STATE OF NORTH CAROLINA
UTILITIES COMMISSION
RALEIGH

DOCKET NO. E-2, SUB 1341

BEFORE THE NORTH CAROLINA UTILITIES COMMISSION

In the Matter of Application of Duke Energy Progress, LLC Pursuant to G.S. 62-133.2 and NCUC Rule R8-55 Relating to Fuel and Fuel-Related Charge Adjustments for Electric Utilities	)	**DIRECT TESTIMONY OF JEFFREY FLANAGAN FOR DUKE ENERGY PROGRESS, LLC**

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Jeffrey Flanagan and my business address is 8320 East Highway 150, Terrell, North Carolina.

Q. BY WHOM ARE YOU EMPLOYED AND IN WHAT CAPACITY?

A. I am employed by Duke Energy as General Manager III of the Carolinas Dispatchable Generation - West Zone including the Marshall, Allen, Asheville and W.S. Lee stations.

Q. PLEASE BRIEFLY DESCRIBE YOUR EDUCATIONAL AND PROFESSIONAL BACKGROUND.

A. I graduated from NC State University with a Bachelor's Degree in Paper Science & Engineering and a Bachelor's Degree in Chemistry. I also graduated from The University of South Carolina with a Master's Degree in Business Administration. I am a registered Professional Engineer in the state of South Carolina. My career began with Duke Energy as a Flue Gas Desulfurization ("FGD") Scrubber Engineer at Progress Energy. Since that time, I have held various roles of increasing responsibility in generation projects, engineering and operations areas, including Operations and Maintenance ("O&M") Superintendent at Marshall Station and Station Manager at Smith Energy Complex. I was named General Manager of Marshall and Allen Stations in July of 2021. I assumed my current role in February of 2023.

Q. WHAT ARE YOUR DUTIES AS GENERAL MANAGER III OF THE CAROLINAS DISPATCHABLE GENERATION?

A. I am responsible for the overall direction and management for over 4,000 megawatts ("MWs") of Carolinas Dispatchable Generation coal, combined cycle and peaking

generation. I provide strategic direction and leadership to station general managers, including day to day operations, business analysis, process development, O&M and capital budget allocation and implementation, and outage performance. I am also responsible for operational excellence at all levels of the organization, including continuous improvement and competitive benchmarking. I interact with the public and private sector to manage the overall business to maintain profitable and publicly positive stations.

Q. HAVE YOU TESTIFIED BEFORE THIS COMMISSION IN ANY PRIOR PROCEEDINGS?

A. Yes. I testified before the North Carolina Utilities Commission ("Commission") in support of fuel and fuel-related cost recovery applications in DEP's 2023 annual fuel and fuel-related rider proceeding in Docket No. E-2, Sub 1321, and in DEC's 2024 and 2023 fuel and fuel-related rider proceeding in Docket No. E-7, Sub 1304 and Docket No. E-7, Sub 1282, respectively.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY IN THIS PROCEEDING?

A. The purpose of my testimony is to (1) describe DEP's Traditional/Renewable - (formerly called the Fossil/Hydro/Solar fleet) generation portfolio and changes made since the 2023 fuel and fuel-related cost recovery proceeding, as well as those expected in the near term; (2) discuss the performance of DEP's Traditional/ Renewable facilities during the period of April 1, 2023 through March 31, 2024 (the "test period"); (3) provide information on significant Traditional/Renewable - outages that occurred during the test period; and (4) provide information concerning environmental compliance efforts.

Q. PLEASE DESCRIBE DEP'S TRADITIONAL/RENEWABLE - GENERATION PORTFOLIO.

A. The Company's Traditional/Renewable generation portfolio consists of approximately 8,974 MWs of generating and storage capacity, made up as follows:

Coal-fired -	3,143 MWs
Combustion Turbines -	2,432 MWs
Combined Cycle Turbines -	3,079 MWs
Hydro -	228 MWs
Solar -	86 MWs[1]
Battery Storage-	6 MWs

The 3,143 MWs of coal-fired generation represent two generating stations with a total of five units. These units are equipped with emission control equipment, including selective catalytic reduction ("SCR") equipment for removing nitrogen oxides ("NO_x"), flue gas desulfurization ("scrubber") equipment for removing sulfur dioxide ("SO_2"), and low NO_x burners. This inventory of coal-fired assets with emission control equipment enhances DEP's ability to maintain current environmental compliance and concurrently utilize coal with increased sulfur content – providing flexibility for DEP to procure the most cost-effective options for fuel supply.

