PLACE: Dobbs Building, Raleigh, North Carolina

DATE: Tuesday, June 11, 2019

TIME: 9:54 a.m. - 9:58 a.m.

DOCKET NO: E-7, Sub 1191

BEFORE: Commissioner Daniel G. Clodfelter, Presiding
Chair Charlotte A. Mitchell
Commissioner ToNola D. Brown-Bland
Commissioner Jerry C. Dockham
Commissioner James G. Patterson
Commissioner Lyons Gray

IN THE MATTER OF:

Application of Duke Energy Carolinas, LLC, for Approval of Renewable Energy and Energy Efficiency Portfolio Standard Cost Recovery Rider Pursuant to N.C.G.S. § 62-133.8 and NCUC Rule R8-67

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P R O C E E D I N G S

COMMISSIONER CLODFELTER: Let's come back to order and we'll proceed now with Docket E-7, Sub 1191. I'm Commissioner Dan Clodfelter. I've been assigned to preside over this particular docket. And with me today are Commissioners Brown-Bland, Dockham, Patterson, Lyons Gray, and Chair Charlotte Mitchell.

So we'll proceed with Docket E-7, Sub 1191, which is - we take a deep breath - In the Matter of Application of Duke Energy Carolinas, LLC, for Approval of Renewable Energy and Energy Efficiency Portfolio Standard Cost Recovery Rider pursuant to N.C.G.S. § 62-133.8 and Commission Rule R8-67.

We really like acronyms around here so from now on this one will be referred to as the REEEPSCRR Rider. Okay.

In compliance with the requirements of the State Government Ethics Act, I remind all Commission members of the our duty to avoid conflicts of interest, and inquire whether any member of the Commission has a known conflict of interest with regard to this docket?

(No response)

Ms. Mitchell, let the record show that no

conflicts were identified by any of the Commissioners.

Ladies and gentlemen, the Clerk's official docket reflects all of the prehearing filings and Orders. Those are a part of the record already and they are recognized and accepted as part of the record this morning by the Commission. I will not recite each of them individually.

So that brings us to the hearing this morning. And I'll call on counsel for the parties to make their appearances for the record, beginning with the Applicant.

MR. KAYLOR: Thank you, Mr. Chair. Robert Kaylor appearing on behalf of Duke Energy Carolinas.

MR. SMITH: Ben Smith appearing on behalf of the North Carolina Sustainable Energy Association.

MR. PAGE: Bob Page appearing on behalf of Carolina Utility Customers Association.

MS. FENNELL: Good morning. Heather Fennell with the Public Staff on behalf of the Using and Consuming Public.

COMMISSIONER CLODFELTER: Great. Ms. Fennell, have you identified any members of the public who wish to testify as public witnesses this morning?

MS. FENNELL: No, we have not.

COMMISSIONER CLODFELTER: Let me ask is there anyone in the audience this morning who would like to offer testimony as a public witness?

(No response)

Ms. Mitchell, again, let the record show that no one came forward.

Let me ask are there any procedural matters or prehearing motions that need to be addressed by any of the parties?

MR. KAYLOR: I'm not aware of any.

MS. FENNELL: (Shakes head no).

COMMISSIONER CLODFELTER: Let me also ask the parties, with respect to the state of the Clerk's docket are those filings complete and accurate to the best of your knowledge?

MR. KAYLOR: Yes.

COMMISSIONER CLODFELTER: Any changes need to be made to any of those filings?

MS. FENNELL: No, sir.

COMMISSIONER CLODFELTER: Great. Then pursuant to the Commission's Order Excusing Witnesses, and my understanding in the recitations that were made with the motion on that is that all parties have

agreed to waive cross examination of those witnesses, at this time the Commission on its own motion will receive into evidence the prefiled direct testimony and exhibits of Travis Payne and Veronica Williams, the testimony and exhibit of Michelle Boswell, and the testimony of Evan Lawrence, and the rebuttal testimony of Travis E. Payne. All exhibits that accompanied and were sponsored by those witnesses will be identified as they were premarked and prefiled. They will be admitted into the record at this time. Any confidentiality designations on those exhibits will be preserved and will be reflected so that confidential materials are masked from the public record and are kept under seal. In addition, the Application of the parties -- Application of Duke Energy Carolinas will also be received into evidence this morning.

Let me ask the parties, do you wish to at this time to make any corrections to the prefiled testimony or the prefiled exhibits?

MR. KAYLOR: Not for the Company.

COMMISSIONER CLODFELTER: Anyone else?

MS. FENNELL: Not for the Public Staff.

COMMISSIONER CLODFELTER: That's great.

(WHEREUPON, Application of Duke

Energy Carolinas, LLC, is received into evidence.)

(WHEREUPON, Jennings Exhibits 5, 8 - 10, 13, 20 and Confidential Exhibits 1 - 4, 6, 7, 11, 12, 14 - 19, 21 - 23 are marked for identification as prefiled and received into evidence.)

(WHEREUPON, the prefiled direct testimony of MEGAN W. JENNINGS, as adopted by TRAVIS E. PAYNE, is copied into the record as if given orally from the stand.)

BEFORE THE NORTH CAROLINA UTILITIES COMMISSION

DOCKET NO. E-7, SUB 1191

In the Matter of Application of Duke Energy Carolinas, LLC for Approval of Renewable Energy and Energy Efficiency Portfolio Standard (REPS) Compliance Report and Cost Recovery Rider Pursuant to N.C. Gen. Stat. 62-133.8 and Commission Rule R8-67	)	**DIRECT TESTIMONY OF MEGAN W. JENNINGS**

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Megan W. Jennings, and my business address is 400 South Tryon Street, Charlotte, North Carolina.

Q. PLEASE STATE YOUR POSITION WITH DUKE ENERGY AND DESCRIBE YOUR CURRENT RESPONSIBILITIES.

A. In my capacity as Renewable Compliance Manager, I am responsible for the development and implementation of renewable energy compliance strategies for Duke Energy Carolinas, LLC ("Duke Energy Carolinas," "DEC" or "the Company"), Duke Energy Progress, LLC ("Duke Energy Progress") and Duke Energy Ohio, LLC. My responsibilities include compliance with North Carolina's Renewable Energy and Energy Efficiency Portfolio Standard ("REPS"), compliance with Ohio's Renewable Energy Portfolio Standard and evaluation of renewable generation initiatives and customer programs that relate to renewable compliance.

Q. PLEASE BRIEFLY SUMMARIZE YOUR EDUCATIONAL BACKGROUND.

A. I received a Bachelor of Science in Mathematical Sciences from Clemson University and a Masters of Financial Mathematics from North Carolina State University.

Q. PLEASE DESCRIBE YOUR BUSINESS BACKGROUND AND EXPERIENCE.

A. I joined Progress Energy, Inc. in 2008, where I held positions in Investor Relations and Regulatory Planning. Following the merger of Progress

Energy, Inc. with Duke Energy Corporation, I worked in the Rates and Regulatory Strategy Department until June of 2015, when I moved to my current position as Renewable Compliance Manager in the Distributed Energy Technology Department.

Q. HAVE YOU PREVIOUSLY TESTIFIED BEFORE THE NORTH CAROLINA UTILITIES COMMISSION?

A. Yes, I most recently provided testimony in Docket No. E-2, Sub 1175 on Duke Energy Progress's 2017 REPS compliance report and application for approval of its REPS cost recovery rider and in Docket No. E-7, Sub 1162 on Duke Energy Carolinas' 2017 REPS compliance report and application for approval of its REPS cost recovery rider.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. The purpose of my testimony is to describe Duke Energy Carolinas' activities and the costs it has incurred, or projects it will incur, in support of compliance with North Carolina's Renewable Energy and Energy Efficiency Portfolio Standard under N.C. Gen. Stat. ("G.S.") § 62-133.8 during the twelve months beginning on January 1, 2018 and ending on December 31, 2018 ("Test Period"), as well as during the twelve months beginning on September 1, 2019 and ending on August 31, 2020 ("Billing Period").

Q. PLEASE DESCRIBE THE EXHIBITS TO YOUR TESTIMONY.

A. My testimony includes twenty-three exhibits: Jennings Confidential Exhibit No. 1 is the Company's 2018 REPS Compliance Report, and Jennings

Confidential Exhibit No. 2 provides actual and forecasted REPS compliance costs, by resource, that the Company has incurred during the Test Period and projects to incur during the Billing Period in support of compliance with REPS. Jennings Confidential Exhibit No. 3 is a worksheet detailing the other incremental costs included in the DEC REPS filing, listing the labor costs by activity, as directed by the North Carolina Utilities Commission ("Commission") in its August 17, 2018 Order in Docket No. E-7, Sub 1162. Jennings Confidential Exhibit No. 4 provides information on DEC's Renewable Energy Certificate ("REC") sales, as required to comply with the Commission's May 13, 2014 *Order Regarding Accounting Treatment for REC Sales* in Docket No. E-100, Sub 113. Jennings Exhibit Nos. 5-23 are the results of studies the costs of which the Company is recovering via the REPS Rider.

Q. WERE THESE EXHIBITS PREPARED BY YOU OR AT YOUR DIRECTION AND UNDER YOUR SUPERVISION?

A. Jennings Confidential Exhibit Nos. 1-4 were prepared by me or under my supervision. Jennings Exhibit Nos. 5-23 include the results of studies not prepared under my supervision. In my role at Duke Energy, however, I am familiar with the studies.

Compliance with REPS Requirements

Q. WHAT ARE DUKE ENERGY CAROLINAS' REPS REQUIREMENTS UNDER G.S. § 62-133.8?

A. Pursuant to G.S. § 62-133.8,[1] as an electric power supplier, Duke Energy Carolinas is required to comply with the overall REPS requirement ("Total Requirement") by submitting for retirement a total volume of RECs equivalent to the following percentages of its North Carolina retail sales in the prior year:

- Beginning in 2012, three percent (3%);
- In 2015, six percent (6%);
- In 2018, ten percent (10%); and
- In 2021 and thereafter, twelve point five percent (12.5%).

Furthermore, each electric power supplier must comply with the requirements of G.S. § 62-133.8 (d), (e), and (f) (individually referred to as the "Solar Set-Aside," "Swine Waste Set-Aside," and "Poultry Waste Set-Aside," respectively). That is, within the Total Requirement described above, each electric power supplier is to ensure that specific quantities of qualifying solar RECs, swine waste RECs, and poultry waste RECs are also submitted for retirement. The Company generally refers to its Total Requirement net of the three set-asides as its "General Requirement."

[1] In its *Order Clarifying Electric Power Suppliers' Annual REPS Requirements*, Docket No. E-100, Sub 113 (November 26, 2008), the Commission clarified that the calculation of these requirements for each year shall be based upon the electric utility's North Carolina retail sales for the prior year.

Specifically, each electric power supplier is to comply with the Solar Set-Aside by submitting for retirement a volume of qualifying solar RECs equivalent to the following percentages of its North Carolina retail sales in the prior year:

- Beginning in 2010, two-hundredths of one percent (0.02%);
- In 2012, seven-hundredths of one percent (0.07%);
- In 2015, fourteen-hundredths of one percent (0.14%); and
- In 2018 and thereafter, two-tenths of one percent (0.2%).

Each electric power supplier is also to comply with the Swine Waste Set-Aside by submitting for retirement a volume of qualifying swine waste RECs equivalent to its pro-rata share of total retail electric power sold in North Carolina multiplied by the statewide, aggregate Swine Waste Set-Aside Requirement.[2] Duke Energy Carolinas' Swine Waste Set-Aside Requirements, as modified by the Commission[3], are as follows:

- In 2018, its pro-rata share of two-hundredths of one percent (0.02%) of the total retail electric power sold in North Carolina in the year prior;

[2] In its *Order on Pro Rata Allocation of Aggregate Swine and Poultry Waste Set-Aside Requirements and Motion for Clarification* in Docket No. E-100, Sub 113 (March 31, 2010), the Commission approved the electric power suppliers' proposed pro-rata allocation of the statewide aggregate swine and poultry waste set-aside requirements, such that the aggregate requirements will be allocated among the electric power suppliers based on the ratio of each electric power supplier's prior year retail sales to the total statewide retail sales.

[3]In its *Order Modifying the Swine and Poultry Waste Set-Aside Requirements And Providing Other Relief* (October 8, 2018) Docket No. E-100, Sub 113, the Commission modified the 2018 Swine Waste Set-Aside Requirement for electric public utilities to 0.02% and delayed by one year the scheduled increases to the requirement. The Commission also modified the 2018 Poultry Waste Set-Aside Requirement to 300,000 MWh, and delayed by one year the scheduled increases in the requirement.

- In 2019, its pro-rata share of seven-hundredths of one percent (0.07%) of the total retail electric power sold in North Carolina in the year prior;
- In 2021, its pro-rata share of fourteen-hundredths of one percent (0.14%) of total retail electric power sold in North Carolina in the year prior; and
- In 2024 and thereafter, its pro-rata share of two-tenths of one percent (0.2%) of total retail electric power sold in North Carolina in the year prior.

Finally, each electric power supplier is also to submit for retirement a volume of qualifying poultry waste RECs equivalent to its pro-rata share of the aggregate state-wide Poultry Waste Set-Aside requirement. Duke Energy Carolinas' Poultry Waste Set-Aside Requirements, as modified by the Commission, are as follows:

- Beginning in 2014, its pro-rata share of 170,000 megawatt-hours ("MWh");
- In 2018, its pro-rata share of 300,000 MWh;
- In 2019, its pro-rata share of 700,000 MWh; and
- In 2020 and thereafter, its pro-rata share of 900,000 MWh.

The requirements that are described in this testimony and accompanying exhibits reflect the aggregation of the REPS requirements of Duke Energy Carolinas' retail customers as well as those wholesale customers, specifically Blue Ridge Electric Membership Corporation,

Rutherford Electric Membership Corporation, Town of Dallas, Town of Forest City, City of Concord, Town of Highlands, and City of Kings Mountain (collectively "Wholesale"), for which the Company has been contracted to provide REPS compliance services. DEC's contracts to provide REPS compliance services for the City of Concord and the City of Kings Mountain end in December 2018, and thus the compliance requirements have been adjusted accordingly.

Q. PLEASE DISCUSS DUKE ENERGY CAROLINAS' REPS REQUIREMENTS FOR THE TEST AND BILLING PERIODS.

A. For the Test Period, the Company has submitted for retirement 5,923,670 RECs, which includes 14,084 Senate Bill 886 ("SB 886") RECs, each of which counts for two poultry waste and one general REC, to meet its Total Requirement of 5,951,838 RECs. Within this total, the Company has submitted for retirement 119,041 RECs to meet the Solar Set-Aside Requirement, 108,493 RECs, along with 14,084 SB 886 RECs (which count as 28,168 Poultry Waste Set-Aside RECs), to meet the Poultry Waste Set-Aside Requirement, and 11,203 RECs to meet the Swine Waste Set-Aside Requirement. During the prospective Billing Period, which spans two calendar years, with different requirements in each year, the Company's estimated requirements are as follows[4]:

In 2019, the Company estimates that it will be required to submit for retirement 6,217,691 RECs to meet its Total Requirement. Within this total,

[4] The Company's projected requirements are based upon retail sales estimates and will be subject to change based upon actual prior-year North Carolina retail sales data.

the Company is also required to retire the following: 124,357 solar RECs, 43,526 swine waste RECs and 313,614 poultry waste RECs.

