STATE OF NORTH CAROLINA
UTILITIES COMMISSION
RALEIGH

DOCKET NO. E-7, SUB 1306

BEFORE THE NORTH CAROLINA UTILITIES COMMISSION

In the Matter of	)	
	)	
Application of Duke Energy Carolinas, LLC for Approval of Clean Energy and Energy Efficiency Portfolio Standard (CEPS) Compliance Report and Cost Recovery Rider Pursuant to N.C. Gen. Stat. 62-133.8 and Commission Rule R8-67	)	**DIRECT TESTIMONY OF KIMBERLY A. PRESSON FOR DUKE ENERGY CAROLINAS, LLC**

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Kimberly A. Presson, and my business address is 525 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 clean energy compliance strategies for Duke Energy Carolinas, LLC ("Duke Energy Carolinas," "DEC" or "the Company"), Duke Energy Progress, LLC ("Duke Energy Progress" or "DEP") and Duke Energy Ohio, LLC. My responsibilities include compliance with North Carolina's Clean Energy and Energy Efficiency Portfolio Standard ("CEPS")[1], compliance with Ohio's Renewable Portfolio Standard and evaluation of clean generation initiatives and customer programs that relate to CEPS compliance.

Q. PLEASE BRIEFLY SUMMARIZE YOUR EDUCATIONAL BACKGROUND.

A. I received a Bachelor of Arts in Business Administration from Furman University.

Q. PLEASE DESCRIBE YOUR BUSINESS BACKGROUND AND EXPERIENCE.

[1] On October 10, 2023, Session Law 2023-138 ("Senate Bill 678") became law. The law modified the name of the former Renewable Energy and Energy Efficiency Portfolio Standard ("REPS") by changing the name to the Clean Energy and Energy Efficiency Portfolio Standard. The law introduced, among other things, clean energy facilities and clean energy resources, and modified the definition of a Renewable Energy Certificate to include those clean energy resources.

A. I began my career with Duke Power Company (now known as Duke Energy Carolinas) in 1990, where I held various positions in the customer service and the finance organizations. I joined the Rates Department in 2019 and moved to my current position as Renewable Compliance Manager in the Business Development and Compliance Department in 2021.

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

A. Yes, I most recently provided testimony in Docket No. E-2, Sub 1320 on DEP's 2022 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 Clean Energy and Energy Efficiency Portfolio Standard under N.C. Gen. Stat. ("G.S.") § 62-133.8 during the twelve months beginning on January 1, 2023 and ending on December 31, 2023 ("Test Period"), as well as during the twelve months beginning on September 1, 2024 and ending on August 31, 2025 ("Billing Period").

Q. PLEASE DESCRIBE THE EXHIBITS TO YOUR TESTIMONY.

A. My testimony includes twenty-eight exhibits. Presson Confidential Exhibit No. 1 is the Company's 2023 CEPS Compliance Report. Presson Confidential Exhibit No. 2 provides actual and forecasted CEPS compliance costs, by resource, that the Company incurred during the Test Period and

projects to incur during the Billing Period in support of compliance with CEPS. Presson Confidential Exhibit No. 3 is a worksheet detailing the other incremental costs included in the DEC CEPS filing and lists 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. Presson Exhibit Nos. 4-28 contain updates and results of studies the costs of which the Company is recovering via the CEPS Rider.

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

A. Presson Confidential Exhibit Nos. 1-3 were prepared by me or under my supervision. Presson Exhibit Nos. 4-28 include status reports and results of studies not prepared under my supervision; however, in my role at Duke Energy I am familiar with the studies.

COMPLIANCE WITH CEPS REQUIREMENTS

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

A. Pursuant to G.S. § 62-133.8,[2] as an electric power supplier, Duke Energy Carolinas is required to comply with the overall CEPS requirement ("total requirement") by submitting for retirement a total quantity of renewable energy certificates equivalent to the following percentages of its North Carolina retail sales in the prior year:

[2] 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.

- 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."

Specifically, each electric power supplier is to comply with the solar set-aside by submitting for retirement 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 (0.20%).

Each electric power supplier is also to comply with the swine waste set-aside by submitting for retirement 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.[3] As an electric public utility, Duke Energy Carolinas' swine waste set-aside requirements, as modified by the Commission,[4] 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;
- In 2019, its pro-rata share of four-hundredths of one percent (0.04%) of the total retail electric power sold in North Carolina in the year prior;
- In 2020 and 2021, 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 2022 and 2023, its pro-rata share of five-hundredths of one percent (0.05%) of total retail electric power sold in North Carolina in the year prior;
- In 2024, 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 2025 and thereafter, its pro-rata share of two-tenths of one percent

[3] 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.

[4] The Swine set-aside requirement was modified in the Commission's December 11, 2023, *Order Modifying Swine Waste Set-Aside Requirement and Granting Other Relief* ("2023 Delay Order").

(0.20%) of total retail electric power sold in North Carolina in the year prior.

The 2023 Delay Order also modified the swine waste set-aside for each electric membership corporation and municipality according to the following schedule:

- In 2023, zero percent (0.00%) of total retail electric power sold in North Carolina in the year prior;
- In 2024 and 2025, its pro-rata share of seven-hundredths of one percent (0.07%) of total retail electric power sold in North Carolina in the year prior; and
- In 2026 and 2027, 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;
- In 2028 and thereafter, its pro-rata share of two-tenths of one percent (0.20%) of total retail electric power sold in North Carolina in the year prior.

Finally, each electric power supplier is also to submit for retirement 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,[5] are as follows:

[5] The Poultry set-aside requirement was modified in the Commission's March 4, 2022, *Order Modifying the Swine and Poultry Waste Set-Aside Requirements and Providing Other Relief.*

- 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 500,000 MWh;
- In 2020, its pro-rata share of 700,000 MWh;
- In 2021, its pro-rata share of 300,000 MWh;
- In 2022, its pro-rata share of 700,000 MWh; and
- In 2023 and thereafter, its pro-rata share of 900,000 MWh.

The requirements described in this testimony and accompanying exhibits reflect the aggregation of the CEPS requirements of Duke Energy Carolinas' retail customers as well as those wholesale customers, specifically Blue Ridge Electric Membership Corporation, Rutherford Electric Membership Corporation, the Town of Dallas, the Town of Forest City, and the Town of Highlands (collectively "Wholesale"), for which the Company has been contracted to provide CEPS compliance services.

