PLACE: Dobbs Building, Raleigh, North Carolina

DATE: Tuesday, September 18, 2018

TIME: 9:30 a.m. - 9:40 a.m.

DOCKET NO: E-2, Sub 1173

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

IN THE MATTER OF:

Application of Duke Energy Progress, LLC, Pursuant to G.S. 62-133.2 and Commission Rule R8-55 Relating to Fuel and Fuel-Related Cost Adjustments for Electric Utilities.

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E X H I B I T S

P R O C E E D I N G S

CHAIRMAN FINLEY: Let's come to order, please. Good morning. My name is Edward Finley and with me this morning are Commissioners ToNola D. Brown-Bland, Jerry C. Dockham, James G. Patterson, Lyons Gray, Daniel G. Clodfelter and Charlotte Mitchell.

I now call for hearing Docket Number E-2, Sub 1173, which is the Application by Duke Energy Progress, Pursuant to G.S. 62-133.2 and Commission Rule R8-55 Relating to Fuel and Fuel-Related Charge Adjustments for Electric Utilities.

On June 20, 2018, Duke Progress filed its Application to adjust the fuel and fuel-related cost component of electric rates with the testimony and exhibits and workpapers of Kendra A. Ward, the testimony of Joseph Miller and Kelvin Henderson, and the testimony and exhibits of Eric Grant and Kenneth Church.

On July 2, 2017 -- that's 2018, the Commission issued its Order Scheduling Hearing, Requiring Filing of Testimony, Establishing Discovery Guidelines and Requiring Public Notice.

On August 29, 2018, the Public Staff filed a

Notice of Filing of the Affidavits of Jenny Li and Dustin Metz to the -- to be used as evidence at the hearing scheduled pursuant to -- scheduled for September 18, 2018.

Petitions to Intervene have been filed and granted to the North Carolina Sustainable Energy Association, the Carolina Industrial Group for Fair Utility Rates II, and the Carolina Utility Customers Association.

On September 10, 2018, Duke filed a motion requesting that their witnesses be excused from attending the expert witness hearing on this date and that the Commission accept Duke Energy Progress' Application for Fuel Charges Adjustments.

All parties have agreed to waive cross examination of the witnesses.

On September 2, 2018, the Commission ordered that the Applicant's witnesses be excused from appearing at the hearing and the testimony and exhibits of the witnesses be received into evidence.

Pursuant to the State Ethics Act, I remind members of the Commission of their duty to avoid conflicts of interest, and inquire whether any member has a known conflict of interest with regard to the

matters coming before the Commission this morning in this docket?

(No response)

There appear to be no conflicts, so we will proceed. And I call upon the parties to announce their appearances, beginning with the Applicant.

MR. KAYLOR: Thank you, Mr. Chairman. Members of the Commission, Robert Kaylor appearing on behalf of Duke Energy Progress.

MR. DWIGHT ALLEN: Mr. Chairman, Members of the Commission, my name is Dwight Allen also appearing on behalf of Duke Energy Progress.

MS. WARREN: Good morning, Chairman Finley and Commissioners. My name is Warren Hicks with the Law Firm of Bailey & Dixon appearing on behalf of Carolina Industrial Group for Fair Utility Rates II.

MR. PAGE: Good morning, Chairman Finley and Commissioners. I'm Robert Page representing Carolina Utility Customers Association.

MR. JOSEY: Chairman, Mr. -- Commissioners, my name is Robert Josey with the Public Staff. I'm representing the Using and Consuming Public.

MR. SMITH: Ben Smith with the North Carolina Sustainable Energy Association.

CHAIRMAN FINLEY: Mr. Josey, have you identified any public witnesses in the hearing room that wish to participate in this docket?

MR. JOSEY: We have not.

CHAIRMAN FINLEY: Are there any public witnesses who wish to testify in this docket in the hearing room?

(No response)

There appear to be no public witnesses that wish to be heard and so we will proceed with the Applicant.

MR. DWIGHT ALLEN: Thank you very much, Mr. Chairman. First, I would like to thank the Public Staff, and CIGFUR, and CUCA, and the North Carolina Sustainable Energy Association for agreeing to the admission of our testimony without cross examination. We appreciate their cooperation and the discussions we had with them.

The Company has filed a verified Application in this docket consisting of four pages. There is also a confidential Fuel Cost Recovery Rider attached to the Application. We would ask that both the verified Application and the confidential Fuel Cost Adjustment Rider be entered into evidence, please.

CHAIRMAN FINLEY: The Company's Application and the fuel -- confidential Fuel Rider attachment shall be entered into evidence.

(WHEREUPON, the Application of Duke Energy Progress, LLC, is admitted into evidence.)

(Confidential Fuel Cost Adjustment Rider is admitted on page 37 as Confidential Grant Exhibit 3.)

MR. DWIGHT ALLEN: Our first witness is Kendra A. Ward. Ms. Ward filed testimony consisting of 16 pages. We would ask that that testimony be copied into the record as if given orally from the stand.

CHAIRMAN FINLEY: Ms. Ward's 16 pages of testimony will be copied into the record as if given orally from the stand.

(WHEREUPON, the prefiled direct testimony of KENDRA A. WARD is copied into the record as if given orally from the stand.)

BEFORE THE NORTH CAROLINA UTILITIES COMMISSION

DOCKET NO. E-2, SUB 1173

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 KENDRA A. WARD FOR DUKE ENERGY PROGRESS, LLC**

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Kendra A. Ward. My business address is 550 South Tryon Street, Charlotte, North Carolina.

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

A. I am a Rates Manager supporting both Duke Energy Carolinas, LLC ("DEC") and Duke Energy Progress, LLC ("DEP" or the "Company").

Q. PLEASE SUMMARIZE YOUR EDUCATION AND PROFESSIONAL QUALIFICATIONS.

A. I have a Bachelor of Arts degree in Political Science and Economics from the University of North Carolina at Chapel Hill and a Masters in Accounting from Appalachian State University. I am a certified public accountant licensed in the State of North Carolina. I began my career in 2004 with Cherry, Bekaert & Holland, LLP (now known as Cherry Bekaert, LLP) as a staff auditor. From 2006 until 2013 I held various financial accounting and reporting roles at Cherry, Bekaert, LLP; Wachovia Bank (now known as Wells Fargo) and The Shaw Group, Inc. (now known as CB&I). In 2013, I started at Duke Energy as Lead Accounting Analyst and held a variety of positions in the finance organization. I joined the Rates Department in 2016 as Manager, Rates and Regulatory Filings.

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

A. Yes. I submitted testimony in DEP's fuel and fuel-related cost recovery proceedings in Docket No. E-2, Sub 1146.

Q. ARE YOU FAMILIAR WITH THE ACCOUNTING PROCEDURES AND BOOKS OF ACCOUNT OF DEP?

A. Yes. Duke Energy Progress' books of account follow the uniform classification of accounts prescribed by the Federal Energy Regulatory Commission ("FERC").

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. The purpose of my testimony is to present the information and data required by North Carolina General Statutes ("N.C. Gen. Stat.") § 62-133.2(c) and (d) and Commission Rule R8-55, as set forth in Ward Exhibits 1 through 8, along with supporting workpapers. The test period used in supplying this information and data is the period April 1, 2017 through March 31, 2018 ("test period"), and the billing period is December 1, 2018 through November 30, 2019 ("billing period").

Q. WHAT IS THE SOURCE OF THE ACTUAL INFORMATION AND DATA FOR THE TEST PERIOD?

A. Actual test period kilowatt hour ("kWh") generation, kWh sales, fuel-related revenues, and fuel-related expenses were taken from the Company's books and records. These books, records, and reports of the Company are subject to review by the regulatory agencies that regulate the Company's electric rates.

In addition, independent auditors perform an annual audit to provide assurance that, in all material respects, internal accounting controls are operating effectively and the Company's financial statements are accurate.

Q. WERE WARD EXHIBITS 1 THROUGH 8 PREPARED BY YOU OR AT YOUR DIRECTION AND UNDER YOUR SUPERVISION?

A. Yes, these exhibits were either prepared by me or at my direction and under my supervision, and consist of the following:

Exhibit 1: Summary Comparison of Fuel and Fuel-Related Costs Factors.

Exhibit 2:

Schedule 1: Fuel and Fuel-Related Costs Factors - reflecting a 94.1% proposed nuclear capacity factor and projected billing period megawatt hour ("MWh") sales.

Schedule 2: Fuel and Fuel-Related Costs Factors - reflecting a 94.1% nuclear capacity factor and normalized test period sales.

Schedule 3: Fuel and Fuel-Related Costs Factors - reflecting an 90.0% North American Electric Reliability Corporation ("NERC") five-year national weighted average nuclear capacity factor for comparable units and projected billing period MWh sales.

Exhibit 3:

Page 1: Calculation of the Proposed Composite Experience Modification Factor ("EMF") rate.

Page 2: Calculation of the EMF for residential customers.

Page 3: Calculation of the EMF for small general service customers.

Page 4: Calculation of the EMF for medium general service customers.

Page 5: Calculation of the EMF for large general service customers.

Page 6: Calculation of the EMF for lighting customers.

Exhibit 4: MWh Normalized Sales, Fuel Revenue, and Fuel and Fuel-Related Expense, as well as System Peak for the test period.

Exhibit 5: Nuclear Capacity Ratings.

Exhibit 6: Calculation of Fuel EMF Deficiency Rates.

Exhibit 7: March 2018 Monthly Fuel Reports.

1) March 2018 Monthly Fuel Report required by NCUC Rule R8-52.

2) March 2018 Monthly Base Load Power Plant Performance Report required by NCUC Rule R8-53.

Exhibit 8: Proposed Fuel EMF Deficiency Rider FED-1.

Q. PLEASE EXPLAIN WHAT IS SHOWN ON WARD EXHIBIT 1.

A. Ward Exhibit 1 presents a summary of fuel and fuel-related cost factors, including the current fuel and fuel-related cost factors, the fuel and fuel-related cost factors using the NERC five-year average nuclear capacity factor using projected billing period sales, the fuel and fuel-related cost factors using the proposed capacity factor and normalized test period sales, and the proposed fuel and fuel-related cost factors. Exhibit 1 also shows the fuel EMF deficiency rates.

Q. WHAT FUEL AND FUEL RELATED COST FACTORS DOES DEP PROPOSE FOR INCLUSION IN RATES FOR THE BILLING PERIOD?

A. The Company proposes that fuel and fuel-related costs factors shown in the table below be reflected in rates during the billing period. The factors that DEP proposes in this proceeding incorporate a 94.1% nuclear capacity factor as testified to by Company witness Henderson, projected fossil fuel costs as testified to by Company witness Grant, projected nuclear fuel costs as testified to by Company witness

Church, and projected reagents costs as testified to by Company witness Miller. The components of the proposed fuel and fuel-related cost factors by customer class, as shown on Ward Exhibit 1 in cents per kWh ("cents/kWh"), are:

	Residential	Small General Service	Medium General Service	Large General Service	Lighting
	cents/KWh	cents/KWh	cents/KWh	cents/KWh	cents/KWh
Proposed Fuel and Fuel Related Costs cents/kWh	2.311	2.556	2.477	1.757	2.251
EMF Increment/(Decrement) cents/kWh	0.575	0.363	0.343	1.038	0.885
EMF Interest Decrement cents/kWh	-	-	-	-	-
Net Fuel and Fuel Related Costs Factors cents/kWh	2.886	2.919	2.820	2.795	3.136

Q WHAT IS THE IMPACT TO CUSTOMERS' BILLS IF THE PROPOSED FUEL AND FUEL-RELATED COST FACTORS ARE APPROVED BY THE COMMISSION?