In 2020, the Company estimates that it will be required to submit for retirement 6,020,898 RECs to meet its Total Requirement. Within this total, the Company estimates that it will be required to retire approximately 120,421 solar RECs, 42,150 swine waste RECs and 313,614 poultry waste RECs.

Q. HAS THE COMPANY COMPLIED WITH ITS GENERAL REQUIREMENT FOR 2018?

A. Yes. The Company has met its 2018 General Requirement of 5,684,933 RECs. Specifically, the RECs to be used for 2018 compliance have been transferred from the North Carolina Renewable Energy Tracking System ("NC-RETS") Duke Energy Electric Power Supplier account to the Duke Energy Compliance Sub-Account and the Sub-Accounts of its Wholesale customers. Upon completion of this regulatory proceeding, the Commission will finalize retirement of the RECs.

Q. WILL THE COMPANY COMPLY WITH ITS GENERAL REQUIREMENT IN 2019?

A. Yes, the Company is well-positioned to comply with its General Requirement in 2019.

Q. WHAT ACTIONS HAS DUKE ENERGY CAROLINAS TAKEN DURING THE TEST PERIOD TO SATISFY ITS CURRENT AND FUTURE REPS REQUIREMENTS?

A. During the Test Period, Duke Energy Carolinas has continued to produce and procure RECs to satisfy its REPS requirements. Specifically, the Company has taken the following actions: (1) executed and continued negotiations for additional REC purchase agreements with renewable facilities; (2) completed construction and operated three utility-scale solar projects totaling 81 megawatts ("MW"), generating RECs for compliance purposes - the Mocksville Solar Facility, placed in service in December 2016, the Monroe Solar Facility, placed in service in April 2017, and the Woodleaf Solar Facility, placed in service in December 2018; (3) continued operations of its solar and hydroelectric facilities; (4) enhanced and expanded energy efficiency programs that will generate savings that can be counted towards the Company's REPS requirement; (5) performed research studies, both directly and through strategic partnerships, to enhance the Company's ability to comply with its future REPS requirements; (6) obtained approval from the Commission on a method by which to calculate the RECs generated from net metering facilities and track these RECs for use in meeting the Company's REPS requirements; and (7) issued a Request for Proposals as part of the Competitive Procurement of Renewable Energy ("CPRE") Program of North Carolina House Bill 589 ("NC HB 589"), the RECs from which will be used to meet the Company's future REPS requirements.

Q. IS THE COMPANY ABLE TO USE RECS GENERATED FROM NET METERING FACILITIES TO SATISFY ITS FUTURE REPS REQUIREMENTS?

A. Yes. Under the current Net Metering for Renewable Energy Facilities Rider offered by DEC (Rider NM), a customer receiving electric service under a schedule other than a time-of-use schedule with demand rates ("NMNTD customer") shall provide any RECs to DEC at no cost. Per the Commission's June 5, 2018 *Order Approving Rider and Granting Waiver Request* ("NMNTD Order") in Docket Nos. E-2, Sub 1106 and E-7, Sub 1113, for NMNTD customers, DEC may use the PVWatts™ Solar Calculator developed by the National Renewable Energy Laboratory for estimating the generation from NMNTD customers' solar facilities, as permitted by Commission Rule R8-67(g)(2). Commission Rule R8-67(g)(2) allows the use of a scalable conversion factor for estimating annual generation from program participants. DEC shall then report the total amount of electricity produced by facilities under the Rider directly into NC-RETS in a separately identified generation project. DEC has complied with these requirements and reported generation from NMNTD customers to NC-RETS. The RECs from these facilities are currently in DEC's REC inventory and available for use for future compliance requirements.

Q. ARE THERE OTHER COMPLIANCE REQUIREMENTS IN THE NMNTD ORDER WITH WHICH DEC MUST COMPLY?

A. Yes. The NMNTD Order also requires that DEC shall provide NC-RETS on a monthly basis with a list of participating customers, including location and the kW capacity of their installations, to be made available on the NC-RETS website. DEC has complied, and continues to comply, with this requirement. In addition, the NMNTD Order requires that for two years, DEC shall verify through site visits to a statistically significant number of participating residences that the solar installations covered by this Rider continue to be operating, and shall include the findings of its site visits in its annual REPS compliance filing. DEC has hired a third-party contractor to perform the required site visits which are underway and should be completed by June 2019. Therefore, the results of these visits will be reported in the Company's 2019 compliance filing.

Q. HOW WILL THE CPRE PROGRAM OF NC HB 589 IMPACT DEC'S COMPLIANCE WITH ITS GENERAL REQUIREMENT?

A. Under G.S. § 62-110.8(a), DEC and DEP are responsible for procuring renewable energy and capacity through a competitive procurement program with the purpose of adding renewable energy to the state's generation portfolio in a manner that allows DEC and DEP to continue to reliably and cost-effectively serve their customers' future energy needs. To meet the CPRE Program requirements, the Companies must issue requests for proposals to procure energy and capacity from renewable energy facilities in the aggregate amount of 2,660 MW (subject to adjustment in certain

circumstances) reasonably allocated over a term of 45 months beginning on February 21, 2018, when the Commission approved the CPRE Program.

Renewable energy facilities eligible to participate in the CPRE solicitation(s) include those facilities that use renewable energy resources identified in G. S. § 62-133.8(a)(8), the REPS statute. The renewable energy facilities to be developed or acquired by the Companies or procured from a third party through a power purchase agreement under the CPRE Program, must also deliver to the Companies the environmental and renewable attributes, or RECs, associated with the power. The Company's annual CPRE Program Plan, filed on September 1, 2018 in Docket No. E-100, Sub 157, includes a planned allocation of ~1,460 to ~1,960 MWs between the DEC and DEP service territories, as well as a planned timeline for each solicitation. DEC plans to use the RECs acquired through the CPRE RFP solicitations for its future REPS compliance requirements and has therefore included the planned MW allocation and timeline in its REPS compliance planning process. Because the Company will use the RECs acquired through CPRE for REPS compliance, CPRE program implementation costs could be recovered through the REPS Rider. However, as I noted in my testimony in last year's annual REPS cost-recovery proceeding in Docket No. E-7, Sub 1162, the Company has elected to recover the reasonable and prudent costs incurred to implement the CPRE Program through the CPRE Rider as contemplated under Commission Rule R8-71(j).

Q. HAS THE COMPANY COMPLIED WITH ITS SOLAR SET-ASIDE REQUIREMENT FOR 2018?

A. Yes. The Company has met the 2018 Solar Set-Aside Requirement of 119,041 solar RECs. Pursuant to the NC-RETS Operating Procedures, the Company has submitted for retirement 119,041 solar RECs. Specifically, the RECs to be used for 2018 compliance have been transferred from the NC-RETS Duke Energy Electric Power Supplier account to the Duke Energy Compliance Sub-Account and the Sub-Accounts of its Wholesale customers. Upon completion of this regulatory proceeding, the Commission will finalize retirement of the RECs.

Q. WILL THE COMPANY COMPLY WITH ITS SOLAR SET-ASIDE REQUIREMENT IN 2019?

A. Yes, the Company is well-positioned to comply with its Solar Set-Aside Requirement in 2019.

Q. PLEASE PROVIDE AN UPDATE ON THE COMPANY'S EFFORTS TO COMPLY WITH ITS SOLAR SET-ASIDE REQUIREMENT.

A. The Company is well-positioned to comply with its Solar Set-Aside Requirement in 2019 through a diverse and balanced portfolio of solar resources. The Company's efforts to comply with the Solar Set-Aside Requirement include REC generation and procurement from solar renewable energy facilities.

As previously noted, the Company constructed three DEC-owned solar photovoltaic ("PV") facilities, which will generate an estimated

155,000 RECs per year over the life of the projects. These facilities include the Monroe Solar Facility, 60 MW located in Union County, the Mocksville Solar Facility, 15 MW located in Davie County, and the Woodleaf Solar Facility, 6 MW located in Rowan County.

Q. PLEASE DESCRIBE THE OPERATIONAL STATUS OF THE COMPANY'S PV DISTRIBUTED GENERATION ASSETS.

A. The Company's approximately 10 MW-DC of solar PV generation facilities were operational and generating power for the benefit of its customers during the test period. One of the sites is currently in a partial outage to repair damaged conduit. The repair work is estimated to be completed in the second quarter of 2019. In 2019, the Company plans to continue updating monitoring equipment at its 18 nonresidential sites.

Q. HAS THE COMPANY COMPLIED WITH ITS POULTRY WASTE SET-ASIDE REQUIREMENT FOR 2018?

A. Yes. The Company has met the 2018 Poultry Waste Set-Aside Requirement of 136,661 RECs. Pursuant to NC-RETS Operating Procedures, the Company has submitted for retirement 108,493 poultry RECs and 14,084 SB 886 RECs (which count as 28,168 Poultry Waste Set-Aside RECs). Accordingly, the Company has submitted the equivalent of 136,661 poultry RECs for compliance. Specifically, the RECs to be used for 2018 compliance have been transferred from the NC-RETS Duke Energy Electric Power Supplier account to the Duke Energy Compliance Sub-Account and the Sub-Accounts of its Wholesale customers. Upon

completion of this regulatory proceeding, the Commission will finalize retirement of the RECs.

Q. WILL THE COMPANY COMPLY WITH ITS POULTRY WASTE SET-ASIDE REQUIREMENT IN 2019?

A. The Company's ability to comply with its Poultry Waste Set-Aside Requirement in 2019 is dependent on the performance of poultry waste-to-energy developers on current contracts and two new poultry waste-to-energy projects that are scheduled to come online during 2019. Three poultry waste-to-energy facilities that were previously operational encountered operational issues and were shut down in 2018 to perform plant modifications. One facility is already back online, another is expected back online in mid-2019, and the third is expected back online in late 2019, but 2019 production will be lower than originally expected.

Q. WHAT ACTIONS HAS THE COMPANY TAKEN DURING THE TEST PERIOD TO PROCURE OR DEVELOP POULTRY WASTE-TO-ENERGY RESOURCES TO SATISFY ITS POULTRY WASTE SET-ASIDE REQUIREMENTS?

A. In the Test Period, the Company (1) continued direct negotiations for additional supplies of both in-state and out-of-state resources with multiple counterparties; (2) secured contracts for additional poultry waste-to-energy resources; (3) worked diligently to understand the technological, permitting, and operational risks associated with various methods of producing qualifying poultry RECs to aid developers in overcoming those risks; when

those risks could not be overcome, the Company worked with developers via contract amendments to adjust for more realistic outcomes; (4) explored leveraging current biomass contracts by working with developers to add poultry waste to their fuel mix; (5) explored adding thermal capabilities to current poultry sites to bolster REC production; (6) explored poultry-derived directed biogas at facilities located in North Carolina and directing such biogas to combined cycle plants for combustion and electric generation; (7) utilized the Company's REC trader to search the broker market for out-of-state poultry RECs available in the market; and (8) participated in the North Carolina Energy Policy Council Biogas Working Group. Additional information on the Company's compliance with the Poultry Waste Set-Aside requirement can be found in the Company's Joint Semiannual Progress Report, filed on November 30, 2018 in Docket No. E-100, Sub 113A.

The Company remains committed to satisfying its statutory requirements for the Poultry Waste Set-Aside and will continue to reasonably and prudently pursue procurement of these resources.

Q. HAS THE COMPANY COMPLIED WITH ITS SWINE WASTE SET-ASIDE REQUIREMENT FOR 2018?

A. Yes. The Company has met the 2018 Swine Waste Set-Aside Requirement of 11,203 swine RECs. Pursuant to the NC-RETS Operating Procedures, the Company has submitted for retirement 11,203 swine RECs. Specifically, the RECs to be used for 2018 compliance have been

transferred from the NC-RETS Duke Energy Electric Power Supplier account to the Duke Energy Compliance Sub-Account. Upon completion of this regulatory proceeding, the Commission will finalize retirement of the RECs.

Q. WILL THE COMPANY COMPLY WITH ITS SWINE WASTE SET-ASIDE REQUIREMENT IN 2019?

A. The Company's ability to comply with its Swine Waste Set-Aside Requirement in 2019 is dependent on the performance of swine waste-to-energy developers on current contracts, particularly achievement of projected delivery requirements and commercial operation milestones.

As part of its efforts to achieve compliance with the Swine Waste Set-Aside Requirement, the Company, together with Duke Energy Progress (jointly, "The Companies"), in December 2017 issued a Request for Proposals for swine waste fueled proposals, soliciting up to 750,000 MMBtu of swine waste fueled biogas, or the equivalent in MWh, which is approximately 110,000 MWh, of electric power fueled by swine waste. The Companies received seven responses to the RFP, have evaluated the proposals, and have executed contracts with two of the projects. Under these contracts, the Company will purchase the swine-derived biogas generated by the facilities, one being built in Union County, NC and the other in Wilson County, NC, and use it for generating power at the Companies' combined cycle facilities. The two projects are due online in 2021.

The Company understands that current swine waste-to-energy projects have encountered difficulties in achieving the full REC output of their contracts due to issues including local opposition to siting of the facilities, the inability to secure firm and reliable sources of swine waste feedstock from waste producers in North Carolina, difficulties securing project financing and technological challenges encountered when ramping up production. In addition, after terminating four contracts for swine waste RECs in 2017 due to failure to perform, force majeure events and project bankruptcy, the Company was notified by another project in January 2019 that the project will not be continuing due to failure to operate.

Q. WHAT ACTIONS HAS DUKE ENERGY CAROLINAS TAKEN DURING THE TEST PERIOD TO PROCURE OR DEVELOP SWINE WASTE-TO-ENERGY RESOURCES TO MEET ITS SWINE WASTE SET-ASIDE REQUIREMENTS?

A. In the Test Period, the Company (1) continued direct negotiations for additional supplies of both in-state and out-of-state resources; (2) continued support of the Loyd Ray Farms research and development project; (3) worked diligently to understand the technological, permitting, and operational risks associated with various methods of producing qualifying swine RECs to aid developers in overcoming those risks; when those risks could not be overcome, the Company worked with developers via contract amendments to adjust for outcomes that the developers believe are achievable based on new experience; (4) explored and is engaging in

modification of current biomass and set-asides contracts by working with developers to add swine waste to their fuel mix; (5) continued pursuit of swine-derived directed biogas from North Carolina facilities; (6) utilized the Company's REC trader to search the broker market for out-of-state swine RECs available in the market; (7) engaged the North Carolina Pork Council ("NCPC") in a project evaluation collaboration effort that will allow the Company and the NCPC to discuss project viability, as appropriate, with respect to the Company's obligations to keep certain sensitive commercial information confidential; and (8) participated in the North Carolina Energy Policy Council Biogas Working Group. Additional information on the Company's compliance with the Swine Waste Set-Aside requirement can be found in the Company's Joint Semiannual Progress Report, filed on November 30, 2018 in Docket No. E-100, Sub 113A.

The Company remains committed to satisfying its statutory requirements for the Swine Waste Set-Aside and will continue to reasonably and prudently pursue procurement of these resources.

Q. IS DUKE ENERGY CAROLINAS CONTINUING TO EXECUTE ADDITIONAL REC PURCHASE AGREEMENTS?

A. Yes. The Company continues to execute additional REC purchase agreements and maintains an open solicitation for proposals from developers of renewable energy resources.

Q. DID THE COMPANY SELL ANY RECS DURING THE TEST PERIOD?

A. Yes, the Company sold poultry RECs during the test period to other electric suppliers in North Carolina to enable the state's electric power suppliers to comply with the aggregate Poultry Waste Set-Aside Requirement. These sales did not negatively impact compliance, and the proceeds were credited back to the Company's retail and Wholesale REPS customers.