The Company has a total of 24 simple cycle combustion turbine ("CT") units, the larger 14 of which provide 2,172 MWs, or 89% of CT capacity. These 14 units are located at the Asheville, Darlington, Richmond County (Smith Energy

[1] This value represents the dependable capacity contribution to meeting summer peak demand, based on the Company's integrated resource planning metrics. The nameplate capacity of the Company's solar facilities is 141 MWs.

Complex), and Wayne County (H.F. Lee) facilities, and are equipped with water injection and/or low NO_x burners for NO_x control. The 3,079 MWs shown as "Combined Cycle Turbines" ("CC") represent six power blocks. The two Asheville CC power blocks have a configuration of one CT and one steam turbine. The H.F. Lee Energy Complex CC power block has a configuration of three CTs and one steam turbine. The two Richmond County power blocks located at the Smith Energy Complex consist of two CTs and one steam turbine each. The Sutton CC at Sutton Energy Complex consists of two CTs and one steam turbine. The six CC power blocks are equipped with SCR equipment, and all eleven CTs have low NOx burners. The steam turbines do not combust fuel and, therefore, do not require NO_x controls. The Company's hydro fleet consists of 15 units providing 228 MWs of capacity. The Company's solar fleet consists of four sites providing 86 MWs of dependable capacity. The 6 MWs of battery storage includes the Asheville-Rock Hill battery and the Hot Springs Microgrid battery.

Q. WHAT NOTABLE CHANGES HAVE OCCURED WITHIN THE TRADITIONAL/RENEWABLE PORTFOLIO SINCE DEP'S 2023 ANNUAL FUEL AND FUEL-RELATED COST RECOVERY PROCEEDING?

A. The Smith Energy Complex performed advanced gas path peaker upgrades and maintenance on the remaining simple cycle units, resulting in a 28 MW increase in capacity. The upgrade extends the units' outage interval by approximately two years (based on assumptions of forecasted starts per year) or 38% more starts intervals. The upgrade also provides additional flexibility by doubling the ramp rate capabilities of the units.

Q. WHAT ARE DEP'S OBJECTIVES IN THE OPERATION OF ITS TRADITIONAL/RENEWABLE FACILITIES?

A. The primary objective of DEP's Traditional/Renewable generation is to provide safe, reliable, and cost-effective electricity to DEP's customers. Operations personnel and other station employees are well-trained and execute their responsibilities to the highest standards in accordance with procedures, guidelines, and a standard operating model. Like safety, environmental compliance is a first principle, and DEP strives to achieve high level results.

The Company complies with all applicable environmental regulations and maintains station equipment and systems in a cost-effective manner to ensure reliability for customers. The Company also acts in a timely manner to implement work plans and projects that enhance the safety and performance of systems, equipment, and personnel, consistent with providing low-cost power options for DEP's customers. Equipment inspection and maintenance outages are generally scheduled during the spring and fall months when customer demand is reduced due to milder temperatures. These outages are well-planned and executed with the primary purpose of preparing the unit for reliable operation until the next planned outage to maximize value for customers.

Q. HOW DID DEP COST EFFECTIVELY DISPATCH THE DIVERSE MIX OF GENERATING UNITS DURING THE TEST PERIOD?

A. The Company's portfolio includes a diverse mix of units that, along with its nuclear capacity, allows DEP to meet the dynamics of customer load requirements in a logical and cost-effective manner. The addition of new CC units within the

Carolinas' portfolio in recent years has provided DEP with additional natural gas resources that feature state-of-the-art technology for increased efficiency and significantly reduced emissions. DEP also uses the Joint Dispatch Agreement with DEC, which allows generating resources for DEP and DEC to be dispatched as a single system to enhance dispatching the lowest cost resources available. The cost and operational characteristics of each unit generally determine the type of customer load situation (e.g., base and peak load requirements) that a unit would be called upon or dispatched to support.

Q. WHAT IS HEAT RATE, AND WHAT WAS THE HEAT RATE FOR DEP'S COAL-FIRED AND COMBINED CYCLE UNITS DURING THE TEST PERIOD?

A. Heat rate is a measure of the amount of thermal energy needed to generate a given amount of electric energy and is expressed as British thermal units ("Btu") per kilowatt-hour ("kWh"). A low heat rate indicates an efficient fleet that uses less heat energy from fuel to generate electrical energy. Over the test period, the Company's five coal units produced 22% of the Traditional/Renewable generation, with the average heat rate for the coal-fired units being 10,821 Btu/kWh. The most active coal-fired station during this period was Roxboro, providing 79% of the coal fleet production with an average heat rate of 11,022 Btu/kWh. During the test period, the Company's six combined cycle power blocks produced 70% of the Traditional/Renewables generation, with an average heat rate of 7,151 Btu/kWh.