A. If the proposed fuel and fuel-related cost factors are approved, there will be a 6.4% increase, on average, in customers' bills. The table below shows both the proposed and existing fuel and fuel-related cost factors (without regulatory fee).

	Residential	Small General Service	Medium General Service	Large General Service	Lighting
	cents/KWh	cents/KWh	cents/KWh	cents/KWh	cents/KWh
Proposed Factors cents/kWh	2.886	2.919	2.820	2.795	3.136
Current Factors cents/kWh	2.179	2.121	2.258	2.417	1.657

Q. WHAT ARE THE KEY DRIVERS IMPACTING THE PROPOSED FUEL AND FUEL-RELATED COSTS FACTOR?

A. The largest component of the increase is the collection of $224.3 million of under-collected fuel costs related to the EMF increment, in contrast to the $10.9 million of over-collected fuel costs and interest included in the existing EMF decrement.

Q. HOW DOES DEP DEVELOP THE FUEL FORECASTS FOR ITS GENERATING UNITS?

A. For this filing, DEP used an hourly dispatch model in order to generate its fuel forecasts. This hourly dispatch model considers the latest forecasted fuel prices, outages at the generating units based on planned maintenance and refueling schedules, forced outages at generating units based on historical trends, generating unit performance parameters, and expected market conditions associated with power purchases and off-system sales opportunities. In addition, the model dispatches DEP's and DEC's generation resources with the joint dispatch optimizing the generation fleets of DEP and DEC.

Q. PLEASE EXPLAIN WHAT IS SHOWN ON WARD EXHIBIT 2, SCHEDULES 1, 2, AND 3 INCLUDING THE NUCLEAR CAPACITY FACTORS.

A. Exhibit 2 is divided into three schedules. Schedule 1 sets forth the determination of the prospective fuel and fuel-related costs. The calculation uses the nuclear capacity factor of 94.1% as explained by Company witness Henderson in his testimony, and provides the forecasted MWh sales for the billing period on which system generation and costs are based. Schedule 2 also uses the proposed capacity factor of 94.1% along with normalized test period kWh generation, as prescribed by NCUC Rule R8-55(e)(3), which requires the use of the methodology adopted by the Commission in the Company's last general rate case.

The Capacity factor shown on Schedule 3 is prescribed in NCUC Rule R8-55(d)(1). The normalized five-year national weighted average NERC nuclear capacity factor is 90.0%. This capacity factor is based on the 2012 through 2016

data reported in the NERC's Generating Unit Statistical Brochure ("NERC Brochure") for comparable units. A projected billing period kWh generation was also used for Schedule 3 as required by NCUC Rule R8-55(d)(1).

Page 2 of Exhibit 2, Schedules 1, 2, and 3, presents the calculation of the proposed fuel and fuel-related costs factors by customer class resulting from the allocation of renewable, cogeneration, and qualifying facility capacity costs by customer class on the basis of production plant as described in paragraph 26 of the Order in the Company's general rate case in Docket No. E-2, Sub 1023.

Page 3 of Exhibit 2, Schedules 1, 2, and 3 shows the allocation of system fuel costs to North Carolina retail jurisdiction, and the calculation of DEP's proposed fuel and fuel-related cost factors for the residential, small general service, medium general service, large general service, and lighting classes, exclusive of regulatory fee, using the uniform percentage average bill adjustment method.

Q. PLEASE SUMMARIZE THE METHOD USED TO ADJUST TEST PERIOD KWH GENERATION IN WARD EXHIBIT 2 SCHEDULES 2 AND 3.

A. The methodology used by DEP in its most recent general rate case for determining generation mix is based upon generation dispatch modeling used on Ward Exhibit 2, Schedule 1. For purposes of this filing, as a proxy for generation dispatch modeling, Ward Exhibit 2 Schedules 2 and 3 adjust the coal generation produced by the dispatch model. For example, on Exhibit 2, Schedule 2, which is based on the proposed capacity factor and normalized test period sales, DEP decreased the level of coal generation to account for the difference between forecasted generation and normalized test period generation.

On Exhibit 2, Schedule 3, which is based on the NERC capacity factor, DEP increased the level of coal generation to account for the decrease in nuclear generation. The decrease in nuclear generation results from assuming an 90.0% NERC nuclear capacity factor compared to the proposed 94.1% nuclear capacity factor.

Q. DID YOU DETERMINE THAT DEP'S ANNUAL INCREASE IN THE AGGREGATE AMOUNT OF THE COSTS IDENTIFIED IN SUBSECTIONS (4), (5), (6), (10) AND (11) OF N.C. GEN. STAT. § 62-133.2(A1) DID NOT EXCEED 2.5% OF ITS NC RETAIL GROSS REVENUES FOR 2017, AS REQUIRED BY N.C. GEN. STAT. § 62-133.2(A2)?

A. The Company's analysis shows that the annual increase in the amount recoverable under the relevant sections of the statute exceeded 2.5% of DEP's gross revenues for the NC retail jurisdiction for the preceding calendar year. A large portion of the forecasted increase in costs relates to the new subsection (10) of the statute, which provides for inclusion in fuel costs of total delivered costs associated with purchases from qualifying facilities under PURPA. As a result of this exceedance, $57,234,383 of DEP's forecasted costs for purchased power for the billing period will not be included in the proposed fuel billing factors in this proceeding as shown on Ward Exhibit 2, Schedule 1, Page 3. In future fuel proceedings, the forecasted costs will be trued up to actual costs incurred. The resulting true-up amounts will be part of the evaluation of the 2.5% cap. In addition, a reduction in the forecasted purchased power was also reflected in the fuel and fuel-related costs factors based on normalized sales on Exhibit 2, Schedule 2, Page 3 and fuel and fuel-related costs factors based on the NERC five-year national weighted average nuclear capacity

factor on Exhibit 2, Schedule 3, Page 3.

Q. WARD EXHIBIT 3 SHOWS THE CALCULATION OF THE TEST PERIOD (OVER)/UNDER RECOVERY BALANCE AND THE EMF RATE. HOW DID ACTUAL FUEL EXPENSES COMPARE WITH FUEL REVENUE DURING THE TEST PERIOD?

A. Ward Exhibit 3, Pages 1 through 6, demonstrates that for the test period, the Company experienced a net under-recovery of $182.5 million for the combined customer classes. When adjusted for the previously deferred under-recovery of $41.9 million, discussed later in my testimony, the total under-recovery amount requested in this proceeding is $224.3 million. The table below shows the breakdown of this total amount by customer class.

	Residential cents/KWh	Small General Service cents/KWh	Medium General Service cents/KWh	Large General Service cents/KWh	Lighting cents/KWh
EMF (over)/ under Collection of Fuel - ($ million)	$ 89.8	$ 6.9	$ 37.8	$ 86.6	$ 3.2
EMF Interest Costs ($ million)	$ -	$ -	$ -	$ -	$ -

The test period (over)/under collection amount was determined each month by comparing the amount of fuel revenue collected for each class to actual fuel and fuel-related costs incurred by class. The revenue collected is based on actual monthly sales for each class. Actual fuel and fuel-related costs incurred were first allocated to NC retail jurisdiction based on jurisdictional sales, with consideration given to any fuel and fuel-related costs or benefits that should be directly assigned. The North Carolina retail amount is further allocated among customer classes as follows: capacity-related purchased power costs were allocated among customer classes based on production plant allocators from DEP's cost of service study. All other fuel and fuel-related costs were allocated among customer classes based on

allocation factors determined using the uniform percentage average bill adjustment method used in the previous fuel proceeding. The under-recovered amounts above include the deferred under-recoverd balance of $41.9 million carried forward from the prior year filing, E-2, Sub 1146. The table below shows the breakdown of this amount by customer class.

	Residential	Small General Service	Medium General Service	Large General Service	Lighting
	cents/KWh	cents/KWh	cents/KWh	cents/KWh	cents/KWh
EMF (over)/ under Collection of PY Deferred Fuel - ($ million)	$ 21.3	$ 1.0	$ -	$ 17.8	$ 1.8

Q. HAS DEP HANDLED THE DEFERRED UNDER-RECOVERED BALANCE FROM THE PRIOR YEAR FILING (E-2, SUB 1146) AS STATED IN TESTIMONY IN THAT DOCKET?

A. Yes. In my supplemental testimony in Docket E-2, Sub 1146 I stated the following: "In its 2018 fuel proceeding, DEP will follow its normal practices to compute the EMF component of its fuel rates to address any over or under collection of the fuel and fuel-related cost for the test period of the 2018 case. The deferred amount of $41.9 million, broken down by customer class, will be added into the proposed 2018 EMF amounts for each customer class and billed in the rate period of December 2018 – November 2019. DEP will also follow its normal practices to propose the appropriate fuel and fuel-related costs for the rate period of its 2018 fuel case, which will be unaffected by the deferred recovery of the $41.9 million." In this proceeding DEP is including the deferred under-recovered amounts for the residential, small general service, large general service, and lighting classes in Ward Exhibit 3, Pages 1 through 6 as part of the EMF rate.

Q. PLEASE EXPLAIN WHAT IS SHOWN ON WARD EXHIBIT 4.

A. As required by NCUC Rule R8-55(e)(1) and (e)(2), Ward Exhibit 4 sets forth test period actual MWh sales, the customer growth MWh adjustment, and the weather MWh adjustment. Test period MWh sales were normalized for weather using a 30-year period, as used in DEP's last general rate case (Docket No. E-2, Sub 1142) and fuel and fuel-related cost recovery proceeding (Docket No. E-2, Sub 1146). Customer growth was determined using regression analysis for residential, small general service, and lighting classes, and a customer-by-customer analysis for medium and large general service customers. Ward Exhibit 4 also sets forth actual test period fuel-related revenue and fuel expense on a total Company basis and for North Carolina Retail. Finally, Ward Exhibit 4 shows the test period peak demand for the system and for North Carolina Retail customer classes.

Q. PLEASE IDENTIFY WHAT IS SHOWN ON WARD EXHIBIT 5.

A. Ward Exhibit 5 sets forth the capacity ratings for each of DEP's nuclear units, in compliance with Rule R8-55(e)(12).

Q. PLEASE EXPLAIN WHAT IS SHOWN ON WARD EXHIBIT 6.

A. Ward Exhibit 6 calculates the rate to recover a revenue deficiency related to a fuel EMF that expired and was removed from billed rates on November 30, 2017, but was inadvertently included in the calculation of the compliance rates filed effective March 16, 2018. The rate calculated in Ward Exhibit 6 will recover the undercollection without interest for the time period March 16, 2018 – May 31, 2018. Ward Exhibit 8 provides the Company's proposed Fuel EMF Deficiency Rider, which will remain in effect for a 12-month period expiring on and after Novmeber 30, 2019. Starting June 1, 2018, there will be corrected compliance tariffs that

remove the expired, prior-year fuel EMF going forward.