Q. HAS THE COMPANY COMPLIED WITH THE COMMISSION'S MAY 2014 ORDER IN DOCKET NO. E-100, SUB 113, PERTAINING TO ACCOUNTING FOR REC SALES?

A. Yes. Please see Jennings Confidential Exhibit No. 4 for information on the Company's REC sales, as required by this Order.

Q. DOES THE COMPANY HAVE IN ITS INVENTORY ANY RECS THAT IT CANNOT USE FOR ITS OWN REPS COMPLIANCE REQUIREMENTS?

A. Yes. DEC has RECs in its inventory that it cannot use for its own REPS compliance requirements. The RECs were generated by specific hydroelectric generating facilities owned by the Company, each of which has a generation capacity of 10 MW or less and was placed into service prior to January 1, 2007.

Q. PLEASE EXPLAIN WHY THE COMPANY CANNOT USE THESE RECS TO MEET ITS OWN COMPLIANCE REQUIREMENTS.

A. Under G.S. § 62-133.8(b)(2), an electric public utility, such as DEC, may meet its REPS compliance requirement through several methods, including by "generat[ing] electric power at a new renewable energy facility." The

Commission accepted the registration of these DEC-owned hydroelectric facilities as renewable energy facilities, but not as *new* renewable energy facilities, in its July 31, 2009 *Order Accepting Registration of Renewable Energy Facilities* in Docket Nos. E-7, Subs 886, 887, 888, 900, 903 and 904 ("*June 31, 2009 Registration Order*") and its December 9, 2010 *Order Accepting Registration of Renewable Energy Facilities* in Docket Nos. E-7, Subs 942, 943, 945 and 946 (collectively, "*Registration Orders*"). In the *Registration Orders*, the Commission specifically cited its June 17, 2009 *Order on Public Staff's Motion for Clarification* in Docket No. E-100, Sub 113, where it concluded that these utility-owned hydroelectric facilities do not meet the delivery requirement of G.S. § 62-133.8(a)(5)(c), which requires the delivery of electric power to an electric power supplier, such as DEC, by an entity other than the electric power supplier to qualify as a *new* renewable energy facility.

Q. WHAT HAS THE COMPANY PROPOSED TO DO WITH THESE HYDROELECTRIC RECS THAT IT CANNOT USE FOR ITS OWN REPS COMPLIANCE?

A. In last year's REPS cost recovery proceeding, Docket No. E-7, Sub 1162, the Company proposed to exchange a portion of these hydroelectric RECs for RECs within the inventory of the North Carolina Electric Membership Corporation ("NCEMC"). Unlike DEC, NCEMC can use these hydroelectric RECs to comply with its REPS requirements because G.S. § 62-133.8(c)(2)(d) allows electric membership corporations and

municipalities to meet their REPS requirements through the purchase of RECs derived from renewable, as opposed to new renewable, energy facilities. Additionally, the Company noted that the REC exchange would benefit DEC's customers because it would allow DEC to meet part of its general REPS requirements through the RECs exchanged with NCEMC at no cost to DEC's customers rather than through the purchase of additional RECs from new renewable energy facilities. NCEMC's customers are held harmless in the transaction as this exchange simply replaces RECs in NCEMC's inventory with different RECs that NCEMC will use to meet its General Requirement. The Public Staff of the North Carolina Utilities Commission supported the Company's proposed REC transfer with NCEMC, and the Commission concluded that the proposed transfer was reasonable and served the public interest in its *Order Approving REPS and REPS EMF Riders and 2017 REPS Compliance Report*, issued on August 17, 2018 in Docket No. E-7, Sub 1162.

Q. HAS THE COMPANY EXCHANGED ANY OF THESE HYDROELECTRIC RECS WITH NCEMC?

A. Yes. The Company has executed contracts with NCEMC exchanging a portion of these hydroelectric RECs for an equal number of General Requirement RECs in NCEMC's inventory that DEC can use for REPS compliance.

Cost of REPS Compliance

Q. WHAT ARE THE COMPANY'S COSTS ASSOCIATED WITH REPS COMPLIANCE DURING THIS TEST PERIOD AND THE UPCOMING BILLING PERIOD?

A. Duke Energy Carolinas' costs associated with REPS compliance are reflected in Jennings Confidential Exhibit No. 2 and are categorized by actual costs incurred during the Test Period and projected costs for the Billing Period.

Q. IN ADDITION TO RENEWABLE ENERGY AND REC COSTS, WHAT OTHER COSTS OF REPS COMPLIANCE DOES THE COMPANY SEEK TO RECOVER IN THIS PROCEEDING?

A. Jennings Confidential Exhibit Nos. 2 and 3 identify "Other Incremental Cost," "Solar Rebate Program Cost" and "Research Cost" that the Company has incurred, and estimates it will incur, in association with REPS compliance.

Other Incremental Costs and Solar Rebate Program Costs

Q. PLEASE EXPLAIN THE OTHER INCREMENTAL COSTS INCLUDED FOR RECOVERY IN THIS PROCEEDING.

A. Other Incremental Costs include labor costs associated with REPS compliance activities and non-labor costs associated with administration of REPS compliance. Among the non-labor costs associated with REPS compliance are the Company's subscription to NC-RETS, and accounting and tracking tools related to RECs, reduced by proceeds from REC sales

and agreed-upon liquidated damages paid by sellers for failure to meet contractual milestones, and amounts paid for administrative contractual amendments requested by sellers.

Q. PLEASE PROVIDE INFORMATION ON THE NC HB 589 SOLAR REBATE PROGRAM.

A. As required by G.S. § 62-155(f), DEC developed a Solar Rebate Program offering reasonable incentives to residential and nonresidential customers for the installation of small customer owned or leased solar energy facilities participating in the Company's net metering tariff. The incentive is limited to 10 kilowatts alternating current ("kW AC") for residential solar installations and 100 kW AC for nonresidential solar installations. The program incentive shall be limited to 10,000 kW of installed capacity annually starting January 1, 2018 and continuing until December 31, 2022.

Q. ARE COSTS RELATED TO THE NC HB 589 SOLAR REBATE PROGRAM INCLUDED FOR RECOVERY IN THIS FILING?

A. Yes. Pursuant to G.S. § 62-155(f), each public utility required to offer a solar rebate program, "shall be authorized to recover all reasonable and prudent costs of incentives provided to customers and program administrative costs by amortizing the total program incentives distributed during a calendar year and administrative costs over a 20-year period, including a return component adjusted for income taxes at the utility's overall weighted average cost of capital established in its most recent general rate case, which shall be included in the costs recoverable by the

public utility pursuant to G.S. 62-133.8(h).” G.S. § 62-133.8(h) provides for an electric power supplier’s cost recovery and customer charges under the REPS statute; NC HB 589 amended it by adding a provision to allow for the recovery of incremental costs incurred to “provide incentives to customers, including program costs, incurred pursuant to G.S. § 62-155(f).” Therefore, DEC has included for recovery in this filing costs incurred during the EMF period, and projected to be incurred in the Billing Period, related to the implementation of the NC HB 589 Solar Rebate Program. As detailed on Jennings Confidential Exhibit No. 3, these costs include the annual amortization of incentives paid to customers and program administration costs, which includes labor, information technology and marketing costs.

Q. PLEASE PROVIDE DETAIL ON THE NON-LABOR COSTS ASSOCIATED WITH THE NC HB 589 SOLAR REBATE PROGRAM.

A. Non-labor costs associated with the NC HB 589 Solar Rebate Program include the rebate incentives paid to customers, program marketing costs and information technology costs for the automation of program administrative tasks.

The NC HB 589 Solar Rebate Program launched on July 9, 2018. On July 26, 2018, DEC filed a notice that the 2018 annual participation limits for residential and non-residential customers under the Solar Rebate Program, exclusive of the non-profit participation set-aside, had been

reached. Rebate payments were made to customers accepted into the program, upon installation of their generating system. Beginning in 2019, for a residential customer who obtains a rebate reservation prior to installation, the installation must be completed no later than December 31 in the year in which the reservation was obtained. For a nonresidential customer who obtains a rebate reservation prior to installation, the installation must be completed no later than 365 days from the date of an executed interconnection agreement. Therefore, rebate payments for the 2018 program year will continue into 2019, and the same principle will apply for subsequent program years, with payments continuing into 2023 after the final program year of 2022. In accordance with the September 20, 2018 Order issued by the Commission in Docket Nos. E-2, Sub 1167, and E-7, Sub 1166, after December 31, 2018, a reallocation was completed to assign capacity and pay rebates to those defined as 'Affected Customers' within the Order. This resulted in an increase in rebate payments made at the beginning of 2019. On January 4, 2019, DEC filed a notice that the 2019 annual participation limits for residential and non-residential customers under the Solar Rebate Program, exclusive of the non-profit participation set-aside, had been reached.

Q. PLEASE PROVIDE DETAIL ON THE INTERNAL LABOR COSTS ASSOCIATED WITH THE NC HB 589 SOLAR REBATE PROGRAM.

A. The labor dollars related to the NC HB 589 Solar Rebate Program included for recovery in this filing include projected costs for one Program Manager, two Program Specialists, complex billing staff, information technology, and compliance, accounting and rates support. The Program Manager is responsible for marketing, installer communications, reporting and overseeing the Program Specialists, who are responsible for processing applications, initiating incentive payments and handling customer inquiries. In addition, incremental employees are needed in complex billing as the number of net metering accounts has increased as a result of the NC HB 589 Solar Rebate Program. Information technology work is performed by both internal employees and contractors and included implementation of an electronic application process, including automation required to receive and process solar rebate applications and payments. These employees and contractors continue to provide support and enhancements to this platform to ensure rebate applications are able to be accepted, tracked and monitored. Compliance, accounting, and rates are responsible for ensuring program costs incurred and included for recovery are valid and have appropriate support, rebate payments made comply with the terms outlined in the Solar Rebate Rider, and detail included in required website and updates to the Commission is accurate.

Q. PLEASE PROVIDE DETAIL ON THE INTERNAL LABOR COSTS THAT ARE ASSOCIATED WITH REPS COMPLIANCE AND NC HB 589 SOLAR REBATE PROGRAM ACTIVITIES THAT ARE

INCLUDED IN DEC'S CURRENT APPLICATION FOR REPS COST RECOVERY.

A. DEC charges only the incremental cost of REPS compliance and the NC HB 589 Solar Rebate Program to the REPS cost recovery rider. Consistent with that policy and DEC's practices in previous applications for cost recovery for REPS compliance, internal employees that work to comply with G.S. § 62-133.8 and G.S. § 62-155(f) charge only that portion of their labor to REPS. The departments/functions that charged labor to REPS during the Test Period are detailed in Jennings Confidential Exhibit No. 3.

Q. HOW DO EMPLOYEES CHARGE THEIR REPS-RELATED AND NC HB 589 SOLAR REBATE PROGRAM-RELATED LABOR COSTS TO REPS?

A. Employees positively report their time, which means that each employee is required to submit a timesheet every two weeks in DEC's time reporting system. The hours reported for the period are split according to the accounting entered in the time reporting system for that specific employee. The division of hours is updated for the reporting period as necessary, as the nature of the employee's work changes.

To educate employees to account for their time properly, DEC annually provides instructions for charging time to REPS to affected employees and the management of the employee groups performing REPS work. Additionally, every year prior to filing for approval of the DEC REPS

Compliance Report and Cost-Recovery Rider, the labor hours charged are carefully reviewed and confirmed.

Q. ARE THERE ANY LABOR AND NON-LABOR INTERCONNECTION-RELATED COSTS INCLUDED FOR RECOVERY IN THIS FILING?

A. No. As directed by the Commission in Docket No. E-2, Sub 1109, all internal interconnection-related labor costs, such as those related to employees in the Distributed Energy Resources Standard PPAs and Interconnection Team and the Renewables Service Center, contract labor costs, such as those for temporary employees working on interconnection information technology projects and non-labor costs, such as PowerClerk platform costs, have not been included for recovery in this filing.

Research Costs

With respect to Research and Development ("R&D") activities during the Test Period and projected for the Billing Period, the Company has incurred or projects to incur costs associated with the support of various pilot projects and studies related to distributed energy technology and the Company's REPS compliance.

Q. THE COMMISSION'S *ORDER APPROVING REPS AND REPS EMF RIDERS AND 2012 REPS COMPLIANCE* REQUIRES DUKE ENERGY CAROLINAS TO FILE WITH ITS 2018 REPS RIDER APPLICATION STUDY RESULTS FOR ANY STUDIES THE COSTS OF WHICH IT HAS RECOVERED VIA THE REPS RIDER.

IS THE COMPANY SUPPLYING SUCH STUDIES IN THIS FILING?

A. Yes. The Company's R&D efforts are an integral part of its REPS Compliance efforts. The following summary outlines efforts undertaken by the Company in the test period and specifies the availability of applicable study results.

- CAPER, Short Course Development – In 2018, the Company worked with the Center for Advanced Power Engineering Research ("CAPER"), on a project to develop a short course of "Fundamentals of Power Engineering and Integration of Distributed Energy Resources." This five-week course will provide a comprehensive overview of the fundamentals of power engineering. Topics include three-phase fundamentals, transformers, power flows, power system planning, analysis, protection, dynamics, stability, control, transients, and distributed energy resources and integration into the grid. The course is designed to act as a refresher for the basics and as a brief introduction for more advanced topics for industry professionals who have completed at least a Bachelor of Science degree in Electrical Engineering or have adequate work experience. The course syllabus can be found in Jennings Exhibit No. 5.
- CAPER, Smart Battery Gauge ("SBG") – In 2018, the Company worked with North Carolina State University ("NC State") and

Clemson University, through CAPER, on a project to develop the SBG and to validate the value proposition of the SBG by demonstrating its ability to accurately estimate the State of Charge, State of Health and the Remaining Useful Life in real-time and while the energy storage device is in use. The results of this project can be found in Jennings Confidential Exhibit No. 6. This project is ongoing and is estimated to be completed in 2019.

- Clemson University – Small DG Interface Testing – In 2018, the Company engaged with the eGRID laboratory located at Clemson University on a project to test and validate the function and performance of the Company's small DG interface. A description of the project background can be found in Jennings Confidential Exhibit No. 7.
- Closed Loop Biomass – In 2018, the Company continued to support a closed-loop biomass research project to better understand yield potential for various woody crops, including Loblolly Pine, Hybrid Poplar, Hybrid Aspen, Sweetgum, Willow and Cottonwood trees. American Forest Management ("AFM") provided project management support and periodic updates to the Company. In addition to their regular crop assessments, in 2017 and 2018 AFM collected woody biomass samples from various plots. These were then provided to Mineral Labs so that the lab could perform Ultimate Analysis on each woody biomass sample. Jennings Exhibit No. 8

provides AFM's 2018 Inventory Report, and Jennings Exhibit No. 9 provides the lab results from Mineral Labs. The work on this project concluded in 2018.

- Coalition for Renewable Natural Gas – The Company joined the Coalition for Renewable Natural Gas in 2017, and renewed its membership in 2018, to add a valuable resource of knowledge and public policy advocation in this growing sector of potential animal waste supply. The Coalition for Renewable Natural Gas provides its members with exclusive whitepapers, support on model pipeline gas specifications and access to other members for discussions on current and future projects.
- DER Risks to Transformers and Transmission – In 2018, the Company worked with ABB and Pike Engineering on a project to evaluate the distribution energy resource interconnection impacts to the Transmission to Distribution transformers and the transmission system. The results of this project can be found in Jennings Confidential Exhibit No. 10. The report contains Critical Energy Infrastructure Information as defined by the Federal Energy Regulatory Commission. As such, Exhibit 10 should be treated as strictly confidential.
- Eos Energy Storage Technology Development – The Company and Eos Services started a collaborative technology development program to validate, demonstrate, and quantify the benefits of an

Eos Aurora Battery System that is DC Coupled to a PV facility at the McAlpine Creek Substation 50 kW Solar Facility. The expected completion date of the project is in 2020.