Q. WHAT WERE THE COMPANY'S NORTH CAROLINA RETAIL SALES FOR CALENDAR YEAR 2022, THE YEAR ON WHICH THE COMPLIANCE REQUIREMENTS FOR 2023 ARE BASED?

A. Duke Energy Carolinas' North Carolina retail sales for calendar year 2022 were 59,059,117 MWhs. North Carolina retail sales for DEC's Wholesale CEPS customers were 2,668,189 MWhs.

Q. PLEASE SUMMARIZE DUKE ENERGY CAROLINAS' CEPS REQUIREMENTS FOR THE TEST AND BILLING PERIODS FOR

ITS RETAIL CUSTOMERS AND WHOLESALE CUSTOMERS FOR WHICH IT PROVIDES CEPS COMPLIANCE SERVICES.

A. The Company's total requirement for compliance year 2023 is 7,649,211 RECs. The Company submitted for retirement the following RECs, the sum of which are included in the total requirement stated above: 123,457 solar set-aside RECs, 29,530 swine waste set-aside RECs and 337,038 poultry waste set-aside RECs, along with 33,610 SB 886 RECs (which count as 67,220 poultry waste set-aside RECs) for the equivalent of 404,258 poultry waste set-aside RECs.

For the prospective Billing Period, which spans two calendar years, with different requirements in each year, the Company's estimated requirements are as follows[6]:

For compliance year 2024, the Company estimates that it will be required to submit for retirement 7,446,972 RECs to meet its total requirement. Within this total, the Company is also required to retire the following: 120,178 solar RECs, 82,335 swine waste RECs and 404,258 poultry waste RECs.

For compliance year 2025, the Company estimates that it will be required to submit for retirement 7,719,022 RECs to meet its total requirement. Within this total, the Company estimates that it will be required to retire approximately 124,533 solar RECs, 121,200 swine waste RECs and 404,258 poultry waste RECs.

[6] 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.

Q. HAS THE COMPANY COMPLIED WITH ITS GENERAL REQUIREMENT FOR 2023 FOR DEC RETAIL AND ITS WHOLESALE CEPS CUSTOMERS?

A. Yes, the Company met its 2023 general requirement of 7,091,966 RECs. Specifically, the RECs to be used for 2023 compliance have been transferred from the NC-RETS Duke Energy Electric Power Supplier account to the Duke Energy Compliance Sub-Account and the Compliance 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 2024?

A. Yes, the Company is positioned to comply with its general requirement in 2024.

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

A. During the Test Period, Duke Energy Carolinas continued to produce and procure RECs to satisfy its CEPS requirements. Specifically, the Company took the following actions: (1) executed and continued negotiations for additional REC purchase agreements with clean energy facilities; (2) maintained an open solicitation for clean energy proposals of various types; (3) continued operations of its solar and hydroelectric facilities; (4)

enhanced and expanded energy efficiency programs generating savings that can be counted towards the Company's CEPS requirement; (5) performed research studies, both directly and through strategic partnerships, to enhance the Company's ability to comply with its future CEPS requirements; (6) monitored the development of projects selected in the Competitive Procurement of Renewable Energy ("CPRE") Program of North Carolina House Bill 589 (SL 2017-192) ("NC HB 589"), the RECs from which will be used to meet the Company's future CEPS requirements; and (7) monitored the progress of the 2022 Solar and the 2023 Solar plus Storage Procurements as directed by Session Law 2021-165, the RECs from which will also be used to meet the Company's future CEPS requirements.

Q. DOES THE COMPANY ANTICIPATE ANY CHANGES TO ENERGY EFFICIENCY CERTIFICATE REPORTING IN THE FUTURE?

A. The Public Staff of the North Carolina Utilities Commission initiated discussions with the Company regarding the timing and processes relating to reporting into NC-RETS those Energy Efficiency Certificates ("EECs") which are used to satisfy a portion of DEC's CEPS Compliance obligation. In prior years the number of EECs DEC reported into NC-RETS consisted of those EECs earned for the year including a true-up of prior year EECs relating to Evaluation Measurement and Verification ("EM&V"), or participation updates, or both. The Public Staff and the Company are currently exploring options to modify the EEC reporting process such that

only EECs for programs having fully progressed through EM&V and participation review cycles are reported into NC-RETS. Migrating to this EEC reporting process will result in a significant reduction of banked EECs available for CEPS Compliance use while not materially contributing to the EEC bank for several years. This proposed approach may eventually eliminate the ongoing need for a discrete worksheet detailing EEC inventories and linking them to EM&V reports as required by the Commission in its August 20, 2013, *Order Approving REPS and REPS EMF Riders and 2012 REPS Compliance* in Docket No. E-7, Sub 1034. Conversations are ongoing with the Public Staff. As such, the Company has elected to delay reporting 2023 EECs into NC-RETS and will do so at a later time.

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

A. Yes. The Company is entitled to retain RECs from systems of customers participating in net metering through the Net Metering Rider ("Rider NM") and the Non-Residential Solar Choice Rider ("Rider NSC") where, in either case, the base tariff associated with the net metering service lacks time-of-use periods and demand charges ("NMNTD"). While Rider NM was closed to new residential participants on and after October 1, 2023, the Company will continue to receive RECs as described for residential customers continuing to be billed on this rider until December 31, 2026. Rider NM

was closed to new non-residential participants on and after January 15, 2024; the Company will continue to receive RECs for non-residential participants who continue to be billed on this rider until December 31, 2033. The Company also retains RECs as described under Rider NSC which became effective for service rendered on and after January 15, 2024.

Q. HOW ARE THE RECS CALCULATED AND RECORDED FOR THOSE NET METERING FACILITIES DELIVERING RECS TO DEC?

A. 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 ("NREL") 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. For those facilities delivering RECs to DEC, the Company reports the aggregate amount of electricity produced by those facilities under Rider NM and new Rider NSC directly into NC-RETS in a separately identified generation project. DEC 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 DEC to provide a monthly report to NC-RETS listing participating customers, their location, and the kW capacity of their installations. Additionally, the NMNTD Order requires that the report be available on the NC-RETS website. DEC has complied, and continues to comply, with this requirement.