Q. DO YOU BELIEVE DEP'S FUEL AND FUEL-RELATED COSTS INCURRED IN THE TEST YEAR ARE REASONABLE?

A. Yes. As shown on Ward Exhibit 7, DEP's test year actual fuel and fuel-related costs were 2.704 cents/kWh. Key factors in DEP's ability to maintain lower fuel and fuel-related rates include its diverse generating portfolio mix of nuclear, coal, natural gas, and hydro; lower natural gas and coal prices; the capacity factors of its nuclear fleet; and fuel procurement strategies that mitigate volatility in supply costs. Other key factors include the combination of DEP's and DEC's respective skills in procuring, transporting, managing and blending fuels, procuring reagents, and the increased and broader purchasing ability of the combined Company, as well as the joint dispatch of DEP's and DEC's generation resources. Company witness Henderson discusses the performance of DEP's nuclear generation fleet, and Company witness Miller discusses the performance of the fossil/hydro/solar fleet, as well as the chemicals that DEP uses to reduce emissions. Company witness Grant discusses fossil fuel procurement strategies and merger fuel-related savings, and Company witness Church discusses DEP's nuclear fuel costs and procurement strategies.

Q. IN DEVELOPING THE PROPOSED FUEL AND FUEL-RELATED COST FACTORS, WERE THE FUEL COSTS ALLOCATED IN ACCORDANCE WITH N.C. GEN. STAT. § 62-133.2(A2)?

A. Yes, the costs for which statutory guidance is provided have been allocated in compliance with N.C. Gen. Stat. § 62-133.2(a2). These costs are described in subsections (4), (5), (6), (10) and (11) of N.C. Gen. Stat. § 62-133.2(a1) and the allocation methods are specified in paragraph 31 of DEP's last general rate case

Order in Docket No. E-2, Sub 1142. Capacity-related purchased power costs in subsections (5), (6) and (10) are allocated based upon the production plant allocator from the latest annual cost of service study, using the cost of service methodology approved in DEP's most recent rate case, Docket No. E-2, Sub 1142. Subsection (4) costs and non-capacity costs in subsections (6) and (10) are allocated in the same manner as all other fuel and fuel-related costs, using a uniform percentage average bill adjustment method.

Q. HOW ARE THE OTHER FUEL COSTS ALLOCATED FOR WHICH THERE IS NO SPECIFIC GUIDANCE IN N.C. GEN. STAT. § 62-133.2(A2)?

A. System costs are allocated to NC retail jurisdiction based on jurisdictional sales, with consideration given to any fuel and fuel-related costs or benefits that should be directly assigned. Costs are further allocated among customer classes using the uniform percentage average bill adjustment methodology in setting fuel rates in this fuel proceeding. DEP proposes to use the same uniform percentage average bill adjustment methodology to adjust its fuel rates to reflect a proposed increase in fuel and fuel-related costs as it did in its 2017 fuel and fuel-related cost recovery proceeding in Docket No. E-2, Sub 1146.

Q. PLEASE EXPLAIN THE CALCULATION OF THE UNIFORM PERCENTAGE AVERAGE BILL ADJUSTMENT METHOD SHOWN ON WARD EXHIBIT 2, PAGE 3 OF SCHEDULES 1, 2, AND 3.

A. Ward Exhibit 2, Page 3 of Schedule 1 shows DEP's proposed fuel and fuel-related cost factors for the residential, small general service, medium general service, large general service, and lighting classes, exclusive of regulatory fee. The uniform bill percentage change of 6.4% was calculated by dividing the fuel and fuel-related cost

increase of $226 million for North Carolina retail by the normalized annual North Carolina retail revenues at current rates of $3.5 billion. The cost increase of $226 million was determined by comparing the total proposed fuel rate per kWh to the total fuel rate per kWh currently being collected from customers, and multiplying the resulting increase in fuel rate per kWh by projected North Carolina retail kWh sales for the billing period. The proposed fuel rate per kWh equals the sum of: (1) the rate necessary to recover projected period fuel costs; (2) the proposed composite EMF increment/(decrement) rate; and (3) the proposed EMF decrement interest rate (as computed on Ward Exhibit 3, page 1). Ward Exhibit 2, Page 3 of Schedules 2 and 3 uses the same calculation, but with the methodology as prescribed by NCUC Rule R8-55(e)(3) and NCUC Rule R8-55(d)(1), respectively.

Q. HOW ARE SPECIFIC FUEL AND FUEL-RELATED COST FACTORS FOR EACH CUSTOMER CLASS DERIVED FROM THE UNIFORM PERCENT ADJUSTMENT COMPUTED ON WARD EXHIBIT 2, PAGE 3 OF SCHEDULES 1, 2, AND 3?

A. In each of Ward Exhibit 2, Page 3 of Schedules 1, 2, and 3, the equal percent increase for each customer class is applied to current annual revenues by customer class to determine a dollar amount of increase for each customer class. The dollar increase is divided by the projected billing period sales for each class to derive a cents/kWh increase. The current total fuel and fuel-related cost factors for each class are adjusted by the proposed cents/kWh increase or decrease to get the proposed total fuel and fuel-related cost factors. The proposed total fuel factors are then separated into the prospective and EMF components by subtracting the EMF components for each customer class (EMF components computed on Ward Exhibit

3, Page 2, 3, 4, 5, and 6) to derive the prospective rate component for each customer class. This breakdown of projected fuel and fuel-related cost factor and EMF increment/ (decrement) is shown on Ward Exhibit 2, Page 2 of Schedules 1, 2, and 3.

Q. DO THE PROPOSED RATES INCLUDE THE NET GAIN OR LOSS ON THE SALE OF BY-PRODUCTS FOR BENEFICIAL REUSE FROM THE SUTTON COAL PLANT?

A. No. All net gains or losses related to the sale of by-products for beneficial reuse from the Sutton coal plant were removed from the fuel filing in compliance with the order in DEP's general rate case, Docket E-2, Sub 1142.

Q. HAS THE COMPANY FILED WORKPAPERS SUPPORTING THE CALCULATIONS, ADJUSTMENTS, AND NORMALIZATIONS AS REQUIRED BY NCUC RULE R8-55(E)(11)?

A. Yes. The work papers supporting the calculations, adjustments, and normalizations are included with the filing in this proceeding.

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

A. Yes, it does.

MR. DWIGHT ALLEN: Ms. Ward also filed as part of her testimony eight exhibits. Some of those exhibits were one-page exhibits. Exhibit 2 consisted of three schedules consisting of multiple pages to those schedules. Exhibit 3 consisted of six pages. Exhibit 7 had a series of schedules, 10 schedules actually; Schedule 3 had four pages and then had an additional four pages listed as Schedule B; Schedule 5 had two pages, and Schedule 6 had three pages, and Schedule 10 had six pages. And we would ask that her exhibits, including the Schedules and the multiple page exhibits, that they all be introduced into evidence in their entirety.

CHAIRMAN FINLEY: All of Ms. Ward's exhibits and schedules and so forth that has been recounted by Mr. Allen are admitted into evidence.

(WHEREUPON, Ward Exhibits 1 - 8, including Schedules are admitted into evidence.)

MR. DWIGHT ALLEN: Ms. Ward also had attached to her workpapers -- or a series of workpapers, and there were actually 14 of those workpapers. In addition to the 14, there was also Workpapers 7A and 7B. Workpaper Number 10 consisted

of two pages. The rest of them -- well, Workpaper Number 14 also had A and B. So we would ask that all of her workpapers from number 1 through number 14B also be entered into evidence.

CHAIRMAN FINLEY: Ms. Ward's Workpapers 1 through 14 are admitted into evidence.

(WHEREUPON, Ward Workpapers 1 - 14 are admitted into evidence.)

MR. DWIGHT ALLEN: The next witness is Eric S. Grant. Mr. Grant submitted testimony on fossil fuel purchasing consisting of eight pages. And we would ask that Mr. Grant's testimony be copied into the record as if given orally from the witness stand.

CHAIRMAN FINLEY: Mr. Grant's eight pages of prefiled testimony will be copied into the record as if given orally from the stand.

(WHEREUPON, the prefiled direct testimony of ERIC S. GRANT is copied into the record as if given orally from the stand.)

BEFORE THE NORTH CAROLINA UTILITIES COMMISSION

DOCKET NO. E-2, SUB 1173

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 ERIC S. GRANT FOR DUKE ENERGY PROGRESS, LLC**

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Eric S. Grant. My business address is 526 South Church Street, Charlotte, North Carolina 28202.

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

A. I am Vice President, Fuels & Systems Optimization for Duke Energy Corporation ("Duke Energy"). In that capacity, I lead the organization responsible for the purchase and delivery of coal, natural gas, fuel oil, and reagents to Duke Energy's regulated generation fleet, including Duke Energy Progress, LLC ("Duke Energy Progress," "DEP," or the "Company") and Duke Energy Carolinas, LLC ("DEC") (collectively, the "Companies"). In addition, I manage the fleet's power trading, system optimization, energy supply analytics, and contract administration functions.

Q. PLEASE SUMMARIZE YOUR EDUCATIONAL AND PROFESSIONAL EXPERIENCE.

A. I have a Bachelor of Science degree in Electrical Engineering from North Carolina State University. I joined Progress Energy in 1990, as an engineer in the Nuclear Engineering Department. From 2000-2006, I held a variety of management positions within Progress Energy's System Planning and Operations Department, including managing system operations for what is now DEP and Duke Energy Florida (DEF). In 2007, I became General Manager for the DEF Combined Cycle and Combustion Turbine Generation Fleet. I joined Duke Energy in July 2012 as the Managing Director of System Optimization, the position which I held until April 2017. I assumed my current position in April 2017. I am also a licensed professional engineer in the state of North

Carolina.

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

A. Yes. I testified in support of DEC's 2017 fuel and fuel-related cost recovery application in Docket No. E-7, Sub, 1163.

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

A. The purpose of my testimony is to describe DEP's fossil fuel purchasing practices, provide actual fossil fuel costs for the period April 1, 2017 through March 31, 2018 ("test period") versus the period April 1, 2016 through March 31, 2017 ("prior test period"), and describe changes projected for the billing period of December 1, 2018 through November, 30 2019 ("billing period").

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

A. Yes. These exhibits were prepared at my direction and under my supervision, and consist of Grant Exhibit 1, which summarizes the Company's Fossil Fuel Procurement Practices, Grant Exhibit 2, which summarizes total monthly natural gas purchases and monthly contract and spot coal purchases for the test period and prior test period, and Grant Exhibit 3, which summarizes the fuels related transactional activity between DEC and Piedmont Natural Gas Company, Inc. ("Piedmont") for spot commodity transactions during the test period, as required by the Merger Agreement between Duke Energy and Piedmont, of which DEP

receives an allocated portion based on its pro rata share of the overall gas plant burns for the respective month.

Q. HOW DOES DEP OPERATE ITS PORTFOLIO OF GENERATION ASSETS TO RELIABLY AND ECONOMICALLY SERVE ITS CUSTOMERS?

A. Both DEP and DEC utilize the same process to ensure that the assets of the Companies are reliably and economically committed and dispatched to serve their respective customers. To that end, both companies consider numerous factors such as the latest forecasted fuel prices, transportation rates, planned maintenance and refueling outages at the generating units, generating unit performance parameters, and expected market conditions associated with power purchases and off-system sales opportunities in order to determine the most economic and reliable means of serving their respective customers.