- Electric Power Research Institute ("EPRI") – In 2018, the Company subscribed to the following EPRI programs, the costs of which were recovered via the REPS rider: Program 174 – Integration of Distributed Energy Resources. The company participated in a supplemental project under this program – "Evaluation of Inverter On-Board Detection Methods to Prevent Unintended Islanding." EPRI designates such study results as proprietary or as trade secrets and licenses such results to EPRI members, including Duke Energy Carolinas. As such, the Company may not disclose the information publicly. Non-members may access these studies for a fee. Information regarding access to this information can be found at http://www.epri.com/Pages/Default.aspx.
- ETO - Mitigation of Transformer High Inrush Current – In 2018, the Company started working with multiple vendors on a project to test and evaluate different options to mitigate the transformer high inrush current. Transformers are very expensive components of the electric power system. The transformers installed in the utility scale solar generating facilities are experiencing high inrush current during energization. Transformer inrush currents are short duration currents that flow into the transformer primary every time the

transformer is energized. These currents are typically high magnitude (up to 20 times the nominal current), harmonic currents with some DC component. These high inrush currents can cause numerous problems on the electrical system, such as breaker tripping, voltage sags, voltage flicker, mechanical stress on the transformer windings, oscillatory torque in motors and system resonance. A detailed description of the project can be found in Jennings Confidential Exhibit No. 11. The expected completion date of the project is by the end of 2019.

- NC State University's Future Renewable Electric Energy Delivery and Management ("FREEDM") Systems Center – Duke Energy supports NC State's FREEDM Center through annual membership dues. The FREEDM partnership provides Duke Energy with the ability to influence and focus research on materials, technology, and products that will enable the utility industry to transform the electric grid into a 2-way power flow system supporting distributed generation.
- Institute for Electrical and Electronics Engineers ("IEEE") 1547 Conformity Assessment – The IEEE 1547 Conformity Assessment Steering Committee has been working to develop industry standard tools and methodologies to assure consistent and comprehensive compliance prior to utility grid interconnection sign off. IEEE and the Company share a common goal to accelerate and broaden

industry adoption through the development and publication of well-designed and managed conformity assessment and certification programs. This project was about establishment and execution of an IEEE 1547 Commissioning Test demonstration for solar installations within the eGRID laboratory located at Clemson University. The project formally commissioned the operation of a 50kW inverter and established an operational test bed for more advanced interconnection evaluation. The results of this project can be found in Jennings Confidential Exhibit No. 12.

- Loyd Ray Farms – The Company partnered with Duke University to develop a pilot-scale, sixty-five kW swine waste-to-energy facility, which initiated operation and began producing renewable energy in 2011. Jennings Exhibit No. 13 summarizes the project's progress through December 31, 2018.
- Marshall Solar Site Algorithm – In 2018, the Company continued to work with the University of North Carolina at Charlotte ("UNCC") on a project to utilize the operational data to design and implement an autonomous active and reactive power dispatch algorithm with PV farms and/or Battery Energy Storage system on any feeder considering DMS coordination. The work in 2018 was to develop a battery degradation model that can be seamlessly integrated to a stacked energy storage application controller. The methodology has been tested on a specific battery type and compared with other

battery models. The Phase IV results of this project can be found in Jennings Confidential Exhibit No. 14. The Company is continuing to support the next phase of this project which will be completed in the summer of 2019.

- Mini-DVAR Project – In 2016, the Company started a project to investigate a new technology manufactured by American Superconductor Corporation which makes a device called Mini-DVAR. This device can potentially be used for voltage stability/VAR support for renewable energy applications such as voltage compliance, grid reliability, efficiency, energy savings and grid integration of distributed PV. The project also included engineering design of a protection scheme with Schweitzer Engineering Laboratories, and the procurement of switch gear from ABB. In 2017, the Company completed installation and commissioning of the mini-DVAR to verify it was fully functional. This project continued in 2018 to collect operational data and to analyze its application and benefit in Volt VAR Optimization of the distribution system. The results of this project can be found in Jennings Confidential Exhibit Nos. 15-17.
- NC State University – ETO – Grid-forming Battery Energy Storage System Characterization and Testing – Starting from late 2018, the Company worked with NC State on a project to install and commission a Battery Energy Storage System ("BESS") and to

study the loading capabilities of the BESS operating in grid-forming mode. A BESS may need to power up a microgrid after an outage, thus supplying all of the magnetizing currents to line-start machines as well as isolation transformers in the microgrid. There is a need to understand the capabilities of the state-of-the art BESS inverters to support these loads. Though simulating such behavior is feasible, experimental validation is required to guarantee that the system will operate as expected, and the BESS inverter protection will not trip. The expected completion date of the project is by the end of 2019.

- NC State University – Interactions of PV Installations with Distribution Systems – Starting from late 2018, the Company worked with NC State on a project to construct a testbed and analysis framework for investigating how large PV penetration on a feeder affects the operation of the distribution system. The expected completion date of the project is by the end of 2019.
- PNNL – Dynamic Var Compensator ("DVC") Pilot – In 2018, the Company worked with One-Cycle Control, Inc. and Pacific Northwest National Laboratory ("PNNL") on a project, which is part of DOE SunlAmp Contract: 0000-1714, to install and commission two DVC devices in the Company's distribution system, and to evaluate its performance in mitigating the voltage variability due to high penetration of distributed photovoltaic on a

distribution feeder. A detailed description of the project can be found in Jennings Confidential Exhibit Nos. 18-19.

- Research Triangle Institute – Biogas Utilization in North Carolina – In 2018, the Company began support of the Research Triangle Institute project for the NC Energy Policy Council to determine the potential bioenergy/biogas resources available in NC, and to identify the most beneficial and optimum utilization of resources to maximize economic, environmental and societal advantages. An overview of the project can be found in Jennings Exhibit No. 20.
- Rocky Mountain Institute ("RMI") – The Company participates in eLab, a forum sponsored by RMI, composed of a number of North Carolina and nationally based entities, and organized to overcome barriers to economic deployment of distributed energy resources in the U.S. electric sector. Specifically, the Company seeks to gauge customer desires related to distributed resources and provide ideas of potential long-term solutions for distributed energy resources and microgrids. Please visit RMI's website at http://www.rmi.org/elab for more information on eLab.
- Swine Extrusion/Poultry Mortality – The Animal and Poultry Waste Management Center ("APWMC") at NC State University – In 2018, the Company continued support of the various projects being undertaken by the APWMC. This work is centered around drying swine lagoon solids, bagged lagoon sludge and lagoon sludge mixed

with agricultural wastes at a farm-based level to create a higher MMBtu fuel that can be safely and easily transported to a central plant for combustion. A detailed description of the project along with future testing plans can be found in Jennings Confidential Exhibit No. 21.

- UNCC – Evaluation of DER Fault Scenarios and Mitigation Techniques – In 2018, the Company worked with UNCC on a project to evaluate behavior of inverter-based power sources during fault conditions and make recommendations to enhance protection algorithms to standard vendors of protection and control systems. The results of this project can be found in Jennings Confidential Exhibit No. 22.
- UNCC – Hardware Cyber Security for DER Inverters – In 2018, the Company worked with UNCC on a project to provide hardware assurance in an affordable manner to transition a global supply chain to producing solar inverters with trusted hardware for secure control and communications. In this work, the Company and UNCC investigated the enhancement of security of power grid converters using reconfigurable architecture and hardware-based crypto processors. The results of this project can be found in Jennings Confidential Exhibit No. 23.

Q. ARE YOU SATISFIED THAT THE ACTUAL COSTS INCURRED IN THE TEST PERIOD HAVE BEEN, AND THAT THE

PROJECTED COSTS OF THE BILLING PERIOD WILL BE, PRUDENTLY INCURRED?

A. Yes. Duke Energy Carolinas believes it has incurred and projects to incur all of these costs associated with REPS compliance in a prudent manner. The Company continues to exercise thorough and rigorous technical and economic analysis to evaluate all options for compliance with its REPS requirements. Duke Energy Carolinas has developed strong foundational market knowledge related to renewable resources. The Company continues to enhance and develop expertise in this field through the Company's various solicitations for renewable energy and the operation of its unsolicited bid process, its implementation of the Duke Energy North Carolina Solar PV Distributed Generation Program, its construction of DEC-owned utility-scale solar facilities, its participation in industry research, and daily interaction with developers of renewable energy facilities. As a result of these efforts, the Company has been able to identify, procure, and develop a diverse portfolio of renewable resources to meet its REPS requirements in a prudent, reasonable and cost-effective manner.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes.

(WHEREUPON, Williams Exhibits 2 - 6 and Confidential Exhibits 1 and 7 are marked for identification as prefiled and received into evidence.)

(WHEREUPON, the prefiled direct testimony of VERONICA I. WILLIAMS is copied into the record as if given orally from the stand.)

BEFORE THE NORTH CAROLINA UTILITIES COMMISSION

DOCKET NO. E-7, SUB 1191

In the Matter of	)	
	)	
Application of Duke Energy Carolinas, LLC	)	
for Approval of Renewable Energy and	)	**DIRECT TESTIMONY OF**
Energy Efficiency Portfolio Standard (REPS)	)	**VERONICA I. WILLIAMS**
Compliance Report and Cost Recovery Rider	)	
Pursuant to N.C. Gen. Stat. § 62-133.8 and	)	
Commission Rule R8-67	)	

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Veronica I. Williams, and my business address is 550 South Tryon Street, Charlotte, North Carolina.

Q. PLEASE STATE YOUR POSITION WITH DUKE ENERGY AND DESCRIBE YOUR CURRENT RESPONSIBILITIES.

A. In my capacity as Rates and Regulatory Strategy Manager, I am responsible for providing regulatory support related to retail and wholesale rates, providing guidance on Renewable Energy and Energy Efficiency Portfolio Standard ("REPS") compliance and cost recovery for Duke Energy Carolinas, LLC ("Duke Energy Carolinas," "DEC," or the "Company") and Duke Energy Progress, LLC ("Duke Energy Progress" or "DEP"), and preparing and filing testimony and exhibits in annual DEC and DEP REPS rider proceedings.

Q. PLEASE BRIEFLY SUMMARIZE YOUR EDUCATIONAL BACKGROUND, BUSINESS BACKGROUND AND PROFESSIONAL AFFILIATIONS.

A. I received a Bachelor of Science degree in Business from the University of North Carolina at Charlotte. I am a certified public accountant licensed in the state of North Carolina. I began my career with Duke Power Company ("Duke Power") (now known as Duke Energy Carolinas) as an internal auditor and subsequently worked in various departments in the finance organization. I joined the Rates Department in 2001.

Q. HAVE YOU PREVIOUSLY TESTIFIED BEFORE THE NORTH CAROLINA UTILITIES COMMISSION?

A. Yes. I most recently provided testimony in Docket No. E-2, Sub 1175 regarding Duke Energy Progress' 2017 REPS compliance report and application for approval of its REPS cost recovery rider, and in Docket No. E-7, Sub 1162 regarding Duke Energy Carolinas' 2017 REPS compliance report and application for approval of its REPS cost recovery rider.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. The purpose of my testimony is to describe the calculation of and present the support for the REPS rider proposed by Duke Energy Carolinas under N.C. Gen. Stat. ("G.S.") § 62-133.8 and to present the information and data required by Commission Rule R8-67 as set forth in Williams Exhibit Nos. 1 through 4. The test period used in supplying this information and data is the twelve months beginning on January 1, 2018 and ending on December 31, 2018 ("Test Period" or "EMF Period"), and the billing period for the REPS rider requested in the Company's application is the twelve months beginning on September 1, 2019 and ending on August 31, 2020 ("Billing Period").

Q. PLEASE DESCRIBE THE EXHIBITS TO YOUR TESTIMONY.

A. Williams Confidential Exhibit No. 1 ("Williams Exhibit No. 1") identifies the total REPS compliance costs for which the Company seeks recovery from Duke Energy Carolinas' North Carolina Retail ("NC Retail") customers and from the Company's wholesale customers that receive REPS

compliance services from the Company ("Wholesale"). Williams Confidential Exhibit No. 2 ("Williams Exhibit No. 2") shows the allocation of the total REPS compliance costs, identified in Williams Exhibit No. 1, to the Company's NC Retail customers for the Test Period. Williams Confidential Exhibit No. 3 ("Williams Exhibit No. 3") shows the allocation of the total expected REPS compliance costs, identified on Williams Exhibit No. 1, to the Company's NC Retail customers for the Billing Period. Williams Exhibit No. 4 shows the total REPS rider amounts proposed, including the REPS Experience Modification Factor ("EMF"), by customer class, compared to the cost cap for each customer class. Williams Exhibit No. 5 is the tariff sheet for the proposed REPS Rider. Williams Exhibit No. 6 is a worksheet detailing the Company's energy efficiency certificate ("EEC") inventory balance as of December 31, 2018. Finally, Williams Confidential Exhibit No. 7 ("Williams Exhibit No. 7") is a summary cost recovery worksheet related to the Company's Woodleaf solar facility ("Woodleaf"), recently placed into service.

Q. WERE THESE EXHIBITS PREPARED BY YOU OR AT YOUR DIRECTION AND UNDER YOUR SUPERVISION?

A. Yes.

Q. WHAT COSTS ARE INCLUDED IN DUKE ENERGY CAROLINAS' PROPOSED REPS RIDER?

A. The proposed REPS rider intends to recover Duke Energy Carolinas' incremental costs of compliance with the renewable energy requirements

pursuant to G.S. § 62-133.8. The costs incurred by the Company to comply with its REPS compliance requirements are described comprehensively in the testimony of Company witness Jennings, and detailed in Jennings Confidential Exhibits Nos. 2 and 3, filed in this docket. The costs incurred during the Test Period are presented in this filing to demonstrate their reasonableness and prudency as provided in North Carolina Utilities Commission ("Commission") Rule R8-67(e).

The rider includes the REPS EMF component to recover the difference between the compliance costs incurred and revenues realized during the Test Period. In last year's annual REPS cost recovery proceeding, Docket No. E-7, Sub 1162, DEC filed supplemental testimony and exhibits updating the calendar year 2017 EMF Period to include the months of January through April of 2018, as allowed by Commission Rule R8-67(e)(5). The REPS rider approved by the Commission included the overcollection applicable to the additional four months of January through April of 2018. Accordingly, calendar year 2018 EMF Period costs in this current REPS docket are adjusted to remove the compliance costs for January through April 2018 that were included in the overcollection reflected in the REPS rider approved in Docket No. E-7, Sub 1162. In addition to an EMF component, the current proposed rider includes a component to recover the costs expected to be incurred for the Billing Period.

Q. PLEASE DESCRIBE THE METHODOLOGY DUKE ENERGY CAROLINAS USED TO CALCULATE THE INCREMENTAL COSTS OF COMPLIANCE WITH THE REPS REQUIREMENTS.