Q. WILL ALL OF THE COMPANY'S RESIDENTIAL NET METERING TARIFFS CONTRIBUTE RECS ELIGIBLE TO BE USED FOR CEPS COMPLIANCE?

A. No. Generation for residential customers served under the Company's revised net energy metering tariffs – the Residential Solar Choice Rider ("Rider RSC") and the Net Metering Bridge Rider ("Rider NMB") – will not contribute RECs to the Company's CEPS portfolio. Under the Company's revised net metering tariffs filed in Docket No. E-100, Sub 180 and approved by the Commission's March 23, 2023, *Order Approving Revised Net Metering Tariffs*, residential customers served under the new Rider RSC and Rider NMB retain all RECs produced by their facility.

For clarity, the Company only retains RECs from systems of NMNTD customers participating in net metering through either Rider NM or Rider NSC.

Q. HOW DOES THE CPRE PROGRAM OF NC HB 589 (SL 2017-192) 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 2,660 MW of renewable energy to the state's generation portfolio in a manner that allows DEC and DEP to continue to serve customers' future energy needs reliably and cost-effectively. To meet the CPRE Program requirements, the Companies issued requests for proposals to procure energy and capacity beginning on February 21, 2018. The Companies solicited bids in three procurement windows, the last of which closed on February 3, 2022. After the CPRE Tranche 3 bid window closed, the CPRE Program was ultimately left with a 441 MW shortfall. The Companies filed a petition in both the CPRE Program dockets and the 2022 Solar Procurement Proceeding and received the Commission's approval to procure the remaining MWs through the 2022 Solar Procurement process.

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 CEPS statute. The renewable energy facilities developed or acquired by the Companies, or the renewable energy procured from a third party through a power purchase agreement under the CPRE Program and in the 2022 Solar Procurement, must also deliver to the Companies the environmental and renewable attributes, or RECs,

associated with the power. The NC retail allocated portion of the actual and estimated REC production from these projects during the Test and Billing Periods can be found in Presson Exhibit No. 2. Additional details regarding DEC's CPRE compliance activities for the current Test Period are being filed concurrently with this CEPS filing and may be reviewed in Docket No. E-7, Sub 1307.

Q. HAS THE COMPANY COMPLIED WITH ITS SOLAR SET-ASIDE REQUIREMENT FOR 2023 FOR DEC RETAIL AND ITS WHOLESALE CEPS CUSTOMERS?

A. Yes, the Company met its 2023 solar set-aside requirement of 123,457 solar RECs. Specifically, the RECs to be used for 2023 compliance have been transferred from the NC-RETS Duke Energy Electric Power Supplier account to the Duke Energy Compliance Sub-Account and the Compliance 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 2024?

A. Yes, the Company will comply with its solar set-aside requirement in 2024.

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

A. The Company will comply with its solar set-aside requirement in 2024 through a diverse and balanced portfolio of solar resources. The Company's

efforts to comply with the solar set-aside requirement include REC procurement from solar facilities and generation from DEC-owned solar photovoltaic ("PV") systems. The Company has constructed the following five utility-scale solar PV facilities in North Carolina:

- the 55 MW Monroe Solar Facility which was placed in service in March 2017;
- the 15 MW Mocksville Solar Facility which was placed in service in December 2016;
- the 6 MW Woodleaf Solar Facility which was placed in service December 2018;
- the 69 MW Maiden Creek Solar Facility which was placed in service in December 2020 as a part of the CPRE Program; and
- the 25 MW Gaston Solar Facility which was also placed in service in December 2020 as a part of the CPRE Program.

Q. PLEASE DESCRIBE THE OPERATIONAL STATUS OF THE COMPANY'S PV DISTRIBUTED GENERATION ASSETS INSTALLED IN 2010 AND 2011.

A. The Company's solar PV distributed generation ("PVDG") facilities have provided valuable learning experiences for the Company over the past thirteen years. Most of the systems were operational and generating power for the benefit of customers during the Test Period. In December of 2022, in accordance with the terms of the lease agreements between DEC and each PV system host, the Company began removing rooftop panels at one of the

commercial sites so leaks could be repaired. Another site requested removal of its panels in April 2023 to facilitate scheduled roof replacement. Due to safety concerns, new building and electrical code requirements, the age of the systems and lifetime of existing components, the Company is planning to remove most of the PVDG systems over the course of the next two years. Six residential systems as well as the McAlpine system will remain in service.

Q. HAS THE COMPANY COMPLIED WITH ITS POULTRY WASTE SET-ASIDE REQUIREMENT FOR 2023 FOR DEC RETAIL AND ITS WHOLESALE CEPS CUSTOMERS?

A. Yes, the Company met its 2023 poultry waste set-aside requirement of 404,258 RECs. The Company submitted for retirement 337,038 poultry RECs and 33,610 SB 886 RECs (which count as 67,220 poultry waste set-aside RECs) to meet its 2023 poultry waste set-aside requirement of 404,258 RECs. Specifically, the RECs to be used for 2023 compliance have been transferred from the NC-RETS Duke Energy Electric Power Supplier account to the Duke Energy Compliance Sub-Account and the Compliance 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 2024?

A. Yes, the Company expects to comply with its poultry waste set-aside requirement in 2024. Longer term compliance is dependent on the performance of current poultry waste-to-energy contracts, achievement of projected delivery requirements of those poultry waste-to-energy facilities currently operating, and the ability of three new facilities to reach expected commercial operation dates in 2024.

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 in-state resources; (2) continued pursuit of poultry-derived directed biogas from facilities located in North Carolina in order to direct such biogas to combined cycle plants for combustion and electric generation; (3) worked diligently to understand the technological, permitting, and operational risks associated with various methods of producing qualifying poultry RECs and 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; and (4) maintained an open solicitation for out-of-state poultry REC opportunities when available in the market. 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 December 1, 2023, 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 pursue procurement of these resources reasonably and prudently.

Q. HAS THE COMPANY COMPLIED WITH ITS SWINE WASTE SET-ASIDE REQUIREMENT FOR 2023 FOR DEC RETAIL AND ITS WHOLESALE CEPS CUSTOMERS?

A. Yes, the Company met its 2023 swine waste set-aside requirement of 29,530 RECs. Specifically, the RECs to be used for 2023 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 2024?