Q. PLEASE DESCRIBE THE COMPANY'S DELIVERED COST OF COAL AND NATURAL GAS DURING THE TEST PERIOD.

A. The Company's average delivered cost of coal per ton for the test period was $80.82 per ton, compared to $80.26 per ton in the prior test period, representing an increase of approximately 1%. This includes an average transportation cost of $29.42 per ton in the test period, compared to $28.03 per ton in the prior test period, representing an increase of approximately 5%. The Company's average price of gas purchased for the test period was $4.68 per Million British Thermal Units ("MMBtu"), compared to $4.00 per MMBtu in the prior test period, representing an increase of approximately 17%. The cost of gas is inclusive of gas supply, transportation, storage and financial hedging.

DEP's coal burn for the test period was 3.9 million tons, compared to a coal burn of 4.7 million tons in the prior test period, representing a decrease of approximately 16%. The Company's natural gas burn for the test period was 169.4 million MMBtu, compared to a gas burn of 170.0 million MMBtu in the prior test period, representing a decrease of approximately 0.4%. The primary contributing factors were changes in (1) weather driven demand, and (2) commodity prices.

Q. PLEASE DESCRIBE THE LATEST TRENDS IN COAL AND NATURAL GAS MARKET CONDITIONS.

A. Coal markets continue to be in a state of flux due to a number of factors, including: (1) uncertainty around proposed, imposed, and stayed U.S. Environmental Protection Agency ("EPA") regulations for power plants; (2) continued abundant natural gas supply and storage resulting in lower natural gas prices, which has lowered overall domestic coal demand; (3) continued changes in global market demand for both steam and metallurgical coal; (4) uncertainty surrounding regulations for mining operations; and (5) tightening supply as bankruptcies, consolidations and company reorganizations have allowed coal suppliers to restructure and settle into new, lower on-going production levels.

With respect to natural gas, the nation's natural gas supply has grown significantly over the last several years and producers continue to enhance production techniques, enhance efficiencies, and lower production costs. Natural gas prices are reflective of the dynamics between supply and demand factors, and in the short term, such dynamics are influenced primarily by seasonal weather demand and overall storage inventory balances. In addition,

there continues to be growth in the natural gas pipeline infrastructure needed to serve increased market demand. However, pipeline infrastructure permitting and regulatory process approval efforts are taking longer due to increased reviews and interventions, which can delay and change planned pipeline construction and commissioning timing.

Over the longer term planning horizon, natural gas supply is projected to continue to increase along with the needed pipeline infrastructure to move the growing supply to meet demand related to power generation, liquefied natural gas exports and pipeline exports to Mexico.

Q. WHAT ARE THE PROJECTED COAL AND NATURAL GAS CONSUMPTIONS AND COSTS FOR THE BILLING PERIOD?

A. DEP's current coal burn projection for the billing period is 2.3 million tons, compared to 3.9 million tons consumed during the test period. DEP's billing period projections for coal generation may be impacted due to changes from, but not limited to, the following factors: (1) delivered natural gas prices versus the average delivered cost of coal; (2) volatile power prices; and (3) electric demand. Combining coal and transportation costs, DEP projects average delivered coal costs of approximately $81.65 per ton for the billing period compared to $80.82 per ton in the test period. This cost, however, is subject to change based on, but not limited to, the following factors: (1) exposure to market prices and their impact on open coal positions; (2) the amount of non-Central Appalachian coal DEP is able to consume; (3) performance of contract deliveries by suppliers and railroads which may not occur despite DEP's strong contract compliance monitoring process; (4) changes in transportation rates; and (5) potential

additional costs associated with suppliers' compliance with legal and statutory changes, the effects of which can be passed on through coal contracts.

DEP's current natural gas burn projection for the billing period is approximately 171.8 million MMBtu, which is an increase from the 169.4 million MMBtu consumed during the test period. The current average forward Henry Hub price for the billing period is $2.81 per MMBtu, compared to $3.03 per MMBtu in the test period. Projected natural gas burn volumes will vary based on factors such as, but not limited to, changes in actual delivered fuel costs and weather driven demand.

Q. WHAT STEPS IS DEP TAKING TO MANAGE PORTFOLIO FUEL COSTS?

A. The Company continues to maintain a comprehensive coal and natural gas procurement strategy that has proven successful over the years in limiting average annual fuel price changes while actively managing the dynamic demands of its fossil fuel generation fleet in a reliable and cost effective manner. With respect to coal procurement, the Company's procurement strategy includes (1) having an appropriate mix of term contract and spot purchases for coal; (2) staggering coal contract expirations in order to limit exposure to forward market price changes; and (3) diversifying coal sourcing as economics warrant, as well as working with coal suppliers to incorporate additional flexibility into their supply contracts. The Company conducts spot market solicitations throughout the year to supplement term contract purchases, taking into account changes in projected coal burns and existing coal inventory levels.

The Company has implemented natural gas procurement practices that

include periodic Request for Proposals and shorter-term market engagement activities to procure and actively manage a reliable, flexible, diverse, and competitively priced natural gas supply. These procurement practices include contracting for volumetric optionality in order to provide flexibility in responding to changes in forecasted fuel consumption. Lastly, DEP continues to maintain a short-term financial natural gas hedging plan to manage fuel cost risk for customers via a disciplined, structured execution approach.

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

A. Yes, it does.

MR. DWIGHT ALLEN: Mr. Grant had three exhibits attached to his testimony. Exhibits 1 and 2 were exhibits consisting of two pages each. Grant Confidential Exhibit Number 3 is a confidential exhibit. And we would ask that those three exhibits also be entered in to evidence in their entirety.

CHAIRMAN FINLEY: Mr. Grant's three exhibits are entered into evidence, and with Exhibit 3 marked confidential.

(WHEREUPON, Grant Exhibits 1, 2 and Confidential Exhibit 3 are admitted into evidence.)

MR. DWIGHT ALLEN: We also had the testimony of Mr. Joseph A. Miller consisting of 12 pages. We would ask that Mr. Miller's testimony be copied into the record as if given orally from the witness stand.

CHAIRMAN FINLEY: Mr. Miller's testimony of 12 pages is copied into the record as though given orally from the stand.

(WHEREUPON, the prefiled direct testimony of JOSEPH A. MILLER is copied into the record as if given orally from the stand.)

BEFORE THE NORTH CAROLINA UTILITIES COMMISSION

DOCKET NO. E-2, SUB 1173

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 JOSEPH A. MILLER, JR. FOR DUKE ENERGY PROGRESS, LLC**

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Joseph A. Miller, Jr. and my business address is 526 South Church Street, Charlotte, North Carolina 28202.

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

A. I am Vice President of Central Services for Duke Energy Business Services, LLC ("DEBS"). DEBS is a service company subsidiary of Duke Energy Corporation ("Duke Energy") that provides services to Duke Energy and its subsidiaries, including Duke Energy Progress, LLC ("DEP" or the "Company") and Duke Energy Carolinas, LLC ("DEC").

Q. PLEASE BRIEFLY DESCRIBE YOUR EDUCATIONAL AND PROFESSIONAL BACKGROUND.

A. I graduated from Purdue University with a Bachelor of Science degree in mechanical engineering. I also completed twelve post graduate level courses in Business Administration at Indiana State University. My career began with Duke Energy (d/b/a Public Service of Indiana) in 1991 as a staff engineer at Duke Energy Indiana's Cayuga Steam Station. Since that time, I have held various roles of increasing responsibility in the generation engineering, maintenance, and operations areas, including the role of station manager, first at Duke Energy Kentucky's East Bend Steam Station, followed by Duke Energy Ohio's Zimmer Steam Station. I was named General Manager of Analytical and Investments Engineering in 2010, and became General Manager of Strategic Engineering in 2012 following the merger between Duke Energy and Progress Energy, Inc. I became the Vice President of Central Services in 2014.

Q. WHAT ARE YOUR DUTIES AS VICE PRESIDENT OF CENTRAL SERVICES?

A. In this role, I am responsible for providing engineering, environmental compliance planning, generation and regulatory strategy, technical services, and maintenance services, for Duke Energy's fleet of fossil, hydroelectric, and solar (collectively, "Fossil/Hydro/Solar") facilities.

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

A. Yes. I have filed testimony before the North Carolina Utilities Commission ("Commission" or "NCUC") in DEP's 2016 and 2017 annual fuel and fuel-related cost recovery proceedings (Docket Nos. E-2, Subs 1107 and 1146), as well as DEC's 2017 and 2018 annual fuel and fuel-related cost recovery proceedings (Docket Nos. E-7, Subs 1129 and 1163).

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

A. The purpose of my testimony is to (1) describe DEP's Fossil/Hydro/Solar generation portfolio and changes made since the 2017 fuel cost recovery proceeding, as well as those expected in the near term, (2) discuss the performance of DEP's Fossil/Hydro/Solar facilities during the period of April 1, 2017 through March 31, 2018 (the "test period"), (3) provide information on significant Fossil/Hydro/Solar outages that occurred during the test period, and (4) provide information concerning environmental compliance efforts.

Q. PLEASE DESCRIBE DEP'S FOSSIL/HYDRO/SOLAR GENERATION PORTFOLIO.

A. The Company's Fossil/Hydro/Solar generation portfolio consists of 9,268 megawatts ("MWs") of generating capacity, made up as follows:

Coal-fired -	3,544 MWs
Combustion Turbines -	2,867 MWs
Combined Cycle -	2,568 MWs
Hydro -	227 MWs
Solar[1] -	62 MWs

The 3,544 MWs of coal-fired generation resources represent three generating stations and a total of seven units. These units are equipped with emission control equipment, including selective catalytic reduction ("SCR") equipment for removing nitrogen oxides ("NOx"), flue gas desulfurization ("FGD" or "scrubber") equipment for removing sulfur dioxide ("SO2"), and low NOx 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, thereby providing flexibility for DEP to procure the most cost-effective options for fuel supply.

The Company has a total of 33 simple cycle combustion turbine ("CT") units, the larger 14 of which provide 2,183 MWs. These 14 units are located at the

[1] This value represents the relative 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.

Asheville (NC), Darlington (SC), Smith Energy (NC), and Wayne County (NC) facilities, and are equipped with water injection and/or low NOx burners for NOx control. The 2,568 MWs shown above as "Combined Cycle " ("CC") represent four power blocks. The HF Lee Energy Complex CC power block ("HF Lee CC") has a configuration of three CTs and one steam turbine. The two power blocks located at the Smith Energy Complex ("Richmond CC") consist of two CTs and one steam turbine each. The Sutton Combined Cycle at Sutton Energy Complex ("Sutton CC") consists of two CTs and one steam turbine. The four CC power blocks, are equipped with SCR equipment, and all nine CTs have low NOx burners.

The Company's hydro fleet consists of 15 units providing 227 MWs of capacity and its solar fleet consists of four sites with 141 MWs of nameplate capacity which provide 62 MWs of relative dependable capacity.

Q. WHAT CHANGES HAVE OCCURRED WITHIN THE FOSSIL/HYDRO/SOLAR PORTFOLIO SINCE DEP'S 2017 ANNUAL FUEL AND FUEL-RELATED COST RECOVERY PROCEEDING?

A. Sutton CT Unit 1 retired in March 2017, which reduced capacity by 11 MWs. Sutton CT 2A and 2B were retired in July 2017, which reduced capacity by 48 MWs. Corresponding with the retirements, the Company brought online two new fast start CTs at Sutton in July 2017, adding 39 MWs of capacity for each CT for a total of 78 MWs of capacity. Darlington CT Unit 9 retired in June 2017, which reduced capacity by 50 MWs.