A. Company witness Jennings describes the costs Duke Energy Carolinas incurred during the Test Period and the costs the Company projects to incur during the Billing Period to comply with its REPS requirements. G.S. § 62-133.8(h)(1) provides that "incremental costs" means "all reasonable and prudent costs incurred by an electric power supplier" to comply with the REPS requirements "that are in excess of the electric power supplier's avoided costs other than those costs recovered pursuant to G.S. § 62-133.9."

For purchased power agreements with a renewable energy facility, the Company subtracted its avoided cost from the total cost associated with the renewable energy purchase to arrive at the incremental cost for the renewable energy purchase during the period in question. Consistent with Rule R8-67(e)(2), which provides that the cost of an unbundled renewable energy certificate ("REC") "is an incremental cost and has no avoided cost component," the total costs incurred during the Test Period for REC purchases are included in incremental costs. Further, the projected costs for REC purchases during the Billing Period are included as incremental costs.

With respect to the Company's utility-owned solar generating facilities, an annual revenue requirement, including capital and operations and maintenance costs, was calculated for each facility for the period covering the expected service life of the project. The present value of the

total facility revenue requirement was levelized over the asset life to produce a level annual revenue requirement that was compared to avoided cost to determine annual incremental cost subject to cost recovery through the REPS rider. For biogas purchases used to generate renewable energy at the Company's generating stations, the incremental cost is calculated by subtracting the applicable avoided cost from the total biogas cost associated with the MWhs generated. Similar calculations are made to estimate the incremental biogas costs for the prospective Billing Period.

As described in detail by Company witness Jennings in her direct testimony filed in this docket, the REPS EMF and Billing Period components of the proposed REPS rider also include compliance-related incremental administration costs, labor costs, and costs related to research incurred during the 2018 EMF Period and estimated to be incurred during the Billing Period, respectively. Additionally, as further detailed in the testimony of Company witness Jennings, amounts reflecting the amortization of Solar Rebate Program costs incurred pursuant to G.S. § 62-155(f) applicable to the EMF and Billing Periods are included for recovery in the proposed REPS rider.

Q. PLEASE EXPLAIN FURTHER THE CALCULATION OF INCREMENTAL COST RELATED TO THE COMPANY'S SOLAR GENERATING FACILITIES PROPOSED FOR RECOVERY IN ITS REPS RIDER.

A. The revenue requirements for recovery of capital and operating costs for the Duke Energy North Carolina Solar Photovoltaic Distributed Generation

Program ("Duke Energy PV DG Program" or "Solar PVDG Program") are levelized and then reduced by avoided cost to determine incremental cost. The incremental cost for which the Company seeks recovery through the REPS rider is limited, in compliance with the Commission's May 6, 2009 *Order on Reconsideration* in Docket No. E-7, Sub 856 and the Commission's August 23, 2011 *Order Approving REPS and REPS EMF Riders and 2010 REPS Compliance* in Docket No. E-7, Sub 984 ("*2011 REPS Order*").

On May 16, 2016, the Commission issued orders approving the transfers of the certificates of public convenience and necessity to DEC for both the Company's Mocksville solar facility ("Mocksville," Docket No. E-7, Sub 1098) and the Company's Monroe solar facility ("Monroe," Docket No. E-7, Sub 1079). On June 16, 2016, the Commission issued its Order Granting Certificate of Public Convenience and Necessity ("*Woodleaf Order*") in Docket No. E-7, Sub 1101, approving the certificate of public convenience and necessity ("CPCN") for construction of Woodleaf. Collectively, these orders are referred to herein as the "*DEC Solar PV Orders*" and collectively, Mocksville, Monroe, and Woodleaf are referred to herein as the "DEC Solar PV facilities". In its *DEC Solar PV Orders*, the Commission limited cost recovery for the DEC Solar PV facilities through the Company's REPS rider to the equivalent of the standard REC offer price that DEC was offering to new renewable energy facilities at the time the purchase agreements were executed for the facilities. The current

annual levelized total revenue requirement per megawatt hour ("MWh") for each facility, computed based on updated tax benefit assumptions and actual completed or estimated project cost, is greater than the applicable levelized avoided cost per MWh, as was the case when each project was submitted for approval in the applicable CPCN proceeding. Accordingly, the Company is including for cost recovery in this REPS rider only the percentage of annual levelized total cost equivalent to the standard REC offer price as approved by the Commission in its *DEC Solar PV Orders*.

The Company's costs associated with its Solar PVDG Program, Mocksville, and Monroe were reflected in base rates approved in its most recent general rate case in Docket No. E-7, Sub 1146. Adjustments to rate base in the general rate case were made, as necessary, to remove incremental REPS costs associated with the facilities that were being recovered in the REPS rider instead. In the REPS rider currently proposed, the Company is holding the percentage of incremental cost recovered in the REPS rider for each facility constant with the incremental cost percentage for each facility that was excluded from rates approved in Docket No. E-7, Sub 1146. The purpose of this step is to avoid calculating a REPS cost recovery amount for these facilities that includes a portion of cost already currently included in base rates, created by any small difference in the incremental cost percentage recovered in REPS versus the incremental cost percentage excluded from base rates.

Q. WHAT CONDITIONS RELEVANT TO THIS PROCEEDING DID THE COMMISSION INCLUDE IN ITS APPROVAL OF THE CPCN FOR EACH OF THE DEC SOLAR PV FACILITIES?

A. In its *DEC Solar PV Orders*, the Commission included two conditions related to cost recovery for the DEC Solar PV facilities that are relevant to this proceeding. First, the Company agreed to the condition noted above, limiting the cost recovery amount in REPS to the standard offer REC price. The second condition relates to DEC's ability to realize certain tax benefits included in the Company's revenue requirements analysis for each facility as presented during the CPCN proceedings. The condition provides that, in the appropriate REPS rider and general rate case proceedings, DEC will separately itemize the actual monetization of the tax benefits listed in the Commission's orders within its calculation of the levelized revenue requirement per MWh for each facility, so that it may be compared with the monetization of such tax benefits included in the Company's revenue requirement analysis of each facility presented during the CPCN proceedings. To the extent the Company fails to fully realize the tax benefits it originally assumed in its estimated revenue requirements, costs associated with the increased revenue requirements (with a limited exception) will be presumed to be imprudent and unreasonably incurred. The condition further provides that DEC may rebut this presumption with evidence supporting the reasonableness and prudence of its actual monetization of the tax credits.

Q. DID THE COMPANY COMPLY WITH THE TWO CONDITIONS OUTLINED ABOVE IN THE APPROPRIATE REPS RIDER AND GENERAL RATE CASE PROCEEDINGS WITH RESPECT TO ITS MOCKSVILLE SOLAR FACILITY AND ITS MONROE SOLAR FACILITY?

Yes. In the Company's 2017 annual REPS rider filing in Docket No. E-7, Sub 1131 and its 2018 annual REPS rider filing in Docket No. E-7, Sub 1162, the Company updated its original models of estimated annual revenue requirements to reflect its actual experience to date for each of the specified tax-related benefits, and the Company updated its estimates of the timing of realization of the relevant tax benefits in future tax years. In addition, in each docket, the incremental costs from the updated revenue requirement models that were included for recovery in the REPS rider were limited to the percentage of annual levelized total cost equivalent to the standard REC offer price as approved by the Commission in its *DEC Solar PV Orders*.

On August 25, 2017, DEC filed its *Application to Adjust Retail Rates, Request for an Accounting Order and to Consolidate Dockets* in Docket No. E-7, Sub 1146, the Company's only general rate case proceeding since the date of the *DEC Solar PV Orders*. Mocksville and Monroe costs were included (reduced by the percentage of cost recovered in the REPS rider as capped by the Commission in its *DEC Solar PV Orders*) in the revenue requirement calculated and subject to recovery in base rates in the general rate case docket. The Commission issued its June

22, 2018 *Order Accepting Stipulation, Deciding Contested Issues, and Requiring Revenue Reduction* ("2018 Rate Order") in Docket No. E-7, Sub 1146, in which the Commission accepted DEC's conclusion that the facility costs included in its proposed base rates were prudently incurred and approved applicable recovery through base rates. The Company is limiting recovery of costs related to Mocksville and Monroe in its current REPS rider filing to the percentage equivalent to the REC price cap established in the *DEC Solar PV Orders*, and holding that percentage constant with the percentage used to adjust cost of the facilities included in the E-7, Sub 1146 general rate case (as discussed above).

The Company respectfully submits that it has now met in full the cost recovery conditions of the *DEC Solar PV Orders* specific to Mocksville and Monroe, and its compliance requirement has been completed with respect to those facilities.

Q. DISCUSS THE COMPANY'S COMPLIANCE WITH THE TWO CONDITIONS OUTLINED ABOVE IN THE APPROPRIATE REPS RIDER AND GENERAL RATE CASE PROCEEDINGS WITH RESPECT TO ITS WOODLEAF SOLAR FACILITY.

A. As noted in Company witness Jennings' testimony, Woodleaf was placed in service in December 2018. Costs for the facility have not yet been included in a DEC general rate case. As of last year's annual REPS rider filing in Docket No. E-7, Sub 1162, Woodleaf was not yet under construction, and no costs were included in the EMF Period at that time. A

complete analysis of tax benefit assumptions specific to the project was not available, and the Company only included in its prospective Billing Period a forecast of levelized cost limited to the approved avoided cost plus the incremental cost calculated at the cap specified by the Commission in its *DEC Solar PV Orders*.

In this current REPS docket, the Company updated its revenue requirement calculation for Woodleaf to reflect its current assumptions regarding the availability of the following tax benefits listed in the Woodleaf Order, and its estimates of the timing of realizing the tax benefits:

(a) The federal Section 199 deduction;

(b) The federal Investment Tax Credit ("ITC") of 30% of the cost of eligible property;

(c) The five-year Modified Accelerated Cost Recovery System ("MACRS") tax depreciation; and

(d) A property tax abatement of 80% on solar property.

The Company's current assumptions regarding tax benefits continue to reflect Woodleaf qualifying for MACRS tax depreciation, and that it will realize the benefit of 80% property tax abatement on the facility. The assumptions related to realizing the tax benefits of MACRS tax depreciation and 80% property tax abatement are the same as those presented as part of the original Woodleaf CPCN proceeding.

The Federal Tax Cuts and Jobs Act (the "Tax Act") was enacted on December 22, 2017. Among other provisions, it eliminated the federal Section 199 manufacturing deduction. Accordingly, the associated reduction is removed from the composite tax rate utilized in the updated

revenue requirement calculations. Federal ITC benefits were originally assumed to be realized in 2021 for Woodleaf. However, DEC expects to experience a delay in realizing the federal ITC benefits because it anticipates lacking sufficient taxable income against which it can take the tax credit. The Company currently estimates realizing the federal ITC benefits beyond the current forecast window of year 2023. The Company's ability to take federal bonus depreciation related to many of its assets placed in service prior to the bonus depreciation expiration deadline established by the Tax Act, combined with the updated forecast timing of utilization of other tax credits, contribute to the estimated lack of taxable income for utilization of ITC[1].

In addition to the tax benefits discussed above, the Tax Act reduced the corporate federal income tax rate to 21% from 35%, which affects the revenue requirement calculation for Woodleaf as well. The return on equity, debt rate, and capital ratios were also updated in the revenue requirement model to reflect amounts approved according to the 2018 Rate Order.

Q. HOW DOES THE COMPANY INTERPRET THESE RESULTS IN TERMS OF AMOUNTS TO BE RECOVERED THROUGH THE REPS RIDER FOR WOODLEAF?

A. In summary, although DEC expects to experience some delay in realizing the ITC benefit, the accelerated benefits of bonus depreciation to Duke

[1] Woodleaf is not eligible for bonus depreciation based on its construction start date in 2018.

Energy Corporation, and the overall benefit of a lower federal tax rate mitigate the effect of the delay. The tax benefit updates taken together with current general rate case assumption inputs, result in a calculated revenue requirement that is not materially different from that presented during the original Woodleaf CPCN proceeding. Williams Exhibit No. 7 summarizes levelized cost recovery amounts reflecting original assumptions, as well as updated tax monetization estimates, and updated project capital expenditures.

Q. DOES THE COMPANY SEEK RECOVERY OF COSTS FOR THE WOODLEAF SOLAR FACILITY IN ITS PROPOSED REPS RIDER?

A. The Woodleaf facility was placed in service in late December 2018. The Company is electing to update its annual revenue requirement calculation to begin computing a REPS rider recovery amount beginning January 2019, so it included no Woodleaf costs in the EMF Period. The revenue requirement calculation updated for the tax and rate case inputs described above produced a projected incremental cost recovery amount for the Billing Period. In compliance with the conditions included in the Commission's Woodleaf Order, the Company limited the estimated amount included for recovery in the proposed REPS rider to the percentage of annual levelized cost equivalent to the standard offer REC price established in that CPCN proceeding.

Q. HOW DID DUKE ENERGY CAROLINAS DETERMINE THE AVOIDED COST ASSOCIATED WITH REPS COMPLIANCE COSTS?

A. In all cases where Duke Energy Carolinas has determined incremental compliance costs as the excess amount above avoided cost, the Company has applied an avoided cost rate in cents per kilowatt-hour ("kWh") to the expected kWh of renewable energy for each compliance initiative. In determining the avoided costs associated with purchased power agreements, Rule R8-67(a)(2) provides that:

> "Avoided cost rates" mean an electric power supplier's most recently approved or established avoided cost rates in this state, as of the date the contract is executed, for purchases of electricity from qualifying facilities pursuant to Section 210 of the Public Utility Regulatory Policies Act of 1978. If the Commission has approved an avoided cost rate for the electric power supplier for the year when the contract is executed, applicable to contracts of the same nature and duration as the contract between the electric power supplier and the seller, that rate shall be used as the avoided cost. Therefore, for example, for a contract by an electric public utility with a term of 15 years, the avoided cost rate applicable to that contract would be the comparable, Commission-approved, 15-year, long-term, levelized rate in effect at the time the contract was executed. In all other cases, the avoided cost shall be a good faith estimate of the electric power supplier's avoided cost, levelized over the duration of the contract, determined as of the date the contract is executed, taking into consideration the avoided cost rates then in effect as established by the Commission. In any event, when found by the Commission to be appropriate and in the public interest, a good faith estimate of an electric public utility's avoided cost, levelized over the duration of the contract, determined as of the date the contract is executed, may be used in a particular REPS cost recovery proceeding. Determinations of avoided costs, including estimates thereof, shall be subject to continuing

Commission oversight and, if necessary, modification should circumstances so require.

Duke Energy Carolinas' approved avoided cost rates are set forth in its Purchased Power Non-Hydroelectric, Schedule PP-N, Purchased Power Hydroelectric, Schedule PP-H, and Schedule PP rate schedules (collectively "Schedule PP"). For executed purchased power agreements, where the price of the REC and energy are bundled, the Company used annualized combined capacity and energy rates as shown on the Company's Exhibit No. 3, filed in Docket No. E-100, Sub 106; Exhibit No. 3 in Docket No. E-100, Sub 117; Exhibit No. 3 in Docket No. E-100, Sub 127; Exhibit No. 3 in Docket No. E-100, Sub 136; Exhibit No. 3 in Docket No. E-100, Sub 140; or Attachment H in Docket No. E-100, Sub 148 (depending on the execution date of the contract). For those purchased power agreements with terms that did not correspond with the durational terms for which rates were established in the avoided cost proceeding (i.e., two, five, ten, or fifteen year durations), Duke Energy Carolinas computed avoided cost rates for the particular term of the purchased power agreements using the same inputs and methodology used for the Schedule PP rates approved in Docket Nos. E-100, Sub 106, E-100, Sub 117, E-100, Sub 127, E-100, Sub 136, E-100, Sub 140 or E-100, Sub 148, respectively. The avoided cost components of energy and REC purchased power agreements effective during the prospective billing period were estimated in the same manner.