A. Compliance with the swine waste set-aside for 2024 and beyond is uncertain and will be difficult to meet as the swine waste obligation increases. Swine waste-to-energy compliance challenges have been numerous and varied. Existing contracts have not reached contracted levels of production. New contracts have failed to come online in the timeframe originally planned and have taken longer than expected to ramp up production. On the other hand, two new swine waste-to-energy projects came online in 2023, and another

is expected to come online in early 2024. The ability of the new facility to come online and for all facilities to produce the full volume of RECs expected under their contracts will determine the levels of compliance that the DEC is able to meet in the near term.

Successfully developing additional swine waste-to-energy projects in North Carolina has been a slow and tedious process over the last few years due to several factors. The Company understands that current swine waste-to-energy projects have encountered difficulties 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, technological challenges encountered when ramping up production, and issues with lower-than-expected production due to revised industry expectations, farm waste management and biosecurity practices. In addition, COVID-19, together with the war in Ukraine, created or exacerbated global supply chain disruptions, affecting prices and availability of equipment and building materials. Disruptions in work flows due to COVID-19 led to depleted inventories. Market price volatility for certain materials (e.g. stainless steel, rebar) has caused reluctance by suppliers to carry inventories, which in turn created shortages for those materials and goods. All these factors together have caused shipment delays thereby increasing wait times on completion of new facilities. Developers have also communicated potential delays as they work through the regulatory process, interconnections with local

utilities, environmental regulations, and other stakeholder concerns which affect their development plans.

The Company remains actively engaged in monitoring existing facilities and facilities that are under construction, providing assistance where possible to help projects be successful. The Company continues to seek additional resources and makes every reasonable effort to comply with the swine waste set-aside requirement.

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 in-state resources; (2) secured a contract for additional swine waste-to-energy resources; (3) continued pursuit of swine-derived directed biogas from North Carolina facilities, working with Piedmont Natural Gas Company, Inc. to locate favorable biogas injection sites in order to direct such biogas to combined cycle plants for combustion and generation; (4) worked diligently to understand the technological, permitting, and operational risks associated with various methods of producing qualifying swine RECs and 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; (5) explored

modifications to current bioenergy contracts by working with developers to add swine waste to their fuel mix; (6) maintained an open solicitation for out-of-state swine REC opportunities when available in the market; and (7) continued support of research studies through North Carolina State University centered around low-energy drying of swine waste for fuel and fertilizer products. 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 December 1, 2023, 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 pursue procurement of these resources reasonably and prudently.

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

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

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

A. No, the Company did not sell RECs in the Test Period.

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

A. Yes. DEC has RECs in its inventory that it cannot use for its own CEPS 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 CEPS compliance requirement through several methods, including by "generat[ing] electric power at a new clean[7] 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 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

[7] Senate Bill 678 changed language in G.S. § 62-133.8(b)(2) from "renewable" to "clean".

than the electric power supplier to qualify as a new renewable energy facility.

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

A. In the 2017 REPS cost recovery proceeding in 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 CEPS requirements because G.S. § 62-133.8(c)(2)(d) allows electric membership corporations and municipalities to meet their CEPS requirements through the purchase of RECs derived from clean[8], as opposed to *new* clean[9], 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 CEPS requirements through the RECs exchanged with NCEMC at no cost to DEC's customers rather than through the purchase of additional RECs from new clean 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 transfers with NCEMC, and the

[8] Id.
[9] Id.

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 CEPS compliance.

COST OF CEPS COMPLIANCE

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

A. Duke Energy Carolinas' costs associated with CEPS compliance are reflected in Presson 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 CEPS COMPLIANCE DOES THE COMPANY SEEK TO RECOVER IN THIS PROCEEDING?

A. Presson Confidential Exhibit Nos. 2 and 3 identify "Other Incremental Costs," "Solar Rebate Program Costs," "PowerPair^{SM} Program Costs," and

"Research Costs" the Company incurred, and estimates it will incur, in association with CEPS compliance.

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

A. Other Incremental Costs include labor costs associated with CEPS compliance activities and non-labor costs associated with administration of CEPS compliance. Among the non-labor costs associated with CEPS compliance are the Company's subscription to NC-RETS and accounting and tracking tools related to RECs, reduced by 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 (SL 2017-192) SOLAR REBATE PROGRAM ("SOLAR REBATE PROGRAM").

A. As required by G.S. § 62-155(f), DEC developed a Solar Rebate Program offering incentives to residential, non-residential, and non-profit customers in North Carolina for the installation of small customer owned or leased solar energy facilities participating in the Company's net metering tariff. The goal of the Solar Rebate Program is to provide an economic incentive for customers to adopt solar power by reducing the upfront costs of installing solar equipment. The incentive is limited to 10 kilowatts alternating current ("kW-AC") for residential solar installations and 100

kW-AC for non-residential solar installations. The program incentive is limited to 10,000 kW of installed capacity annually. The program began January 1, 2018, and continued until December 31, 2022, with limits for each participant class. At the end of 2022, 1,079 kW of unsubscribed capacity remained. This was made available to any participant meeting the solar rebate rider requirements when the 2023 rollover allocation process began on January 11, 2023. Solar Rebate Program participation caps for all customer types and application periods were met following the close of the random selection period on January 18, 2023. The waitlist established during the January 2023 random selection process will remain until all customers with rebate reservations are paid. The program is now closed to new applicants, and all capacity has been reserved. Currently thirty-seven DEC customers with a total of 2,345 kW AC of reserved capacity are awaiting rebate payments upon completion of their solar project installations. The Company expects all projects to be online in 2024 resulting in the Company paying incentives for those reservations. Accordingly, on February 2, 2024, the Company filed its plan not to extend deadlines beyond 2024 and has communicated this intention to parties on the waitlist.

Additional information regarding the status of the solar rebate program, including the Company's most recent Joint Biannual Solar Rebate Program Report and various filings related to extended deadlines, may be found in Docket Nos. E-7, Sub 1166 and E-2, Sub 1167.

Q. ARE COSTS RELATED TO THE NC HB 589 (SL 2017-192) 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 CEPS statute; NC HB 589 (SL 2017-192) 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 included for recovery in this filing both costs incurred during the Test 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 Presson Confidential Exhibit No. 3, these costs include the annual amortization of incentives paid to customers, program administration costs including labor, information technology, and marketing costs offset by early termination fees assessed to customers who

received a rebate check but failed to maintain participation in the Net Metering Rider. Projected incentive costs for the Billing Period are based on the currently approved rebate amounts: $0.40 per watt for residential installations, $0.30 per watt for non-residential installations and $0.75 per watt for non-profit installations.