Q. WHAT ARE DEP'S OBJECTIVES IN THE OPERATION OF ITS FOSSIL/HYDRO/SOLAR FACILITIES?

A. The primary objective of DEP's Fossil/Hydro/Solar generation department is to provide safe, reliable and cost-effective electricity to DEP's Carolinas 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 works very hard 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. The Company also takes action 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.

Q. HOW MUCH GENERATION DID EACH TYPE OF FOSSIL/HYDRO/SOLAR GENERATING FACILITY PROVIDE FOR THE TEST PERIOD?

A. For the test period, DEP's total system generation was 62,675,716 MW hours ("MWHs"), of which 33,009,179 MWHs, or approximately 53%, was provided by the Fossil/Hydro/Solar fleet. The breakdown includes 37% contribution from gas

facilities, 15% contribution from coal-fired stations, and approximately 1% contribution from hydro and solar facilities.

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. Additionally, DEP has utilized the Joint Dispatch Agreement ("JDA"), which allows generating resources for DEP and DEC to be dispatched as a single system to enhance dispatching at the lowest possible cost. 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. HOW DID DEP COST EFFECTIVELY DISPATCH THE DIVERSE MIX OF GENERATING UNITS DURING THE TEST PERIOD?

A. The Company, like other utilities across the U.S., has experienced a change in the dispatch order for each type of generating facility due to continued favorable economics resulting from the low pricing of natural gas. Further, the addition of CC units within DEP's portfolio has provided DEP with additional natural gas resources that feature state-of-the-art technology for increased efficiency and significantly reduced emissions. These factors promote the use of natural gas and provide real benefits in cost of fuel and reduced emissions for customers. Gas fired facilities provided 69% of the DEP Fossil/Hydro/Solar generation during the test period.

Q. WHAT IS HEAT RATE?

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.

Q. WHAT WAS THE HEAT RATE FOR DEP'S COAL-FIRED FLEET AND COMBINED CYCLES DURING THE TEST PERIOD?

A. Over the test period, the seven coal units produced 28% of the Fossil/Hydro/Solar generation. The average heat rate for the coal-fired units was 10,737 Btu/kWh. The most active station during this period was Roxboro, providing 72% of the coal production with a heat rate of 10,329 Btu/kWh.

During the test period, the four CC power blocks produced 62% of the Fossil/Hydro/Solar generation with an average heat rate of 7,111 Btu/kWh.

Q. PLEASE DISCUSS THE OPERATIONAL RESULTS FOR DEP'S FOSSIL/HYDRO/SOLAR FLEET DURING THE TEST PERIOD.

A. The Company's generating units operated efficiently and reliably during the test period. Several key measures are used to evaluate the operational performance depending on the generator type: (1) equivalent availability factor ("EAF"), which refers to the percent of a given time period a facility was available to operate at full power, if needed (EAF is not affected by the manner in which the unit is dispatched or by the system demands; it is impacted, however, by planned and unplanned (*i.e.*, forced) outage time); (2) net capacity factor ("NCF"), which measures the generation that a facility actually produces against the amount of generation that theoretically could be produced in a given time period, based upon its maximum dependable capacity (NCF *is* affected by the dispatch of the unit to serve customer needs); (3) equivalent forced outage rate ("EFOR"), which represents the percentage

of unit failure (unplanned outage hours and equivalent unplanned derated[2] hours); a low EFOR represents fewer unplanned outage and derated hours, which equates to a higher reliability measure; and (4) starting reliability ("SR"), which represents the percentage of successful starts.

The following chart provides operational results categorized by generator type, as well as results from the most recently published North American Electric Reliability Council ("NERC") Generating Unit Statistical Brochure ("NERC Brochure") representing the period 2012 through 2016. The NERC data reported for the coal-fired units represents an average of comparable units based on capacity rating. The data in the chart reflects DEP results compared to NERC five-year comparisons.

Generator Type	Measure	Review Period	2012-2016	Nbr of Units
		DEP Operational Results	NERC Average	
Coal-Fired Test Period	EAF	78.0%	82.0%	446
	NCF	29.6%	58.3%	
	EFOR	8.0%	7.6%	
Coal-Fired Summer Peak	EAF	90.5%	n/a	n/a
Total CC Average	EAF	85.2%	84.8%	301
	NCF	78.0%	53.0%	
	EFOR	0.69%	5.5%	
Total CT Average	EAF	79.4%	87.6%	826
	SR	98.2%	98.1%	
Hydro	EAF	95.8%	81.1%	1,120

[2] Derated hours are hours the unit operation was less than full capacity.

Q. PLEASE DISCUSS SIGNIFICANT OUTAGES OCCURRING AT DEP'S FOSSIL/HYDRO/SOLAR 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.

Roxboro Unit 4 had a planned outage in Spring 2017. The primary purpose of the outage was to tie-in the new dry bottom ash system. Asheville Unit 1 had a planned outage in Spring 2017 to perform inspections and maintenance on the boiler, SCR, FGD, and air preheaters. Roxboro Units 1-4 had a plant-wide planned outage in Fall 2017. The primary purpose of the outage was to upgrade the FGD control systems and to perform boiler maintenance.

The CC fleet performed planned outages at Richmond County CC PB4 and PB5 in Spring 2017. The primary purpose of the PB4 and PB5 outages was to perform borescope inspections on the combustion turbines and perform balance of plant equipment maintenance.

The CT fleet performed planned outages in Spring and Fall 2017. In Spring 2017 Asheville CT Unit 4 had a planned outage to perform a combustion inspection and to upgrade the controls system. In Fall 2017 Richmond County CT Unit 1 and Darlington Unit 12 and Unit 13 had planned outages. The primary purpose of the Richmond County CT outage was to perform a generator rotor rewind and re-wedge the stator. The outage on Darlington Unit 12 and Unit 13 was to upgrade the protection relay system.

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

A. The Company has installed pollution control equipment in order to meet various current federal, state, and local reduction requirements for NO_x and SO_2 emissions. The SCR technology that DEP currently operates on the coal-fired units uses ammonia or urea for NO_x removal and the scrubber technology employed uses crushed limestone or lime for SO_2 removal. SCR equipment is also an integral part of the design of the newer CC facilities in which aqueous ammonia (19% solution of NH_3) is introduced for NO_x 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 due to competing fuels 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 Mercury and Air Toxics Standards ("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 Ward provides the cost information for DEP's chemical use and forecast.

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

A. Yes, it does.

MR. DWIGHT ALLEN: Our next witness is Witness Kenneth D. Church. His testimony consists of nine pages. And we would ask that his testimony be copied into the record as if given orally from the witness stand.

CHAIRMAN FINLEY: Mr. Church's nine pages of prefiled testimony will be copied into the record as if given orally from the stand.

(WHEREUPON, the prefiled direct testimony of KENNETH D. CHURCH is copied into the record as if given orally from the stand.)

BEFORE THE NORTH CAROLINA UTILITIES COMMISSION

DOCKET NO. E-2, SUB 1173

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 KENNETH D. CHURCH FOR DUKE ENERGY PROGRESS, LLC**

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Kenneth D. Church and my business address is 526 South Church Street, Charlotte, North Carolina.

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

A. I am the Manager of Nuclear Fuel Engineering's Fuel Management & Design for Duke Energy Progress, LLC ("DEP" or the "Company") and Duke Energy Carolinas, LLC ("DEC").

Q. WHAT ARE YOUR PRESENT RESPONSIBILITIES AT DEP?

A. I am responsible for nuclear fuel procurement and spent fuel management, as well as the fuel mechanical design and reload licensing analysis for the nuclear units owned and operated by DEP and DEC.

Q. PLEASE SUMMARIZE YOUR EDUCATIONAL BACKGROUND AND PROFESSIONAL EXPERIENCE.

A. I graduated from North Carolina State University with a Bachelor of Science degree in mechanical engineering. I began my career with DEC in 1991 as an engineer and worked in various roles, including nuclear fuel assembly and control component design, fuel performance, and fuel reload engineering. I assumed the commercial responsibility for purchasing uranium, conversion services, enrichment services, and fuel fabrication services at DEC in 2001. Beginning in 2011, I incrementally assumed responsibility at DEC for spent nuclear fuel management along with the nuclear fuel mechanical design and reload licensing analysis functions. Subsequently, I assumed the same responsibilities for DEP following the merger between Duke Energy Corporation and Progress Energy, Inc.

I have served as Chairman of the Nuclear Energy Institute's Utility Fuel Committee, an association aimed at improving the economics and reliability of nuclear fuel supply and use, and currently serve on the World Nuclear Fuel Market's Board of Governors, an organization that promotes efficiencies in the nuclear fuel markets. I am currently a registered professional engineer in the state of North Carolina.

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

A. The purpose of my testimony is to: (1) provide information regarding DEP's nuclear fuel purchasing practices (2) provide costs for the April 1, 2017 through March 31, 2018 test period ("test period"), and (3) describe changes forthcoming for the December 1, 2018 through November 30, 2019 billing period ("billing period").

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

A. Yes. These exhibits were prepared at my direction and under my supervision, and consist of Church Exhibit 1, which is a Graphical Representation of the Nuclear Fuel Cycle, and Church Exhibit 2, which sets forth the Company's Nuclear Fuel Procurement Practices.

Q. PLEASE DESCRIBE THE COMPONENTS THAT MAKE UP NUCLEAR FUEL.

A. In order to prepare uranium for use in a nuclear reactor, it must be processed from an ore to a ceramic fuel pellet. This process is commonly broken into four distinct

industrial stages: (1) mining and milling; (2) conversion; (3) enrichment; and (4) fabrication. This process is illustrated graphically in Church Exhibit 1.

Uranium is often mined by either surface (i.e., open cut) or underground mining techniques, depending on the depth of the ore deposit. The ore is then sent to a mill where it is crushed and ground-up before the uranium is extracted by leaching, the process in which either a strong acid or alkaline solution is used to dissolve the uranium. Once dried, the uranium oxide ("U_3O_8") concentrate – often referred to as yellowcake – is packed in drums for transport to a conversion facility. Alternatively, uranium may be mined by in situ leach ("ISL") in which oxygenated groundwater is circulated through a very porous ore body to dissolve the uranium and bring it to the surface. ISL may also use slightly acidic or alkaline solutions to keep the uranium in solution. The uranium is then recovered from the solution in a mill to produce U_3O_8.

After milling, the U_3O_8 must be chemically converted into uranium hexafluoride ("UF_6"). This intermediate stage is known as conversion and produces the feedstock required in the isotopic separation process.

Naturally occurring uranium primarily consists of two isotopes, 0.7% Uranium-235 ("U-235") and 99.3% Uranium-238. Most of this country's nuclear reactors (including those of the Company) require U-235 concentrations in the 3-5% range to operate a complete cycle of 18 to 24 months between refueling outages. The process of increasing the concentration of U-235 is known as enrichment. Gas centrifuge is the primary technology used by the commercial enrichment suppliers. This process first applies heat to the UF_6 to create a gas. Then, using the mass differences between the uranium isotopes, the natural uranium is separated into two

gas streams, one being enriched to the desired level of U-235, known as low enriched uranium, and the other being depleted in U-235, known as tails.

Once the UF_6 is enriched to the desired level, it is converted to uranium dioxide powder and formed into pellets. This process and subsequent steps of inserting the fuel pellets into fuel rods and bundling the rods into fuel assemblies for use in nuclear reactors is referred to as fabrication.