For the Duke Energy Carolinas PVDG Program, the Company determined the avoided cost using a process similar to that described above

for a purchased power agreement with a non-standard duration. The inputs and methodology used for the Schedule PP rates approved in Docket No. E-100, Sub 117 were used to determine the annualized combined capacity and energy rates for a twenty-year term, corresponding to the expected life of the solar facilities. The Company estimated its avoided cost and incremental cost in a similar fashion for its new DEC Solar PV facilities.

Q. DOES DUKE ENERGY CAROLINAS PROVIDE SERVICES TO WHOLESALE CUSTOMERS TO MEET THEIR REPS REQUIREMENTS?

A. Yes. As part of its 2018 REPS Compliance Plan, Duke Energy Carolinas continues to provide services to native load priority wholesale customers that contract with the Company for REPS compliance services, including delivery of renewable energy resources and compliance planning and reporting. These wholesale customers, including distribution cooperatives and municipalities, rely on Duke Energy Carolinas to provide this renewable energy delivery service in accordance with G.S. § 62-133.8(c)(2)e. For REPS compliance year 2018, the Company provided renewable energy resources and compliance reporting services for the following native load priority wholesale customers: Blue Ridge Electric Membership Corporation ("Blue Ridge EMC"), Rutherford Electric Membership Corporation ("Rutherford EMC"), City of Concord, Town of Dallas, Town of Forest City, Town of Highlands, and City of Kings Mountain.

Effective January 1, 2019, the Company's contractual obligation to provide REPS compliance services to City of Concord and City of Kings Mountain ended. These two municipalities are included in DEC's 2018 Compliance Report and share in REPS compliance costs incurred for the calendar year 2018 EMF Period, which are applicable to 2018 REPS compliance requirements.

Q. PLEASE EXPLAIN HOW THE COMPANY ALLOCATES INCREMENTAL REPS COSTS BETWEEN ITS RETAIL CUSTOMERS AND ITS WHOLESALE CUSTOMERS RECEIVING THIS SERVICE.

A. The incremental cost of REPS compliance represents the cost to meet the combined total MWh requirement for native load customers, based on the sum of Duke Energy Carolinas' NC retail sales and Wholesale NC retail sales. To properly allocate incremental costs between Duke Energy Carolinas and its Wholesale customers, the class allocation methodology was performed using a combined aggregate cost cap as shown in Williams Exhibit Nos. 2 and 3 for the EMF Period and the Billing Period, respectively. The class allocation methodology combines the number of accounts subject to a REPS charge by customer class for both Duke Energy NC retail accounts and Wholesale NC retail accounts. In the cases where a Wholesale customer self-supplied a portion of its annual REPS requirement (for example, using its Southeastern Power Administration allocation to partially meet the requirement as provided in G.S. § 62-133.8(c)), or where

the Company met its compliance requirement by reduced energy consumption through implementation of energy efficiency ("EE") measures, the combined total number of accounts on which the cost allocation is based was adjusted on a pro-rata basis. This adjustment recognizes that a portion of the compliance requirement was not supplied by RECs generated or acquired by Duke Energy Carolinas as part of the combined total requirements. The adjusted totals by class were multiplied by the per-account cost caps to determine the combined total cost cap dollar amounts by customer class and in total. Each customer class is allocated its share of the incremental costs based on its pro-rata share of the customer cost cap dollar amounts. The cost allocated to each customer class is divided by the total adjusted number of accounts within each customer class to arrive at an annual per-account charge. The annual per-account charge for each customer class is multiplied by the Company's NC Retail adjusted number of accounts within each customer class and totaled to arrive at the incremental cost to be allocated to Duke Energy Carolinas' NC Retail customers.

Q. PLEASE ALSO DESCRIBE HOW DUKE ENERGY CAROLINAS ALLOCATES ITS EE SAVINGS AMONG ITS CUSTOMER CLASSES FOR REPS AND REPS EMF RIDER PURPOSES.

A. Incremental costs assigned to Duke Energy Carolinas' NC Retail customers are separated into two categories: costs related to solar, poultry and swine compliance requirements, and research, other incremental and Solar Rebate

Program costs ("Set-Aside and Other Incremental Costs"); and costs related to the General Requirement[2] ("General Incremental Costs"). This separation is based on the percentage of Set-Aside and Other Incremental Costs and General Incremental Costs calculated on Williams Exhibit No. 1.

Set-Aside and Other Incremental Costs are allocated among customer classes based on per-account cost caps. General Incremental Costs are allocated among customer classes in a manner that gives credit for EE RECs (for which there are no General Incremental Costs) according to the relative energy reduction contributed by each customer class. As a result, General Incremental Costs are allocated among customer classes based on each class' pro-rata share of requirements for non-EE general RECs. The calculations for allocating General Incremental Costs are updated to reflect the modifications recommended by the Public Staff, and accepted by the Commission in its November 17, 2017 *Order Approving REPS and REPS EMF Rider and Approving REPS Compliance Report*, in DEP's 2017 REPS rider filing in Docket No. E-2, Sub 1144. The Company notes that any deviation from allocating costs according to the statutory per-account cost cap ratios creates the potential for the resulting charges computed for one or more classes to exceed the per-account cost cap(s). If that occurs, the Company would continue to reallocate the costs in excess of the cap for the affected customer class to the other customer classes to

[2] The Company generally refers to the "General Requirement" as its overall REPS requirement, set forth in G.S. § 62-133.8(b), net of the three set-asides.

the extent required to produce charges for all classes that do not exceed the respective caps.

Q. PLEASE DESCRIBE HOW DUKE ENERGY CAROLINAS CALCULATED THE PROJECTED PORTION OF THE REPS RIDER THAT THE COMPANY PROPOSES FOR THE BILLING PERIOD.

A. Using the allocation methods described above, and as shown on Williams Exhibit No. 3, the Set-Aside and Other Incremental Costs and the General Incremental Costs are calculated by customer class for the Company's NC Retail customers. The Set-Aside and Other Incremental Costs and General Incremental Costs are summed for the Billing Period by customer class to arrive at a total REPS cost to be collected from the Company's NC Retail customers. On Williams Exhibit No. 4, the cost allocated to each customer class is then divided by the total projected number of Duke Energy Carolinas NC Retail accounts within each customer class to arrive at the total annual cost to be recovered from each account over the Billing Period. The monthly NC Retail REPS rider for each customer class is one-twelfth of the total annual cost.

Q. PLEASE EXPLAIN THE CALCULATION OF THE PROPOSED REPS EMF.

A. Using the allocation methods described above, and as shown on Williams Exhibit No. 2, the Set-Aside and Other Incremental Costs and the General Incremental Costs are calculated by customer class for the Company's NC

Retail customers. The Set-Aside and Other Incremental Costs and General Incremental Costs are summed for the Test Period by customer class to illustrate the total REPS costs assigned to the Company's NC Retail customers. The actual NC Retail revenues realized during the Test Period by customer class are then subtracted from the total REPS costs by customer class to arrive at the EMF for each class. As described above, Test Period costs were adjusted to exclude costs incurred for January through April 2018, that were included in the updated EMF period in the REPS rider filed in Docket No, E-7, Sub 1162. Likewise, the REPS revenues realized for the Test Period were adjusted to remove revenues collected in January through April 2018 to calculate the EMF under- or over-collection by class. On Williams Exhibit No. 4, the total EMF over/under collection to be recovered from each customer class is adjusted to include any credits to customers not considered a refund of amounts advanced by customers, and then divided by the total projected number of Duke Energy Carolinas' NC Retail accounts within each customer class to arrive at the total EMF to be recovered from each account over the Billing Period. The monthly EMF for each customer class is one-twelfth of the total EMF.

Q. HOW DOES DUKE ENERGY CAROLINAS DEFINE A CUSTOMER ACCOUNT FOR PURPOSES OF REPS BILLING?

A. In its December 15, 2010 *Order Approving REPS Riders*, in Docket No. E-7, Sub 872, the Commission approved Duke Energy Carolinas' proposed method of determining the number of customer accounts. The Company

defines "account" as an "agreement" or "tariff rate" between Duke Energy Carolinas and a customer to determine the per-account REPS charge with certain exceptions, which are listed below. The following service schedules are not considered accounts for purposes of the per-account charge because of the near certainty that customers served under these schedules already will pay a per-account charge under another residential, general service, or industrial service agreement and because they represent small auxiliary service loads. The following agreements fall within this exception:

- Outdoor Lighting Service (Schedule OL)
- Floodlighting Service (Schedule FL and FL-N)
- Street and Public Lighting Service (Schedule PL)
- Yard Lighting (Schedule YL)
- Governmental Lighting (Schedule GL)
- Nonstandard Lighting (Schedule NL)
- Off-Peak Water Heating (Schedule WC is a sub-metered service)
- Non-demand metered, nonresidential service, provided on Schedule SGS, at the same premises, with the same service address, and with the same account name as an agreement for which a monthly REPS charge has been applied.

Within Wholesale, Blue Ridge EMC, Rutherford EMC, Town of Forest City, and City of Concord have a methodology for determining Wholesale year-end number of accounts that is generally consistent with that used by Duke Energy Carolinas. The modifications and exclusions are similarly intended to avoid charging customers twice, as in the case of customers with additional lighting accounts, or to exclude small auxiliary service loads. Town of Highlands, Town of Dallas, and City of Kings Mountain define an account in the manner the information is reported to the

Energy Information Administration for annual electric sales and revenue reporting.

Q. DOES DUKE ENERGY CAROLINAS PROJECT THE REPS CHARGE TO EACH CUSTOMER ACCOUNT FOR THE BILLING PERIOD TO BE WITHIN THE ANNUAL COST CAPS DEFINED IN G.S. § 62-133.8?

A. Yes. In NC House Bill 589, the General Assembly revised G.S. § 62-133.8(h)(4) to lower the annual cost cap for the Residential customer class from $34.00 to $27.00 in years subsequent to 2014, for cost recovery proceedings initiated on or after July 1, 2017. Accordingly, the Company has applied that revision to the cost caps in this cost recovery proceeding. As shown in Williams Exhibit No. 4, the annual charges for each customer class are below the per-account caps defined in G.S. § 62-133.8(h)(4).

Q. HOW DOES DUKE ENERGY CAROLINAS PROPOSE TO COLLECT THE REPS CHARGES FROM EACH CUSTOMER CLASS?

A. Duke Energy Carolinas proposed Renewable Energy Portfolio Standard Rider ("REPS-NC") is attached as Williams Exhibit No. 5. As shown on the rider, Duke Energy Carolinas proposes that a fixed monthly charge be added to the bill for each class of customer.

Q. WHAT IS THE MONTHLY REPS CHARGE PROPOSED BY THE COMPANY FOR EACH CUSTOMER CLASS?

A. The Company proposes the following monthly REPS charges to be effective September 1, 2018.

Customer class	Per Month – excluding regulatory fee	Per Month – including regulatory fee	Total annual REPS charge – including regulatory fee	Annual per-account cost cap
Residential	$ 0.87	$ 0.87	$ 10.44	$ 27.00
General	$ 4.64	$ 4.65	$ 55.80	$ 150.00
Industrial	$ 21.28	$ 21.31	$ 255.72	$ 1,000.00

Q. WHAT IS THE MONTHLY CHANGE IN REPS CHARGE PROPOSED BY THE COMPANY FOR EACH CUSTOMER CLASS?

Excluding the regulatory fee, the following table shows the EMF and rider components of the proposed rider and the currently-effective riders established in Docket No. E-7, Sub 1162:

	Proposed			*Current*			*Change*		
Customer class	EMF	Rider	Total	EMF	Rider	Total	EMF	Rider	Total
Residential	**$(0.07)**	**$0.94**	**$0.87**	$(0.67)	$0.74	$0.07	$0.60	$0.20	$0.80
General	**$(0.18)**	**$4.82**	**$4.64**	$(2.79)	$3.82	$1.03	$2.61	$1.00	$3.61
Industrial	**$ 0.75**	**$20.53**	**$21.28**	$(19.04)	$12.61	$(6.43)	$19.79	$7.92	$27.71

Q. PLEASE DESCRIBE THE EEC INVENTORY DETAILS PRESENTED IN WILLIAMS EXHIBIT NO. 6.

A. Williams Exhibit No. 6 shows a reconciliation of the Company's EEC inventory balance available for REPS compliance as of December 31, 2018, as well as references to the evaluation, measurement and verification ("EM&V") reports the results of which are incorporated into current EEC

balances. The Company annually determines the level of EECs generated and available for REPS compliance, and this update includes the results of any periodic EM&V performed to-date, adjustments identified during the Company's ongoing analysis of energy efficiency program effectiveness, as well as any other corrections. The updated cumulative level of EECs generated to date is compared to the number of EECs previously reported for compliance, less any EECs used for compliance, to determine the EECs to be added to inventory for the most recent calendar year. Williams Exhibit No. 6 shows the calculation for EECs added to inventory for 2018, including details of the adjustments incorporated therein.

Q. DOES THE COMPANY CONTINUE TO INCORPORATE THE COMMISSION'S ORDER ADDRESSING THE DURATION OF ENERGY EFFICIENCY SAVINGS AS CALCULATED FOR REPS COMPLIANCE PURPOSES?

A. Yes. In its January 17, 2017 *Order Approving REPS and REPS EMF Rider and REPS Compliance Report* ("DEP REPS Order") in the Duke Energy Progress REPS Docket No. E-2, Sub 1109, the Commission directed DEP to limit its continued recognition of EE savings initiated in a particular EE program year to the life of the measure or program as established in DEP's energy efficiency rider proceedings held pursuant to G.S. § 62-133.9. Consistent with that Order, in this rider filing DEC also continues to calculate EE savings only for the duration of the established measure life of each program or measure.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes.

(WHEREUPON, the prefiled rebuttal testimony of TRAVIS E. PAYNE is copied into the record as if given orally from the stand.)

BEFORE THE NORTH CAROLINA UTILITIES COMMISSION

DOCKET NO. E-7, SUB 1191

In the Matter of	)	
	)	
Application of Duke Energy Carolinas, LLC	)	
for Approval of Renewable Energy and	)	**REBUTTAL TESTIMONY**
Energy Efficiency Portfolio Standard (REPS)	)	**OF TRAVIS E. PAYNE**
Compliance Report and Cost Recovery Rider	)	
Pursuant to N.C. Gen. Stat. 62-133.8 and	)	
Commission Rule R8-67	)	

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Travis E. Payne, and my business address is 410 South Wilmington Street, Raleigh, North Carolina.

Q. PLEASE STATE YOUR POSITION WITH DUKE ENERGY AND DESCRIBE YOUR CURRENT RESPONSIBILITIES.

A. In my capacity as Business Development Manager II, I am responsible for the origination and execution of wholesale and renewable energy compliance transactions for Duke Energy Carolinas, LLC ("Duke Energy Carolinas," "DEC" or "the Company"), Duke Energy Progress, LLC ("Duke Energy Progress") and other Duke Energy jurisdictions as the need arises. My responsibilities include projects related to compliance with the renewable energy and energy efficiency portfolio standard ("REPS") requirements and renewable generation coordination for Duke Energy's Wholesale customers.

Q. PLEASE BRIEFLY SUMMARIZE YOUR EDUCATIONAL BACKGROUND.

A. I received a Bachelor of Science degree in Financial Management from the University of North Carolina at Charlotte and a Masters of Business Administration from the University of Florida.