Q. ARE COSTS RELATING TO THE POWERPAIR[SM] SOLAR AND BATTERY INSTALLATION PROGRAM INCLUDED FOR RECOVERY IN THIS FILING?

A. Yes. Program costs for both the Test Period and Billing Period related to the PowerPair[SM] Solar and Battery Installation Program ("PowerPair[SM] Program") are included in this filing pursuant to the Commission's March 23, 2023, *Order Declining to Approve Proposed Smart $aver Solar Program and Requiring Development of Pilot Program* ("Order Establishing Pilot") and the Commission's January 11, 2024, *Order Approving PowerPair Pilot Program, with Conditions, and Approving Modifications to Energywise and Power Manager Residential Load Control Programs* ("Order Approving PowerPair") both in Docket No. E-7, Sub 1261. The pilot program established by the Commission provides that participants receive an incentive of $0.36/watt toward the cost of installing a solar array and $400/kWh for the battery storage component. The solar incentive is capped at 10 kW per installation, and the battery storage component is limited to 13.5 kWh. In its Order Establishing Pilot the Commission provided a cost recovery mechanism for all reasonable and

prudent costs of the PowerPair[SM] Program participant incentives and program administrative costs by instructing the Company to amortize the total program incentives and administrative costs over a 20-year period, including a return component adjusted for income taxes at DEC's overall weighted average cost of capital as established in its most recent general rate case, to be included in the costs recoverable by DEC through N.C. G. S. § 62-188.8(h).

Therefore, as provided in both the Order Establishing Pilot and the Order Approving PowerPair, DEC included amortization of actual costs incurred in the Test Period and those costs projected to be incurred in the Billing Period related to the implementation of the PowerPair[SM] Program. These costs are detailed on Presson Confidential Exhibit No. 3 and include the amortization of incentives projected to be paid to customers as well as program administration costs including labor, information technology and marketing costs.

Q. PLEASE PROVIDE DETAIL ON THE INTERNAL LABOR COSTS INCLUDED IN DEC'S CURRENT APPLICATION FOR CEPS COST RECOVERY.

A. DEC charges only the incremental cost of CEPS compliance, the NC HB 589 (SL 2017-192) Solar Rebate Program, and the PowerPair[SM] Program to the CEPS cost recovery rider. Consistent with that policy and DEC's practices in previous applications for cost recovery for CEPS compliance, internal employees who work to comply with G.S. § 62-133.8 and G.S. §

62-155(f) charge only that portion of their labor to CEPS or the specific program mentioned. Labor related to the Solar Rebate Program and the PowerPair[SM] Program is isolated in the cost of those programs which is in turn amortized to CEPS for cost recovery. The departments/functions that charged labor to CEPS during the Test Period are detailed in Presson Confidential Exhibit No. 3.

Q. HOW DO EMPLOYEES CHARGE THEIR INTERNAL LABOR COSTS TO CEPS?

A. Employees positively report their time, which means that each employee is required to submit a timesheet every two weeks in the Company's time reporting system. Hours reported for the period are split according to the accounting entered in the time reporting system for that specific employee. As the nature of the employee's work changes, the division of hours is updated for the reporting period. Additionally, each year prior to filing for approval of the DEC CEPS Compliance Report and Cost Recovery Rider, the labor hours charged to CEPS, the HB 589 (SL2017-192) Solar Rebate Program, and the PowerPair[SM] Program are carefully reviewed and confirmed for accuracy.

Q. ARE CEPS-RELATED RESEARCH COSTS INCLUDED FOR RECOVERY IN THIS FILING?

A. Yes. With respect to Research 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

which encourage the development of renewable energy, energy efficiency or improved air quality and is related to distributed energy technology and the Company's CEPS compliance.

RESEARCH STUDY RESULTS

Q. THE COMMISSION'S *ORDER APPROVING REPS AND REPS EMF RIDERS AND 2012 REPS COMPLIANCE* REQUIRES DUKE ENERGY CAROLINAS TO FILE WITH ITS 2023 CEPS RIDER APPLICATION STUDY RESULTS FOR ANY STUDIES THE COSTS OF WHICH IT HAS RECOVERED VIA THE CEPS RIDER. IS THE COMPANY SUPPLYING SUCH STUDIES IN THIS FILING?

A. Yes. The Company's Research efforts are an integral part of its CEPS Compliance efforts. The following summary outlines efforts undertaken by the Company in the Test Period and specifies the availability of applicable study results.

- 2023 Resource Adequacy Study – During 2023 the Companies retained Astrapé Consulting, LLC to analyze the DEC and DEP reserve margins relating to both islanded (where there are no neighboring balancing authorities) and interconnected (where neighboring balancing authorities exist). The 2023 Study built upon studies it performed in previous years. In 2023, attention focused on accurately modeling the shifting neighbor resource portfolios including coal retirements and the buildout of solar, wind and

storage resources on other utilities' systems as well as cold weather load response and unit performance. This changing resource mix, along with the cold weather load response, shifts the resource adequacy risk of the Companies' neighbors to the winter. Because of this, there is a reduction in market assistance available to the Companies during periods of extreme winter weather, thus increasing the Companies' need to carry a higher reserve margin to maintain a reliable system. These study results provide the planning reserve margin target for use in development of the Company's consolidated Carbon Plan and Integrated Resource Plan ("CPIRP") filed August 17, 2023, in Docket No. E-100, Sub 190, as well as the Supplemental Planning Analysis filed January 31, 2024. The results of this study were included as Attachment I to the CPIRP and can also be found as Presson Exhibit No. 4.

During 2023 the Companies also retained Astrapé Consulting, LLC to conduct a wind resources Effective Load Carrying Capability ("ELCC") study to determine the winter capacity value for future wind resources on the Companies' system for use in development of the Companies' CPRIP and Supplemental Planning Analysis. Because solar and wind are intermittent resources, a solar or wind facility's ability to provide reliable capacity when it is needed is different from that of a fully dispatchable resource such as gas-fired turbine, which can be called

upon in any hour to produce energy, notwithstanding unit outages. The Wind ELCC study evaluated three different wind portfolios at four different capacity levels in conjunction with the existing solar portfolio as well as expanded solar portfolios that totaled 10,000 MW, 15,000 MW and 20,000 MW. The wind resources were simulated along with the different solar portfolios to capture the synergistic effects of the two resource types when modeled together. The Wind ELCC Study was included as Attachment II to the Companies' 2023 CPIRP and can also be found as Presson Exhibit No. 5.