Q. HOW MUCH GENERATION DID EACH TYPE OF TRADITIONAL/RENEWABLE GENERATING FACILITY PROVIDE FOR THE TEST PERIOD?

A. The Company's system generation was approximately 60.5 million MW hours ("MWhs") for the test period. The Traditional/Renewable fleet provided approximately 29.4 million MWHs, or approximately 49% of the total generation. As a percentage of the total system generation, approximately 10% was produced from coal fuel-fired stations, 34% of generation was produced from CC operations, 3% from CTs, 1% from hydro facilities, and 0.4% from solar.

Q. PLEASE DISCUSS THE OPERATIONAL RESULTS FOR DEP'S TRADITIONAL/RENEWABLES FLEET DURING THE TEST PERIOD.

A. The Company's generating units operated efficiently and reliably during the test period. The CC fleet produced approximately 20.7 million MWhs of power for the benefit of the customers during the test period. The CT fleet produced approximately 1.5 million MWhs of power during the test period with a starting reliability rate above 99%. The coal-fired steam fleet produced approximately 6.3 million MWhs of power during the same period.

The Company produced approximately 873,000 MWhs of renewable power during the test period. The Hydro fleet produced approximately 610,000 MWhs of power for our customers in the test period, led by Walters Hydro at over 300,000 MWhs of generation. Rounding out the portfolio, the Solar fleet produced approximately 260,000 MWhs of generation.

Q. PLEASE DISCUSS SIGNIFICANT OUTAGES OCCURRING AT DEP'S TRADITIONAL/RENEWABLES FACILITIES DURING THE TEST PERIOD.

A. In general, planned maintenance outages for all fossil and hydro units are scheduled for the spring and fall to maximize unit availability during periods of peak demand. Most units had at least one short, planned outage during this test period to inspect and maintain plant equipment.

In the first half of the test period, Smith Energy Complex performed a planned outage on CC power block 4 which included a major steam turbine inspection, a major steam turbine generator inspection and a borescope inspection. Smith Energy Complex also performed a separate planned outage on CT Unit 6 for advanced gas path peaker and control system upgrade. Mayo Unit 1 executed a planned outage to maintain turbine valves, perform various equipment inspections, and balance of plant scope.

In the second half of the test period, Roxboro Unit 4 performed a planned outage for major turbine rebuild, air heater basket replacement, and balance of plant scope. In addition, Roxboro Unit 3 and Unit 4 coordinated planned outages to perform the coal reclaim chute replacement. Roxboro Unit 3 outage scope also included boiler certificate and balance of plant scope.

Q. HOW DOES DEP ENSURE EMISSIONS REDUCTIONS FOR ENVIRONMENTAL COMPLIANCE?

A. The Company has installed pollution control equipment on coal-fired units, as well as new generation resources, to meet various current federal, state, and local

reduction requirements for NOx and SO2 emissions. The SCR technology that DEP currently operates on the coal-fired units uses ammonia or urea for NOx removal and the scrubber technology employed uses crushed limestone or lime for SO2 removal. Beginning April of 2022, Mayo Plant completed its transition from anhydrous ammonia to aqueous ammonia (19% solution of NH_3) for the reduction of NOX in its air emissions. Sodium Hydroxide, an additional reagent beyond those previously in use, is a reagent added to the aqueous ammonia for maximum NOx removal. The SCR equipment on power blocks 4 and 5 at Smith Energy Complex also utilizes aqueous ammonia for NOx removal.

Overall, the type and quantity of chemicals used to reduce emissions at the plants varies depending on the generation output of the unit, the chemical constituents in the fuel burned, and/or the level of emissions reduction required. The Company is managing the impacts, favorable or unfavorable, as a result of changes to the fuel mix and/or changes in coal burn and utilization of non-traditional coals. Overall, the goal is to effectively comply with emissions regulations and provide the optimal total-cost solution for operation of the unit. The Company will continue to leverage new technologies and chemicals to meet both present and future state and federal emissions requirements including the MATS rule. MATS chemicals that DEP may use in the future to reduce emissions include, but may not be limited to, activated carbon, mercury oxidation chemicals, and mercury re-emission prevention chemicals. Company witness Harrington provides the cost information for DEP's chemical use and forecast.

Q. DOES THAT CONCLUDE YOUR PRE-FILED DIRECT TESTIMONY?

A. Yes, it does.