result in a reduction of overall system demand. The combined reduction for these two activities was estimated to be 1.5% of the Company’s total demand or 510 kW.

While voltage reduction is within the Company's control, "voluntary" demand side management is entirely dependent on individual customer behavior. The Company did not provide a solid basis for its assumption that customers will respond in a way that will result in its assumed demand reduction.

The Public Staff recognizes that attempting to capture all costs and benefits of an AMI system is a difficult task, and that certain assumptions must be made. In addition, customers' ability to make more informed decisions regarding their electricity usage, and NRLP being able to operate its system in a more efficient and customer-focused manner are benefits that are not easily quantified. While the payback period may be understated, the Public Staff does not take issue with the overall benefits of the NRLP AMI system.

Another concern is the lack of an AMI opt-out policy. The Company stated to the Public Staff that it has received no opposition to the AMI system from consumers and, as a result, has not developed an opt-out policy. While I do not expect a large percentage of customers to seek to opt-out of having a smart meter, I believe it is prudent that NRLP develop, at a minimum, an internal policy to address those customers who will want to opt-out of AMI. Therefore, I recommend that NRLP develop such a policy within 90 days of the Commission's final order in this proceeding.

Q. DO YOU HAVE ANY OTHER CONCERNS REGARDING THE NEWLY INSTALLED AMI SYSTEM?

A. Yes. I am concerned that the Company has chosen to delay utilization of some features of the system such as auto-reconnect. The AMI system has the ability to remotely and automatically reconnect consumers that have been disconnected due to non-payment. The Company states that it is concerned that automatically reconnecting the power may lead to a situation where a customer appliance, such as the oven, may have been left turned on without the customer realizing it, resulting in damage to the customer's property. While this situation is a possibility, it is somewhat unfounded because consumers are not notified currently by the Company when power has been off and is about to be restored. By not utilizing this feature, reconnect costs will be higher than is necessary resulting in higher rates to customers.

Q. WHAT IS YOUR RECOMMENDATION REGARDING THE AUTOMATIC RECONNECT FEATURE OF THE AMI SYSTEM?

A. I recommend that NRLP reevaluate its decision to not utilize this feature by reevaluating and capturing the costs associated with the avoidance of manual reconnection of power to customer premises, and the benefits to customers of avoiding these costs.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes, it does.

APPENDIX A

Evan D. Lawrence

I graduated from East Carolina University in Greenville, North Carolina, in May of 2016 earning a Bachelor of Science degree in Engineering and a concentration in Electrical Engineering. I started my current position with the Public Staff in September of 2016. Since that time my duties and responsibilities have focused around the review of renewable energy projects, interconnection standards, and renewable energy portfolio standards compliance.