- 2023 Solar Integration Services Charge Study – In 2023 the Company once again engaged Astrapé Consulting, LLC to update its two previous Solar Integration Services Charge ("SISC") studies in order to satisfy one of the Commission's directives from its November 22, 2022, *Order Establishing Standard Rates and Contract Terms for Qualifying Facilities* in Docket No. E-100, Sub 175 to address whether reserve levels used to calculate the SISC could be further refined depending on each day's volatility forecast and to consider the effect, if any, of the Southeastern Energy Exchange Market on the calculation of SISC. As part of this effort, Astrapé analyzed and quantified the costs of the ancillary service impact associated with integrating existing and future solar generation on both the DEC and DEP systems. The final report was

included as Exhibit 10 in the Company's November 1, 2023, Biennial Avoided Cost filing in Docket No. E-100, Sub 194. A copy of the report is included as Presson Exhibit No. 6.

- Adopting DVAR to Mitigate PV Impacts on a Distribution System, Phase 2 – In late 2021, the Company kicked off a second phase of the project with North Carolina State University ("NC State University" or "NCSU") to assess the effectiveness of the American Superconductor Corporation Dynamic Volt-Amp Reactive Compensation Solution ("mini-DVAR") in mitigating various power quality issues on distribution circuits due to increasing penetration of PV. Phase 2 of the study focused on the development of more dynamic dispatching schemes for the mini-DVAR such that the expected benefits are maximized. No charges were incurred in the Test Period for this study. Results for this second phase are included as Presson Exhibit No. 7.
- Application of High-Level Screening Tool for Data Analytics for Operational Planning – The Company contracted with the Electric Power Research Institute ("EPRI") in 2023 to fund a supplemental project using EPRI's in-house High-Level Screening ("HiLS") tool to analyze a set of operational data and create visualizations assisting the Company in identifying critical operating conditions to enhance subsequent planning and operating capabilities. The timelines for implementing network upgrades and constructing

interconnection facilities for a growing number of clean energy resources requires the evaluation and identification of system conditions that are outside of the traditional Spring and Fall "outage season" windows when system loads are lower. Utilizing the HiLS research to identify those time periods throughout the year which are favorable for these system improvements and upgrades, the Company can enable their on-time completion without diminishing system reliability in the process. Participating in the HiLS supplemental project allows Duke Energy to contribute to industry research to enable the interconnection of a growing number of renewable resources. Additionally, the increasing variability of both renewable generation and customer loads has resulted in power system operators encountering conditions that were not previously commonplace. Using HiLS to screen for and understand common operating conditions requires analysis and visualizing large datasets can be significantly challenging simply due to their size. The development of the EPRI HiLS tool will enable the analysis and clustering of data with similar operating hours and conditions based on load and generation variability. Results of this assessment will support the Company's operations teams' need to identify time periods and system conditions which can be leveraged to develop more informed outage and maintenance scheduling for the Company's operations thus improving reliability and reducing

unwanted customer interruptions and outages. Further details relating to the study can be found as Presson Confidential Exhibit No. 8.

- Battery Cost Index – In 2023 the Company subscribed to the Fastmarkets Battery Cost Index to leverage Fastmarkets' research and expertise to promptly update storage costs informing resource planning models and cost benefit analysis. Fastmarkets is a trusted cross-commodity reporting agency in the agriculture, forest products, metals, and mining markets. The Battery Cost Index is an innovative solution addressing the many challenges of traditional cost analysis methods and metrics involving integrating price indices for essential battery materials effectively tracking the influence of material price volatility and enabling users to compare material and manufacturing costs across a variety of cathode chemistries. This proprietary tool provides valuable insights for decision-making and requires a subscription to review. Please visit the Fastmarkets website at www.fastmarkets.com for more information regarding access to the tool. While the Company is limited in what it can share regarding data extracted from the tool, a sample is included as Presson Exhibit No. 9.
- Biogas Utilization in North Carolina – No costs were incurred in the Test Period relating to the Biogas Utilization in North Carolina study undertaken by RTI International ("RTI"). The Company

previously provided funding for a project requested by 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. The second phase of the RTI study, a portion of which extends the scope of Phase 1 to include other sources of biogas feedstock, is now complete. Phase 2 was augmented by stakeholder outreach and policy option evaluations addressing what the state's objectives for the captured emissions should be and includes an analysis of the physical, economic, and political challenges to potential objectives. The Phase 2 report can be found as Presson Exhibit No. 10.

- Bus Load Allocation Analysis – As an extension to the "Power Flow Analysis to Improve Integrated Volt/Var ("IVVC") and Energy Efficiency Programs," the Company contracted with NCSU to more deeply investigate the options that exist within our Distribution Management System ("DMS") software which may be adjusted to minimize the differences between power flow results and measurements, focusing on the configuration of Bus Load Allocation ("BLA"). The result of the study will be a set of recommended settings that may be implemented by the Company to reduce the differences between power flow results and measurements, thereby improving the DMS' ability to effectively

operate the IVVC program. The program scope can be found as Presson Confidential Exhibit No. 11.

- Coalition for Renewable Natural Gas – The Company renewed its membership to the Coalition for Renewable Natural Gas in 2023 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. The Company previously provided funding through the Coalition for Renewable Natural Gas for a study by Colorado State University of methane leakage from renewable natural gas processing facilities to promote improved practices. The final report from that study can be found as Presson Exhibit No. 12.
- DC Microgrids/DC Home Study – In 2023 the Company began collaborating with Direct Energy Partners and Renewable Design Associates to validate, demonstrate and quantify the benefits of a Community Microgrid coupled with a direct current ("DC") link connected to a mock DC powered home at the Company's Mount Holly test lab. Recognizing that an increasing amount of equipment is DC powered, this study focuses on future DC Microgrid architecture from a utility perspective to better serve customers. The study will document the benefits of utility-owned and managed DC

distribution, storage, shared renewables, and fast charging. The benefits of DC technologies and systems include: (1) eliminating losses of more than 15% relating to conversions from direct current to alternating current and back to direct current by matching PV, battery, and electric vehicle ("EV") with modern DC loads; (2) reducing copper wiring costs by as much as 50%; and (3) reducing integration costs as systems are simplified. The study is ongoing and a status update on the project can be found as Presson Exhibit No. 13.