Q. PLEASE PROVIDE A SUMMARY OF DEP'S NUCLEAR FUEL PROCUREMENT PRACTICES.

A. As set forth in Church Exhibit 2, DEP's nuclear fuel procurement practices involve computing near and long-term consumption forecasts, establishing nuclear system inventory levels, projecting required annual fuel purchases, requesting proposals from qualified suppliers, negotiating a portfolio of long-term contracts from diverse sources of supply, and monitoring deliveries against contract commitments.

For uranium concentrates, conversion, and enrichment services, long-term contracts are used extensively in the industry to cover forward requirements and ensure security of supply. Throughout the industry, the initial delivery under new long-term contracts commonly occurs several years after contract execution. DEP relies extensively on long-term contracts to cover the largest portion of its forward requirements. By staggering long-term contracts over time for these components of the nuclear fuel cycle, DEP's purchases within a given year consist of a blend of contract prices negotiated at many different periods in the markets, which has the effect of mitigating DEP's exposure to price volatility. Diversifying fuel suppliers reduces DEP's exposure to possible disruptions from any single source of supply.

Due to the technical complexities of changing fabrication services suppliers, DEP generally sources these services to a single domestic supplier on a plant-by-plant basis using multi-year contracts.

Q. PLEASE DESCRIBE DEP'S DELIVERED COST OF NUCLEAR FUEL DURING THE TEST PERIOD.

A. Staggering long-term contracts over time for each of the components of the nuclear fuel cycle means DEP's purchases within a given year consist of a blend of contract prices negotiated at many different periods in the markets. DEP mitigates the impact of market volatility on the portfolio of supply contracts by using a mixture of pricing mechanisms. Consistent with its portfolio approach to contracting, DEP entered into several long-term contracts during the test period.

DEP's portfolio of diversified contract pricing yielded an average unit cost of $29.18 per pound for uranium concentrates during the test period, representing a decrease of 26% per pound from the prior test period.

A majority of DEP's enrichment purchases during the test period were delivered under long-term contracts negotiated prior to the test period. The staggered portfolio approach has the effect of mitigating DEP's exposure to price volatility. The average unit cost of DEP's purchases of enrichment services during the test period decreased 39% to $101.85 per Separative Work Unit.

Delivered costs for fabrication and conversion services have a limited impact on the overall fuel expense rate given that the dollar amounts for these purchases represent a substantially smaller percentage – 15% and 5%, respectively, for the fuel batches recently loaded into DEP's reactors – of DEP's total direct fuel cost relative

to uranium concentrates or enrichment, which each represent 40% of the total.

Q. PLEASE DESCRIBE THE LATEST TRENDS IN NUCLEAR FUEL MARKET CONDITIONS.

A. Prices in the uranium concentrate markets remain relatively low due to reduced demand following the March 2011 event at Fukushima. Industry consultants believe that recent production cutbacks have been warranted due to the previously existing oversupply conditions and that market prices need to increase in the longer term to provide the economic incentive for the exploration, mine construction, and production necessary to support future industry uranium requirements.

Market prices for enrichment and conversion services have declined primarily due to reduced demand and increased inventories following the Fukushima event.

Fabrication is not a service for which prices are published; however, industry consultants expect fabrication prices will continue to generally trend upward.

Q. WHAT CHANGES DO YOU SEE IN DEP'S NUCLEAR FUEL COST IN THE BILLING PERIOD?

A. The Company anticipates a decrease in nuclear fuel costs on a cents per kilowatt hour ("kWh") basis through the next billing period. Because fuel is typically expensed over two to three operating cycles (roughly three to six years), DEP's nuclear fuel expense in the upcoming billing period will be determined by the cost of fuel assemblies loaded into the reactors during the test period, as well as prior periods. The fuel residing in the reactors during the billing period will have been obtained under historical contracts negotiated in various market conditions. Each of

these contracts contribute to a portion of the uranium, conversion, enrichment, and fabrication costs reflected in the total fuel expense.

The average fuel expense is expected to decrease from 0.686 cents per kWh incurred in the test period, to approximately 0.672 cents per kWh in the billing period. This change reflects the discharge of fuel with a higher cost basis from the reactors and its replacement with fuel procured under new contracts negotiated in lower markets.

Q. WHAT STEPS IS DEP TAKING TO PROVIDE STABILITY IN ITS NUCLEAR FUEL COSTS AND TO MITIGATE PRICE INCREASES IN THE VARIOUS COMPONENTS OF NUCLEAR FUEL?

A. As I discussed earlier and as described in Church Exhibit 2, for uranium concentrates, conversion, and enrichment services, DEP relies extensively on staggered long-term contracts to cover the largest portion of its forward requirements. By staggering long-term contracts over time and incorporating a range of pricing mechanisms, DEP's purchases within a given year consist of a blend of contract prices negotiated at many different periods in the markets, which has the effect of mitigating DEP's exposure to price volatility.

Although costs of certain components of nuclear fuel are expected to increase in future years, nuclear fuel costs on a cents per kWh basis will likely continue to be a fraction of the cents per kWh cost of fossil fuel. Therefore, customers will continue to benefit from DEP's diverse generation mix and the strong performance of its nuclear fleet through lower fuel costs than would otherwise result

absent the significant contribution of nuclear generation to meeting customers' demands.

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

A. Yes, it does.

MR. DWIGHT ALLEN: Mr. Church had two exhibits attached to his testimony, Exhibits 1 and 2. And we would ask that Mr. Church's Exhibits 1 and 2 be entered into the evidence, please.

CHAIRMAN FINLEY: Mr. Church's two exhibits are entered into evidence.

(WHEREUPON, Church Exhibits 1 and 2 are admitted into evidence.)

MR. DWIGHT ALLEN: We also had the testimony of Mr. Kelvin Henderson. Mr. Henderson filed testimony consisting of 12 pages. There are no exhibits to Mr. Henderson's testimony. We would ask that his testimony be copied into the record as if given orally from the witness stand.

CHAIRMAN FINLEY: Mr. Henderson's 12 pages of prefiled testimony are copied into the record as though given orally from the stand.

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

BEFORE THE NORTH CAROLINA UTILITIES COMMISSION

DOCKET NO. E-2, SUB 1173

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 KELVIN HENDERSON FOR DUKE ENERGY PROGRESS, LLC**

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Kelvin Henderson and my business address is 526 South Church Street, Charlotte, North Carolina.

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

A. I am Senior Vice President of Nuclear Operations for Duke Energy Corporation ("Duke Energy") with direct executive accountability for Duke Energy's North Carolina nuclear stations, including Duke Energy Progress, LLC's ("DEP" or the "Company") Brunswick Nuclear Station ("Brunswick") in Brunswick County, North Carolina, the Harris Nuclear Station ("Harris") in Wake County, North Carolina, and Duke Energy Carolinas, LLC's ("DEC") McGuire Nuclear Station, located in Mecklenburg County, North Carolina.

Q. WHAT ARE YOUR PRESENT RESPONSIBILITIES AS SENIOR VICE PRESIDENT OF NUCLEAR OPERATIONS?

A. As Senior Vice President of Nuclear Operations, I am responsible for providing oversight for the safe and reliable operation of Duke Energy's nuclear stations in North Carolina. I am also involved in the operations of Duke Energy's other nuclear stations, including DEP's Robinson Nuclear Station ("Robinson") located in Darlington County, South Carolina.

Q. PLEASE SUMMARIZE YOUR EDUCATIONAL BACKGROUND AND PROFESSIONAL EXPERIENCE.

A. I have a Bachelor's degree in Mechanical Engineering from Bradley University and over 26 years of nuclear energy experience with increasing responsibilities. My nuclear career began at Commonwealth Edison's Zion Nuclear Station in Illinois where I received a senior reactor operator license from the Nuclear

Regulatory Commission ("NRC") and served as a control room unit supervisor. In 1998, I joined Progress Energy in the operations department at the Harris Nuclear Station. After serving in various leadership roles in Operations, Work Management, and Maintenance, I was named plant manager at Harris. In 2011, I was named general manager of nuclear fleet operations for Progress Energy. Following the Duke Progress merger in 2012, I became site vice president of DEC's Catawba Nuclear Station in York County, South Carolina. In 2016, I was named senior vice president of corporate nuclear, and I assumed my current role as senior vice president of Nuclear Operations in December 2017.

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

A. No.

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

A. The purpose of my testimony is to describe and discuss the performance of DEP's nuclear fleet during the period of April 1, 2017 through March 31, 2018 ("test period"). I provide information about refueling outages for the test period and also discuss the nuclear capacity factor being proposed by DEP for use in this proceeding in determining the fuel factor to be reflected in rates during the billing period of December 1, 2018 through November 30, 2019 ("billing period").

Q. PLEASE DESCRIBE EXHIBIT 1 INCLUDED WITH YOUR TESTIMONY.

A. Exhibit 1 is a confidential exhibit outlining the planned schedule for refueling outages for DEP's nuclear units through the billing period. This exhibit represents DEP's current plan, which is subject to adjustment due to changes in operational and maintenance requirements.

Q. PLEASE DESCRIBE DEP'S NUCLEAR GENERATION PORTFOLIO.

A. The Company's nuclear generation portfolio consists of approximately 3,543 megawatts ("MWs") of generating capacity, made up as follows:

Brunswick - 1,870 MWs

Harris - 932 MWs[1]

Robinson - 741 MWs

The three generating stations summarized above are comprised of a total of four units. Brunswick is a boiling water reactor facility with two units and was the first nuclear plant built in North Carolina. Unit 2 began commercial operation in 1975, followed by Unit 1 in 1977. The operating licenses for Brunswick were renewed in 2006 by the NRC, extending operations up to 2036 and 2034 for Units 1 and 2, respectively. Harris is a single unit pressurized water reactor that began commercial operation in 1987. The NRC issued a renewed license for Harris in 2008, extending operation up to 2046. Robinson is also a single unit pressurized water reactor that began commercial operation in 1971. The license

[1] MDC was increased effective 1/1/2018.

renewal for Robinson Unit 2 was issued by the NRC in 2004, extending operation up to 2030.

Q. WERE THERE ANY CAPACITY CHANGES WITHIN DEP'S NUCLEAR PORTFOLIO DURING THE REVIEW PERIOD?

A. Yes. The replacement of the Harris moisture separator reheater ("MSR") in the fall of 2016 increased the efficiency and capacity of the unit. After seasonal observations and validation testing, the Harris maximum dependable capacity ("MDC") was increased by 4 MWs to 932 MWs effective January 1, 2018. The winter capability rating was also increased, adding 7 MWs to the unit's winter capability.

Q. WHAT ARE DEP'S OBJECTIVES IN THE OPERATION OF ITS NUCLEAR GENERATION ASSETS?

A. The primary objective of DEP's nuclear generation department is to safely provide reliable and cost-effective electricity to DEP's customers in North and South Carolina. The Company achieves this objective by focusing on a number of key areas. Operations personnel and other station employees receive extensive, comprehensive training and execute their responsibilities to the highest standards in accordance with detailed procedures that are continually updated to ensure best practices. The Company maintains station equipment and systems reliably, and ensures timely implementation of work plans and projects that enhance the performance of systems, equipment, and personnel. Station refueling and maintenance outages are conducted through the execution of well-planned, well-executed, and high quality work activities, which ensure that the plant is prepared for operation until the next planned outage.

Q. PLEASE DISCUSS THE PERFORMANCE OF DEP'S NUCLEAR FLEET DURING THE TEST PERIOD.

A. The Company operated its nuclear stations in a reasonable and prudent manner during the test period, providing 47% of the total power generated by DEP. During calendar year 2017, DEP's nuclear fleet recorded the second highest annual net generation in DEP's history, producing just over 29,504 GWHs and falling just below the record established in 2014. Harris set a new net output record during the year, producing just over 8,208 GWHs, which surpassed the prior record established in 2011. The Brunswick station, with annual net generation of just over 15,370 GWHs recorded the second best production in the station's history, falling just below the record established in 2016.

Q. HOW DOES DEP'S NUCLEAR FLEET COMPARE TO INDUSTRY AVERAGES?

A. The Company's nuclear fleet has a history of solid performance that consistently exceeds industry averages. The most recently published North American Electric Reliability Council's ("NERC") Generating Unit Statistical Brochure ("NERC Brochure") indicates an industry average capacity factor of 90.03% for comparable units representing the period 2012 through 2016. The Company's test period capacity factor of 95.67% and 2-year average[2] of 94.66% both exceed the NERC comparable average of 90.03%.

[2] This represents the simple average for the current test period and prior test period of 12 months ended March 2017 for the DEP nuclear fleet.

Industry benchmarking efforts are a principal technique used by the Company to ensure best practices in operations. Duke Energy's nuclear fleet continues to rank among the top performers when compared to the seven other large domestic nuclear fleets using Key Performance Indicators ("KPIs") in the areas of personal safety, radiological dose, manual and automatic shutdowns, capacity factor, forced loss rate, industry performance index, and total operating cost. By continually assessing the Company's performance as compared with industry benchmarks, the Company continues to ensure the overall safety, reliability and cost-effectiveness of DEP's nuclear units.

Q. WHAT IMPACTS A UNIT'S AVAILABILITY AND WHAT IS DEP'S PHILOSOPHY FOR SCHEDULING REFUELING AND MAINTENANCE OUTAGES?

A. In general, refueling, maintenance, and NRC required testing and inspections impact the availability of DEP's nuclear system.

Prior to a planned outage, DEP develops a detailed schedule for the outage and for major tasks to be performed, including sub-schedules for particular activities. The Company's scheduling philosophy is to strive for the best possible outcome for each outage activity within the outage plan. For example, if the "best ever" time an outage task was performed is 10 days, then 10 days or less becomes the goal for that task in each subsequent outage. Those individual aspirational goals are incorporated into an overall outage schedule. The Company then aggressively works to meet, and measures itself against, that aspirational schedule. To minimize potential impacts to outage schedules due to unforeseen maintenance requirements, "discovery activities" (walk-downs,

inspections, etc.) are scheduled at the earliest opportunities so that any maintenance or repairs identified through those activities can be promptly incorporated into the outage plan.

As noted, the schedule is utilized for measuring outage planning and execution and driving continuous improvement efforts. However, for planning purposes, particularly with the dispatch and system operating center functions, DEP also develops an allocation of outage time that incorporates reasonable schedule losses. The development of each outage allocation is dependent on maintenance and repair activities included in the outage, as well as major projects to be implemented during the outage. Both schedule and allocation are set aggressively to drive continuous improvement in outage planning and execution.

Q. HOW DOES DEP HANDLE OUTAGE EXTENSIONS AND FORCED OUTAGES?

A. If an unanticipated issue that has the potential to become an on-line reliability challenge is discovered while a unit is off-line for a scheduled outage and repair cannot be completed within the planned work window, the outage is extended when in the best interest of customers to perform necessary maintenance or repairs prior to returning the unit to service. The decision to extend an outage or to defer work is based on numerous factors, including reliability risk assessments, system power demands, and the availability of resources to address the emergent challenge. In general, if an issue poses a credible risk to reliable operations until the next scheduled outage, the issue is repaired prior to returning the unit to service. This approach enhances reliability and results in longer

continuous run times and fewer forced outages, thereby reducing fuel costs for customers in the long run. In the event that a unit is forced off-line, every effort is made to safely perform the repair and return the unit to service as quickly as possible.

Q. DOES DEP PERFORM POST OUTAGE CRITIQUES AND CAUSE ANALYSES FOR INTERNAL IMPROVEMENT EFFORTS?

A. Yes. DEP applies self-critical analysis to each outage and, using the benefit of hindsight, identifies every potential cause of an outage delay or event resulting in a forced or extended outage, and applies lessons learned to drive continuous improvement. The Company also evaluates the performance of each function and discipline involved in outage planning and execution in order to identify areas in which it can utilize self-critical observation for improvement efforts.

Q. IS SUCH ANALYSES INTENDED TO ASSESS OR MAKE A DETERMINATION REGARDING THE PRUDENCE OR REASONABLENESS OF A PARTICULAR ACTION OR DECISION?

A. No. Given this focus on identifying opportunities for improvement, these critiques and cause analyses are not intended to document the broader context of the outage nor do they make any attempt to assess whether the actions taken were reasonable in light of what was known at the time of the events in question. Instead, the reports utilize hindsight (*e.g.*, subsequent developments or information not known at the time) to identify every potential cause of the incident in question. However, such a review is quite different from evaluating whether the actions or decisions in question were reasonable given the circumstances that existed at that time.

Q. WHAT OUTAGES WERE REQUIRED FOR REFUELING AT DEP'S NUCLEAR FACILITIES DURING THE TEST PERIOD?

A. There were two refueling outages completed during the test period.[3]

Brunswick Unit 2 began a refueling outage on March 17, 2017. In addition to refueling and maintenance activities, safety and reliability enhancements were completed. Work on the emergency diesel generator number 4 included replacement of the governor and timing relays, and installation of an automatic voltage regulator and jet air assist system. Switchyard reliability improvements included open phase relay protection modifications to both the start-up ("SAT") and unit auxiliary transformers ("UAT"). Inspections and repairs were completed on the 'A' and 'B' low pressure turbines and a main generator exciter water cooled diode bridge modification was completed. Fukushima related modifications included the installation of a harden containment vent on Unit 2, and the installation of fire hose pressure reducing valves. Ten year interval in-service ("ISI") and non-destructive evaluations ("NDE") testing were completed. During startup activities, turbine vibrations extended the outage by 1.8 days above allocation. After the turbine issues were corrected, the unit returned to service on April 17, 2017. On April 18, 2017, the unit was removed from service for just under two hours to complete turbine overspeed testing.

Brunswick Unit 1 was removed from the grid for refueling on March 3, 2018. In addition to refueling, safety, reliability, and regulatory enhancements

[3] The Brunswick Unit 1 refueling outage began on March 3, 2018 and ended on April 4, 2018, 4 days beyond the end of the test period.

and projects were completed. Emergency Diesel Generator ("EDG") modifications were completed on EGD 2, including upgrades to starting air system, automatic voltage regulator, and governor. Completion of these safety and reliability enhancements on EDG 2 marks the completion of this safety and reliability enhancement project on all 4 of the station's EDGs. Regulatory work accomplished included the completion of all modifications associated with National Fire Protection Association ("NFPA") 805 requirements and post-Fukushima required Harden Wetwell Vent installation. Turbine related work included the implementation of the digital turbine pressure control, turbine vibration system and valve hydraulic operating components. A full turbine alignment and balance shot was also completed. After refueling, projects, maintenance, and inspections were completed, the unit returned to service on April 4, 2018. The outage was completed in 32.48 days compared to a 35 day allocation. Following the end of the refueling outage, the turbine was disconnected from the grid for just over 2 hours to complete overspeed testing.

Q. WHAT CAPACITY FACTOR DOES DEP PROPOSE TO USE IN DETERMINING THE FUEL FACTOR FOR THE BILLING PERIOD?

A. The Company proposes to use a 94.12% capacity factor, which is a reasonable value for use in this proceeding based upon the operational history of DEP's nuclear units and the number of planned outage days scheduled during the billing period. This proposed percentage is reflected in the testimony and exhibits of Company witness Ward and exceeds the five-year industry weighted average capacity factor of 90.03% for comparable units as reported in the NERC Brochure during the period of 2012 to 2016.

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

A. Yes, it does.

MR. DWIGHT ALLEN: And, finally, Mr. Chairman, on September 13th, the Company submitted a complete set of Affidavits of Publication that had been published in area newspapers impacting customers as ordered by the Commission's Order of July 2, 2018, and they have been filed with the Commission.

CHAIRMAN FINLEY: Those Affidavits are noted as having been filed with the Clerk's office.

MR. DWIGHT ALLEN: And with that, that completes the case for the Company. Thank you.

CHAIRMAN FINLEY: Public Staff.

MR. JOSEY: Mr. Chairman, out of an abundance of caution, the Public Staff would move pursuant to NC G.S. 62-68 to have the prefiled affidavit of Witness Dustin Metz consisting of four pages and an appendix, and the prefiled affidavit of Jenny Li consisting of six pages and an appendix introduced into the record as evidence as if given orally from the stand.

CHAIRMAN FINLEY: The Metz and Li affidavits are admitted into evidence as though these witnesses were here and testified live.

MR. JOSEY: Thank you.

CHAIRMAN FINLEY: And their appendices as

well.

MR. JOSEY: Thank you.

(WHEREUPON, the prefiled affidavit and Appendix A of DUSTIN R. METZ is copied into the record as if given orally from the stand.)

STATE OF NORTH CAROLINA
UTILITIES COMMISSION
RALEIGH

DOCKET NO. E-2, SUB 1173

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	)))))	AFFIDAVIT OF DUSTIN R. METZ

STATE OF NORTH CAROLINA

COUNTY OF WAKE

I, Dustin R. Metz, first being duly sworn, do depose and say:

I am an engineer with the Electric Division of the Public Staff – North Carolina Utilities Commission. A summary of my education and experience is attached to this affidavit as Appendix A.

The purpose of this affidavit is to present the Public Staff's recommendations regarding the proposed fuel and fuel-related cost factors for the residential, small general service, medium general service, large general service, and lighting customers of Duke Energy Progress, LLC (DEP or the Company), as set forth in the Company's June 20, 2018, application. I have reviewed DEP's application, its prefiled testimony and exhibits, its fuel-related costs, its test period baseload power plant performance reports, and the current coal, natural gas, nuclear fuel, and reagents markets, various documents related to test year power plant outages, and the costs authorized to be recovered by

Session Law 2017-192 (HB 589). I have also reviewed the testimony of Public Staff witness Jenny Li.

For this proceeding, the test period is April 1, 2017 through March 31, 2018, and the billing period is December 1, 2018 through November 30, 2019.

Of particular concern to the Public Staff in its investigation of the test year fuel costs was the significant under recovery that took place due to the Company's greater than expected fuel costs in January 2018. After reviewing discovery and discussing the issue with DEP, the Public Staff is satisfied that the January 2018 fuel costs were reasonable and prudently incurred.

Based upon my investigation, I have determined that the projected fuel and reagent prices set forth in the testimony of DEP witnesses Ward, Grant, and Church, were calculated appropriately for this proceeding.

The cost of natural gas and nuclear fuel is expected to decrease from the test period to the billing period while the cost of coal is expected to increase. DEP's proposed fuel and fuel-related costs are based on a 94.1% system nuclear capacity factor, which is what the Company anticipates for the billing period.[1]

Based on my investigation, I have determined that the projected fuel and reagent costs set forth in DEP's testimony, and the prospective components of

[1] The Company's actual system nuclear capacity factor for the test year was ~ 95%. In comparison, the most recent North American Electric Reliability Council (NERC) five-year average weighted for the size and type of reactors in DEP's nuclear fleet was ~90% during the test period.

the total fuel factor, have been calculated in accordance with the requirements of N.C. Gen. Stat. § 62-133.2.

The Public Staff investigated DEP's fuel costs authorized to be recovered in the fuel adjustment proceeding by HB 589 by reviewing spreadsheets provided by the Company detailing QF costs for the test year. Based upon this investigation, I have determined that the costs authorized by HB 589 that DEP seeks to recover for the test year are reasonable.

Public Staff witness Li describes the Public Staff's review of the test period EMF in her testimony, and I have incorporated her recommendations in Table 1 below.

The Public Staff recommends approval of the fuel components and total fuel factors (excluding the regulatory fee) shown in Table 1, effective for the twelve months beginning December 1, 2018:

TABLE 1 – Total Proposed Fuel and Fuel-Related Cost Factors (¢ per kWh)

Rate Class	Base & Prospective	EMF and EMF Interest	Total Fuel Factor
Residential	2.311	0.575	2.886
Small General Service	2.556	0.363	2.919
Medium General Service	2.477	0.343	2.820
Large General Service	1.757	1.038	2.795
Lighting	2.251	0.885	3.136

For comparison, Table 2 below provides the existing fuel and fuel-related cost factors (excluding the regulatory fee) approved in Docket No. E-2, Sub 1146:

TABLE 2 – Total Existing Fuel and Fuel-Related Cost Factors (¢ per kWh)

Rate Class	Base & Prospective	EMF	Total Fuel Factor
Residential	2.179	0.0	2.179
Small General Service	2.121	0.0	2.121
Medium General Service	2.356	(0.098)	2.258
Large General Service	2.417	0.0	2.417
Lighting	1.657	0.0	1.657

This completes my affidavit.

Dustin R. Metz

Sworn to and subscribed before me,

this the 29th day of August, 2018.

Joanne M Bérubé
Notary Public

Joanne M. Berube
NOTARY PUBLIC
WAKE COUNTY, N.C.
My Commission Expires 12-17-2022.

JOANNE M. BÉRUBÉ
Printed Name

My Commission Expires: 12/17/2022

Appendix A

Dustin R. Metz

Through the Commonwealth of Virginia Board of Contractors, I hold a current Tradesman License certification of Journeyman and Master within the electrical trade, 2008 and 2009 respectively. I graduated from Central Virginia Community College with Associates of Applied Science degrees in Electronics and Electrical Technology (Magna Cum Laude), 2011 and 2012 respectively, and an Associates of Arts in Science in General Studies (Cum Laude) in 2013. I graduated from Old Dominion University in 2014, earning a Bachelor of Science degree in Engineering Technology with a major in Electrical Engineering and a minor in Engineering Management.

I have over 12 years of combined experience in engineering, electromechanical system design, troubleshooting, repair, installation, commissioning of electrical & electronic control systems in industrial and commercial nuclear facilities, project planning and management, and general construction experience, including 6 years with AREVA NP, where I provided onsite technical support and participated in root cause analysis teams at commercial nuclear power plants, including those owned by both Duke and Dominion.

I joined the Public Staff in the fall of 2015. Since that time, I have worked on general rate cases, fuel cases, applications for certificates of public convenience and necessity, customer complaints, nuclear decommissioning, power plant performance, participated in multiple technical working groups, and other aspects of utility regulation.

(WHEREUPON, the prefiled affidavit and Appendix A of JENNY X. LI is copied into the record as if given orally from the stand.)

STATE OF NORTH CAROLINA
UTILITIES COMMISSION
RALEIGH

DOCKET NO. E-2, SUB 1173

BEFORE THE NORTH CAROLINA UTILITIES COMMISSION

In the Matter of Application of Duke Energy Progress, LLC, Pursuant to G.S. 62-133.2 and Commission Rule R8-55 Relating to Fuel and Fuel-Related Cost Adjustments for Electric Utilities	)))))	AFFIDAVIT OF JENNY X. LI

STATE OF NORTH CAROLINA

COUNTY OF WAKE

I, Jenny X. Li, first being duly sworn, do depose and say:

I am a Staff Accountant with the Electric Section of the Accounting Division of the Public Staff - North Carolina Utilities Commission. A summary of my education and experience is attached to this affidavit as Appendix A.

The purpose of my affidavit is to present the results of the Public Staff's investigation of the Experience Modification Factor (EMF) rates proposed by Duke Energy Progress, LLC (DEP or the Company) in this proceeding. The EMF rates are utilized to "true-up," by customer class, the recovery of fuel and fuel-related costs incurred during the test year. DEP's test year in this fuel proceeding is the twelve months ended March 31, 2018.

In its application filed on June 20, 2018, DEP proposed EMF increment rates (excluding the North Carolina regulatory fee) for each North Carolina retail customer class, as shown in the table below:

DEP Proposed – EMF Rates (¢ per kWh)

Rate Class	EMF
Residential	0.575 ¢ per kWh
Small General Service	0.363 ¢ per kWh
Medium General Service	0.343 ¢ per kWh
Large General Service	1.038 ¢ per kWh
Lighting	0.885 ¢ per kWh

The EMF rates are based on DEP's calculated and reported North Carolina retail fuel and fuel-related cost underrecovery of $182.5 million for the current test period, and the previously deferred underrecovery of $41.9 million, from the prior year fuel filing in Docket No. E-2, Sub 1146, for a total underrecovery amount of $224.3 million. This results in underrecoveries of $89,796,902 for the residential class, $6,865,500 for the small general service class, $37,833,573 for the medium general service class, $86,641,717 for the large general service class, and $3,196,403 for the lighting class, for the twelve months ended March 31, 2018. The rates were calculated by dividing these fuel and fuel-related cost underrecoveries by DEP's normalized test year North Carolina retail sales of 15,621,843 MWh for the residential class, 1,891,451 MWh for the small general service class, 11,038,646 MWh for the medium general service class, 8,346,128 MWh for the large general service class, and 361,235 MWh for the lighting class.

In addition, the Company proposed a Fuel EMF Deficiency Rider (excluding the North Carolina regulatory fee) to recover a revenue deficiency related to a fuel EMF that expired and was removed from billed rates on November 30, 2017, but was inadvertently included in the calculation of compliance rates filed in Docket No. E-2, Sub 1142, effective March 16, 2018. The Fuel EMF Deficiency Rider will recover the undercollection (without interest) for the time period March 16, 2018 through May 30, 2018. This rider will remain in effect for a twelve-month period expiring on November 30, 2019. The proposed rates are set forth in the table below:

DEP Proposed - Fuel EMF Deficiency Rider (¢ per kWh)

Rate Class	Rate Adjustment Factor
Residential	0.022 ¢ per kWh
Small General Service	0.052 ¢ per kWh
Medium General Service	0.068 ¢ per kWh
Large General Service	0.002 ¢ per kWh
Lighting	(0.046) ¢ per kWh

The Public Staff's investigation of the EMF rates included procedures intended to evaluate whether the Company properly determined its per books fuel and fuel-related costs and revenues during the test period. These procedures included a review of the Company's filing, prior Commission orders, the Monthly Fuel Reports filed by the Company with the Commission, and other Company data provided to the Public Staff. Additionally, they included review of certain specific

types of expenditures impacting the Company's test year fuel and fuel-related costs, including renewable energy and Session Law 2017-192 (HB 589) PURPA purchases, as well as reviews of source documentation of fuel and fuel-related costs for certain selected Company generation resources. Performing the Public Staff's investigation required the review of numerous responses to written and verbal data requests, as well as a site visit to the Company's offices and several telephone conferences with Company representatives.

As a result of the Public Staff's investigation, I am recommending that DEP's EMF increment rates for each customer class be based on net fuel and fuel-related cost underrecoveries of $89,796,902 for the residential class, $6,865,500 for the small general service class, $37,833,573 for the medium general service class, $86,641,717 for the large general service class, and $3,196,403 for the lighting class, and normalized North Carolina retail sales of 15,621,843 megawatt-hours (MWh) for the residential class; 1,891,451 MWh for the small general service class, 11,038,646 MWh for the medium general service class, 8,346,128 MWh for the large general service class, and 361,235 MWh for the lighting class. These amounts produce the EMF increment rates for each North Carolina retail customer class (excluding the North Carolina regulatory fee) set forth in the table below:

Public Staff Recommended – EMF Rates (¢ per kWh)

Rate Class	EMF
Residential	0.575 ¢ per kWh
Small General Service	0.363 ¢ per kWh
Medium General Service	0.343 ¢ per kWh
Large General Service	1.038 ¢ per kWh
Lighting	0.885 ¢ per kWh

I am also recommending that DEP's Fuel EMF Deficiency Rider for each North Carolina retail customer class (excluding the North Carolina regulatory fee) set forth in the table below be approved to recover the undercollection (without interest) incurred for the time period March 16, 2018 through May 30, 2018. This rider will remain in effect for a twelve-month period expiring on November 30, 2019.

Public Staff Recommended– Fuel EMF Deficiency Rider (¢ per kWh)

Rate Class	Rate Adjustment Factor
Residential	0.022 ¢ per kWh
Small General Service	0.052 ¢ per kWh
Medium General Service	0.068 ¢ per kWh
Large General Service	0.002 ¢ per kWh
Lighting	(0.046) ¢ per kWh

I have provided these amounts to Public Staff witness Dustin R. Metz for incorporation into his recommended final fuel factor.

This completes my affidavit.

Jenny Li
Jenny X. Li

Sworn to and subscribed before me,

This the 29th day of August, 2018.

Cleo L. Ackerman
Notary Public
Cleo L. Ackerman

Cleo L Ackerman
NOTARY PUBLIC
WAKE COUNTY, N.C.
My Commission Expires 01-08-2023

My Commission Expires: 01-08-2023

APPENDIX A

Jenny X. Li

I graduated from North Carolina State University with a Bachelor of Science degree in Accounting.

I joined the Public Staff Accounting Division in August 2016 as a Staff Accountant. 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 under the jurisdiction of the Commission or involved in Commission proceedings; and (2) the preparation and presentation to the Commission of testimony, exhibits, and other documents in those proceedings.

Since joining the Public Staff, I have assisted on several electric cases and performed reviews in Duke Energy Carolinas, LLC (DEC), Duke Energy Progress, LLC (DEP) rate cases and fuel cases. I have also performed reviews of DEC's Existing DSM Program Rider and BPM/NFPTP Rider; Western Carolina University's PPA Rider and New River Light and Power Company's PPA Factor.

Prior to joining the Public Staff, I was employed by MDU Enterprises Inc. and Neusoft America Inc. My duties there varied from examining various financial statements to supervising accounting and assisting external audits.

CHAIRMAN FINLEY: Anything else?

MR. DWIGHT ALLEN: That's all for the Company.

CHAIRMAN FINLEY: What about proposed orders, 30 days from today. Is that satisfactory?

MR. DWIGHT ALLEN: Yes. We can do 30 days from today.

MR. JOSEY: (Nods head affirmatively).

CHAIRMAN FINLEY: Thirty days from the outset and, if anybody wants to get them in more quickly, that's fine with us.

MR. DWIGHT ALLEN: Thank you.

CHAIRMAN FINLEY: Anything else we need to do in this docket?

(No response)

We will conclude this docket and then we'll move to the REPS docket next.

(WHEREUPON, the proceedings were adjourned.)

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
Court Reporter II