Q. PLEASE DESCRIBE YOUR BUSINESS BACKGROUND AND EXPERIENCE.

A. I joined Progress Energy, Inc. in 2007, where I held positions in the Fuels and System Operations department. Following the merger of Progress

Energy, Inc. with Duke Energy Corporation, I worked in the same organization as a Natural Gas Trader until September of 2013, when I moved to the Renewables and Distributed Energy Technology organization. Since the move, I have held roles as a Renewable Analytics Manager, the Renewable Compliance Manager and my current position as a Business Development Manager.

Q. HAVE YOU PREVIOUSLY TESTIFIED BEFORE THE NORTH CAROLINA UTILITIES COMMISSION?

A. Yes, I most recently provided testimony in Docket No. E-7, Sub 1131 on DEC's 2016 REPS compliance report and application for approval of its REPS cost recovery rider.

Q. WHAT IS THE PURPOSE OF YOUR REBUTTAL TESTIMONY?

A. The purpose of my testimony is to respond to the testimony of Public Staff witness Michelle M. Boswell and comment on a portion of the testimony of Public Staff witness Evan D. Lawrence.

Q. DO YOU AGREE WITH ANY OF THE RECOMMENDATIONS SET FORTH BY MICHELLE M. BOSWELL IN HER PREFILED TESTIMONY?

A. The Company agrees with witness Boswell's testimony starting on page 6 wherein she recommends that the REC prices and the regulatory treatment of RECs by the Commission should be further evaluated by the Company and the Public Staff. The Company commits to working with the Public Staff over the next year to evaluate the sale price of the set-aside RECs the

Company sells to other electric suppliers. The Company further agrees to work with the Public Staff on the five considerations set forth in witness Boswell's testimony beginning on line 13 of page 10 and continuing through line 9 on page 11. The Company commits to address these issues in direct testimony in the Company's 2020 REPS cost recovery proceeding.

Q. DO YOU TAKE ISSUE WITH PORTIONS OF PUBLIC STAFF WITNESS LAWRENCE'S TESTIMONY? AND IF YES, PLEASE STATE YOUR DIFFERENCES.

A. Yes, as set forth beginning on page 5 of his testimony, witness Lawrence does not believe that all of the costs DEC has included in this proceeding qualify as research costs under N.C. Gen. Stat. § 62-133.8(h)(b). Witness Lawrence does not believe that the costs associated with the "CAPER, Short Course Development" as described in DEC witness Megan Jennings' testimony qualifies as research, nor as incremental cost to be recovered in this REPS proceeding. The Company believes that the costs associated with this program are appropriately recoverable as research costs, however, the Company has decided that it will not contest or object to witness Lawrence's recommendation that they are not to be recovered in this proceeding. The Company believes that courses such as the "CAPER, Short Course Development" course are intended to train in the improved understanding of power systems operations and planning for those working in this field. Finally, I do disagree with witness Lawrence's testimony that CPRE costs cannot be recovered through REPS proceedings, but this is not

an issue that needs to be decided in this proceeding as there are no CPRE costs in the Company's filing.

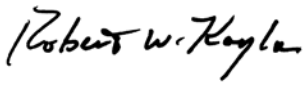
Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes.

CERTIFICATE OF SERVICE

The undersigned hereby certifies that a copy of Duke Energy Carolinas, LLC's Rebuttal Testimony of Travis E. Payne in Docket No. E-7, Sub 1191, has been served by electronic mail (e-mail), hand delivery or by depositing a copy in the United States Mail, first class postage prepaid, properly addressed to the parties of record.

This, the 30th day of May, 2019.



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ATTORNEY FOR DUKE ENERGY CAROLINAS, LLC

(WHEREUPON, Confidential Boswell Exhibit 1 is marked for identification as prefiled and received into evidence.)

(WHEREUPON, the prefiled direct testimony and Appendix A of MICHELLE M. BOSWELL is copied into the record as if given orally from the stand.)

PUBLIC

BEFORE THE NORTH CAROLINA UTILITIES COMMISSION

DOCKET NO. E-7, SUB 1191

Testimony of Michelle M. Boswell

On Behalf of the Public Staff

North Carolina Utilities Commission

May 20, 2019

Q. PLEASE STATE YOUR NAME AND ADDRESS FOR THE RECORD.

A. My name is Michelle M. Boswell. My business address is 430 North Salisbury Street, Raleigh, North Carolina.

Q. WHAT IS YOUR POSITION WITH THE PUBLIC STAFF?

A. I am an accountant in the Accounting Division of the Public Staff - North Carolina Utilities Commission.

Q. WOULD YOU BRIEFLY DISCUSS YOUR EDUCATION AND EXPERIENCE?

A. Yes. My education and experience are summarized in Appendix A to my testimony.

Q. WHAT ARE YOUR DUTIES?

A. I am responsible for the performance of the following activities: (1) the examination and analysis of testimony, exhibits, books and records, and other data presented by utilities and other parties

involved in Commission proceedings; and (2) the preparation and presentation to the Commission of testimony, exhibits, and other documents in those proceedings. I have the further responsibility of supervising the examination and analysis of testimony, exhibits, books and records, and other data presented by electric utilities in Commission proceedings.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. The purpose of my testimony is to make a recommendation regarding the results of the Public Staff's investigation of the Renewable and Energy Efficiency Portfolio Standard (REPS) Experience Modification Factor (EMF) rider, proposed by Duke Energy Carolinas, LLC (DEC or the Company) in its application and testimony filed on February 26, 2019, in this proceeding. The REPS EMF is based on the difference between incremental REPS compliance costs incurred and REPS rider revenues billed from January through December 2018 (REPS EMF period or test period). The REPS EMF is utilized to "true-up" the recovery of reasonable and prudently incurred incremental REPS compliance costs incurred during the test period.

Q. PLEASE EXPLAIN THE REPS EMF RIDER BEING PROPOSED BY DEC IN THIS PROCEEDING.

A. On February 26, 2019, DEC filed its application and testimony related to the incremental costs incurred for compliance with the REPS. Williams Exhibit No. 4 indicates that DEC over-recovered its incremental REPS compliance costs for the test period by $(1,471,965) for the residential class, $(527,194) for the general service class, and under-recovered its REPS compliance costs for the test period by $42,828 for the industrial class. These amounts, when divided by the number of customer accounts in each class, produce proposed annual North Carolina retail REPS EMF decrements of $(0.84) and $(2.14) for residential and general customers, respectively, and a proposed EMF annual increment of $9.00 for industrial customers. On a monthly basis, the proposed North Carolina retail REPS EMF decrement riders are $(0.07) and $(0.18) for residential and general customers, respectively, and a monthly increment of $0.75 for industrial customers, per customer account. All of these values exclude the North Carolina regulatory fee.

Q. PLEASE DESCRIBE THE PUBLIC STAFF'S INVESTIGATION OF THE REPS EMF INCREMENT RIDERS.

A. The Public Staff's investigation included procedures intended to evaluate whether the Company properly determined its per book incremental compliance costs for the test period ended December

31, 2018. These procedures included a review of the Company's filing and other Company data provided to the Public Staff. Additionally, the procedures included a review of certain specific types of expenditures impacting the Company's costs. Performing the Public Staff's investigation required the review of numerous responses to written and verbal data requests, along with conference calls with Company personnel.

Q. DID THE PUBLIC STAFF'S INVESTIGATION IDENTIFY ANY ISSUES THAT RESULTED IN ADJUSTMENTS TO DEC'S PROPOSED EMF INCREMENT RIDERS?

A. Yes, we identified an issue in our investigation that resulted in an adjustment to DEC's proposed EMF Increment Rider. The adjustment relates to a specific expenditure DEC sought to recover as a research cost pursuant to N.C. Gen. Stat. § 62-133.8(h)(1), as discussed in greater detail in the testimony of Public Staff witness Evan Lawrence. Consistent with witness Lawrence's recommendation, I am recommending that the EMF increment riders be adjusted to remove the research cost in question from the EMF incremental costs, as shown in Boswell Exhibit 1.

Q. BASED ON THE PUBLIC STAFF'S ADJUSTMENT, WHAT REPS EMF INCREMENT/(DECREMENT) RIDERS ARE THE PUBLIC STAFF RECOMMENDING?

A. As a result of the Public Staff's investigation, I am recommending annual North Carolina retail REPS EMF increment/(decrement) riders of $(0.85), $(2.20), and $8.57, per customer account, for DEC's residential, general service, and industrial customers, respectively, excluding the North Carolina regulatory fee. The corresponding monthly rider amounts are $(0.07), $(0.18), and $0.71, per customer account.

Q. DOES THE PUBLIC STAFF HAVE ANY RECOMMENDATIONS REGARDING DEC'S PROPOSED EMF RIDERS THAT DO NOT RESULT IN AN ADJUSTMENT TO THE RIDERS AT THIS TIME?

A. Yes. The Public Staff also reviewed the sale prices used by DEC when it sells RECs to other electric power suppliers to help them achieve compliance with the specific carveouts or "set-aside" amounts in N.C. Gen. Stat. § 62-133.8(e) and (f), which require a portion of each electric power suppliers' REPS compliance obligations to be met using renewable energy resources from swine and poultry waste resources ("swine and poultry waste set-asides"), and how this sale price should be treated for purposes of determining the REPS rider. After its review and discussions with

the Company, the Public Staff recommends that the Company and the Public Staff work together over the next year to review and evaluate the sale price of set-aside RECS sold by DEC to other electric power suppliers to aid in their REPS compliance efforts.

Q. PLEASE DESCRIBE WHY THE PUBLIC STAFF RECOMMENDS THAT THESE REC PRICES AND THEIR REGULATORY TREATMENT BE FURTHER EVALUATED.

A. As the Commission is aware, the swine and poultry waste set-asides have been difficult for the electric power suppliers to achieve, and the requirements have been delayed or modified on several occasions by the Commission pursuant to its authority in N.C. Gen. Stat. § 62-133.8(i)(2). Since 2014, the electric power suppliers have been able to meet lower set-aside requirements for poultry waste resources partially because DEC[1] periodically sold a portion of the poultry RECs it originally acquired for its own REPS compliance needs to other electric power suppliers that would not otherwise be in a position to comply.[2] The Public Staff has generally been supportive of these efforts by DEC to help all electric power suppliers meet these statutory requirements.

[1] This discussion also equally applies to Duke Energy Progress, LLC (DEP), but for the purposes of this proceeding, my testimony will only refer to DEC.

[2] The Public Staff does not believe that DEC has sold any swine waste RECs to other electric power suppliers at this time for REPS compliance, but the same concerns raised regarding the price of poultry waste RECs may also equally apply to swine waste RECs in future years.

Historically, DEC has calculated the price for the sale of poultry RECs to other North Carolina electric power suppliers based on **[BEGIN CONFIDENTIAL]** [redacted]. **[END CONFIDENTIAL]** This methodology has been accepted in previous REPS filings before the Commission. The use **[BEGIN CONFIDENTIAL]** [redacted]. **[END CONFIDENTIAL]** In the present case, however, DEC **[BEGIN CONFIDENTIAL]** [redacted]. **[END CONFIDENTIAL]**

The Public Staff disagrees with DEC regarding this assumption. **[BEGIN CONFIDENTIAL]** [redacted]

[redacted]. **[END CONFIDENTIAL]**

The Public Staff recognizes there are some **[BEGIN CONFIDENTIAL]** [redacted]

[redacted]. **[END CONFIDENTIAL]** The Public Staff also recognizes that DEC is not required to sell RECs to other North Carolina electric power suppliers to help them comply with the REPS requirements. Given all these factors, the Public Staff believes it is in the best interest of all parties if this issue is held open so that the Company and Public Staff can work together to determine what, if any adjustments should be made to the current sale price calculation to address the concerns described later in my testimony.

Q. PLEASE EXPLAIN YOUR RECOMMENDATION REGARDING THE SALE PRICE OF RECS.

A. First, as a result of this issue, I recommend that the ultimate ratemaking treatment of **[BEGIN CONFIDENTIAL]** [redacted], **[END CONFIDENTIAL]** collected by DEC in the EMF period from the sale of poultry RECs be held in abeyance. DEC sold these RECs to other electric power suppliers to help them reach the statewide poultry waste set-aside for 2018. The Public Staff recommends that the abeyance continue until the determination of the appropriate REC price is resolved, at which

point the proceeds can be assigned or allocated consistent with the treatment deemed appropriate for those items. The 2018 poultry waste set-aside requirement was modified by the Commission in its October 8, 2018, *Order Modifying the Swine and Poultry Waste Set-Aside Requirements and Providing Other Relief* in Docket No. E-100, Sub 113.

Second, in determining the appropriate sales price of the set-aside RECs sold by DEC, I recommend that the Company and the Public Staff work together over the next year to review and evaluate whether the sale price of set-aside RECS sold by DEC should include the following considerations, and if so, how each should be determined:

(1) overhead costs associated with obtaining the REC and subsequent sale of the REC;

(2) an amount to mitigate the interest DEC may pay ratepayers on any REPS EMF overcollection that results from the sale of set-aside RECs;

(3) an amount to ensure that DEC's customers do not bear any risk of REC contracts not materializing or resulting in lower quantities of RECs being generated;

(4) an amount to provide a price signal to other electric power suppliers to encourage them to continue to participate in the development of swine and poultry waste-to-energy resources without relying solely on DEC to provide the needed set-aside RECs; and

(5) an amount to encourage DEC to sell RECs, when available, to other North Carolina electric power suppliers for the purpose of assisting with their compliance with the REPS requirements.

Finally, I recommend that DEC address the issue of the sales prices of RECs and any resolution of these issues in its direct testimony in its next REPS cost-recovery proceeding.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes, it does.

PUBLIC
Appendix A

MICHELLE M. BOSWELL

Qualifications and Experience

I graduated from North Carolina State University in 2000 with a Bachelor of Science degree in Accounting. I am a Certified Public Accountant.

I joined the Public Staff in September 2000. I have performed numerous audits and/or presented testimony and exhibits before the Commission addressing a wide range of electric, natural gas, and water topics. I have performed audits and/or presented testimony in DEC's 2010, 2015, and 2017 REPS Cost Recovery Rider; DEP's 2014, 2015, 2017, and 2018 REPS Cost Recovery Rider; the 2014 REPS Cost Recovery Rider for Dominion North Carolina Power (DNCP); the 2008 REPS Compliance Reports for North Carolina Municipal Power Agency 1, North Carolina Eastern Municipal Power Agency, GreenCo Solutions, Inc., and EnergyUnited Electric Membership; four recent Piedmont rate cases, PSNC's 2016 rate case, DNCP's 2012 rate case, DEP's 2013 and 2017 rate case, DEC's 2017 rate case, the 2018 fuel rider for Dominion Energy North Carolina, , several Piedmont, NUI, and Toccoa annual gas cost reviews; Piedmont and NUI's merger; and Piedmont and NCNG's merger.

Additionally, I have filed testimony and exhibits in numerous water rate cases and performed investigations addressing a wide range of topics and issues related to the water, electric, and telephone industries.

(WHEREUPON, the prefiled direct testimony and Appendix A of EVAN D. LAWRENCE is copied into the record as if given orally from the stand.)

BEFORE THE NORTH CAROLINA UTILITIES COMMISSION
DOCKET NO. E-7, SUB 1191

Testimony of Evan D. Lawrence
On Behalf of the Public Staff
North Carolina Utilities Commission

May 20, 2019

Q. PLEASE STATE YOUR NAME AND ADDRESS FOR THE RECORD.

A. My name is Evan D. Lawrence. My business address is 430 North Salisbury Street, Raleigh, North Carolina.

Q. WHAT IS YOUR POSITION WITH THE PUBLIC STAFF?

A. I am an engineer in the Electric Division of the Public Staff.

Q. WOULD YOU BRIEFLY DISCUSS YOUR EDUCATION AND EXPERIENCE?

A. Yes. My education and experience are summarized in Appendix A to my testimony.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. The purpose of my testimony is to make recommendations to the Commission on the Renewable Energy and Energy Efficiency Portfolio Standard (REPS) Compliance Report and the Application for Approval of the REPS Cost Recovery Rider filed by Duke Energy

Carolinas, LLC (DEC, or the Company), on February 26, 2019. I also make recommendations on DEC's "Other Incremental Costs" (costs other than the costs of purchased renewable energy and renewable energy certificates (RECs)), specifically, DEC's proposed research costs.

REPS Compliance

Q. IS DEC PROVIDING REPS COMPLIANCE SERVICES TO ANY OTHER ELECTRIC POWER SUPPLIERS?

A. Yes. For 2018 REPS compliance, DEC was contractually obligated to acquire RECs and provide reporting services to meet the REPS compliance requirements of the following wholesale customers: Blue Ridge Electric Membership Corporation, Rutherford Electric Membership Corporation, City of Concord, Town of Dallas, Town of Forest City, Town of Highlands, and City of Kings Mountain (collectively, Wholesale Customers). DEC's contractual obligations to provide REPS compliance services to the City of Concord and the City of Kings Mountain ended on December 31, 2018. DEC maintains separate accounts in the North Carolina Renewable Energy Tracking System (NC-RETS) for itself and for each Wholesale Customer. Commission Rule R8-67(h)(2) requires that all

RECs used for REPS compliance in North Carolina be tracked in NC-RETS.

The REPS compliance costs for the Wholesale Customers are not included in DEP's requested REPS cost recovery rider.

Q. PLEASE DESCRIBE THE 2018 REPS COMPLIANCE REQUIREMENTS FOR DEC AND ITS WHOLESALE CUSTOMERS.

A. For 2018 compliance, DEC needed to obtain a sufficient number of general RECs,[1] energy efficiency certificates (EECs), and RECs derived from other eligible sources so that the total equaled 10% of the 2017 North Carolina retail electricity sales of itself and the Wholesale Customers. Additionally, DEC needed to pursue retirement of sufficient solar RECs to match 0.2% of retail sales in 2017 for itself and the Wholesale Customers, sufficient swine waste derived RECs to match 0.02% of retail sales in 2017 for itself only, and sufficient poultry waste RECs to match their pro-rata share of the poultry waste set-aside of 300,000 MWh required by N.C. Gen. Stat. § 62-133.8(f), as modified by the Commission's October 8,

[1] General RECs include all RECs other than those used to meet the solar, swine waste, and poultry waste set-asides. Unlike RECs used for the set-asides, general RECs and EECs are interchangeable for REPS compliance purposes, with the exception that EECs are limited to 25 percent of the total compliance requirement for the investor-owned utilities.

2018, *Order Modifying the Swine and Poultry Waste Set-Aside Requirements and Providing Other Relief* in Docket No. E-100, Sub 113. The October 8 Order modified the swine waste REC requirement under N.C. Gen. Stat. § 62-133.8(e) to lower the 2018 compliance requirement to 0.02% of 2017 sales for the investor-owned utilities (IOUs) only.

Q. HAVE YOU REVIEWED THE REPS COMPLIANCE REPORT?

A. Yes. DEC's REPS Compliance Report is included as Exhibit 1 to the testimony of DEC witness Megan Jennings. Based on its review, the Public Staff has determined that DEC's REPS Compliance Report meets the requirements of N.C. Gen. Stat. § 62-133.8 and Commission Rule R8-67(c) for both DEC and the Wholesale Customers. Accordingly, the Public Staff recommends that the Commission approve DEC's 2018 REPS Compliance Report.

Research Costs

Q. PLEASE DISCUSS THE RESEARCH COSTS DEC HAS INCLUDED FOR COST RECOVERY.

A. On pages 30 through 40 of her testimony, DEC witness Megan Jennings summarizes the results of the 23 research expenditures for which DEC is seeking cost recovery in this proceeding. The research

costs included total $938,393 which is below the $1,000,000 maximum annual amount allowed, as specified in N.C. Gen. Stat. § 62-133.8(h)(1)(b). The included projects generally deal with operation of distributed energy resources (DERs) and advancing the understanding of optimal ways to integrate DERs into the power grid. Also included are fees for membership in research organizations.

Q. DO YOU BELIEVE THAT ALL OF THE COSTS DEC HAS INCLUDED QUALIFY AS RESEARCH COSTS UNDER N.C. GEN. STAT. § 62-133.8(h)(1)(b)?

A. No. N.C. Gen. Stat. § 62-133.8(h)(1)(b) states that a public electric utility may recover costs that "[f]und research that encourages the development of renewable energy, energy efficiency, or improved air quality, provided those costs do not exceed one million dollars ($1,000,000) per year." The Public Staff does not believe that the "CAPER, Short Course Development" described in DEC witness Megan Jennings testimony beginning on page 31, line 7, with the course syllabus included as Jennings Exhibit No. 5, qualifies as research, nor as an incremental cost to be recovered within REPS.

Q. PLEASE EXPLAIN THE PUBLIC STAFF'S UNDERSTANDING OF THE COURSE AND RELATED COSTS.

A. It is the Public Staff's understanding that the costs associated with this course are related to the development of the course and not for any course materials or registration fees. According to witness Jennings, the course, titled "Fundamentals of Power Engineering and Integration of Distributed Energy Resources," is designed to cover topics such as three-phase fundamentals, transformers, power flows, power system planning, analysis, protection, dynamics, stability, control, transients, and integration into the grid of distributed energy resources. Witness Jennings also states "the course is designed to act as a refresher for the basics and as a brief introduction for more advanced topics for industry professionals who have completed at least a Bachelor of Science degree in Electrical Engineering or have adequate work experience."

DEC explained during a conference call with the Public Staff that the course would help employees better understand how DERs interconnect and interact with the grid, as well as impacts of DERs on grid operation. According to the syllabus, the textbook that will be used is Power System Analysis & Design, 6th edition, by Glover, Overbye & Sarma, CL Engineering. This book is a standard text

used in many undergraduate engineering programs for teaching basic power system concepts.[2]

Q. PLEASE EXPLAIN WHY THE PUBLIC STAFF DOES NOT AGREE THAT THE COSTS FOR THE COURSE SHOULD NOT QUALIFY AS RESEARCH COSTS.

A. The Public Staff believes that while this course could help the attendees learn or refresh their understanding of the underlying physics and engineering of electrical engineering principals present in the electric grid, the development of a basic power system concepts review course does not constitute "research" that advances the development of renewable energy.

Q. WHAT IS THE PUBLIC STAFF'S RECOMMENDATION WITH REGARD TO THE "CAPER – SHORT COURSE DEVELOPMENT" RESEARCH COSTS?

A. The Public Staff recommends that the costs associated with the short course development should be disallowed. The Public Staff believes that, research costs should have a direct relationship to the development of renewable energy, energy efficiency, or improved air

[2] See, e.g. the following course descriptions online:
https://ece.illinois.edu/academics/courses/profile/ECE476,
http://www.ece.uidaho.edu/ee/power/ECE421/Lectures/L1/syllabus.pdf.
http://www.ece.uidaho.edu/ee/power/ECE422/Lectures18/Lecture1/syllabus.pdf.
http://engineering.sfsu.edu/academics/undergraduate/major/electrical/pdfs/engr448f08.pdf.

quality in order to be eligible for cost recovery as an incremental cost for REPS compliance under N.C. Gen. Stat. § 62-133.8(h)(1)(b). As such, I recommend that DEC's REPS Experience Modification Factor (EMF) increment riders be adjusted to remove the research cost in question from the EMF incremental costs. This adjustment is included in Exhibit 1 of Public Staff witness Michelle Boswell's testimony.

Competitive Procurement of Renewable Energy Program Costs

Q. HAS DEC REQUESTED TO RECOVER ANY COSTS RELATED TO THE COMPETITIVE PROCUREMENT OF RENEWABLE ENERGY PROGRAM IN THIS PROCEEDING?

A. No, DEC has not included any costs related to the Competitive Procurement of Renewable Energy (CPRE) Program, enacted in 2017 as part of North Carolina House Bill 589 (HB 589), in this proceeding. DEC witness Jennings states that since DEC will use the RECs acquired through CPRE for REPS compliance, DEC believes that CPRE program implementation costs could be recovered through the REPs Rider. She states, however, that DEC has elected to recover the reasonable and prudent costs incurred to implement the CPRE Program through the CPRE Rider as contemplated under Commission Rule R8-71(j).

Q. DO YOU AGREE THAT CPRE COSTS CAN BE RECOVERED THROUGH THE REPS RIDER?

A. Generally I do not agree with this statement, although it is difficult to definitively conclude before any CPRE costs are reviewed, and impossible to foresee every scenario that may occur.

Q. PLEASE EXPAND ON WHY YOU DISAGREE THAT CPRE COSTS SHOULD BE RECOVERED THROUGH THE REPS RIDER.

A. There are multiple reasons why CPRE costs should be recovered only through the CPRE rider, as opposed to the REPS rider:

(1) N.C. Gen. Stat. §§ 62-110.8(g) and (h), as enacted by HB 589, authorized the Commission to establish an annual cost recovery mechanism for CPRE cost recovery. For other new programs established as part of HB 589 that the General Assembly intended the costs to be recovered through the REPS rider, such as the solar rebate program established in N.C. Gen. Stat. § 62-155(f), the General Assembly provided clear authority for the recovery of those costs in the REPS rider.[3]

[3] N.C. Gen. Stat. § 62-155(f) provides, in part, that:

> "Each public utility required to offer the incentive program pursuant to this subsection shall be authorized to recover all reasonable and prudent costs of incentives provided to customers and program administrative costs […] in the costs recoverable by the public utility pursuant to G.S. 62-133.8(h). Nothing in this section shall prevent the reasonable and prudent costs of

(2) REPs costs are recovered, by statute, on a per-account basis with the largest percentage of the utility's REPS costs being recovered from residential customers. This disparity grows as the incremental costs increase. As the general service and industrial classes are likely to reach their cost caps first, all remaining costs are assigned to the residential class, creating an even greater class disparity. By adding in program costs that should be recovered elsewhere, the allocation of REPS costs among different customer classes is further distorted.

(3) Other REPS compliance methods such as EECs that are derived from the DSM/EE programs are provided for REPS compliance without any costs for the EECs being recovered through the REPS rider.

Q. HAS DEC DISCUSSSED THE RECOVERY OF CPRE COSTS IN THE REPS RIDER IN OTHER PROCEEDINGS?

A. Yes. In Docket No. E-100, Sub 150, DEC and Duke Energy Progress, LLC (DEP), jointly filed their Reply Comments and Amended Proposed Rule to Implement N.C. Gen. Stat. § 62-110.8 on September 8, 2017. On page 13 of those comments, DEC and DEP state:

a utility's programs […] from being reflected in a utility's rates to be recovered through the annual rider established pursuant to G.S. 62-133.8(h)."

> Specific to the interrelationship with REPS, the Companies do not anticipate any CPRE Program costs being recovered through the REPS rider because N.C. Gen. Stat. § 62-110.8(b)(2) caps CPRE Program PPA purchases, including the cost of RECs, at or below the Companies' avoided cost. Therefore, the full cost of bundled CPRE Program RECs would be recovered through the CPRE Program rider mechanism. Similar to the approach used today for energy efficiency credits applied towards REPS compliance, the cost of RECs associated with renewable energy resources procured under the CPRE Program would simply be assigned $0 cost for REPS compliance.

Q. WHAT IS THE PUBLIC STAFF'S RECOMMENDATION WITH REGARD TO THE RECOVERY OF CPRE COSTS IN THE REPS RIDER

A. We recommend the Commission address this issue if the Company requests CPRE cost recovery in a REPS rider proceeding. However, the Public Staff believes it would be inappropriate for the Company to request recovery for CPRE costs in a REPS proceeding prior to the Commission considering this issue in a CPRE cost recovery rider proceeding.

REPS Rates

Q. WHAT RATES HAS DEC REQUESTED FOR ITS EMF AND REPS RIDERS?

A. In its Application, DEC requested the following monthly charges for the Billing and Experience Modification Factor (EMF) components of the total REPS rate, excluding the regulatory fee:

DEC's Rider Request Filed on February 26, 2019			
Customer Class	**Billing Period Rate**	**EMF Rate**	**Total REPS Rate**
Residential	$0.94	$(0.07)	$0.87
General	$4.82	$(0.18)	$4.64
Industrial	$20.53	$0.75	$21.28

These monthly charges are below the cost caps set forth in N.C. Gen. Stat. § 62-133.8(h)(4). With the requested rates, the residential customer class is the closest to the cost cap at approximately 39% of the annual per account charges allowed. The general service and industrial classes are at approximately 37% and 26% of their cost caps, respectively.

Q. WHAT RATES DOES THE PUBLIC STAFF RECOMMEND FOR THE EMF AND REPS RIDERS?

A. The Public Staff is recommending the following Billing and EMF components of the total REPS rate, excluding the regulatory fee:

Public Staff's Recommended Rates			
Customer Class	**Billing Period Rate**	**EMF Rate**	**Total REPS Rate**
Residential	$0.94	$(0.07)	$0.87
General	$4.82	$(0.18)	$4.64
Industrial	$20.53	$0.71	$21.24

These rates reflect the adjustment made to remove the "CAPER – Short Course Development" research 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, rate design, and renewable energy portfolio standards compliance. I have filed affidavits in Dominion Energy North Carolina's 2017 and 2018 REPS cost recovery proceeding, testimony in New River Light and Power's (NRLP) most recent rate case proceeding, and testimony in additional small power producer and merchant electric generating facilities (EMPs). I have also assisted other Public Staff personnel with the review and investigation of REPS Compliance Plans filed by the electric power suppliers, previous DEC and DEP REPS cost recovery proceedings, and multiple other cases.

COMMISSIONER CLODFELTER: Then we'll go to the Applicant. Do you have anything further for us this morning?

MR. KAYLOR: I think you've summarized it very well. The Company and the Public Staff will work together on a joint proposed order.

COMMISSIONER CLODFELTER: Great. Intervenors?

MR. SMITH: Nothing for NCSEA.

COMMISSIONER CLODFELTER: Mr. Page?

MR. PAGE: I have nothing.

COMMISSIONER CLODFELTER: Public Staff?

MS. FENNELL: No, sir.

COMMISSIONER CLODFELTER: Anything else we need to talk about this morning? Any reasons we need to hold the record open? If not, the evidentiary record is closed and we'll take proposed orders 30 days from receipt of the transcript.

MR. KAYLOR: Yes, sir.

COMMISSIONER CLODFELTER: Great. That concludes the hearing. Thank you.

(The hearing was adjourned at 9:58 a.m.)

C E R T I F I C A T E

I, KIM T. MITCHELL, DO HEREBY CERTIFY that the Proceedings in the above-captioned matter were taken before me, that I did report in stenographic shorthand the Proceedings set forth herein, and the foregoing pages are a true and correct transcription to the best of my ability.

Kim T. Mitchell

Kim T. Mitchell
Court Reporter