- DER Commissioning Procedures and Toolkit – The Company contracted with EPRI in 2023 to participate in a collaborative research project which aims to identify the best practices for Distributed Energy Resource ("DER") commissioning and to design, develop and demonstrate a DER Commissioning Toolkit to simplify and automate the process to the greatest extent possible. The IEEE 1547-2018 DER interconnection standard made grid support functions mandatory for all DERS. Smart inverter functions such as volt-var, volt-watt, and abnormal voltage and frequency ride-through capabilities are required for DERS. Commissioning tests are a key step in the interconnection process to confirm a DER plant meets the grid support function settings and power quality requirements are met at the point of applicability as specified by the utility. A DER plant's performance depends on many individual

hardware and software components which are not possible to evaluate together during nationally recognized testing laboratory certification testing. As utilities adopt the IEEE 1547-2018 standard, detailed commissioning tests have become critically important for the safety and proper operation of these systems. Tests are more complex, and the volume of DER systems being added to the electric grid is increasing quickly. The procedures developed in this project will identify practical ways to verify DER performance requirements. The toolkit will include the hardware and software components necessary to record and automate data transfer, analyses, and reporting in the field. An overview relating to the study can be found as Presson Confidential Exhibit No. 14.

- Developing Large DER Protection Guidelines and Settings for Mitigating System-wide Impacts across Transmission and Distribution Systems – In late 2021, the Company started the project with the North Carolina State University, the University of North Carolina at Charlotte ("UNCC"), and Clemson University through the Center for Advanced Power Engineering Research ("CAPER"). The project investigates the ability to develop a strategy for evaluating protection device, recloser settings and control algorithms for inverter-based resources ("IBRs") with high penetration levels of DER at both the distribution and transmission levels with an integrated simulation model. There were no charges

incurred in 2022 for this ongoing CAPER project. A status update on the project can be found as Presson Exhibit No. 15.

- Electric Power Research Institute – In 2023 the Company subscribed to Program 174 – DER Integration, the costs of which were recovered via the CEPS Rider. EPRI designates results from studies under this program 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 https://www.epri.com.
- Experian EV Data – In 2023 the Company subscribed to receive quarterly updates from Experian which will include zip code-level data relating to both the number of electric vehicles in operation as well as new electric vehicle registrations plus the make, model, drivetrain, and fuel used for vehicles in operation. The dataset includes light, medium, and heavy-duty vehicles. This information will be used to further advance EV forecasting, charging infrastructure sizing and location, as well as tariff development aimed at increasing EV adoption rates while minimizing emissions and demands on electric infrastructure. Experian considers information from its service to be proprietary and confidential.

Information regarding access can be found at https://www.experian.com/automotive/auto-quarterly-trends.

- Grid Resilience – In late 2022 the Company contracted with Open Energy Solutions, Inc ("OES") to develop a framework and related perspectives on the value of grid resiliency for Duke Energy. OES tested a range of analytical methods for valuing the resilience benefits of distributed energy resources. The project also focused on example algorithms for grid resilience value levers using available public research and Duke Energy system data. The study was completed in August 2023, and no charges were incurred in the Test Period. Study results can be found as Presson Confidential Exhibit No. 16.
- Impacts of Managed Charging and Other Innovative Rates for EV Charging on Utility Load and System – In 2023 the Company initiated a project with UNCC to examine the effect of innovative rates on EV growth, charging time, utility daily load, the utility system and utility carbon emissions. Although EVs are currently a small percentage of overall utility demand, their penetration rates are rapidly increasing. The primary tariffs offered to households owning EVs are either flat rate or time of use ("TOU") rates. Flat rates do not encourage charging in off-peak times; TOU rates have limited acceptance and the on-peak/off-peak hours are set well in advance of actual conditions. Innovative rates, such as managed

charging, might use vehicle data or a second meter, could reflect real-time conditions, and charging could be under greater control of the electricity dispatcher. The study will use simulations and data provided by the Company, giving special attention to managed charging and the effect of charging on the utility's distribution system. The progress report for this multi-year study can be found as Presson Exhibit No. 17.

- Low Energy Drying of Swine Sludge for Fuel and Fertilizer Research Study – In 2023 the Company continued support of the various projects being undertaken by the Animal and Poultry Waste Management Center at NCSU. 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. An update on the project can be found as Presson Confidential Exhibit No. 18.
- Microgrid Electromagnetic Transient ("EMT") Study Enhancement – The Company kicked off a project with EPRI in 2023 to enhance the Company's microgrid study process to increase the level of automation and expand its applicability to cater to the growing needs of microgrid analysis. This project will be completed mid-2024 and is expected to deliver a tool to support CYME to PSCAD conversion

and PSCAD Simulation/plotting automation. The projects scope can be found as Presson Confidential Exhibit No. 19.

- Monitoring and Operational Assessment of DER Reactive Power Control – In 2023 the Company contracted with EPRI to continue the work started in late 2022 relating to its evaluation of the software-based controls of advanced inverters according to the IEEE Standard 1547-2018 ("Standard"). Projects in the Smart Inverter Pilot established in the "Joint Notice of Interconnection Settlement and Petition for Limited Waiver" filed with the Commission in Docket No. E-100, Sub 101 on September 3, 2020, are being commissioned and beginning to operate on the Company's distribution system. Monitoring and assessing each project's performance is important. This study collects operational data, assesses the delivery of the systems' active and reactive power compared to the Standard, identifies any undesirable impact to the feeder system, examines adverse interaction with local or central controls of traditional regulating devices (e.g., voltage regulator, capacitor bank), proposes potential updates for better coordination and further improves the operation's effectiveness. Results of the 2022 study are attached as Presson Confidential Exhibit Nos. 20 and 21. The 2023 Study is ongoing.
- NC State University's Future Renewable Electric Energy Delivery and Management ("FREEDM") Systems Center – Duke Energy

supports NC State University'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 two-way power flow system supporting distributed generation.

- Power Flow Analysis to Improve Integrated Volt/Var and Energy Efficiency Programs – In late 2021 the Company contracted with CAPER to address the issue of inaccurate power flow analysis results in the current DMS when there are DER on a distribution system. The objective of the project was to identify factors that contribute to the differences between calculated power flow results versus power flow measurements from the field on certain identified feeders. When there are only slight differences between calculated power flow results and power flow measurements, DMS has accurate and detailed information about the state of the grid, so that voltage reduction due to IVVC and energy savings can be maximized. When there are large differences between calculated power flow results and power flow measurements, it is very difficult to achieve the full benefits of IVVC. This project analyzed DMS' calculated power flow and offer suggestions for its improvement, especially on circuits which contain high levels of DER. The project was split into 2 phases:

- Phase 1 identified factors that contribute to the differences between calculated power flow results versus power flow measurements from the field and was primarily accomplished by comparing the results of the DMS power flow with the results of power flow from CYME, which is an industry standard application. It was determined the DER on the distribution system is a key contributor. Various differences in modeling and power flow algorithms were investigated, which highlighted process improvements that can be implemented to improve power flow results in both DMS and CYME at the Company. No charges were included for this phase in the Test Period; Phase 1 final results are included as Presson Confidential Exhibit No. 22.
- The second phase of this study incorporated data analytic tools to continue identifying factors contributing to the differences between calculated power flow results versus power flow measurements from the field and focused on feeders with consistently large differences between the power flow results and the measurements. The study team developed a completely novel method of combining two Machine Learning based tools, Binary Logistic Regression and K-means clustering, to group similar feeders and then to highlight the factors that most substantially contribute to the

discrepancy between the power flow results and the measurements. This method identified features of the Company's model and software that can be adjusted to minimize the differences between the power flow results and the measurements, including adjustments to the BLA settings. The Company plans to continue using the developed method to identify additional adjustments as needed in the future. No charges were included for this phase in the Test Period. Phase 2 final results are included as Presson Confidential Exhibit No. 23.

- Reliability Assessment for Utility PV Inverter System – In December 2022 the Company kicked off a second phase of the Reliability Assessment for Utility PV Inverter System project with UNCC to support the development of safe and reliable utility PV and energy storage systems. The extended project conducted technology and standard reviews on PV and utility battery arc fault and fire prevention, evaluated the current arc fault detection and arc flash prevention methods, researched real-time arc fault detection and battery fire detection technology, and provided technical recommendations to reduce fire hazards, enhance electrical safety, and increase PV and utility energy storage system fire resilience. There were no costs incurred for this project in the Test Period. The study's final results can be found in Presson Exhibit No. 24.

- Resilient Community Microgrids with Dynamic Reconfiguration to Serve Critical Loads in the Aftermath of Severe Events – In 2021 the Company supported UNCC in the research project awarded by the Department of Energy's Office of Energy Efficiency and Renewable Energy under DE-FOA-0002243. Duke Energy supports this project with the expectation that it addresses all topics of interest: (1) the study will recommend a methodology which specifies relay-protection elements and settings for utilization in island mode of operation; (2) the study will recommend methodologies for island black start sequences; and (3) a performance evaluation of the microgrid-control will be provided. This three-year project is expected to be complete in April 2024, and no charges were incurred in the Test Period. The progress for this project can be found as Presson Confidential Exhibit No. 25.
- Smart Electric Power Alliance ("SEPA") – The Company renewed its membership to the Smart Electric Power Alliance in 2023. SEPA provides its members with exclusive whitepapers and working group event opportunities on various topics including DER integration, DER management systems, energy efficiency and demand response, electric vehicle development, microgrid and grid resiliency. Please visit SEPA's website at https://sepapower.org for more information on SEPA.

- Solutions for Islanding of Microgrids with High Inverter-Based Resources – The Company contracted with Quanta Technologies in 2023 to investigate and study alternative solutions for the islanding operation of microgrids with high penetrations of inverter-based resources. This study conducted comparative analysis and EMT studies on two potential solutions for improving the islanding of inverter-based microgrids. The study was completed in 2023, and the final report can be found as Presson Confidential Exhibit No. 26.
- Southeastern Wind Coalition, Inc ("SEWC") – The Company renewed its membership in the Southeastern Wind Coalition in 2023. SEWC conducts research on land-based wind, offshore wind, and energy storage, which informs the Company of potential clean energy generation opportunities that may enable the Company to comply with CEPS in a cost-effective manner. In addition, SEWC's work is to advance wind policies across the southeast by holding conferences, addressing prohibitive state policies related to wind deployment, and ensuring workforce development and educational outreach. Please visit SEWC's website at https://sewind.org for more information on SEWC.
- Strategic and Flexible Controllable Load Resources – In 2023 the Company kicked off a study with Tierra Resource Consultants to develop a framework for real-time grid control of strategic and flexible Controllable Load Resources ("CLRs"). CLRs are loads

which can be flexible and agnostic relative to when their loads are increased or decreased. They include flexible computing resources, fleet EV chargers, and other data center CLRs, and enable quick response to fluctuations in both non-dispatchable renewable resources as well as grid constraints. Work is currently being coordinated with Duke Energy's Emerging Technology Office. The project team is also assessing grid value streams attributed to automated-load-fill controls as well as performance attributes and corresponding contributions to the Company's evolving grid management requirements. This phase of the study is expected to be completed in mid-2025. An overview of the study can be found as Presson Exhibit No. 27.

- Verifying Performance of Bulk Power-System-Connected Solar, Wind and Storage Plants – The Company started a project with EPRI in 2023 intended to improve verification practices for technical interconnection requirements of IBRs that will be connected to transmission systems. During the project EPRI will provide or compile information that will be useful in assessing the current state of verification practices and provide information and webinars from the industry and scientific communities about verification practices. EPRI will provide the comparison table of NERC IBR event causes and IEEE 2800 requirements to verify all

causes were addressed by the Standard. The project scope can be found as Presson Confidential Exhibit No. 28.

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 these costs associated with CEPS 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 CEPS requirements. Duke Energy Carolinas has developed strong foundational market knowledge related to clean energy resources. The Company continues to enhance and develop expertise in this field through the various solicitations for clean energy and the operation of its unsolicited bid process, its construction of DEC-owned utility-scale solar facilities, its participation in industry research, and daily interaction with developers of clean energy facilities. As a result of these efforts, the Company has been able to identify, procure, and develop a diverse portfolio of clean energy resources to meet its CEPS requirements in a prudent, reasonable, and cost-effective manner.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes.