PLACE: Dobbs Building
Raleigh, North Carolina
DATE: Wednesday, December 19, 2019
DOCKET NO.: EMP-105, Sub 0
TIME IN SESSION: 10:02 A.M. TO 12:05 P.M.

BEFORE: Chair Charlotte A. Mitchell, Presiding
Commissioner ToNola D. Brown-Bland
Commissioner Lyons Gray
Commissioner Daniel G. Clodfelter
Commissioner Kimberly W. Duffley
Commissioner Jeffrey A. Hughes

IN THE MATTER OF:

Application of Friesian Holdings, LLC, for a Certificate of Public Convenience and Necessity to Construct a 70-MW Solar Facility in Scotland County, North Carolina

Volume 2

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IDENTIFIED/ADMITTED

P R O C E E D I N G S

CHAIR MITCHELL: Good morning. Let's come to order and go on the record, please. I'm Charlotte Mitchell, Chair of the Commission, and with me this morning are my colleagues Commissioners ToNola D. Brown-Bland, Lyons Gray, Daniel G. Clodfelter, Kimberly Duffley, and Jeffrey Hughes.

The Commission now calls for hearing Docket Number EMP-105, Sub 0, in the Matter of the Application of Friesian Holdings, LLC, for a Certificate of Public Convenience and Necessity to Construct a 70-MW Solar Facility in Scotland County, North Carolina.

On May 15th, 2019, Friesian Holdings, LLC, filed an application pursuant to North Carolina General Statute Section 62-110.1 and Commission Rule R8-63 for a certificate of public convenience and necessity to construct a 70-MW solar PV electric generating facility to be located in Scotland County.

From June through August 2019, several parties petitioned to intervene in this docket. The Commission subsequently allowed the intervention of the following: the North Carolina Electric Membership Corporation, Duke Energy Progress, the North Carolina Sustainable Energy Association, and the North Carolina Clean Energy Business

Alliance. The participation of the Public Staff is recognized pursuant to North Carolina General Statute Section 62-15(d).

On August 5th, 2019, the Commission issued an Order Suspending the Procedural Schedule and Allowing the Parties to File Pre-Hearing Briefs addressing several legal issues.

On August 26th, 2019, the Applicant, DEP, the Public Staff, and NCCEBA each filed briefs, and on September 9th, 2019, the Applicant, DEP, the Public Staff, NCCEBA and NCSEA jointly, each filed reply briefs.

On October 3rd, 2019, the Commission issued an Order Scheduling Oral Arguments for the parties to address the legal issues noted in the Commission's August 5th Order and, additionally, another legal issue.

On October 21st, 2019, an oral argument was conducted before this Commission.

On October 25th, 2019, the Commission issued an Interlocutory Order on the Legal Issues addressed in the parties' pre-hearing briefs and at the oral argument. The Commission further ordered the procedural schedule in this matter resumed, allowing for the timely filing of supplemental direct testimony and exhibits and setting today's hearing.

On November 26th, 2019, the Applicant filed the supplemental direct testimony and corresponding exhibits of three witnesses: Charles Askey, Brian Bednar, and Rachel Wilson.

On December 6th, 2019, the Public Staff filed the joint testimony and exhibits of Evan Lawrence and Dustin Metz. Also on December 6, 2019, DEP filed the position statement letters.

On December 12th, 2019, the Applicant filed the rebuttal testimony and exhibits of its three witnesses.

In compliance with the requirements of the State Government Ethics Act, I remind all members of the Commission of their responsibility to avoid conflicts of interest, and inquire at this time as to whether any member of the Commission has a conflict of interest with respect to the matters coming before us this morning?

(No response.)

CHAIR MITCHELL: Please let the record reflect that no conflicts have been identified.

I now call upon counsel for the parties to announce their appearances, beginning with the Applicant.

MS. KEMERAIT: Good morning, Madam Chair, and members of the Commission. My name is Karen Kemerait, and I'm here on behalf of the Applicant, Friesian

Holdings, LLC, and I'm with the law firm of Fox Rothschild in Raleigh.

CHAIR MITCHELL: Good morning, Ms. Kemerait.

MR. LEVITAS: Good morning. I'm Steve Levitas with Kilpatrick Townsend, here on behalf of Friesian Holdings.

CHAIR MITCHELL: Good morning, Mr. Levitas.

MR. JIRAK: Good morning, Chair Mitchell, Commissioners. Jack Jirak on behalf of Duke Energy Progress.

CHAIR MITCHELL: Good morning, Mr. Jirak.

MR. SNOWDEN: Good morning. Ben Snowden with the firm of Kilpatrick Townsend, appearing on behalf of the North Carolina Clean Energy Business Alliance.

CHAIR MITCHELL: Good morning, Mr. Snowden.

MR. LEDFORD: Madam Chair, Peter Ledford on behalf of the North Carolina Sustainable Energy Association. With me is Ben Smith.

CHAIR MITCHELL: Good morning, Mr. Ledford and Mr. Smith.

MR. DODGE: Good morning, Chair Mitchell, and members of the Commission. I'm Tim Dodge with the Public Staff. Also appearing with me today is Layla Cummings. We represent the Using and Consuming Public.

CHAIR MITCHELLS: Good morning, Mr. Dodge and Ms. Cummings. Okay. Before we begin, any preliminary matters we need to address?

MS. KEMERAIT: Not from the Applicant.

CHAIR MITCHELL: Okay. Hearing none, we will proceed. The case is with the Applicant.

MS. KEMERAIT: Commissioners, I'll begin by calling a panel of Friesian's witnesses, and the panel will be Brian Bednar, Charles Askey, and Rachel Wilson. And I would ask that they come to the stand in the middle of the room.

CHAIR MITCHELL: Good morning. Let's go ahead and get you all sworn in.

BRIAN C. BEDNAR, CHARLES ASKEY,
and RACHEL S. WILSON; Having first been duly sworn,
Testified as follows:

DIRECT EXAMINATION BY MS. KEMERAIT:

Q So I'll begin with Mr. Bednar. Mr. Bednar, can you please state your full name and business address for the record.

A (Bednar) Brian Christopher Bednar, 1125 East Morehead Street, Suite 202, Charlotte, North Carolina, 28204.

Q And by whom are you employed and in what

capacity?

A I am the Owner and President of Birdseye Renewable Energy, LLC.

Q Okay. And did you cause to be prefiled on May the 15th of 2019, 13 (sic) pages of direct testimony in the form of question and answer and Exhibits 1, 4, 5A -- excuse me -- 5, 6A, 6B, 6C, and confidential Exhibits 2, 3, and 7?

A I did.

Q Okay. And if I were to ask you the same questions that appear in your testimony today, would your answers be the same?

A It would.

Q And do you have any corrections that you would like to make to that testimony?

A The only correction I would like to make would be the supplemental direct testimony.

Q And I will ask you about the supplemental --

A Oh, okay. Yeah. Sorry.

Q -- testimony in a minute.

A Yeah.

Q Okay. And moving on to the supplemental direct testimony, did you cause to be prefiled on November the 26th of 2019 13 pages of supplemental direct testimony in

the form of question and answer and two exhibits?

A I did.

Q And if I were to ask you the same questions that appear in your supplemental direct testimony today, would your answers be the same?

A With one amendment.

Q Okay. And what amendment would you like to make to your supplemental direct testimony?

A In my supplemental direct testimony I stated that we're intending to post the additional $7 million under the LGIA for Q380, and that has been posted.

Q On what date was the additional payment made?

A I don't recall the date, but it was the date it was due.

Q Okay. And did you also cause to be prefiled on December the 12th of 2019 10 pages of rebuttal testimony in the form of question and answer and one exhibit?

A I did.

Q And if I were to ask you the same questions that appear in your rebuttal testimony today, would your answers be the same?

A They would.

Q And do you have any corrections that you would like to make to your rebuttal testimony?

A I do not.

Q Okay.

MS. KEMERAIT: At this time I would move that Mr. Bednar's prefiled direct, supplemental direct, and rebuttal testimony be copied into the record as if given orally from the stand, and that the exhibits to his testimony be marked for identification and included in the record.

CHAIR MITCHELL: Hearing no objections, the motion is allowed.

(Whereupon, the prefiled direct testimony of Brian C. Bednar was copied into the record as if given orally from the stand.)

(Whereupon, Bednar Exhibits 1, 4, 5, 6A, 6B, and 6C were identified as premarked, and Confidential Bednar Exhibits 2, 3, and 7 were identified as premarked.)

INTRODUCTION

Q. PLEASE STATE YOUR NAME, TITLE, AND BUSINESS ADDRESS.

A. My name is Brian C. Bednar. I am the President and Founder of Birdseye Renewable Energy, LLC ("Birdseye"), an affiliate of the Applicant, Friesian Holdings, LLC ("Friesian" or "Applicant"), and I am the Manager and Authorized Agent of Friesian. Friesian is a domestic North Carolina limited liability company that was formed on March 30, 2015 for the development of clean renewable energy by use of solar. My business address is 1125 E. Morehead Street, Suite 202, Charlotte, North Carolina 28204.

Q. PLEASE DESCRIBE YOUR EDUCATION AND PROFESSIONAL EXPERIENCE.

A. I obtained a Bachelor of Science degree in Business Administration from the University of North Carolina-Chapel Hill and earned a Masters of Business Administration Degree at the University of Virginia's Darden School of Business. My professional background is in agri-business, real estate brokerage, development and property management. In 2015, I sold the real estate business and shifted my entire focus to solar development.

Q. PLEASE SUMMARIZE YOUR CURRENT RESPONSIBILITIES WITH BIRDSEYE AND FRIESIAN.

A. I serve as the chief executive of Birdseye. My day-to-day responsibilities are generally managerial and strategic in focus. I focus on managing Birdseye's

relationships with our financing partners, funding operations, and leading market strategy for the company.

Q. HAVE YOU PREVIOUSLY TESTIFIED BEFORE THIS COMMISSION?

A. No.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. To satisfy the requirements of Commission Rule R8-63 under which this Application for a Certificate of Public Convenience and Necessity ("CPCN") is being requested.

Q. PLEASE STATE THE PARENT COMPANY OF THE APPLICANT.

A. Birdseye is the parent company of the Applicant. Birdseye is a greenfield solar developer based in Charlotte, North Carolina that has built a track record of successfully developing transmission and distribution-scale solar assets through a combination of creativity, trusted utility relationships, and a meticulous project management process. Birdseye leverages funding from Independent Power Producers and regulated utilities to completion. Founded in 2009, Birdseye has built a reputation for thorough execution of solar pipeline throughout the Southeastern United States. The Birdseye team has developed 424 MWdc of completed and operating utility-scale solar assets, along with a current development pipeline consisting of over 2,000 MWdc.

COMPANY BACKGROUND AND PROJECT FINANCE

Q. PLEASE DESCRIBE THE COMPANY'S PERSONNEL, TECHNICAL EXPERIENCE, AND FINANCIAL CAPABILITY TO OWN AND OPERATE THE PROJECT.

A. Birdseye has successfully developed over thirty now-operating utility-scale solar projects across North Carolina. Birdseye has already funded the primary development tasks associated with the Friesian project, and is forming a partnership to advance the project through the remaining development. Once "shovel-ready", Friesian's construction and long-term operation will be financed by a combination of Birdseye's tax equity, sponsor equity, and debt providers. The long-term investors will be able to operate and maintain the project, as well as capture a margin, by selling the output from the facility.

In addition to Brian Bednar, Friesian's professional team is as follows.

Peden Harris, Chief Operating Officer, joined Birdseye in 2012. He has worked in the energy industry for over nine years. Prior to joining Birdseye, he worked for Vestas Wind Systems in Oregon, Denmark, and Germany. Peden was born and raised in Winchester, Virginia, and earned a Bachelor of Arts from Rhodes College and a Masters of Business Administration from The Darden School at the University of Virginia.

Eric Panicco, Director of Strategy, came to Birdseye from Wake Forest University where he earned a Masters degree in Sustainability. While at Wake Forest University, Eric focused on sustainable business practices as a graduate consultant for two Fortune 500 companies. Prior to becoming involved in

renewable energy, Eric taught courses in Physics and Chemistry. He earned a Bachelor's degree in Chemistry from Emory University.

Luke Rogers, Project Manager, graduated Summa Cum Laude with a Bachelor's of Science in Chemistry from Furman University. After graduation, he pursued his interest in solar energy and gained hands-on experience installing PV on rooftops across South Carolina. Before joining Birdseye, he worked for a private equity and consulting firm, Fundacion Chile, in Santiago, Chile. His research focused on the challenges of integrating utility scale solar PV into Chile's existing electric infrastructure.

Brooks Camp, Project Developer, earned a Bachelors in Science in Water and Soil Science from the University of Georgia's Warnell School of Forestry and Natural Resources. After working for the U.S. Geologic Survey, he earned dual Masters Degrees from Appalachian State University in Appropriate Technology and Building Science. He has worked in various sectors of the North Carolina solar industry for the past five years, including as a member of Advanced Energy Corporation's PV Distribution Interconnection Commissioning team, which partnered with Duke Energy to ensure quality interconnection facilities on its distribution grid.

In regard to the capability of Friesian and Birdseye to own and operate the Friesian project, Birdseye's most recent balance sheet and income statement are provided confidentially and under seal as Confidential Exhibit 2.

Q. WHAT IS THE CONSTRUCTION TIMELINE FOR THE FACILITY?

A. Construction for the project is expected to begin in the summer of 2023, and commercial operation is expected to occur in December, 2023.

Q. WHAT IS THE EXPECTED SERVICE LIFE OF THE FACILITY?

A. The expected service life of the facility is twenty (20) years.

Q. WHAT ARE THE ESTIMATED CONSTRUCTION COSTS FOR THE FACILITY?

A. The estimated construction costs are expected to be approximately One Hundred Million Dollars.

Q. DOES THE APPLICANT HAVE OWNERSHIP INTEREST IN AND/OR THE ABILITY TO CONTROL GENERATING FACILITIES IN THE SOUTHEASTERN ELECTRIC RELIABILITY COUNCIL REGION?

A. Yes. The Applicant's affiliate, Birdseye, has ownership interest in and/or the ability to control through leases or contracts numerous solar generating facilities in the Southeastern Electric Reliability Council ("SERC") region. Please see a list of generating facilities that Birdseye owns or controls through leases or contracts in the SERC region attached hereto as Confidential Exhibit 3.

SITE AND FACILITY DESCRIPTION

Q. WHERE IS THE PROJECT LOCATED?

A. The project will be located on three parcels (identified as Scotland County Parcels 04019601060, 04019601018, and 040193A01001) located along Leisure Road, north and south of Leisure Road's intersection with Academy Road, and southwest

of Laurinburg, County, North Carolina. The project will be in the location described above and as shown in the color map attached Exhibit 4.

Q. WHAT IS THE CURRENT LAND USE AND ANTICIPATED USE?

A. The parcels for the project are currently being used for agricultural purposes. Friesian will lease approximately 543.71 acres of the parent parcels (that total approximately 965.89 acres) for the 70 MWac photovoltaic system that will generate solar energy. The area that is not included in the leased area will continue to be used for agricultural purposes. No additional right-of-way is needed for the project. The project has a minimum setback of 40 feet in the front (road frontage), 10 feet in the rear, and 30 feet on all sides. Inverters for the project will be located a minimum of 300 feet from the perimeter parcel line boundary and 150 feet interior to the array, or 500 feet from the perimeter parcel line boundary. The color map attached hereto as Exhibit 4 shows the setbacks.

Q. WHAT IS THE FACILITY'S ANTICIPATED ELECTRICITY PRODUCTION CAPACITY?

A. The maximum gross power production capacity of the facility is 70 MW.

Q. PLEASE DESCRIBE THE BASIC COMPONENTS OF THE FACILITY.

A. Friesian is a 70-MW PV array, and the source of its power is solar energy. The facility will consist of a single-axis tracking, ground mounted solar photovoltaic system, and it will be comprised of approximately 290,000 PV solar modules affixed to ground mounted racks supported on driven piles that will utilize thirty (30) 2500 Kw inverters, generator step-up ("GSU") transformers, racking, posts,

wiring, utility poles, communication poles, security camera, collector station, and accessories. A color map showing the proposed site boundary, layout with all major equipment, roads, and electric facilities, and point of interconnection ("POI") is attached hereto as Exhibit 4.

Q. PLEASE DESCRIBE THE TRANSMISSION FACILITIES TO WHICH THE FACILITY WILL INTERCONNECT AND HOW THE PROJECT WILL BE INTERCONNECTED TO THE GRID?

A. The GSU transformers will connect the solar inverters to the newly constructed 34.5 kV collector station directly adjacent to the Duke Energy Progress, LLC ("DEP") Laurinburg-Bennettsville 230 kV transmission line. The facility will connect to the POI via a single 230/34.5 kV wye grounded main power transformers with a rating of 45/60/75 MVA. The POI will be located at the site-owned 230 kV substation. A diagram showing the location of the 230 kV transmission line and the POI substation is attached hereto as Exhibit 5. Friesian's affiliate leases the current parcel where the collector station will be located, which includes a right-of-way easement for the DEP Laurinburg-Bennettsville 230 kV line. Therefore, no additional right-of-way is needed.

The project is located on three parcels of land. The individual blocks of tracker with solar modules will be connected through medium-voltage cable runs through the parcels. These connections either will use overhead poles or buried cable installed in culverts or via directional boring.

Friesian will be classified as a Distributed Network Resource ("DNR") of the North Carolina Electric Membership Corporation, Inc. ("NCEMC").

DEP has presented to Frisian a Federal Regulatory Energy Commission (FERC)-jurisdictional Interconnection Agreement. Friesian will enter into an Interconnection Service Agreement and Interconnection Customer Agreement with DEP (Queue No. Q380) on May 31, 2019.

The Network Integration Transmission Services Agreement (NITSA) between DEP and the NCEMC will cover the power transfer costs between the two entities. Once the purchase power agreement ("PPA") between Friesian and the NCEMC is executed, the NCEMC will begin the process of applying for DNR status.

NEED FOR THE FACILITY

Q. PLEASE EXPLAIN THE NEED FOR THE FACILITY.

A. There is a need for the facility in the region, and Friesian and the NCEMC have entered into an agreement for Friesian to sell the full output of the facility to the NCEMC under a purchase power agreement ("PPA"). Friesian anticipates that the PPA will be fully executed by the parties on or before May 31, 2019. The draft PPA is filed confidentially and under seal as Confidential Exhibit 7.

Under North Carolina's Renewable Energy and Energy Efficiency Portfolio Standard ("REPS" or "Senate Bill 3"), investor-owned utilities in North Carolina are required to meet up to 12.5% of their energy needs through renewable energy resources or energy efficiency measures by 2021. Rural electric cooperatives and

municipal electric suppliers are subject to a 10% REPS requirement, which must be met by 2018. G.S. § 62-133.8(8) defines solar as a renewable energy resource. The Facility will provide a significant amount of RECS for use by the NCEMC to demonstrate compliance with Senate Bill 3.

REGULATORY APPROVALS AND PERMITS

Q. DOES THE SCOTLAND COUNTY ZONING ORDINANCE APPLY TO THE FRIESIAN PROJECT?

A. Yes.

Q. PLEASE DESCRIBE THE PERMITS AND APPROVALS YOU ANTICIPATE WILL BE NECESSARY TO COMMENCE CONSTRUCTION OF THE FACILITY.

A. On June 5, 2018, the Scotland County Board of Commissioners voted unanimously to approve the Conditional Use Permit application, and issued the Conditional Use Permit on that date. The Conditional Use Permit Order is attached hereto as Exhibit 6(a). In addition to the Conditional Use Permit, Scotland County will require that Friesian obtain a Building Permit and Electrical Permit from the County.

From the State of North Carolina, the facility will require a driveway permit from the North Carolina Department of Transportation, and approval of an erosion and sedimentation control plan from the NC Department of Environmental Quality ("NCDEQ").

In regard to federal permits and approvals, a Phase I Environmental Site Assessment was conducted for the project on January 11, 2019, and a Limited NEPA Assessment was performed on May 30, 2018 On May 23, 2018, the US Army Corps of Engineers ("USACE") verified the wetland delineation for the entire site. A copy of the Wetland Delineation dated June 8, 2018 is attached hereto as Exhibit 6(b). Notice of Jurisdictional Determination of the wetlands on the site dated June 11, 2018 is attached hereto as Exhibit 6(c).

Friesian has submitted Form 860 Annual Electric Generator Reports to the Energy Information Administration on April 18, 2018 and December 31, 2018.

COMMUNITY

Q. PLEASE DESCRIBE THE ANTICIPATED BENEFITS OF THE FACILITY TO THE LOCAL COMMUNITY.

A. The Friesian facility will bring a variety of financial benefits to Scotland County. Friesian anticipates that the County will realize property and real estate tax revenues. The site's landowners will receive revenue in the form of lease payments each year for the life of the facility, and this revenue will assist them in maintaining agricultural operations on their land.

In addition to these financial benefits, Friesian will create community benefits. Friesian will enhance the County's reputation as an attractive and friendly environment for advanced manufacturing, technology, and related jobs. Local contractors and businesses such as installation, fencing, landscaping, and machine rental companies will receive sales opportunities from the facility

construction and operations. During the approximately year-long construction process, the facility will offer full-time construction jobs. Increased economic activity in the area is also expected to increase revenue for local hotels, restaurants, service stores, and other vendors.

Q. WHAT ARE THE EXPECTED ENVIRONMENTAL IMPACTS OF THE FACILITY?

A. By design and by its nature as a solar PV facility, the facility will provide clean renewable power with minimal environmental impacts. The facility will create no air or water emissions or other environmental contamination, nor will it create any noise impacts outside of the fence line. At the end of the facility's useful life, materials can be recycled or sold for scrap, and the land can be returned to agricultural use.

Q. WHAT ARE THE LONG-TERM PLANS FOR OWNERSHIP OF THE PROJECT?

A. In the event of any change in ownership interest, the Applicant will notify the Commission.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes.

(Whereupon, the prefiled supplemental direct testimony of Brian C. Bednar was copied into the record as if given orally from the stand.)

(Whereupon, Bednar Supplemental Direct Exhibits A and B were identified as premarked.)

Q. PLEASE STATE YOUR NAME, TITLE, AND BUSINESS ADDRESS.

A. My name is Brian C. Bednar. I am the President and Founder of Birdseye Renewable Energy, LLC ("Birdseye"), an affiliate of the Applicant, Friesian Holdings, LLC ("Friesian" or "Applicant"), and I am the Manager and Authorized Agent of Friesian. Friesian is a domestic North Carolina limited liability company that was formed on March 30, 2015 for the development of clean renewable energy by use of solar. My business address is 1125 E. Morehead Street, Suite 202, Charlotte, North Carolina 28204.

Q. HAVE YOU PREVIOUSLY TESTIFIED BEFORE THIS COMMISSION?

A. Yes. I filed Direct Testimony in this docket to demonstrate that Friesian's Application for a Certificate of Public Convenience and Necessity ("CPCN") for a 70-MW solar facility in Scotland County meets all requirements of N.C. Gen. Stat. § 62-110.1 and Commission Rule R8-63.

Q. WHAT IS THE PURPOSE OF YOUR SUPPLEMENTAL DIRECT TESTIMONY?

A. The purpose of my supplemental testimony is to provide additional evidence that the development of the Friesian project and the associated network upgrades serves public convenience and necessity.

Q. DOES BIRDSEYE HAVE EXPERIENCE AND EXPERTISE IN DEVELOPING UTILITY-SCALE SOLAR FACILITIES?

A. Yes. Birdseye has substantial experience and expertise in developing utility-scale solar PV facilities. Since 2009, Birdseye has been actively developing solar PV

plants that are located in fifteen North Carolina counties in both Duke Energy Carolinas, LLC ("DEC") and Duke Energy Progress, LLC ("DEP") territories. Over that period of time, Birdseye has successfully completed a number of utility-scale projects in North Carolina, consisting of twenty-four projects totaling 242 MWDC in DEP territory and fourteen projects totaling 198 MWDC in DEC territory. Additionally, Birdseye has been an active participant in CPRE, and is developing the 70 MWAC project located in Catawba County known as Maiden Creek Solar, LLC under Tranche 1 of CPRE. Construction of that project is expected to begin in early 2020.

Q. IN ADDITION TO YOUR EXPERTISE IN DEVELOPING UTILITY-SCALE SOLAR PROJECTS, DO YOU HAVE EXPERIENCE IN LOCATING LEAST COST PROJECTS FOR DEVELOPMENT?

A. Yes. Birdseye's understanding of quality and cost-effective solar development is market-leading. Birdseye has developed a proprietary ArcGIS mapping system which allows us to identify land that is both near Duke transmission infrastructure and is also suitable in size, shape, and topography for development. Once suitable property is identified, Birdseye applies and tracks additional screens to determine the constructability of the site, impact on neighbors to the site, timber clearing and environmental impacts, local permitting climate, and competing uses for the land such as traditional development. Also, Birdseye uses consulting engineers and utility pre-screen evaluations to estimate the quantum and timing of network upgrades to determine if a there is a feasible path to interconnection. The entire

collection of factors focuses on the least cost of the project and the appropriate timing for construction, along with whether the project merits taking development risk.

Q. HAS BIRDSEYE SECURED FINANCING FOR THE FRIESIAN PROJECT?

A. Yes. After conducting a robust process to identify the financing provider who could offer the Friesian project the most attractive economics while ensuring best-in-class execution and the highest level of transaction certainty, Birdseye selected Kayne Solutions Fund, LP ("Kayne"). To date, Kayne has provided $3M in payments to Duke on behalf of the Friesian project under the LGIA, including a $1.5M payment on May 31, 2019, and a subsequent $1.5M payment on July 26, 2019. Kayne is poised to fund the additional $7M LGIA payment to Duke on December 2, 2019, and all subsequent security postings and related interconnection payments per Appendix B of the Friesian LGIA.

In addition to providing access to the initial capital funding needs under the Friesian Project LGIA, Kayne will be providing 100% construction financing for the Friesian Project following issuance of the project's notice to proceed estimated in Q4 2022 to align with completion of the Friesian network upgrades in December 2023. This construction financing commitment will ensure the full $100M in construction capital is available to the Friesian project leading up to commercial operation in December 2023 when the permanent capital structure will be put in place.

Q. ARE THERE CHALLENGES TO FINDING APPROPRIATE AND LEAST COST SITES FOR SOLAR DEVELOPMENT THROUGHOUT THE STATE?

A. Yes. Birdseye has built a database of regions of the state, infrastructure, and parcels that might be suitable for solar development. The southeastern portion of the state where the Friesian project is located is severely constrained, and no new generation resources can be added without substantial upgrades to DEP's transmission system. In regard to other areas of the state, Birdseye believes that in the near future, solar development outside Eastern North Carolina will face many of the same congestion problems that solar development is currently experiencing in Eastern North Carolina.

Q. YOU REFERENCED CONSTRAINED AREAS IN DEP TERRITORY. CAN YOU DESCRIBE THE CONGESTION IN THAT PART OF THE STATE?

A. Yes. There is substantial congestion in DEP's transmission system in the southeastern portion of the state that prevents any additional solar resources and other generation resources from being added to the system without triggering substantial network upgrades. Attached as Exhibit A is Duke's current Constrained Area Map for the DEP territory. As shown in the map, over fifty percent of the DEP's service territory is currently designated as a transmission constrained area and is unavailable for additional generation. Birdseye's analysis of the current DEP queue shows that 3,898 MW of proposed solar is in the constrained area.

I would like to provide some background to the problem that most of southeastern North Carolina is in a constrained area. Prior to any transmission constraints in Duke's system in North Carolina, the southeastern region received the most solar investment because it had all of the leading attributes for solar generation. As a result, the southeastern region was the first to experience constraints driven by the adoption of distributed generation. The constraints became known in early 2016, prior to the enactment of House Bill 589. Since that time, Duke has implemented a series of new standards and screens for interconnection of proposed solar projects in the region. Eventually, most distribution interconnection requests in this constrained region of the state were placed on indefinite hold, which will continue until substantial transmission upgrades are completed. Even after several years of stakeholder meetings between Duke and solar developers, there are currently no network upgrades planned to expand capacity in southeastern region of the state to allow additional solar generation and other generation resources to interconnect.

Q. ARE THE FRIESIAN NETWORK UPGRADES NECESSARY TO ADD NEW GENERATION RESOURCES IN SOUTHEASTERN NORTH CAROLINA?

A. Yes. It will not be possible to add additional generation resources in southeastern North Carolina without construction of substantial network upgrades to DEP's transmission system. The Timmons Group's analysis of DEP's transmission system in southeastern North Carolina finds that the system is at full capacity.

Additionally, smaller utilities that receive transmission service from Duke, like municipal and co-op entities, have advised that they cannot connect any solar generators rated over 500kW without triggering a transmission impact study by DEP. Those smaller utilities have advised us that such studies are expected to show transmission constraints that preclude interconnection.

In addition, DEP has completed an assessment for interconnection requests received through September 30, 2017, and the assessment shows that there are 108 interconnection requests totaling 1,561 MW that have been identified as being directly interdependent on the upgrades assigned to Friesian. In addition to the projects specifically identified to date by DEP as interdependent on the Friesian upgrades, we believe there are many additional later-queued projects yet to be studied that are also technically interdependent on the Friesian upgrades. Duke has confirmed that it is undoubtedly the case that the Friesian upgrades will facilitate the interconnection of about 1,561 MW of additional solar generation and other generation resources.

Q. WOULD THE FRIESIAN UPGRADES PROVIDE NECESSARY IMPROVEMENTS TO DEP'S SYSTEM IN A TIMELY MANNER?

A. Yes. The Friesian project is the most efficient way for upgrades to DEP's transmission system to be completed, as the upgrades will be completed by the end of 2023. Without the Friesian project, it is unlikely that the upgrades can be completed before 2027 at the earliest.

Q. IN LIGHT OF THE CONGESTION IN SOUTHEASTERN NORTH CAROLINA, ARE THERE OTHER AREAS OF THE STATE THAT ARE CONDUCIVE TO SOLAR DEVELOPMENT?

A. The lack of capacity in the constrained southeastern area, has led solar developers to pursue development in other regions of the state where the land is not as conducive to solar development, but where there initially was interconnection capacity . In short order, solar developers began facing similar capacity constraints or a limited supply of sites viable for utility-scale solar. Please see the Land Use Stratification Map attached hereto as Exhibit B that highlights the abundance of open land suitable for solar resources in southeastern North Carolina relative to other areas of the state. In order for the state to reach its published carbon reduction goals, it will be essential for developers and Duke to utilize the constrained southeastern region with all the advantages it offers for solar deployment at scale and low cost.

Moreover, developing solar in the western portion of the state and metropolitan areas such as Charlotte, Raleigh, or Greensboro has several key disadvantages with respect to the siting and construction of new solar facilities.

1. The population density of those areas makes finding sites without significant neighbor impacts more challenging than in the constrained area. In our 70MWac, 430 acre Catawba County project, we located the project within the largest tract of land owned by a single owner in the county and established buffers of over 500 feet in some areas to accommodate the concerns of the neighbors.

We do not believe another site in the county could accommodate a project of this size and have space to ensure that harmony is preserved with the neighbors.

2. As in Catawba County, many western counties, have a limited supply of large, flat sites, and those properties are generally targeted by local stakeholders for industrial uses.

Q. ARE THERE REASONS WHY IT IS PREFERABLE TO LOCATE NEW SOLAR RESOURCES IN SOUTHEASTERN NORTH CAROLINA?

A. Yes. There are numerous advantages and reasons it is preferable to locate solar facilities in southeastern North Carolina. First, Southeastern North Carolina offers abundant large, open sites. These locations avoid the issues of topography and population density found in much of the rest of the state. Second, the coastal plain geology is nearly devoid of shallow rock that impedes efficient installation of solar foundations, which is a major driver of construction cost and duration.

Of the possible sites available elsewhere, a high proportion have a combination of sub-surface rock, drainage features and slopes that trigger special foundation designs, extensive civil engineering, and sediment basins to protect water quality. These measures typically lead to greater tree clearing, non-contiguous designs, lower power density and more costly construction. Second, variable topography west of the coastal plain limits the deployment of single axis tracker racking systems. Tracker systems can provide up to 15% more production

and they are the best method for constructing least-cost solar. However, they are not suitable for sites with significant and variable topography. You may recall the controversy among local stakeholders that arose when Apple cleared and mass graded their solar site in Catawba county to accommodate trackers. The best location for single axis trackers is in Southeastern NC.

Additionally, I consider our recent project, Maiden Creek Solar, which was awarded under CPRE Tranche 1 in Catawba County, an exceptional project for the western half of the state. We believe the preference for DEC projects in CPRE and lack of competition from Southeastern NC projects, allowed Maiden Creek Solar to win despite higher overall construction cost relative to typical Southeastern sites and a fixed tilt penalty of 10-15% in lost production. It is our belief that projects in the constrained area utilizing trackers will deliver energy at approximately $6.50 per MWh less than fixed systems in the western portion of the state.

Also, the constrained area of North Carolina has capitalized on solar resources as a growth industry in a region with limited opportunities for growing the tax base, training workers, and providing jobs to both skilled and unskilled labor. This highly developed workforce allows efficiency for staffing and executing solar construction. Income from solar investment in the constrained area of North Carolina serves as a hedge for family farms and agricultural interests against increasing economic pressure from natural disasters, volatile commodity prices, the end to tobacco buyouts, and limited alternatives for

income. Thus, the constrained area of North Carolina has the most abundant sites, lowest cost of construction, highest energy production, and largest seasoned workforce.

Q. ARE THE FRIESIAN UPGRADES NECESSARY TO ACHIEVE GOVERNOR COOPER'S CLEAN EMISSION REDUCTION GOAL?

A. Yes. Both Duke Energy's 50% and the North Carolina Department of Environmental Quality's 70% target for carbon reduction will require significant acceleration of solar integration. Both parties consider lower carbon generation beneficial for the citizens of North Carolina, shareholders of Duke Energy, and the future of the state. The upgrades being funded by Friesian will provide Duke with access to the optimal region for solar in the state of North Carolina starting in 2024. Without these upgrades, no material solar investment is likely to occur in the region before 2027, at the earliest, given the lead time required to study, plan, fund, and construct the upgrades needed to connect any new generation.

Due to the integrated nature of the DEP transmission system in the constrained area, the Friesian upgrades also limit the ability of co-operatives or municipal utilities to add solar in response to the demands of their residential customers seeking a community solution or large industrial customers meeting sustainability mandates.

The lack of any additional transmission capacity and the six-year lead time with no alternative start date or funding plan make it impossible for the constrained region to attract any further generation investment or meet the

growing needs of commercial and industrial enterprises hoping to continue operating in the region or considering a new investment in the area.

According to information provided by Duke, a 51% CO2 reduction by 2030 will require 3,000+ MW of new solar resources over current amounts. Duke states that an additional 13% of CO2 reduction to 64% by 2030 will require an additional 2,100 MW of solar for a total incremental increase of 5,100 MW by 2030. Synapse's study calls for 10,300 MW by 2030. Setting interconnection aside, siting of 5,100 MW of solar will require conservatively require between 25,000 and 30,000 acres of constructible land. The Land Use Stratification Map (Exhibit B) highlights agricultural land in cultivation in the constrained area but outside the Metropolitan Statistical Areas ("MSA") of Charlotte, Raleigh, Durham/Chapel Hill and Fayetteville. We believe existing agricultural land is a proxy for constructible sites with limited civil and development costs. Quantity of open land, irradiance advantages, lack of competing uses and gentle topography combine to make the Southeastern region of NC the most competitive location for solar. Without its inclusion for siting, it will be virtually impossible for the state to deploy solar at a scale and cost adequate to meet its 2030 goals.

Given that CPRE was unable to fill Tranche 1 of 600 MW with projects that trigger no network upgrades, it is reasonable to assume that even a small portion of the Duke de-carbonization goals of 5,100 MW will trigger wide-ranging network upgrades that will take 4-plus years each to construct. The network upgrades required for the Friesian project are needed now; but if Friesian

is not constructed, they will continue to be triggered over and over by all generation resources in the region. Without Friesian, no progress will occur to prepare the transmission system for the upcoming transition to meet Governor Cooper's clean emission reduction goal.

Q. DO THE FRIESIAN UPGRADES REPRESENT AN IMPORTANT ECONOMIC DEVLOPMENT OPPORTUNITY FOR AN UNDERDEVLOPED REGION OF NORTH CAROLINA?

A. Yes. As discussed previously, most of DEP's service territory is closed to new generation as a result of transmission constraints, and Friesian provides the only immediately-actionable proposal to meaningfully address this issue. Duke has positively identified at least 1,561MW of solar resources beyond Friesian that cannot proceed without the Friesian upgrades. We find it particularly important to note that currently, there are 773MW queued in Tier 1 NC counties. Below is a summary of the economic development impact that these quantities of solar energy represent.

Friesian-Dependent Solar Energy Investment				
	Solar Capacity (MWac)	Investment ($M)	Tax Income (35yr Gross, $M)	Local Construction Jobs
Total Confirmed	1561	$1,748	$72	3,998
Tier 1 NC Counties	773	$866	$36	1,980

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes.

(Whereupon, the prefiled rebuttal testimony of Brian C. Bednar was copied into the record as if given orally from the stand.)

(Whereupon, Bednar Rebuttal Exhibit A was identified as premarked.)

Q. Please state your name, title, and business address.

A. My name is Brian C. Bednar. I am the President and Founder of Birdseye Renewable Energy, LLC ("Birdseye"), an affiliate of the Applicant, Friesian Holdings, LLC ("Friesian" or "Applicant"), and I am the Manager and Authorized Agent of Friesian. My business address is 1125 E. Morehead Street, Suite 202, Charlotte, North Carolina 28204.

Q. Have you previously testified before this Commission?

A. Yes. I filed Direct Testimony on May 15, 2019 and Supplemental Testimony on November 26, 2019.

Q. What is the purpose of your rebuttal testimony?

A. The purpose of my rebuttal testimony is to respond to the testimony of Public Staff Witnesses Evan D. Lawrence and Dustin R. Metz and the letters by Duke Energy Progress, LLC ("DEP") filed in this docket on December 6, 2019.

Q. Do you contend that Friesian's PPA with NCEMC is sufficient to demonstrate the need for the proposed facility?

A. Yes, I do. While I agree with the Public Staff that an executed PPA is not necessary to demonstrate the need for a proposed merchant generation facility, Friesian does have an executed PPA with NCEMC. NCEMC has determined a need to contract for both the power and renewable energy credits (RECs) produced by the facility. In NCEMC's initial comments filed in this docket on July 18, 2019, the NCEMC indicated support for the Friesian project and specifically stated:

> As a G&T cooperative, NCEMC continuously strives to supply power to its members that is affordable, reliable, and safe . . . . More recently, NCEMC developed and began to pursue strategic business objectives under an initiative it christened "*A Brighter Energy Future*" ("BEF"), which entails supplying power that is not only affordable, reliable, and safe, but also increasingly low carbon. . . . Once constructed, the Project – specifically, the parties' execution of the Project PPA – will simultaneously advance NCEMC's pursuit of BEF and further its ability to achieve REPS compliant. *See* NCEMC's Initial Comments, pp 1-2 (filed on July 18, 2019).

Q. Is Friesian relying on DEP's capacity needs identified in its integrated resource plan ("IRP") to support its claim that the Friesian generation facility is needed?

A. No. DEP's capacity needs have nothing to do with the need for the Friesian facility, which will sell all of its output to NCEMC. However, we do contend that the network upgrades associated with the Friesian generation facility serve the public interest in part because they will facilitate the development of future generation facilities planned by DEP. DEP's capacity constraint is obstructing the interconnection of additional renewable generation in the southeastern region of North Carolina. The fact that the construction of the Friesian upgrades would alleviate the constraints in this region of the state and enable the interconnection of additional renewable and low-carbon generation resources means that there is

an important benefit to these upgrades that is much greater than the interconnection of the Friesian project. As I will discuss in more detail in my responses to subsequent questions, this is important when considering other points raised by the Public Staff, including the magnitude of the upgrades, the timing of the upgrades, and the location of the upgrades. Altogether, these benefits associated with the Friesian upgrades are why it is in alignment with the public interest and the public convenience.

Q. Do you agree with the Public Staff that later queued solar projects in the region have not been fully studied and may require additional upgrades, over and beyond the Friesian upgrades that may render them economically unviable?

A. I agree that some later queued projects may trigger additional upgrades that could render them economically unviable, but it is impossible to quantify that impact. Based on our experience developing solar in North Carolina since 2009, a material proportion of attrition is routine due to a host of development risks and factors including interconnection costs. While we do not know exactly which projects following Friesian will succeed, I would expect that the Friesian upgrades will be utilized by a minimum of 1,000 MW of later queued generation in the constrained area which have the mix of development, financing and off-take attributes required to make them viable.

Also, given the broad interdependency of much of the DEP transmission queue on the Friesian upgrades, Duke's ability to complete studies in a timely

manner has been limited by the uncertainty and complexity surrounding the needed Friesian network upgrades. Duke highlights this fact in their letters dated December 6, 2019 filed in this docket when discussing a potential queue reform transition. Duke states: "If the Friesian Network Upgrades are not constructed at this time, the transition process will be much more complex and the transition process may be delayed."

Q. Do you believe that construction of the network upgrades associated with the Friesian generation facility should be deferred until further comprehensive system planning (including IRP, ISOP, NCTPC, CPRE, distributed system planning, and short-term market solicitations) has been conducted?

A. No. While I generally recognize the benefits of comprehensive system planning, I believe that deferral of approval of the Friesian network upgrades is ill-advised for two reasons. First, given the certainty that significant amounts of new generation will be needed in eastern North Carolina in the coming decade and the importance of these upgrades to the development of such additional generation (as discussed in Duke's comment letters filed in this docket on December 6, 2019), I believe it is inevitable that these upgrades will be required, and that they will be paid for by ratepayers. Also, delaying the inevitable accomplishes nothing except to delay DEP's ability to add new generation and to increase the cost of the upgrades to ratepayers.

In particular, the timing of the IRP and the Integrated Systems Operations Planning (ISOP) create risk of delays in bringing new generation online, will result in additional costs for restudy, and will increase the costs for the upgrades constructed at a later date. The transmission system planning to support Governor Cooper's Clean Energy Plan, may not begin until 2021. Similarly, the ISOP will not be approved until the 2021 IRP process and will not go into effect until the start of 2022. As Duke describes in their December 6, 2019 letters, it is evident to Duke and Friesian that the "need for the Friesian Network Upgrades will not go away" and "if the Friesian Network Upgrades are not constructed at this time, there will be a further substantial delay in the interconnection of any additional generating facilities in this area of DEP."

An additional concern with comprehensive system planning is whether it is capable of evaluating hundreds of queued solar generators. Adding 5100 MW of solar by 2030 will, at an absolute minimum, require sixty-eight 75MW solar projects (68 x 75MW = 5,100 MW) placed in service. The number of projects evaluated by comprehensive system planning will be many times greater than the target given attrition and projects smaller than 75MW. Exhibit A shows where experienced developers have successfully sited solar generators to date in North Carolina. We believe this pattern has been driven by the many attributes for solar present in the constrained area and is a strong indication of its importance for meeting future development targets.

Q. Do you agree with the Public Staff that it is speculative that the Friesian network upgrades are necessary to support significant addition of solar generation resources in North Carolina?

A. No, I do not. In addition, to my prior testimony concerning the importance of the constrained area to further solar development, Exhibit A shows where developers have sited solar generators in North Carolina. If it were easy and cost-effective to develop large quantities of solar generation in other parts of the state, it would have already happened.

Q. Does Friesian have the ability, as suggested by the Public Staff on page 35 of its testimony, to continue working with DEP to evaluate the possibility of lower cost interconnection options, such as changes to the capacity, design, or operational characteristics of the facility to allow it to interconnect without triggering the upgrades?

A. Under the Interconnection Standards of the Duke Energy Progress OATT, a proposed generator's ability to downsize the project, add storage, or materially change the generator's operational characteristics are limited without being re-queued. Based on the joint queue published on OASIS, re-queuing in October 2017 would have resulted in losing a minimum of fifty-six queue positions. Further, in a December 2017 meeting with Duke's interconnection team in Raleigh regarding the Q380 Interconnection Facility Study, Duke highlighted that any utility-scale project in the constrained area following

Friesian's immediate predecessor Q377, would trigger significant 230Kv and 115kV transmission upgrades. As a result, there were no alterations to the Q380 application that complied with the OATT, preserved the economic viability of Q380, and offered a means to mitigate or minimize the Network Upgrades.

Q. Are you in agreement with the information that Duke provided in its December 6, 2019 letters filed in this docket?

A. Yes. On December 6, 2019, Duke filed letters from Stephen De May, North Carolina President of Duke Energy, and from Duke's attorney, and I agree with the information that Mr. De May and Duke's attorney provided. First, I agree with Mr. De May's assessment that the Friesian CPCN application involves "unique circumstances". *See* North Carolina President Letter Regarding Friesian CPCN Application, pp. 1, 1. I believe that Friesian's CPCN application involves very unique circumstances, as the construction of the Friesian network upgrades will provide substantial and important benefits to DEP's transmission system and to the state. I also concur with Mr. De May's recommendation that the Commission "should consider the benefits of the Network Upgrades in rendering its decision in this proceeding" in light of "this pivotal time of transition in North Carolina's energy policy". *See* North Carolina President Letter Regarding Friesian CPCN Application, p. 1. Mr. De May provided a summary of the benefits of the Friesian upgrades that include: (1) allowing for the interconnection of a substantial amount of renewable resources in the southeast portion of DEP's service territory, (2) avoiding queue paralysis and substantial

delays in interconnection for certain projects, and (3) minimizing certain short-term challenges associated with Duke Utilities' queue reform plans. In sum, I agree with Mr. De May's assessment that "[c]onstruction of the Network Upgrades in question at this time will result in benefits that will, in turn, smooth the road on the journey in the future." *See* North Carolina President Letter Regarding Friesian CPCN Application, p. 2.

Additionally, I am in complete agreement with Duke's attorney's further detail of the benefits of the Friesian upgrades. In particular, Duke's attorney stated:

> As the Commission is aware, the comprehensive planning process for the DEP and Duke Energy Carolinas, LLC ("DEC" and together with DEP, the "Duke Utilities") 2018 IRP and 2019 IRP Updates demonstrates that a combination of renewable resources, demand-side management and energy efficiency programs, and additional base load, intermediate and peaking generation are required over the next fifteen years to reliably meet customer demand. Additionally, in mid-September 2019, Duke Energy Corporation announced its new, enterprise-wide climate strategy . . . . In a similar vein, the recently released North Carolina Clean Energy Plan from the North Carolina Department of Environmental Quality establishes a goal of 70% greenhouse gas

emissions ("GHG") reductions by 2030 and carbon neutrality by 2050.

Regardless of the precise GHG emissions target, substantial new renewable resources will be needed. For instance, the base case from the 2019 IRP Update – which achieves a 51% CO_2 reduction by 2030 – requires 3,000+ MW of additional solar resources over current amounts. Substantial Network Upgrades will undoubtedly be needed to accommodate the addition of a substantial amount of new grid resources. While the Company's analysis to date has not attempted to identify what specific Network Upgrades will be needed, the Friesian Network Upgrades are representative of the types of Network Upgrades that may be required in the future to achieve CO_2 reduction targets.

. . . [T]he additional solar resources accommodated by the Friesian Network Upgrades will move the Duke Utilities close to the various targets.

Q. What do you request that the Commission do in regard to the information provided by Duke in its letters?

A. I ask that the Commission carefully consider the information provided by Duke as to the importance of the Friesian upgrades and the benefits that the upgrades will provide to Duke's system and to meeting Duke's various targets.

Q. Does this conclude your rebuttal testimony?

A. Yes.

Q Mr. Bednar, do you have a summary of your testimony to present to the Commission at this time?

A I do.

Q Okay. And please go ahead and read it.

A Sure. Good morning, Madam Chair, and members of the Commission. My name is Brian Bednar, and I am the CEO of Birdseye Renewable Energy, LLC. Birdseye is a developer of utility-scale solar photovoltaic facilities. To date, Birdseye has developed 424 MW DC of completed and operating utility scale solar assets, the vast majority of which have been in North Carolina, and Birdseye has a current development pipeline consisting of over 2,000 MW DC. Birdseye has been developing the 70-MW Friesian solar facility in Scotland County for about four years. Although we recently conveyed our ownership interest in the project to Friesian Portfolio Acquisition, LLC, Birdseye will remain heavily involved in the development of the project until it reaches the construction stage. Friesian's application for a CPCN involves issues of critical importance for North Carolina, and the outcome of the proceeding will have a significant impact on North Carolina's energy future.

In my direct, supplemental, and rebuttal testimony I explain how the development of the Friesian

project, including the associated network upgrades, serves the public convenience and necessity, as required by North Carolina General Statute 62-110.1 and Commission Rule R8-63.

With respect to the need for the Friesian facility, I explain that Friesian and NCEMC have entered into a Power Purchase Agreement, PPA, for Friesian to sell the full output of the facility to NCEMC. NCEMC has determined a need to contract for both the power and the renewable energy credits, or RECs, produced by the facility. In NCEMC's initial comments filed in this docket on July the 18th, 2019, NCEMC expressed support for the Friesian project and stated: As a G&T cooperative, NCEMC continuously strives to supply power to its members that is affordable, reliable, and safe. More recently, NCEMC developed and began to pursue strategic business objectives under an initiative it christened A Bright (sic) Energy Future, BEF, which entails supplying power that is not only affordable, reliable, and safe, but also increasingly low carbon. Once constructed, the project, specifically the parties' execution of the project PPA, will simultaneously advance NCEMC's pursuit of BEF and further its ability to achieve REPS compliance.

I further explain that the Friesian project is a viable project. If the Commission approves Friesian's CPCN application, the facility will be constructed because facility -- financing for the facility from Kayne Solutions Fund, LP, known as Kayne, is already in place. To date, Kayne has provided $10 million in payments to Duke on behalf of the Friesian project under the LGIA, including a $1.5 million payment on May 31st, 2019, a $1.5 million payment on July 26th, 2019, and a $7 million payment on December the 2nd, 2019. Kayne is prepared to make all subsequent security postings and related interconnection payments that are required by the Friesian LGIA.

There appears to be no dispute that the Friesian generation facility serves the public convenience because it provides needed renewable energy to an important wholesale customer at an attractive price and at no cost to Duke Energy Progress' ratepayers because there is no environmental, land use, or other similar concerns about the project. The issue raised by the Public Staff is whether it is in the public interest for DEP's North Carolina rate -- retail ratepayers to bear a portion of the significant upgrade costs that DEP is required, under federal law, to reimburse to Friesian

if the project is placed in service. I contend in my testimony that the Friesian network upgrades serve the public convenience because they will provide necessary improvements to DEP's transmission system. Those improvements to DEP's system will enable the connection of additional solar resources, along with the connection of DEP's planned generation resources in southeastern North Carolina. The Friesian network upgrades are also necessary to achieve the carbon reduction goals for the state.

As I discuss in my testimony, Stephen De May, North Carolina President of Duke Energy, and Duke's attorneys filed letters in this docket on December the 6th, 2019, that show that Friesian facility -- that the Friesian facility serves the public convenience. Mr. De May stated that the Friesian CPCN application involves "unique circumstances" and that "construction of the network upgrades...at this time will result in benefits that will, in turn, smooth the road on the journey in the future." Mr. De May summarized the benefits of the Friesian upgrades including: 1) allowing for the interconnection of a substantial amount of renewable resources in the southeast portion of DEP's service territory; 2) avoiding queue paralysis and substantial

delays in interconnection for certain projects; and 3) minimizing certain short-term challenges associated with Duke Utilities' queue reform plans. Mr. De May recommended that the Commission "consider the benefits of the network upgrades in rendering its decision in this proceeding" in light of "this pivotal time of transition in North Carolina's energy policy," as he described it.

I also stated my agreement with Duke's attorney's description of the numerous benefits of the Friesian upgrades. I'll take a minute to read the description of the benefits of the Friesian upgrades that Duke's attorney provided: "The comprehensive planning process for the DEP and Duke Energy Carolinas, LLC...2018 IRP and 2019 IRP Updates demonstrates that a combination of renewable resources, demand-side management, and energy efficiency programs, and the additional base load, intermediate, and peaking generation are required over the next 15 years to reliably meet customer demand. Additionally, in mid-September 2019, Duke Energy Corporation announced its new enterprise-wide climate strategy...In a similar vein, the recently released North Carolina Clean Energy Plan from the North Carolina Department of Environmental Quality establishes a goal of 70 percent greenhouse gas emissions reductions by 2030

and carbon neutrality by 2050.

Regardless of the precise GHG emissions target, substantial new renewable resources will be needed. For instance, the base case from the 2019 IRP update, which achieves 51 percent CO2 reduction by 2030, requires 3,000 plus MW of additional solar resources over current amounts. Substantial network upgrades will undoubtedly be needed to accommodate the addition of a substantial amount of new grid resources. While the Company's analysis to date has not attempted to identify what specific network upgrades would be needed, the Friesian network upgrades are representative of the types of network upgrades that may be required in the future to achieve CO2 reduction targets. The additional solar resources accommodated by Friesian network upgrades will move the Duke Utilities close to the various targets."

The Friesian upgrades are necessary to add new generation resources in southeastern North Carolina, including new solar resources and future generation facilities planned by DEP. There is substantial congestion in DEP's transmission system in the southeastern portion of the state that prevents any new generation resources from being added to the system without triggering substantial network upgrades. Over 50

percent of DEP's service territory is currently designated as a transmission constrained area and is unavailable for additional generation resources. Birdseye's analysis of the current DEP queue shows that 3,898 MW of proposed solar is in the constrained area. Furthermore, the Timmons Group's analysis of DEP's transmission system in southeastern North Carolina finds that the system is at full capacity. Projects as small as 5 MW will not be able to interconnect without triggering substantial and costly network upgrades.

In addition to that information, DEP has completed an assessment for interconnection requests received through September the 30th, 2017. The assessment shows that there are 108 interconnection requests totaling 1,561 MW that are interdependent on the upgrades assigned to Friesian. Duke has stated and confirmed that the Friesian upgrades will at least partially facilitate the interconnection of about 1,561 MW of additional solar generation and other generation resources, including Duke's planned natural gas plant known as Q399.

For many reasons it is preferable to locate solar facilities in the southeastern portion of North Carolina. For example, developing large solar projects

outside of eastern North Carolina almost always requires clearing of trees and much more extensive erosion and stormwater measures to protect streams and wetlands due to significantly greater topography. Also, the southeastern area of North Carolina has capitalized on solar resources as a growth industry in a region with limited opportunities for growing the tax base, training workers, and providing jobs to both skilled and unskilled labor. Income from solar in the constrained area of North Carolina is serving as a hedge for family farms and agricultural interests, against increasing economic pressure from natural disasters, volatile commodity prices, the end of tobacco buyouts, and limited alternatives for income. Thus, the constrained southeastern area of North Carolina has the most abundant sites, the lowest cost of construction, highest energy production, and largest seasoned workforce.

The Friesian upgrades would allow for the construction of necessary improvements to DEP's transition system in a timely manner. The Friesian project is the most efficient way for upgrades in DEP's transmission system to be accomplished, as the upgrades will be completed by the end of 2023. Without the Friesian project, it is unlikely that the upgrades could

be completed before 2027, at the earliest.

I would like to move on to discuss how the Friesian upgrades are necessary to achieve Duke Energy's and North Carolina Department of Environmental Quality's target for carbon reduction. Duke Energy's 50 percent and North Carolina Department of Environmental Quality's 70 percent target for carbon reduction will require a significant acceleration of solar integration. Both Duke and North Carolina Department of Environmental Quality consider lower carbon generation to be important and beneficial for the citizens of North Carolina, shareholders of Duke Energy, and the future of the state. The upgrades being funded by Friesian will provide Duke with access to the optimal region for solar in the state of North Carolina starting in 2024. Without these upgrades, solar investment is not likely to occur in the region before 2027 at the earliest, given the lead time required to study, plan, fund, and construct the upgrades needed to connect any new generation.

According to information provided by Duke, 51 percent of CO2 reduction by 2030 will require 3,000 plus MW of new solar resources over current amounts. Duke states that an additional 13 percent of CO2 reduction to 64 percent by 2030 will require an additional 2,769 MW of

solar, for a total incremental increase of 5,769 MW by 2030. Synapse's study calls for an even greater amount, 10,300 MW by 2030. The network upgrades required for the Friesian project are needed now, but if Friesian is not constructed, they will continue to be triggered over and over by all generation resources in the region. Without Friesian, there will be no progress to prepare the transmission system for the upcoming transition to meet Duke Energy's and the North Carolina Department of Environmental Quality's clean emission reduction goal.

This concludes the summary of my testimony. Thank you very much.

Q Thank you, Mr. Bednar. I will now move on to Friesian's second witness who is Charles Askey. Mr. Askey, can you state your full name and business address for the record, please?

A (Askey) Yes. Charles M. Askey, 610 East Morehead Street, Suite 250, Charlotte, North Carolina, 28203.

Q And by whom are you employed and in what capacity?

A The Timmons Group. I'm Senior Project Manager in our Engineering and System Planning Group.

Q And did you cause to be prefiled on November

the 26th of 2019 11 pages of direct testimony in the form of question and answer and two exhibits?

A I did.

Q And if I were to ask you the same questions that appear in your supplemental testimony today, would your answers be the same?

A They would.

Q And do you have any corrections that you would like to make to your supplemental testimony?

A No. I do not.

Q And did you also cause to be prefiled on December the 12th of 2019 10 pages of rebuttal testimony in the form of question and answer?

A I did.

Q And if I were to ask you the same questions that appear in your rebuttal testimony today, would your answers be the same?

A They would.

Q And do you have any corrections that you would like to make to your rebuttal testimony?

A No. I do not.

MS. KEMERAIT: So at this time I would move that Mr. Askey's prefiled supplemental direct and rebuttal testimony be copied into the record as if given

orally from the stand, and that the exhibits to his testimony be marked for identification and included in the record.

CHAIR MITCHELL: Hearing no objection, the motion is allowed.

MS. KEMERAIT: Thank you.

(Whereupon, the prefiled supplemental direct testimony of Charles Askey was copied into the record as if given orally from the stand.)

(Whereupon, Askey Supplemental Direct Exhibits A and B were identified as premarked.)

I. INTRODUCTION AND QUALIFICATIONS

Q. PLEASE STATE YOUR NAME, TITLE, AND BUSINESS ADDRESS.

A. My name is Charles Askey. I am a Senior Project Manager in the Power Engineering & System Planning Group at Timmons Group. My business address is 610 East Morehead Street, Suite 250, Charlotte, North Carolina 28202.

Q. PLEASE DESCRIBE THE TIMMONS GROUP.

A. Timmons Group is a multi-disciplined engineering and technology firm that has been recognized for over twenty-five years as one of the Engineering New Record's Top 500 Design Firms in the country. Timmons Group provides civil engineering, structural, environmental, electrical, geotechnical, GIS/geospatial technology, landscape architecture, and surveying services to a diverse client base.

Founded in 1953, Timmons Group is a well-established firm with a pioneering spirit. Timmons Group has provided clients with services in the following areas:

- Site/Civil Engineering
- Environmental Services
- Survey & Mapping / ALTA Survey
- Electrical Engineering & Design
- Landscape Architecture
- Stormwater Infrastructure
- Right-of-Way Services
- Generation Interconnection Services
- Unmanned Aircraft Systems (UAS) / Drone Services
- Power System Planning
- Geotechnical Engineering & Testing
- Water & Wastewater Engineering
- Traffic & Transportation
- Structures & Bridges
- Geographic Information Systems (GIS)

- Construction Administration & Inspection
- LEED® & Envision Sustainable Design
- MW Injection / System Impact Studies
- Economic Development

Q. PLEASE DESCRIBE YOUR EDUCATION AND PROFESSIONAL EXPERIENCE.

A. I obtained a Bachelors of Science degree and a Masters of Electrical Engineering with a concentration in Power System Analysis from Clemson University. I am a registered Professional Engineer.

As previously mentioned, I am a Senior Project Manager in the Power Engineering & System Planning Group at Timmons Group. I have over thirty years of experience in Power System Planning and System Operations, and my work experience includes twenty-seven years of utility experience in Power System Planning and Systems Operations either as an employee or as a contractor. My consulting background includes work with Investor Owned Utilities, Electric Membership Cooperatives, Municipal Utilities, Merchant Generation Developers, and EPC Contractors. I have conducted numerous studies and client engagements regarding electrical system studies and NERC compliance. My client work with generation developers includes performing preliminary system impact assessments to identify acceptable Points of Interconnection and the determination of maximum transfer capability from a potential project to the power system. I have performed these generation impact assessments on transmission systems throughout the country, and I have interfaced with most of the Regional Transmission Organizations (RTOs) and NERC regions.

I have also prepared generation interconnection documentation and reviewed Transmission Providers' studies in support of clients' projects. Additionally, I have supported clients in the following areas: power supply contracts, transmission contracts, scheduling, operations, transmission billings, regulatory issues, facility planning and siting, and NERC Audit preparation.

A copy of my resume is attached hereto as Exhibit A.

Q. ON WHOSE BEHALF ARE YOU TESTIFYING IN THIS CASE?

A. I am testifying on behalf of Friesian Holdings, LLC ("Friesian").

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

A. No.

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

A. The purpose of my testimony is to demonstrate that the Friesian network upgrades are required for additional solar resources and other generation resources to be added to Duke Energy Progress, LLC's ("DEP") system even if Friesian is not constructed. My testimony also recognizes that Duke Energy's 2018 Integrated Resource Plans ("IRPs") and Duke Energy's 2019 IRP Updates indicate that additional generation is needed to support load growth and resource portfolio improvements from renewable resources or other generation resources in eastern North Carolina.

Q. ARE YOU SPONSORING ANY EXHIBITS WITH YOUR TESTIMONY?

A. Yes. I am sponsoring the following exhibits:

Exhibit Number	Contents
Exhibit A	Resume of Charles Askey
Exhibit B	*DEP Queue Analysis: Review of Transmission System Upgrades and Project Impact*

II. SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS

Q. HAVE YOU PERFORMED AN ANALYSIS OF THE TRANSMISSION SYSTEM UPGRADES FOR GENERATION ADDITIONS TO DEP'S SYSTEM EVEN IF FRIESIAN IS NOT CONSTRUCTED?

A. Yes. I performed an analysis of the network upgrades that are required to add new generation to DEP's transmission system even if Friesian is not constructed. My analysis and conclusions are contained in my report, *DEP Queue Analysis: Review of Transmission System Upgrades and Project Impact,* that is attached as Exhibit A.

Q. PLEASE SUMMARIZE YOUR ANALYSIS.

A. Interdependency to the Friesian Project

Initially, I considered information that DEP provided in response to Friesian's data request. DEP provided information that it has completed an assessment for interconnection requests received through September 30, 2017. There are 108 interconnection requests totaling 1,561 megawatts ("MW") that have been identified as interdependent on the network upgrades assigned to Friesian. In addition to the projects specifically identified to date by DEP as interdependent

on the Friesian upgrades, DEP stated that there are likely many additional later-queued projects that are also technically interdependent on the Friesian upgrades. DEP also stated that the interconnection study is designed to assess whether upgrades are needed to accommodate a particular generating facility but are not intended to assess whether a particular upgrade will accommodate a particular set of future generating facilities. However, DEP believes that it is undoubtedly the case that the Friesian upgrades will alleviate the interdependency of at least 1,561 MW of additional solar resources and provide a path forward for such projects to interconnect in a safe and reliable manner.

Furthermore, DEP has provided information that as a general matter, substantial network upgrades will be needed to accommodate the addition of a substantial amount of new grid resources (not limited to solar resources). The Friesian upgrades are the type of requisite network upgrades that will help to accommodate the interconnection of a substantial amount of additional renewable and other resources. In fact, in addition to solar resources, Duke Energy's 1235 Combined Cycle Plan in Cumberland County is interdependent on the Friesian upgrades.

Required Transmission System Upgrades

In conjunction with the study of the Friesian project along with several other previously queued projects, DEP has identified multiple system upgrades to be

constructed prior to allowing Friesian to interconnect to the system. These transmission line upgrades are listed in the table below:

Transmission Upgrades	Description	Distance (Miles)
Erwin –Fayetteville East 230 kV Line	Reconductor to 6-1590 MCM ACSR Conductor	~23
Fayetteville – Fayetteville Dupont 115 kV Line	Reconductor to 3-1590 MCM ACSR Conductor	~3.2
Cape Fear – West End 230 kV Line	Reconductor to 6-1590 MCM ACSR Conductor	~26
Sanford Deep River Tap – Sanford Horner Blvd. 230 kV Line	Reconductor to 6-1590 MCM ACSR Conductor	~4.4
Erwin - Fayetteville 115 kV Line	Reconductor to 3-1590 MCM ACSR Conductor	~8.7
Rockingham – West End 230 kV Line	Upgrade the line to full conductor rating.	~7.7

DEP System Impact Study Methodology

As part of Duke's FERC-jurisdictional Large Generation Interconnection Procedures ("LGIP"), DEP uses a "Stressed System" model to evaluate impacts to the system caused by generation interconnection facilities. The stated reason for this is to ensure that the DEP-owned transmission system can deliver on firm transmission commitments under the direst of circumstances.

Timmons Group, through its FERC Critical Energy Infrastructure Information (CEII) clearance, has access to the power flow models and maps for the power systems in the mainland United States. The current set of cases has a Southeastern Electric Reliability Council (SERC) 2023 Summer Peak model that Timmons Group used for the analysis. In evaluating DEP's System Impact Studies for Friesian, Timmons Group was able to access and evaluate

Duke Energy's models to perform the requisite generation interconnection studies. Based on those models of the system, certain changes outlined in the report were made to the FERC CEII model.

Analysis

The below Table 1 shows the pre-contingency and post contingency flows, rating, and percentage loading on the five limiting elements based on the most critical contingency studies.

Table 1 - Pre-contingency and Post Continency Loading on the Friesian Related System Operating Limits for the loss of the Most Critical Contingency

Scenario	Post Contingency Flow (MVA)	Rating (MVA)	Voltage Adjusted Post Contingency Loading (%)
Limitation: Erwin - Fayetteville East 230 kV (~23 Miles)			
Contingency: Wake - Cumberland 500 kV			
Queue included up through Q380	492	478	105.51%
Queue included except for Q380	484	478	103.74%
No Queue	449	478	95.69%
Limitation: West End - Cape Fear 230 kV (~26.6 Miles)			
Contingency: Richmond - Cumberland 500 kV			
Queue included up through Q380	529	542	100.47%
Queue included except for Q380	523	542	99.32%
No Queue	499	542	94.34%
Limitation: Rockingham - West End 230 kV (7.7 Miles)			
Contingency: Richmond - Cumberland 500 kV			
Queue included up through Q380	505	542	96.13%
Queue included except for Q380	500	542	94.87%
No Queue	477	542	90.12%
Limitation: Erwin - Fayettevlle 115 kV (~8.7 Miles)			
Contingency: Wake - Cumberland 500 kV			
Queue included up through Q380	114	119	97.99%
Queue included except for Q380	112	119	95.89%
No Queue	105	119	89.65%
Limitation: Fayetteville - Fayetteville Dupont 115 kV			
Contingency: Richmond - Cumberland 500 kV			
Queue included up through Q380	120	119	103.54%
Queue included except for Q380	119	119	102.41%
No Queue	114	119	97.31%

Evaluation of Results

DEP's System Impact Study contains the following statement in regard to power flow results:

> Facilities that may require upgrade within the first three to five years following the in-service date are identified. Based on projected load

growth on the DEP transmission system, **facilities of concern are those with post-contingency loadings of 95% or greater of their thermal rating** and low voltage of 92% and below, for the requested in-service year or the in-service year of a higher queued request. The identification of these facilities is crucial due to the construction lead times necessary for certain system upgrades. This process will ensure that appropriate focus is given to these problem areas to investigate whether construction of upgrade projects is achievable to accommodate the requested interconnection service. (Emphasis added.)

The results demonstrate that with the interconnection queue loaded up through Friesian (Q380), all the limiting elements are loaded over either 95 percent or 100 percent of their contingency ratings. Obviously, these loading levels are the reason that DEP found that facility loadings need to be addressed prior to granting transmission service to Friesian. However, it is noted the while the loadings are heavy, the loadings without the queue are within five to ten percent of the contingency loading levels without the queued generation listed.

Also note that DEP has two, 1235 MW queued gas projects (Q398 & Q399) which will add significantly to most, if not all these line loadings absent any other upgrades. This projected outcome is consistent with the findings of the Q398 System Impact Study Report that was published in December 2018 and Q399 System Impact Study Report that was published in April 2019. The

first report recommends building a new 35 mile, 230 kV line between the Cumberland and Erwin Substations and a similar 230 kV line between the Cumberland and Clinton Substations. While DEP has determined that its first gas project (Q398) is not dependent upon Friesian's upgrades, DEP's second Combined Cycle Plant (Q399) is interdependent upon Friesian's upgrades.

Q. PLEASE SUMMARIZE YOUR PRIMARY CONCLUSIONS.

A. Based on the Friesian System Impact Study and my study results, the Friesian network upgrades are required to allow Friesian to connect and deliver power to the system without violating the DEP LGIP Study Methodology. Further, without the Friesian upgrades, new generation resources (*i.e.*, renewable energy, Duke Energy's Q398 / Q399 projects, and other generation resources) in this area of DEP's system will not be able to be added to the system without requiring substantial upgrades. In other words, no new generation (new renewable resources, DEP's gas plants, and other generation resources) will be able to be added to this area of the state without substantial network upgrades.

Also, there are a number of key benefits that will result from the Friesian network upgrades, including enhanced load serving capabilities, reduced power system losses, and improved flexibility to operate the transmission grid.

Additionally, Duke Energy's integrated resource plan indicates that additional generation is required to support load growth and resource portfolio improvements. Whether that new generation comes from renewable energy or

other generation resources in eastern North Carolina, it cannot occur without the Friesian network upgrades or other major improvements to DEP's transmission system.

Q. PLEASE SUMMARIZE YOUR RECOMMENDATION.

A. I recommend that the Commission approve Friesian's CPCN Application for a 70-MW solar facility since the network upgrades are not just important for the Friesian project. The Friesian upgrades are important for DEP's transmission system – those upgrades are necessary to support new generation to DEP's transmission system separate and apart from the Friesian project.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes.

(Whereupon, the prefiled rebuttal testimony of Charles Askey was copied into the record as if given orally from the stand.)

Q. Please state your name, title, and business address.

A. My name is Charles Askey. I am a Senior Project Manager in the Power Engineering & System Planning Group at Timmons Group Timmons Group. My business address is 610 East Morehead Street, Suite 250, Charlotte, North Carolina 28202.

Q. Did you previously file testimony in this docket?

A. Yes. I filed supplemental testimony in this docket on November 26, 2019.

Q. What is the purpose of your rebuttal testimony?

A. The purpose of my rebuttal testimony is to respond to the testimony of Public Staff Witnesses Even D. Lawrence and Dustin R. Metz filed in this docket on December 6, 2019. Specifically, I will address (1) the Public Staff's assertion that the public benefits of the Friesian network upgrades are speculative because it is uncertain whether additional generation utilizing those upgrades is needed, (2) the relevance of the fact, relied on by the Public Staff, that the Friesian network upgrades are not referenced in the North Carolina Transmission Collaborative ("NCTPC"), and (3) the Public Staff's analysis of the reasonableness of the Friesian upgrade costs on the basis of the levelized cost of transmission ("LCOT").

I. The benefits of transmission system improvements in southeastern North Carolina

Q. Do you agree with the Public Staff that the benefits of the Friesian upgrades are speculative because they might not be needed to accommodate additional generation in the southeastern portion of the state?

A. No. It is clear that the Friesian network upgrades are necessary to accommodate the addition of new and needed grid resources in southeastern North Carolina. As I mentioned in my direct testimony, DEP has provided information that substantial network upgrades will be needed to accommodate the addition of a substantial amount of new grid resources (not limited to solar resources). The Friesian upgrades are the type of requisite network upgrades that will help to accommodate the interconnection of a substantial amount of additional renewable and other resources, including Duke Energy's 1235 MW Combined Cycle Plant in Cumberland County that is interdependent on the Friesian upgrades. Even if some of the generation shown in Duke's 2018 IRP and 2019 IRP Update are not ultimately constructed, the Friesian upgrades are required to connect new generation resources in this area of the state.

Q. Are the Friesian upgrades needed to support the goals of Duke's IRP?

A. Yes. Duke Energy's 2018 IRP and 2019 IRP Update indicate that additional generation is needed to support load growth and resource portfolio improvements from renewable resources or other generation resources in southeastern North Carolina. In fact, DEP's 2019 IRP Update calls for load growth of 0.9% per year overall.

As I mentioned in my supplemental testimony, the Friesian upgrades are necessary to support new generation to DEP's transmission system separate and apart from the Friesian project. In addition to information contained in DEP's 2019 IRP, Public Staff Witnesses Lawrence and Metz acknowledged the necessity of the Friesian upgrades to accommodate new generation to flow northwest to large load centers. On pages 14 and 15 of the Public Staff's testimony, the Public Staff provided testimony from DEP Witness Gary Freeman on November 19, 2018 in Docket No. E-100, Sub 101. In that docket, DEP Witness Freeman stated:

> DEP has determined that significant transmission network upgrades will be needed to interconnect additional generation in the southeastern North Carolina area of DEP East. These upgrades have been triggered by the cumulative amount of generation located in southeastern North Carolina, where the need for the increased generation to flow northwest toward the large load centers, such as Wake County, has caused several transmission line segments to now reach their power flow limits.

Q. Is this transmission capacity necessary to interconnect additional generation resources in southeastern North Carolina?

A. Yes, it is clear that there must be transmission capacity in order to interconnect additional generation resources. The capacity of Duke's transmission system or, to be clear, its capability to transfer power from generation to load is assessed regularly through system planning studies for reliability and for the interconnection and delivery of generation and load. The identification of transmission system improvements and the need for the improvements are

identified in studies that are typically performed using future year power flow models that include approved assumptions of load growth and generation dispatch. Contingency events are modeled along with obligations to generation and load to determine if the system can deliver under a variety of potential system conditions. If in the course of the studies, facilities are loaded beyond their operational ratings or if there are voltage or stability issues, alternative options and their costs are studied to remedy the problem(s). The selection of the improvement option is usually based on lowest cost solution or best overall value for the system.

II. Transmission line upgrades in the NCTPC

Q. Have you participated in the North Carolina Transmission Planning Collaborative?

A. Yes. I represented four cooperative clients that are served either by DEP or Duke Energy Carolinas, LLC ("DEC") in the NCTPC process. I participated early in the NCTPC process, including the inception of the process.

Q. The Public Staff has noted that the Friesian network upgrades have not been identified in the Report on the NCTPC 2018-2028 Collaborative Transmission Plan (NCTPC Report). Does that fact imply that those upgrades will not serve the public interest?

A. No. The fact that the Friesian network upgrades are have not been identified in the NCTPC Report says nothing about the need for those upgrades or whether they will serve the public interest. The NCTPC does not typically consider

upgrades for generation resources such as the Friesian facility unless and until they have executed interconnection agreements, as Friesian did earlier this year. As noted by the Public Staff, the transmission lines that will be upgraded to accommodate the Friesian project were not identified as needing upgrades in the NCTPC reports because the Friesian Large Generator Interconnection Agreement ("LGIA") had not been executed at the time of the study evaluations. Since the LGIA has since been executed, I expect that the Friesian upgrades will be included in the NCTPC 2020 Transmission Plan.

Based on my participation in the NCTPC process, the primary issues that are considered are the reliability of the transmission system and the ability to transfer power between systems. In the NCTPC, DEP and DEC present results from their NERC Transmission Planning Standard ("TPL") studies and the facility improvements that are needed from those studies. While generation assumptions are included in those studies, they are not designed to ensure the delivery of power from a specific generation location.

As stakeholder involvement has increased in the NCTPC process, stakeholder-suggested studies have been performed by the Planning Working Group ("PWG"). These studies have usually been hypothetical transfers between systems, such as a 500-MW transfer from DEC to Southern Company. The PWG will study a hypothetical transfer and report on whether improvements are needed to complete the transfer; but no obligations are made for transmission construction as the result of the study. In general, developers do not request that

specific generation resources be studied -- if a developer were to request that a specific point of interconnection ("POI") be studied, the developer would be either disclosing the POI location or making competitive information available to other developers. The method that most generation resources use to determine transmission access is to either file a generation interconnection request and enter the interconnection queue, or hire a consultant like me to perform a confidential study of the transmission system impact prior to submitting the interconnection request.

III. Evaluation of the benefits of the proposed network upgrades

Q. Do you agree with the Public Staff that comparing the LCOT for the Friesian network upgrades to the LCOT in the MISO, PJM, and EIA groups is a reasonable way to evaluate the public benefit of the upgrades?

A. No, I do not. In addition to the fact that the Public Staff has failed to consider the significant additional generation that will utilize and benefit from the Friesian network upgrades (as discussed by Witness Wilson in her Rebuttal Testimony), there are significant differences that must be accounted for when comparing the LCOT for Friesian with the LCOT for projects in the MISO, PJM, and EIA groups; the Public Staff has failed to address those distinctions. MISO, PJM, SPP, and other Regional Transmission Organizations ("RTO") are regulated by the Federal Energy Regulatory Commission ("FERC"), and they therefore do not operate under a regulatory compact with any state jurisdiction. Their participating utility members have those obligations and address those responsibilities, which

means that utility system planning for delivery to native load and regional transmission planning for system transfers and access to generation are being coordinated by two different entities. The utilities perform their own NERC Transmission Planning Standard ("TPL") Studies and identify the improvements to solve any contingency loading or voltage issues identified in the process. They also identify any additional transmission resources that are needed to serve load in their load zone. These identified improvements are then combined with the other utilities' projects throughout the RTO to help create the Regional Transmission Plan. For example, in PJM, the plan is called the Regional Transmission Expansion Plan ("RTEP"), MISO has the Midwest Transmission Expansion Plan ("MTEP"), and SPP has the SPP Transmission Expansion Plant ("STEP"). The costs for projects associated with the transmission expansion plans are rate-based by the utility where the project is located. These are commonly referred to as "Baseline" projects.

Q. You point out relevant differences between when comparing how transmission upgrades are assigned and MISO, PJM, and EIA. How do the differences you describe apply to cost allocation?

The RTOs conduct the Large Generation Interconnection Process ("LGIP") Studies associated with their Open Access Transmission Tariff ("OATT"). The RTOs usually perform these LGIP studies in generation queue clusters that are accumulated approximately every six months. During these cluster studies, transmission facility improvements are identified to solve problems associated

with delivery of the queued generation under contingency conditions. The costs associated with upgrading the system to accommodate the new generation are typically one of three following categories:

- Directly assigned costs. These are costs paid directly by the generation resource.
- Network improvements. These are costs that are socialized by the projects that contribute to the problem. This cost socialization varies by RTO, but can take up to five years for the contributions to be assigned.
- Baseline upgrades. For Baseline upgrades, the RTO can determine that a system improvement that is necessary to address a system deficiency is not being caused by the generation interconnection queue. When this occurs, the RTO assigns the problem to the utilities where the problem exists to perform a study and create a project to resolve the issue. The project(s) that result from this study are rate-based by the utility responsible and become part of the Regional Transmission Expansion Plan.

Because project costs are in three separate groupings, it is difficult to determine the direct transmission cost for a generation facility to connect to the system in an RTO. In addition, the RTO is the only entity that could effectively coordinate the calculation of the LCOT, but probably cannot break out the Baseline project costs that are captured in the utilities' cost of service.

Q. What is the value of using LCOT as a means for evaluating the benefits of the network upgrades associated with the Friesian project?

A. In my opinion, calculating the LCOT for the network upgrades associated with the Friesian project does not provide any discernable value for decision-making regarding the public benefits of those upgrades. The Friesian upgrades are needed to resolve a major transmission constraint in southeastern North Carolina. The best way to assess whether any particular solution to that problem serves the public interest is to evaluate all potential options to resolve the problem, and such an analysis always includes a "do nothing" option.

DEP has already performed a full study of the transmission options available to solve the identified transmission issues, and that is the source of the identified network upgrades. I have not reviewed their studies or the cost estimate for the upgrades which I understand contains a contingency amount; however, I understand the cumulative upgrades comprise the lowest cost solution to the problem.

Witnesses Wilson and Bednar discuss in their Direct Testimony the costs of the "do nothing" option. This would entail a continued moratorium on new generation in the southeastern portion of the state. As discussed by other witnesses, the consequences of that moratorium are (i) the likely inability to realize the savings to ratepayers of the Synapse solar + storage IRP scenario; (ii) a limitation on Duke's ability to reduce carbon emissions and the likely inability to achieve Governor Cooper's and Duke's decarbonization goals; (iii) a resulting substantial

increase in health care costs; and (iv) a loss of economic development opportunity in some of the state's poorest counties. Additionally, the "do nothing" scenario will leave DEP's transmission system in southeastern North Carolina in a "maxed out" state. While technically NERC-compliant, the grid will be far more vulnerable to disruption than it would be if the Friesian upgrades are built. Comparing these costs, or conversely the benefits provided if the Friesian upgrades are built, to the cost of the upgrades is a far better way to evaluate whether those upgrades are in the public interest than an LCOT analysis.

Q. Does this conclude your rebuttal testimony?

A. Yes.

Q And do you have a summary of your testimony that you'd like to present to the Commission?

A I do.

Q Okay. You may read it at this time.

A Good morning, Madam Chair, and members of the Commission. My name is Charles Askey, and I'm a Senior Project Manager in the Power Engineering and System Planning Group at the Timmons Group. I'm a registered professional engineer, and I have over 30 years of experience in power system planning and system operations. My work experience includes 27 years in the utility experience in power system planning and system operations, and my consulting background includes work with investor-owned utilities, electric membership cooperatives, municipal utilities, merchant generation developers, and EPC contractors. I've conducted numerous studies and client engagements with generation developers performing preliminary system impact assessments to identify acceptable points of interconnection and the determination of maximum transfer capability from a potential point of power -- potential project to the power system. I have performed these generation impact studies on transmission systems throughout the country, and I've interfaced with most of the regional

transmission organizations, or RTOs, and NERC regions. I've also prepared generation interconnection documentation and reviewed transmission provider studies in support of my clients' projects. Additionally, I've supported clients in the following areas: power supply contracts, transmission contracts, scheduling, operations, transmission billings, regulatory issues, facility planning and siting, and NERC audit processes.

I filed direct testimony on November 26, 2019 and rebuttal testimony on December 12, 2019 in this docket. My direct and rebuttal testimony discussed the need for and the benefits of the construction of the network upgrades associated with the Friesian project and the -- separate and apart from the benefits of Friesian. I want to highlight the following areas of my testimony: the congestion in the Duke Energy Progress -- one, the congestion in Duke Energy Progress, LLC's DEP transmission system in the southeastern portion of the state; two, how the network upgrades associated with the Friesian generation facility are required for the addition of new generation resources to Duke Energy Progress' system, even if the Friesian facility is not constructed; three, that the Friesian network upgrades are the type of upgrades that will allow the

interconnection of a substantial amount of additional renewable and other resources, including Duke Energy's 1,235 MW combined cycle plant in Cumberland County that is independent of the Friesian upgrades; and, four, there's a substantial value to the Friesian network upgrades in that they will resolve a major transmission congestion point in southeastern North Carolina.

In my direct testimony, I discussed the congestion of the transmission system in the southeastern part of North Carolina. Under contingency study, when DEP's interconnection queue is dispatched, including the Friesian project, several transmission facilities in Fayetteville, North Carolina are loaded in excess of either 95 percent or 100 percent of their contingency rating. In light of these loading levels, Duke Energy Progress has identified multiple system upgrades, including the reconductoring of several transmission lines that need to be constructed prior to allowing Friesian to interconnect to the system, and this would include other generation facilities.

I provide information in my direct testimony that Friesian upgrades are required to add new generation to DEP's transmission system, even if Friesian is not constructed. DEP has provided information that has

completed the assessment for an interconnection request through September 30th of 2017. DEP provided information that there are 108 interconnection requests totaling 1,561 MW that are independent of the transmission upgrades -- interdependent of the transmission upgrades assigned to Friesian. In addition to the projects specifically identified to date by Duke Energy Progress as interdependent on the Friesian upgrades, DEP has stated there are likely many additional later queued projects that are also technically interdependent with the Friesian upgrades. According to Duke Energy Progress, it is undoubtedly the case that the Friesian upgrades will alleviate the interdependency of at least 1,561 MW of additional solar resources and provide a path forward for such projects to interconnect in a safe and reliable manner.

Also, Duke Energy has two 1,235 MW natural gas projects, Q398, Q399, located in Cumberland, which will also significant -- add significantly to most, if not all, of the transmission line loadings, absent any other upgrades. While DEP has determined that the first combined cycle plant, Q398, is not dependent upon the Friesian upgrades, DEP's second combined cycle plant, Q399, is interdependent upon the Friesian upgrades. And

without those upgrades, new generation resources, including Q399 natural gas project, renewable resources and other generations in this area of the DEP system will not be able to be added to the system without construction of other upgrades. Therefore, the Friesian upgrades are important for the Duke Energy Progress transmission system separate and apart from the Friesian project. Those network upgrades are necessary to support the new generation resources to DEP's transmission system, including DEP's combined cycle plant.

In my rebuttal testimony, I point out that Duke Energy's 2018 Integrated Resource Plan and 2019 Updates indicate that additional generation is required to support load growth and resource portfolio improvements in southeastern North Carolina. DEP's 2019 IRP calls for load growth of .9 percent per year overall. Whether the new generation comes from renewable resources or other generation resources in eastern North Carolina, they cannot occur without the Friesian network upgrades or other major improvements to DEP's transmission system. In addition, DEP has provided information that substantial network upgrades will be needed to accommodate the addition of an amount of new grid resources, including DEP's 1,235 MW combined cycle plant

that is interdependent on the Friesian upgrades. Thus, the Friesian upgrades are the type of project network upgrades that will help to accommodate the interconnection of a substantial amount of additional renewable and other types of resources.

In my rebuttal testimony, I disagree with Public Staff's statement that the benefits of the Friesian network upgrades are speculative because they may not be needed to accommodate additional generation in the southeastern part of the state. Duke Energy Progress has provided substantial information that the network upgrades will be needed to accommodate the addition of the amount of new grid resources, not limited to solar resources, and the Friesian upgrades are the type of requisite network upgrades that will help to accommodate the interconnection of this -- additional resources and other resources, including Duke's 1,235 MW combined cycle plant. Even if some of the generation in Duke's -- even if some of the generation shown in Duke's 2018 and 2019 IRP Updates are not ultimately constructed, the Friesian upgrades are required to connect any new generation resources in this area of the state.

I also addressed the Public Staff's method of evaluating the Friesian network upgrade costs in my

rebuttal testimony. The Commission (sic) Staff has compared the levelized cost of transmission --

MS. KEMERAIT: Excuse me. Can you restate that statement?

MR. ASKEY: Yes.

MS. KEMERAIT: The Public Staff.

MR. ASKEY: I'm sorry.

A The Public Staff has compared the levelized cost of transmission, LCOT, for the Friesian upgrade -- network upgrades to the LCOT and the MISO, PJM, and the EIA groups. I do not believe that comparing the LCOT for the Friesian network upgrades to the LCOT and the MISO, PJM, and EIA groups is an appropriate way to evaluate the public benefit of Friesian upgrades. The Public Staff's evaluation would prevent any consideration to the value of the Friesian network upgrades to the additional generation that would utilize and benefit from those upgrades. Also, the Public Staff's approach fails to recognize that there are significant differences between comparing the LCOT for Friesian with the LCOT for projects in the MISO, PJM, and EIA groups. MISO, PJM, SPP and other regional transmission organizations are regulated by the FERC, Federal Energy Regulatory Commission, and therefore do not operate under a

regulatory compact with any state jurisdiction. For the RTOs, transmission improvements are combined with the utility's projects that are identified through their IRP process without the RTO to create a Regional Transmission Plan. The costs for the project associated with the Regional Transmission plan are, therefore, rate based by the utility where the project is located.

The RTOs conduct large generation interconnection process studies associated with the Open Access Transmission Tariff for that region. The RTOs usually perform these LGIP studies and generation queue clusters that are accumulated approximately every six months. The costs associated with upgrading the system to accommodate new generation are typically directly assigned costs, network improvements, or baseline upgrades. Because project costs are in three separate groupings, it's difficult to determine the direct transmission cost for a generation facility to connect to the system in an RTO. The RTO is the only entity that could effectively coordinate the calculation of the LCOT, but the RTO probably cannot break out the baseline project costs that are captured in the utility's cost of service.

In my opinion, that -- calculating the LCOT for

the network upgrades associated with the Friesian project does not provide any discernable value for decision making regarding the public benefits of those upgrades. The Friesian upgrades are needed to resolve a major transmission constraint in southeastern North Carolina. The best way to address whether a solution to the transmission constraint, such as construction of the Friesian upgrades, serves the public interest is to evaluate all potential options to resolve those problems. Such an analysis includes -- always includes a do nothing option.

DEP has already performed a full study of the transmission options available to solve the transmission constraints identified in southeastern North Carolina. DEP's solution is for the construction of the Friesian network upgrades. It is my understanding that the cumulative upgrades comprised for the Friesian project are the lowest cost solution to the transmission problem.

The do nothing option would entail a continued moratorium on new generation in the southeastern portion of the state. The consequence of the do nothing scenario would leave DEP's transmission system in southeastern North Carolina in a maxed out state with regard to additional generation. While DEP's transmission system

is technically NERC compliant, the grid -- the grid will be far more vulnerable to disruption than it would be if the Friesian upgrades are constructed. Comparing these costs or, conversely, the benefits associated if the Friesian upgrades are constructed to the cost of the upgrades is a far better way to evaluate whether those upgrades are in the public interest than a LCOT analysis.

This concludes the summary of my presentation. Thank you.

Q Thank you, Mr. Askey. I'll now move on to Rachel Wilson. Ms. Wilson, can you state your full name and business address for the record.

A (Wilson) My name is Rachel Wilson, 485 Massachusetts Avenue, Suite 2, Cambridge, Massachusetts, 02139.

Q By whom are you employed and in what capacity?

A I'm a Principal Associate at Synapse Energy Economics.

Q And did you cause to be prefiled on November the 26th of 2019 15 pages of supplemental (sic) direct testimony in the form of question and answer, and two exhibits?

A Yes, I did.

Q And if I were to ask you the same questions

that appear in your supplemental testimony today, would your answers be the same?

A Yes, they would.

Q And do you have any corrections that you would like to make to your supplemental testimony?

A No.

Q And did you also cause to be prefiled on December the 12th of 2019 six pages of rebuttal testimony in the form of question and answer and one exhibit?

A Yes.

Q And if I were to ask you the same questions that appear in your rebuttal testimony today, would your answers be the same?

A Yes, they would.

Q And do you have any corrections that you would like to make to your rebuttal testimony?

A No, I don't.

MS. KEMERAIT: And at this time I would move that Ms. Wilson's prefiled supplemental direct and rebuttal testimony be copied into the record as if given orally from the stand, and that the exhibits to her testimony be marked for identification and included in the record.

CHAIR MITCHELL: Motion is allowed.

(Whereupon, the prefiled direct testimony of Rachel S. Wilson was copied into the record as if given orally from the stand.)

(Whereupon, Exhibits RW-1 and RW-2 were identified as premarked.)

I. INTRODUCTION AND QUALIFICATIONS

Q Please state your name, business address, and position.

A My name is Rachel Wilson and I am a Principal Associate with Synapse Energy Economics, Incorporated ("Synapse"). My business address is 485 Massachusetts Avenue, Suite 2, Cambridge, Massachusetts 02139.

Q Please describe Synapse Energy Economics.

A Synapse Energy Economics is a research and consulting firm specializing in electricity industry regulation, planning, and analysis. Synapse's clients include state consumer advocates, public utilities commission staff, attorneys general, environmental organizations, federal government agencies, developers, and utilities.

Q Please summarize your work experience and educational background.

A At Synapse, I conduct analysis and write testimony and publications that focus on a variety of issues relating to electric utilities, including integrated resource planning, resource adequacy, electric system dispatch, environmental regulations and compliance strategies, and power plant economics.

I also perform modeling analyses of electric power systems. I am proficient in the use of spreadsheet analysis tools, as well as optimization and electricity dispatch models to conduct analyses of utility service territories and regional energy markets. I have direct experience running the Strategist, PROMOD IV, PROSYM/Market Analytics, PLEXOS, EnCompass, and PCI Gentrader models, and I have reviewed input and output data for several other industry models.

Prior to joining Synapse in 2008, I worked for the Analysis Group, Inc., an economic and business consulting firm, where I provided litigation support in the form of research and quantitative analyses on a variety of issues relating to the electric industry.

I hold a Master of Environmental Management from Yale University and a Bachelor of Arts in Environment, Economics, and Politics from Claremont McKenna College in Claremont, California.

A copy of my current resume is attached as Exhibit RW-1.

Q On whose behalf are you testifying in this case?

A I am testifying on behalf of Friesian Holdings, LLC.

Q Have you testified previously before the North Carolina Utilities Commission?

A No. However, I was the principal author of a report entitled *North Carolina's Clean Energy Future: An Alternative to Duke's Integrated Resource Plan*, which was an exhibit to, and provided the basis for, comments submitted by the North Carolina Sustainable Energy Association on Duke Energy Carolina's ("DEC") and Duke Energy Progress's ("DEP," and collectively with DEC, "Duke Energy") Integrated Resource Plans in Docket E-100 sub 157. That report is attached to my testimony as Exhibit RW-2.

Q Have you testified previously before other state utility regulatory commissions?

A Yes. My experience as a witness in prior proceedings is summarized in my resume, which is provided in Exhibit RW-1.

Q What is the purpose of your testimony in this proceeding?

A The purpose of my testimony is to demonstrate that the least expensive long-term resource plan for North Carolina ratepayers is one that adds increasing amounts of solar and storage resources over the 15-year analysis period from 2019 to 2033. Ratepayers realize substantial savings relative to Duke Energy's proposed natural gas-dominated IRPs even when the likely long-term transmission investment costs necessary to incorporate increased penetrations of solar are included, and

potential avoided transmission costs (transmission costs otherwise associated with gas capacity) are considered in resource plan costs.

Q Please identify the documents and filings on which you base your opinions.

A My findings rely primarily upon the analysis that I conducted and the report I prepared for the North Carolina Sustainable Energy Association, referenced above (Exhibit RW-2).

Q Are you sponsoring any exhibits with your testimony?

A Yes. I am sponsoring the following exhibits:

Exhibit Number	Contents
RW-1	Resume of Rachel S. Wilson
RW-2	*North Carolina's Clean Energy Future: An Alternative to Duke's Integrated Resource Plan*

II. SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS

Q Please summarize your primary conclusions.

I conclude that a clean energy future that relies on a substantial buildout of renewable solar and battery storage resources is in the public interest for North Carolina ratepayers, notwithstanding the inclusion of approximately $223 million of network upgrades in DEP rate base. This type of generating resource portfolio is not only least-cost, saving ratepayer money, but also has benefits in the form of reduced air emissions and improved public health. Investments in solar projects in the near term, such as the one proposed by Friesian Holdings in this docket, are an essential part of realizing the sort of portfolio described above.

Q Please summarize your primary recommendations.

A I recommend that the Commission approve the requested CPCN for Friesian's proposed 70 MW solar facility.

III. NORTH CAROLINA'S LEAST-COST RESOURCE PLAN

Q Have you done any analysis that examines the economics of increased alternative energy penetration, including additional solar resources, in North Carolina?

A Yes. As noted, I was the principal author of the study entitled *North Carolina's Clean Energy Future: An Alternative to Duke's Integrated Resource Plan* previously filed with the Commission and included as Exhibit RW-2.

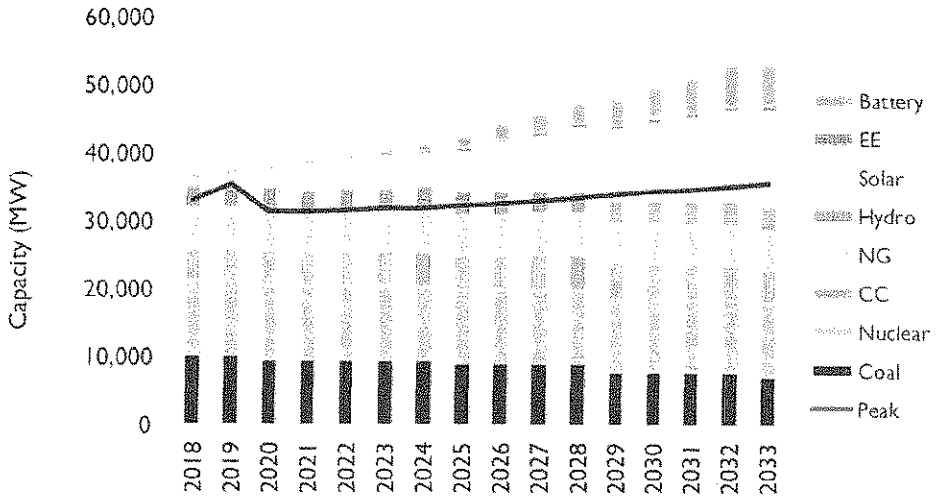
Q What did that study analyze?

A Synapse performed a rigorous, scenario-based analysis to evaluate an alternative clean energy future compared to the more traditional portfolio of fossil-fueled resource additions included in the Duke Energy 2018 IRPs. This report compares a Duke IRP scenario, which reflects the anticipated gas resource additions described in the 2018 IRPs, with an optimized Clean Energy scenario. In the Clean Energy scenario, resources such as solar, wind, energy efficiency, and battery storage were offered to the EnCompass electric sector model for selection of the most cost-effective future resource build to meet capacity and energy need. Synapse examined the benefits of this modeled clean energy future on the electric power system, emissions, public health, job creation, and electricity customer rates and bills. DEC and DEP were modeled as operating in a single Duke Energy service territory, but this does not assume the "capacity sharing" modeled by Duke in its IRPs as part of its Joint Planning scenario. Rather, the resource additions assumed by each utility in its individual IRPs are included and modeled as part of this scenario.

Q What volume of renewable resources is added in the Clean Energy scenario?

A The results show that renewable energy additions, in lieu of gas capacity, is the more economic choice for ratepayers. The Clean Energy scenario adds substantial amounts of solar and battery storage resources, both standalone and paired solar-plus-storage, through the duration of the study period, as shown in Figure 1. This volume of renewables is for the combined Duke Energy service territory in North and South Carolina. By 2033, there are 14 gigawatts (GW) of solar capacity and almost 6 GW of battery capacity in the Duke Energy service territory.

Figure 1. Annual capacity (MW nameplate), Clean Energy scenario



Note that the additions shown in Figure 1 are nameplate capacity and thus exceed the annual peak load requirement. The amount of firm capacity credit, or the portion of the nameplate capacity that contributes to the total reserves used to meet peak demands, given to solar and battery resources is lower than the nameplate value. If capacity were shown on a firm basis, it would track more closely with the annual peak value.

Incremental solar and battery additions in each year are shown in Table 1. Existing resources are included in year 2018 and incremental amounts include

both those planned by Duke Energy and those added by the EnCompass model as part of its resource optimization.

Table 1. Incremental capacity additions (MW nameplate), Clean Energy scenario

Clean Energy scenario		
Year	Solar	Battery
2018	1,036	660
2019	620	12
2020	670	16
2021	1,150	28
2022	580	34
2023	420	34
2024	420	36
2025	1,120	696
2026	1,100	696
2027	950	400
2028	1,090	660
2029	1,090	660
2030	1,090	660
2031	960	660
2032	960	660
2033	810	0
Total	**14,066**	**5,912**

In contrast, the Duke IRP scenario has only 4 GW of solar and 232 megawatts (MW) of battery storage by 2033, relying instead on an additional 9 GW of new gas capacity in the form of combustion turbine and combined cycle units. In the 2019 IRP updates, the amount of new gas capacity increases to 12 GW.[1]

[1] Roselund, Christian. September 5, 2019. *Duke doubles down on fossils in 2019 long-term plan updates.* PV Magazine. Available at: https://pv-magazine-usa.com/2019/09/05/duke-doubles-down-on-fossils-in-2019-long-term-plan-updates/

Q How would you respond to the criticism that the grid cannot support the amount of solar called for in your report?

A The cumulative 14 MW of solar capacity called for in this report occurs over a 15-year period. While that amount of solar could not be integrated onto the grid as it exists today, technological innovation will certainly occur that will support larger volumes of renewables, both at the resource level and at the grid level. Duke CEO Lynn Good is relying on technological innovation to achieve its future goal of net-zero carbon dioxide emissions by 2050, stating that "Getting to net-zero carbon emissions, while ensuring energy remains reliable and affordable, will require new technologies. That's the very reason we need to act now. We must continue leveraging today's technologies while sustaining investment in innovation for this vision to become reality."[2] Getting to this point requires that Duke Energy start early, integrating the volumes of solar and battery storage that are currently possible, and providing the demonstrable benefits to current customers that are described in the next sections. Concerns over integration of 14 GW in the long term should not prevent North Carolina from moving forward with the first few GW of solar capacity in the near term.

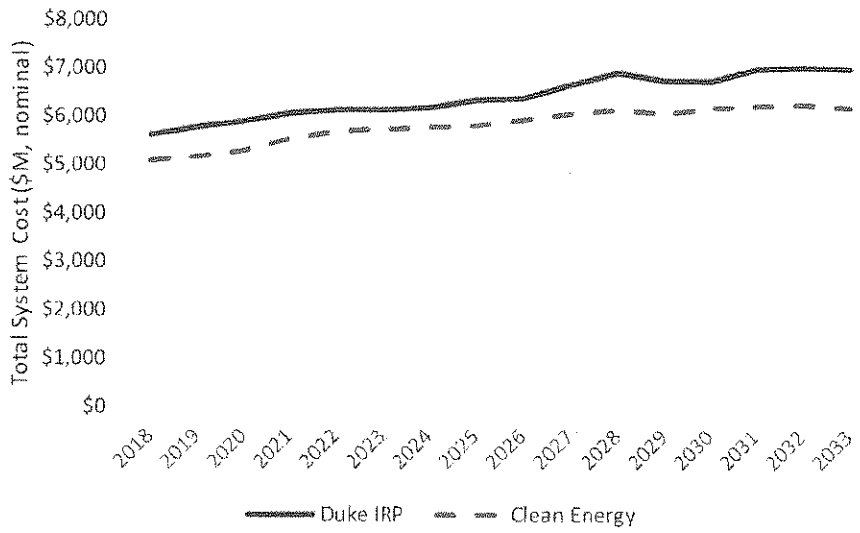
IV. RATEPAYER BENEFITS UNDER THE CLEAN ENERGY SCENARIO

Q What is the savings to ratepayers under the Clean Energy scenario?

A Figure 2, below, shows the total system cost under each scenario, which includes costs associated with new capital investment, the production cost for Duke's system (fuel and operations and maintenance costs), and incremental investments in new energy efficiency. The assumptions and methodology used to calculate these costs are discussed in Appendix A of the Synapse study, which begins on page 19. Under the Clean Energy scenario, ratepayers save an average of $584 million each year.

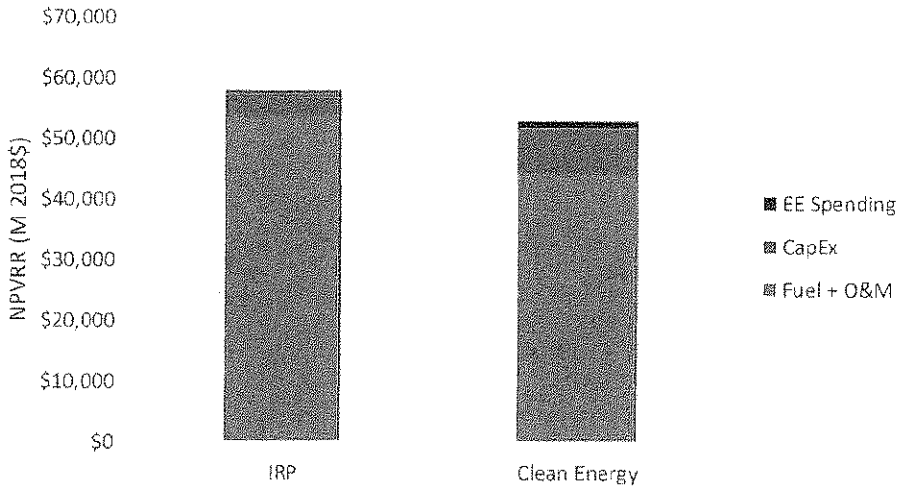
[2] Duke Energy. 2019. *Duke energy aims to achieve net-zero carbon emissions by 2050.* Available at: https://news.duke-energy.com/releases/duke-energy-aims-to-achieve-net-zero-carbon-emissions-by-2050

Figure 2. Annual system cost comparison



This represents a savings of almost $8 billion in terms of the net present value of revenue requirements over the entirety of the analysis period, as shown in Figure 3.

Figure 3. Revenue requirement of the Duke IRP and Clean Energy scenarios, North Carolina



I will note here that all new resources added by the EnCompass model are assumed to be utility-owned, and the costs shown in Figure 2 and Figure 3 include a rate of return to Duke Energy. The costs associated with the Clean Energy

scenario are thus likely to be lower than what we have shown, to the extent that renewables are contracted for through Power Purchase Agreements (PPA) rather than acquired via utility ownership.

Q What does your analysis assume about the cost of solar capacity?

A The Synapse analysis relies on the *2018 Advanced Technology Baseline* published by the National Renewable Energy Laboratory (NREL). In the first year of the analysis period, our assumed capital cost is $1,778/kW in $2016, which NREL translates to a levelized cost of energy (LCOE) of approximately $45/MWh.[3] We assume a decline in the cost of solar in subsequent years.

V. TRANSMISSION UPGRADES ASSOCIATED WITH THE CLEAN ENERGY SCENARIO

Q Do the values shown in the above figures include the transmission upgrades that might be required to interconnect new resources?

A No. The costs of any new transmission, or upgrades to existing transmission, that might be required to interconnect either new gas or renewables generation resources are not included in the Synapse analysis.

A How would you estimate the benefits to ratepayers of the network upgrades associated with the Friesian project?

It is my understanding that the transmission upgrades associated with the Friesian project would support the addition of other solar projects that are behind this one in the interconnection queue. Without the upgrades, not only would the Friesian project not be built, those projects also could not be built, depriving ratepayers of cost savings demonstrated in the Clean Energy scenario and the additional benefits described in the next section. In Figure 2, above, I show that the average annual benefit of the Clean Energy scenario is $584 million. This represents the difference in capital and production costs (fuel plus O&M) between the scenarios.

[3] See *2018 ATB Cost and Performance Summary*, Available at: https://atb.nrel.gov/electricity/2018/summary.html.

In the early years, it is less expensive to add solar and battery resources to the system than to run the most expensive of Duke's existing units, resulting in customer savings under the Clean Energy scenario, even when the capital expenditures are considered. In the later years of the analysis, when new gas plants are built in the Duke IRP scenario, difference in benefits occurs because the capital and production cost associated with the Clean Energy scenario is lower than the same costs in the Duke IRP scenario. While not all of these savings would result from solar projects dependent on the Friesian upgrades, the development of these projects is beneficial for North Carolina customers.

Q How do these benefits compare to the cost of the transmission upgrades necessary for the Friesian project?

A The costs of the necessary transmission upgrades necessary to bring the Friesian project online have been estimated at $223 million.[4] Since Duke would have to ask the Commission for rate recovery of this investment in order for it to be included in customer rates, the costs would be recovered over the life of the asset. If we assume a depreciable life of 30 years for the transmission asset, a 52 percent equity ratio, and a cost of equity of 9.9 percent per year, the cost of the Friesian transmission upgrades plus a rate of return in the first year is just under $24 million. That value declines over time for the life of the asset.

VI. OTHER CUSTOMER BENEFITS FROM RENEWABLE RESOURCES

Q Does the Synapse study attached to your testimony examine other benefits associated with the addition of solar and battery resources?

A Yes. As part of the study, we examined the impacts of the Clean Energy scenario on air emissions from Duke Energy's resource portfolio and the effects on human health.

[4] Appendix A of Large Generator Interconnection Agreement executed by DEP and Friesian on June 6, 2019.

Q What did the Synapse study find regarding emissions of carbon dioxide?

A The Clean Energy scenario leads to a reduction in emissions of carbon dioxide (CO_2), with total emissions being 59 percent less in 2030 under that scenario than in the Duke IRP scenario.

Q How did you calculate CO_2 emissions in each of the modeled scenarios?

A Emissions of CO_2 for Duke Energy service territory in each scenario are an output of the EnCompass model. I allocated emissions between North and South Carolina based on the proportion of sales in each state in 2030, which is based on historical data from the U.S. Energy Information Administration's (EIA) 861 dataset.

Q How did you calculate Duke Energy's portion of Governor Cooper's Clean Energy goal?

A The Clean Energy goal is to reduce emissions from the electric sector by 70 percent below 2005 levels by 2030.[5] The 2019 North Carolina Greenhouse Gas Emissions Inventory shows that emissions from electric power generation were 73.27 million metric tons of CO_2-e in 2005.[6] Thirty percent of those levels would set the goal at just under 22 million metric tons by 2030. I used data from the EIA's 861 dataset to calculate Duke's portion of sales relative to total sales in North Carolina. I then applied that percentage to the 2030 goal to arrive at 11.7 million metric tons.

Q Does the Clean Energy scenario get North Carolina to its goal under Governor Cooper's *Clean Energy Plan*, released in October 2019?

A Not quite, but progress towards that goal is demonstrably greater than under the Duke IRP scenario. The CO_2 emissions under the Duke IRP and Clean Energy

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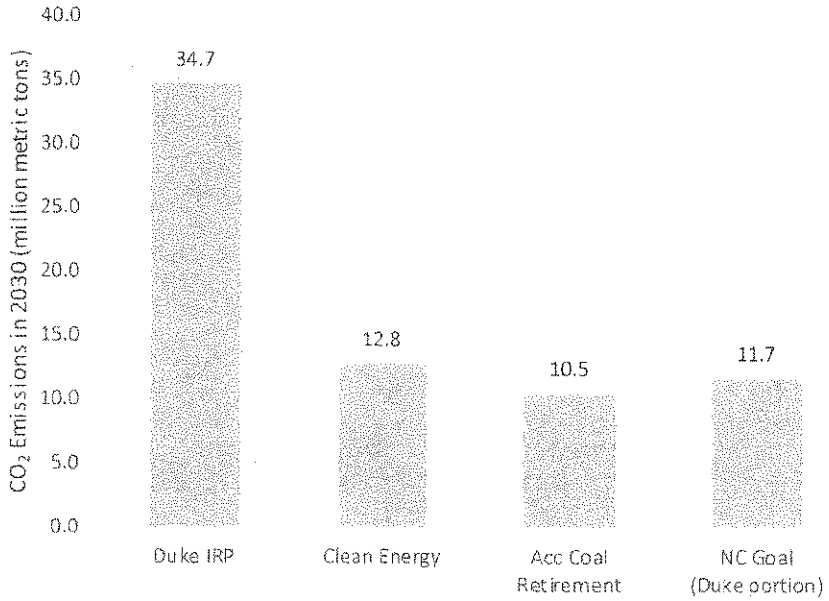
[5] North Carolina Department of Environmental Quality. 2019. *North Carolina Clean Energy Plan*. Available at: https://files.nc.gov/ncdeq/climate-change/clean-energy-plan/NC_Clean_Energy_Plan_OCT_2019_.pdf.

[6] North Carolina Department of Environmental Quality. 2019. *North Carolina Greenhouse Gas Inventory (1990 – 2030)*. Available at: https://files.nc.gov/ncdeq/climate-change/ghg-inventory/GHG-Inventory-Report-FINAL.pdf.

scenarios, as well as an additional scenario that accelerates retirement of certain of Duke's coal units, are shown in Figure 4.

Figure 4. Comparison of North Carolina CO_2 emissions under modeled scenarios, 2030



Q What are the implications of the failure to meet Governor Cooper's Clean Energy Plan goal under the Synapse Clean Energy scenario?

A The Synapse modeling was completed six months prior to the release of the *Clean Energy Plan* and so our analysis did not consider Governor Cooper's emission reduction goal. Meeting that goal will require measures beyond those included in Synapse Clean Energy scenario. In our Accelerated Retirement scenario, Duke Energy's coal and gas combined cycle units run less than in the Clean Energy scenario, which enables the utility to meet its emissions goal. In the future, Duke might consider some combination of greater energy efficiency investment, additional coal retirements, or increased investment in renewables.

Q Are there other future resource portfolios that will meet the emission reduction goal with fewer additions of solar?

A There are likely other ways to meet the emission reduction goal. Duke has stated that it would need to accelerate the pace of coal plant retirements while

"significantly increasing the Companies' mix of renewables (including wind generation), battery storage, energy efficiency, and combustion turbine (CT) generation." Potential illustrative scenarios provided by Duke show an additional 3,000 MW of additional solar resources over current amounts in the Base Case scenario, for a 51 percent reduction in CO_2. For a 60 percent reduction, an additional 669 MW of solar would be needed, while a 64 percent reduction would require an additional 2,100 MW of solar resources, or a total of more than 5 GW, as compared with the Base Case.[7]

Q What is the significance of the Friesian network upgrades to achieving Governor Cooper's emission reduction goal?

A As I show above, achieving that goal will require solar or other clean energy additions such as those shown in the Synapse Clean Energy scenario. It would be challenging to achieve this ultimate level of solar penetration if no additional solar resources can be interconnected in the areas dependent on the Friesian upgrades. From a resource development standpoint, southeastern North Carolina has been and remains the best location in the state for solar development because of favorable topography, higher insolation rates, low population density, and relatively inexpensive land costs, as discussed by Friesian witness Bednar in his Supplemental Direct testimony being filed on November 26, 2019.

In responses to discovery in this docket, Duke states that:

> Nevertheless, as stated in the Company's response to DR 2-7, substantial network upgrades will be needed to accommodate substantial amounts of new grid resources. The Friesian upgrades are representative of the types of upgrades that will be needed. The Friesian upgrades will, in fact, accommodate the interconnection of a substantial amount of solar resources which will introduce incremental renewable generation to the system that will, all things being equal, contribute to a reduction in CO_2.[8]

[7] Duke Energy response to Friesian Holdings Data Request 2-8.

[8] Duke Energy response to Friesian Holdings Data Request 2-10.

Q What did the Synapse study find with respect to benefits to human health?

A Synapse used the CO-Benefits Risk Assessment (COBRA) tool[9] to assess the avoided health impacts in both North Carolina and South Carolina[10] due solely to the change in emissions associated with our modeled Clean Energy scenario. For this analysis, Synapse used modeled emissions (SO_2, NO_X, & $PM_{2.5}$) from the Duke IRP scenario as a baseline and compared them to modeled emissions from the Clean Energy scenario to arrive at an estimate of the health impacts **avoided** by the Clean Energy scenario.

In addition to physical health effects and the costs of associated medical treatment, illnesses related to air pollution impose other costs on society. These costs include lost productivity and wages if a person misses work or school and restrictions on outdoor activity when air quality is poor. Table 2 shows low and high estimates of the monetized value of these total avoided health impacts modeled in COBRA,[11] plus the value of restricted activity days and work loss days.

Table 2. Monetary benefits of all avoided health impacts under the Clean Energy scenario

Year	Total Health Benefits, Low	Total Health Benefits, High
2020	$196,778,415	$444,771,642
2025	$194,592,175	$439,830,666
2030	$161,291,821	$364,570,301
2033	$156,736,570	$354,274,856

[9] Developed for the U.S. Environmental Protection Agency (EPA) State and Local Energy and Environment Program, COBRA utilizes a reduced form air quality model to measure the impacts of emission change on air quality and translates them into health and monetary effects.

[10] Because the DEC and DEP IRPs do not specify the state in which proposed new gas generation would be sited, emissions, and thus health impacts, were modeled for the combined North and South Carolina territory.

[11] COBRA can estimate a number of detailed health impacts, including adult mortality, infant mortality, non-fatal heart attacks, respiratory hospital admissions, cardiovascular-related hospital admissions, acute bronchitis, upper respiratory symptoms, lower respiratory symptoms, asthma exacerbations, asthma emergency room visits, minor restricted activity days, and work loss days due to illness.

Q Are all of these benefits attributable to the Friesian network upgrades?

A No. These benefits result from implementation of the entire Synapse Clean Energy scenario. As with the cost savings to ratepayers, only a portion of these benefits are attributable to solar development that is dependent on the Friesian upgrades. But if only 20 percent of new solar development occurred in areas dependent on those upgrades, the annual health benefits would vastly exceed the annual cost of the upgrades.

VII. CONCLUSIONS AND RECOMMENDATIONS

Q Please summarize your conclusions.

A I conclude that a clean energy future that relies on a substantial buildout of renewable solar and battery storage resources is in the public interest for North Carolina ratepayers. This type of generating resource portfolio is not only least-cost, saving ratepayer money, but also has benefits in the form of reduced air emissions and improved public health. Investments in solar projects in the near term, like the one proposed by Friesian Holdings in this docket, and those that are dependent on the network upgrades associated with the Friesian project, are an essential part of realizing the sort of portfolio described in the Clean Energy scenario and meeting Governor Cooper's emission reduction goal. The public benefits of constructing those upgrades and thereby allowing the Friesian project and other solar project development in southeastern North Carolina to move forward likely exceed the cost of the upgrades by a wide margin.

Q Please summarize your recommendations.

A I recommend that the Commission approve the requested CPCN for Friesian's proposed 70 MW solar facility.

Q Does this conclude your direct testimony?

A Yes, it does.

(Whereupon, the prefiled rebuttal testimony of Rachel W. Wilson was copied into the record as if given orally from the stand.)

(Whereupon, Wilson Rebuttal Exhibit A was identified as premarked.)

Q Please state your name, business address, and position.

A My name is Rachel Wilson and I am a Principal Associate with Synapse Energy Economics, Incorporated ("Synapse"). My business address is 485 Massachusetts Avenue, Suite 2, Cambridge, Massachusetts 02139.

Q Are you the same Rachel Wilson that submitted Direct Testimony in this proceeding?

A Yes.

Q What is the purpose of your rebuttal testimony?

My rebuttal testimony responds to the testimony of Mr. Lawrence and Mr. Metz, witnesses for Public Staff of the North Carolina Utilities Commission, regarding the Friesian Holdings, LLC application for a Certification of Public Convenience and Necessity (CPCN) for a proposed 70 MW solar facility.

Q Does the Public Staff take a position on whether there is a need for the Friesian facility?

A Not conclusively. At pages 6-13 of its testimony, the Public Staff discusses the need for the Friesian facility and suggests that Friesian's power purchase agreement (PPA) with the North Carolina Electric Membership Cooperative (NCEMC) may not be sufficient to demonstrate need, but it states no conclusion on this issue.

Q Do you believe that Friesian's PPA with NCEMC is sufficient to demonstrate a need for the facility?

A Yes, I do. NCEMC is charged with serving its member distribution cooperatives and "…continuously strives to supply power to its members that is affordable, reliable, and safe," as well as increasingly low carbon.[1] Prior to entering into the

[1] NCEMC's Initial Comments Before the North Carolina Utilities Commission. July 18, 2019. Docket No. EMP-105, Sub 0.

PPA Friesian, NCEMC likely analyzed its generation supply requirements, including renewable generation supply needed for REPS compliance, and concluded that contracting with Friesian was a cost-effective way to meet those needs. This inference is consistent with the comments filed by NCEMC in this docket on July 18, 2019, attached hereto as Exhibit RW-3.

Q Are capacity needs identified in DEP's IRP relevant to the need for the Friesian facility?

A No. The Friesian generation facility has been proposed to serve NCEMC via the PPA mentioned above. The Public Staff seems to assert, incorrectly, that Friesian has relied on DEP's capacity needs as evidence of a need for its proposed facility. Rather, Friesian has asserted, through my direct testimony and that of other witnesses, that construction of the Friesian network upgrades serves the public interest, because they are necessary to support DEP's identified needs for new generation, among other reasons.

Q How does the Public Staff evaluate the cost of the network upgrades associated with the Friesian project?

A The Public Staff calculates a levelized cost of transmission (LCOT) in terms of $/MWh associated with the network upgrade costs needed to bring the Friesian project online. Costs are calculated by dividing the annualized cost of the transmission assets over the typical transmission asset lifetime. It uses the Friesian nameplate capacity of 70 MW and the network upgrade cost of $223 million to arrive at a cost of $3,186 $/kW. The associated LCOT cost is $62.94 $/MWh. Staff then compares these numbers to integration costs found in a study from the Lawrence Berkeley National Laboratory (LBNL), which range from $56 - $116 $/kW and $1.56 - $3.22 $/MWh in LCOT.[2]

[2] Joint Testimony of Evan D. Lawrence and Dustin R. Metz, Public Staff – North Carolina Utilities Commission. Docket No. EMP-105, Sub 0. Table 1.

Q Is this a reasonable comparison to make?

A No. The range of costs that the Public Staff presents for comparison purposes come from three sources: the MISO interconnection queue, the PJM interconnection queue, and historical U.S. Energy Information Administration (EIA) data. These data sources sum the total volume of renewable generation, in MW, and compare it to the average LCOT.

Q How should the Public Staff's calculation be adjusted?

A Rather than including just the number of MW associated with the Friesian project, the Public Staff should have included all of the projects in the interconnection queue that are behind Friesian and summed the total number of MW associated with those projects. Any additional transmission costs associated with those projects could have also been included.

Q What effect would that have on the Public Staff's LCOT estimate?

The resulting LCOT estimate would be much lower if the projects in the queue behind Friesian were also included. The Direct Testimony of Brian C. Bednar references a DEP assessment for interconnection requests showing 108 requests totaling 1,561 MW that are directly dependent on the Friesian upgrades, provided as part of Duke's Response to Data Request No. 2. Duke further states that "In addition to the projects specifically identified to date by DEP as interdependent on the Friesian upgrades, there are likely many additional later-queued projects that are also technically interdependent on the Friesian upgrades."[3]

If those additional projects are included, the cost per kW associated with the upgrades declines substantially, as shown in Table 1. When the projects in the interconnection queue are included, "Friesian + Queue," the $/kW cost of the upgrades falls to $137/kW. If we assume an additional 900 MW of resources are constructed, "Friesian + Queue + Future," the cost of upgrades is only $89/kW, which is well within the range shown in the LBNL report.

[3] Duke Response to Data Request No. 2.

Table 1. Comparison of integration costs

	Friesian	Friesian + Queue	Friesian + Queue + Future	MISO (Solar)	PJM (Solar)	EIA (Solar)
Nameplate (MW_{AC})	70	1,631	2,500	3,277	10,057	2,187
Network Upgrades ($M)	$223	$223	$223	$180	$1,170	$220
Network Upgrades ($/kW)	$3,186	$137	$89	$55	$116	$101

Q Did you calculate an associated LCOT that includes all the projects behind Friesian in the interconnection queue?

A No. The LCOT calculation depends on the resource type. It is my understanding that there are a number of different types of generators in the queue behind Friesian and I do not have the details as to which generator types make up the volume of MW in the queue.

Q Isn't it true that generators drop out of the interconnection queue, and that not all of these projects will materialize?

A Yes. However, it is also almost certain that other generation projects will seek to interconnect in this region, taking the place of the generators that drop out.

Q Did the LBNL study on which the Public Staff relied for its cost comparison suggest any other methodologies for evaluating the transmission costs associated with renewables integration?

A Yes. The authors state in the report that "Some capacity-expansion models, such as the Regional Energy Deployment System (ReEDS), consider generation and

transmission capacity costs and aim to minimize busbar and system-level costs for electric-sector planning purposes."[4]

Q Has any such analysis been done using the ReEDS model mentioned above?

A Yes. The ReEDS model was developed by the National Renewable Energy Laboratory (NREL), which states that "The ReEDS model in particular has been designed with special emphasis on capturing the unique traits of renewable energy, including variability and grid integration requirements."[5] NREL recently produced its *2018 Standard Scenarios Report: A U.S. Electricity Sector Outlook*, which defines a set of prospective scenarios that bound ranges of technology, market, and policy assumptions and assesses these scenarios in NREL's ReEDS model to understand the range of resulting outcomes.[6]

Q What does the ReEDS model show for North Carolina?

A The ReEDS 2018 Standard Scenarios results show 5.34 GW of Utility PV by 2022 in its Mid-Case Scenario.[7] North Carolina currently has 4.4 GW of solar capacity.[8] In an optimized scenario, North Carolina adds another 900 MW of solar, and associated transmission necessary for integration, by 2022.

While not specific to North Carolina, one of the key themes of the report is that flexibility and diversity in the resource mix is valuable to future system operations. Transmission capacity grows in all scenarios, providing an additional mode of flexibility to the system.[9]

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[4] Lawrence/Metz Exhibit 2. Gorman, W. et al. 2019. Improving estimates of transmission capital costs for utility-scale wind and solar projects to inform renewable energy policy. Lawrence Berkeley National Laboratory.

[5] NREL. 2018. 2018 Standard Scenarios Report: A U.S. Electricity Sector Outlook. Page vii. Available at: https://www.nrel.gov/docs/fy19osti/71913.pdf

[6] NREL. 2018. 2018 Standard Scenarios Report: A U.S. Electricity Sector Outlook. Page iv.

[7] NREL. Standard Scenarios Results Viewer. Available at: https://openei.org/apps/reeds/#

[8] North Carolina Sustainable Energy Association. 2019. *Installed renewable energy systems.* Available at: https://energync.org/maps/

[9] NREL. 2018. 2018 Standard Scenarios Report: A U.S. Electricity Sector Outlook. Page vii.

Q Does this conclude your rebuttal testimony?

A Yes, it does.

Q And Ms. Wilson, do you have a summary of your testimony that you -- to present to the Commission at this time?

A Yes, I do.

Q Okay. Please go ahead and read it.

A Good morning. My name is Rachel Wilson. I'm a Principal Associate at Synapse Energy Economics in Cambridge, Massachusetts. I have more than a decade of experience with utility integrated resource planning, and I'm the author of a widely cited industry document Best Practices in Electric Utility Integrated Resource Planning. I also perform modeling analyses of electric sector power systems. I'm proficient in the use of spreadsheet analysis tools, and have direct experience running a number of optimization and electricity dispatch models to conduct analyses of utility service territories and regional energy markets.

The primary purpose of my testimony is to demonstrate that the least expensive long-term resource plan for North Carolina ratepayers is one that adds increasing amounts of solar and storage resources over the next 15 years. Ratepayers realize substantial savings under this resource portfolio relative to Duke Energy's proposed natural gas-dominated Integrated

Resource Plans, even when the likely long-term transmission investment cost necessary to incorporate increased penetrations of solar are included. Thus, to the extent that the Friesian network upgrades facilitate the addition of new solar and storage resources, they will contribute to significant cost savings for ratepayers.

I was the principal author of the study entitled North Carolina's Clean Energy Future: An Alternative to Duke's Integrative Resource Plan, which was previously filed with this Commission. This was a rigorous scenario-based analysis of an alternative clean energy future compared to the more traditional fossil-fueled resource portfolio included in Duke Energy's 2018 IRPs. This report compares two scenarios. The first is the Duke IRP scenario, which reflects the anticipated gas resource additions described in the 2018 IRPs. The second is an optimized clean energy scenario. In this scenario, renewable resources were offered to an optimized electric sector model for selection of the most cost-effective future resource build to meet capacity and energy need.

The results show that renewable energy additions, in lieu of gas capacity, is the more economic

choice for ratepayers. The clean energy scenario adds substantial amounts of solar and battery storage resources, both standalone and paired solar plus storage, through the duration of the study period for the combined Duke Energy service territory in North and South Carolina. By 2033, there are 14 GW of solar capacity and almost 6 GW of battery capacity in Duke Energy's service territory.

The clean energy scenario provides many benefits to North Carolina. Ratepayers save an average of $584 million each year. This represents a savings of almost 8 billion in terms of the net present value of revenue requirements over the duration of the 15-year analysis period. Carbon dioxide emissions are 59 percent less in the -- in 2030 under the clean energy scenario than in the Duke IRP scenario. Health benefits range from 195 to $440 million in 2025 due to avoided emissions of sulfur dioxide, oxides of nitrogen, and particulate matter.

The costs of any new transmission or upgrades to existing transmission that might be required to interconnect either new gas or renewables generation resources were not included in the Synapse analysis.

It is my understanding that the transmission

upgrades associated with the Friesian project estimated at $223 million would support the addition of other solar projects that are behind this one in the interconnection queue, as well as other solar and solar-plus storage facilities that may be developed in southeastern North Carolina. Without the upgrades, Duke's ability to add new solar resources will be limited, depriving ratepayers of cost savings, lower CO2 emissions, and human health benefits demonstrated in the clean energy scenario.

My testimony also rebuts that of Public Staff, which asserts that a signed Power Purchase Agreement with NCEMC is not, in and of itself, sufficient to demonstrate need. Prior to entering into the PPA with Friesian, NCEMC likely analyzed its generation supply requirements, including renewable generation supply needed for REPS compliance, and concluded that contracting with Friesian was a cost-effective way to meet those needs. This inference is consistent with the comments filed by NCEMC in this docket on July 18th, 2019. The Public Staff also seems to assert, incorrectly, that Friesian has relied on Duke Progress' capacity needs as evidence of a need for its proposed facility. Rather, my testimony and that of other witnesses shows that construction of the Friesian network upgrades serves the public interest because they

are necessary to support Duke Progress' identified needs for new generation.

Public Staff states that the transmission upgrades associated with the Friesian project are too high, and calculates a levelized cost of transmission in terms of dollars per MWh needed to bring the Friesian project online. Costs are calculated by dividing the annualized cost of the transmission assets over the typical transmission asset lifetime. It uses the Friesian nameplate capacity of 70 MW and the network upgrade cost of $223 million to arrive at a cost of $3,186 per kW. Staff then compares these numbers to integration costs found in a study from the Lawrence Berkley National Laboratory which ranged from 56 to $116 per kW. Rather than including just the number of MW associated with the Friesian project, the Public Staff should have included all of the projects in the interconnection queue that are behind Friesian and summed the total number of MW associated with these projects. Any additional transmission costs associated with those projects could also have been included.

A Duke Progress assessment for interconnection requests showing 108 requests totaling 1,561 MW that are directly dependent on the Friesian upgrades. Duke

further states that, "In addition to the projects specifically identified to date by DEP as interdependent on the Friesian upgrades, there are likely many additional later-queued projects that are also technically interdependent on the Friesian upgrades."

If those additional projects are included, the cost per kW associated with the upgrade falls to $137 per kW. If we assume an additional 900 MW of resources are constructed, for a total of 2,500, the cost of upgrades is only $89 per kW, which is well within the range shown in the Lawrence Berkley National Laboratory report.

I conclude that a clean energy future that relies on a substantial buildout of renewable solar and battery storage resources is in the public interest for North Carolina ratepayers. This type of generating resource portfolio is not only least cost, saving ratepayer money, but also has benefits in the form of reduced air emissions and improved public health. Investments in solar projects in the near term, like the one proposed by Friesian Holdings in this docket, and those that are dependent on the network upgrades associated with the Friesian project, are an essential part of realizing the sort of portfolio described in the clean energy scenario. The public benefits of

constructing those upgrades and thereby allowing the Friesian project and other solar project development in southeastern North Carolina to move forward likely exceed the cost of the upgrades by a wide margin. Thank you.

Q Thank you, Ms. Wilson.

MS. KEMERAIT: The Friesian witnesses are now available for cross examination.

MR. DODGE: Thank you. Good morning. I'm Tim Dodge with the Public Staff. Pardon my voice. Layla Cummings and I will both be asking some questions. Most of my questions will be directed at Mr. Bednar. I do have a few questions for Mr. Askey as well, and then I think most of Layla's questions will probably be for Ms. Wilson. So thank you for being available this morning.

CROSS EXAMINATION BY MR. DODGE:

Q Mr. Bednar, if you could -- we'll start with your direct testimony. If you could turn to page 2 of your prefiled direct testimony, if you have it with you.

A (Bednar) Yes.

Q So on page 2, line 10, you state that Birdseye is a greenfield solar developer, and on line 14 you state that Birdseye leverages funding from IPPs and regulated utilities to completion.

A I'm sorry.

Q Page 2, line 10 and line 14 of direct.

COMMISSIONER GRAY: Mr. Bednar, some of us are challenged with hearing, so if you wouldn't mind --

THE WITNESS: Oh, sorry.

COMMISSIONER GRAY: You're very kind.

THE WITNESS: Yes.

COMMISSIONER GRAY: And Mr. Askey will do the same. Thank you.

THE WITNESS: I don't have direct.

MR. LEVITAS: Do you not have a copy?

Q I'm sorry. I may be referring to your supplemental. I apologize.

A Oh, I'm sorry.

Q I put direct here, but it's --

A Okay. Yeah. No. That's okay.

Q I'll flip to that myself.

A Okay. I'm ready for you now. It's page 2 of the actual testimony, not including the cover page?

Q Yes.

A Okay. All right.

Q So, again, you state you're a greenfield solar developer and leverage funding from IPPs and regulated utilities to completion. Do you see that?

A I apologize. You're on line 10, you said?

Q It starts on line 10, and I think I jumped to line 14 to combine those two sentences, so I can read it directly to you.

A I apologize. I just don't think I have the right document. I'm sorry.

MR. LEVITAS: Mr. Dodge, can you clarify which document you're in? We're having trouble finding it.

MR. DODGE: Sure. No. I am, too. I apologize. I may have been -- okay. I think we are back in the direct.

A Yes. I'm ready. I'm sorry.

Q Back in the direct.

A Yeah.

Q What was prefiled with the testimony, the direct testimony.

A We're good now. Thank you.

Q Or with the application. So on line 10, page 2 of your direct, Birdseye is a greenfield solar developer, and you indicate on line 14 that you leverage funding from independent power producers and regulated utilities to completion.

A Yes.

Q Do you see those statements?

A I do.

Q Okay. We're on the same page now.

A We are, absolutely.

Q Starting off on the wrong one there. So can you elaborate what you mean by leveraging funding from independent power producers and regulated utilities --

A Sure.

Q -- to purchase projects?

A So, yeah, what I'm referring to there is that Birdseye traditionally, with a few very small exceptions, does not own and operate projects long term. So we are a greenfield developer, and as a result, I was trying to state that we utilize financing from investors who want to own and operate projects long term, and that was what I was referring to as independent power producer, and then also have sold projects to utilities, one being Duke Energy, on the regulated side.

Q Okay. Thank you. And so -- and you indicated this a bit in your summary today, too, but so you -- you get projects to the shovel-ready point or you may serve through the construction phase of those before selling those projects or to -- to a long-term investor?

A Correct.

Q All right. And so Birdseye does not own or operate any operational facilities in the state of North

Carolina?

A Not in the state of North Carolina, no.

Q Okay.

MR. DODGE: Chair Mitchell, we're going to go ahead and -- I'd like to submit a cross examination exhibit. We'll be distributing that right now. Madam Chair, I'd like to ask that this exhibit, it's marked as Public Staff Friesian Panel Cross Examination Exhibit, could be identified as Exhibit Number 1, please.

CHAIR MITCHELL: It will be so marked.

MR. DODGE: Thank you.

(Whereupon, Public Staff - Friesian Panel Cross Examination Exhibit 1 was marked for identification.)

Q Mr. Bednar, I'll give you a moment to look at this document and the back page. It's a two-page document. This is a printout from Birdseye's webpage.

A Uh-huh.

Q The first page is entitled Investors, and the second page is a summary of the projects and the portfolio --

A Uh-huh.

Q -- tab from that website as well.

A Sure.

Q I just want to ask you a couple of questions about the statements here and the projects.

A Okay. All right.

Q So the first line reads that Birdseye strives to deliver -- in the Investors page. I'm sorry. "Birdseye Renewable Energy strives to deliver the lowest cost and best returns to its project investors." And it continues, "Birdseye is happy to accommodate" investor project and -- "project investment needs through portfolios of projects or targeted single projects." Do these guiding principles here in terms of lowest cost and best returns apply to this project we're discussing today, the Friesian project?

A I believe it does.

Q So continuing down, you describe kind of the two categories you use to achieve these low costs, and you state under the minimal cost paragraph that "Through experience and innovative approaches, we minimize direct development costs as well as site preparation costs, and we collaborate with our engineers to secure reliable, low cost interconnections." In your testimony, you've already described today some of the goal -- the benefits in southeast North Carolina of those low site development costs --

A Yes.

Q -- have you not? And also seeking to identify suitable locations to interconnect within the utility systems --

A Yes.

Q -- correct? Okay. Now, this -- in this case, would you agree with me that the interconnection costs and the network upgrade costs associated with Friesian are not low cost?

A I would say they are not low cost.

Q All right. And let's continue to the Maximum Long-Term Revenue tab on your Investors sheet -- your Investors page. It's still Exhibit 1. You state that "Birdseye identifies the markets and counterparties that result in the highest value, lowest risk, and longest term offtake agreements." I want to just hold that statement about the long-term offtake agreements.

A All right.

Q We're going to be talking a little bit about the need -- the PPA that's been entered into with Birdseye --

A Uh-huh.

Q -- and NCEMC, as well as some other options in just a moment. But thinking about some of Birdseye's

experience so far here in this state, could you turn the sheet over to the list of portfolio projects?

A Yes, sir.

Q All right. And in your testimony, again, this is on your direct testimony, line -- page 2, line -- making sure I get you the right number here -- 17, you state that you've developed 424 MW of capacity so far in the state?

A Yes.

Q All right. So this table that -- from your portfolio pages indicates that number as well, the 424. Looking at the far right column, there's a -- this is a column that I added to the table to indicate projects that are located within the Friesian constrained zone, so the 15-county region --

A Sure.

Q -- that we're talking about. So at the bottom, summarizing the total capacity that Birdseye has developed in those constrained counties, you have developed 184.5 MW in those -- that constrained zone already?

A It appears to be. Yeah. That's right.

Q Okay. And also just wanted to note a couple of projects here. You have sold mostly, primarily, if you

look at the utility offtake, mostly, the power sold to DEC and DEP, but you do have some other offtakes, including Lumbee River EMC, some facilities out of the state of North Carolina, and then to the City of Laurinburg as well and to NCEMPA. Several of these projects have also been sold directly to utilities, have they not?

A They have.

Q Okay. And just -- I want to highlight a couple of those. Project Number 20, Mocksville Solar Farm, and 21 -- 22, excuse me, Monroe Solar Facility, those two large ones and 21 and 22 were both sold to DEC, and those are now owned by the utility?

A Correct.

Q As well as the Warsaw Farm, Number 39, 87 --

A Yes.

Q -- MW? These values are in DC here on your table.

A Yes. We speak in DCs.

Q Okay. All right. So you have -- have you, at this point, developed any other merchant facilities in the state of North Carolina?

A We have not.

Q Okay. So why -- after having a successful

track record developing QF projects or projects that may be acquired by the utility, why in this context did Friesian choose to seek a merchant CPCN application for this facility?

A So when we initiated Friesian back in 2016, it was at the time that we were completing the project sales of Mocksville and Monroe. So initially the idea was that this potentially could be a project that might be available for sale to Duke as a direct resource. This predates House Bill 589 and the sort of regulatory regime that was occur -- occurring at the time. Secondarily, at that time it was also becoming quite evident that there was constraints -- we were starting to find issues with respect to stiffness of the LDRs and other constraints. And we felt like it's important to have a diverse portfolio. We've always been effective at trying to look ahead and take positions that could be valuable in the future, and we felt like in the end that it was going to be important to have a diverse portfolio, where you would have projects that could be available for sale to Duke or other wholesale customers, as well as traditional QFs.

Q Okay. Thank you. One moment. And thank you for mentioning kind of the potential offtake with Duke for this facility as well. I also wanted to reference,

in your supplemental testimony you identify that Birdseye was the developer for the 70 MW Maiden solar project that was --

A Correct.

Q -- acquired by Duke Carolinas and submitted as a self-build project for CPRE Tranche 1. Were you --

A Correct.

Q -- is that correct? All right. And for that project, in order to be selected for CPRE purposes, that project could not have triggered network upgrade costs along the lines of what we've seen with this project; otherwise, it would not have been viewed as cost effective and selected by the IA; is that correct?

A It did not.

Q So other than the Friesian project, have any of your utility scale solar projects in North Carolina to date triggered network upgrade costs in excess of $10 million?

A No. Are you talking about -- pardon me. Let me clarify that. Are you -- projects that we have completed or projects that we currently are developing?

Q That we have completed -- that you have completed. I'm sorry.

A No. I'm sorry. None that are -- have been

completed.

Q You do -- kind of in the development pipeline you do describe that you have an additional 2,000 MW of projects currently in the development pipeline?

A Correct.

Q Do you know how many -- what volume of that capacity are located within the areas identified as the constrained zone for Friesian?

A I do not know, but it's not -- it's not a large amount. I think we have maybe in the vicinity of 50 MW, probably in North and South Carolina in DEP at this point in time.

Q Okay.

MR. DODGE: I have another cross examination exhibit I'd like to distribute at this point. Chair Mitchell, I'd like to ask that this document -- the front page is a December 6th letter from Birdseye to the Commission for a change in contact information for Fair Bluff Solar -- that this be identified as Public Staff - Friesian Panel Cross Examination Exhibit Number 2.

CHAIR MITCHELL: It shall be so identified.

MR. DODGE: Thank you.

(Whereupon, Public Staff - Friesian Panel Cross Examination Exhibit 2 was

marked for identification.)

A And, obviously, I need to clarify my last answer because I misspoke in the sense of 50 MW of projects outside of these projects that we've discussed before.

Q Okay. Thank you. And just kind of walk -- I'll walk through this --

A Sure.

Q -- fairly quickly, but in this -- these three documents here as Exhibit 2, two of these documents are change in contact information for the Fair Bluff Solar and Homer Solar --

A Right. Yes.

Q -- projects that are in that pipeline, the development pipeline for Birdseye. They are, right?

A (Nods affirmatively.)

Q All right. And then the third document, excuse me, is a Motion for an Extension of a Waiver that was filed by the Commission last week for --

A Yeah.

Q -- those two projects? All right. Now, in addition, does Birdseye also have an additional 80-MW project in development, the Slender Branch project in Bladen County --

A We do.

Q -- that is also interdependent on these upgrades?

A We do.

Q So 230 MW for those three projects --

A That's correct.

Q -- that are interdependent on these upgrades? Okay. And those, again, are in -- those are QF projects at this point --

A They are.

Q -- in the State-jurisdictional queue. All right. So looking at the waiver request -- if you could turn to that document. Go to page 3, paragraph 4. And this describes the statement that you just made, that these projects are interdependent with Friesian. And then in paragraph 4 you state that they would also trigger an additional $9.6 million in upgrades that are independent from Friesian as well --

A Correct.

Q -- correct? Okay. And now looking at paragraph 7, the last line of paragraph 7, you state that "If Friesian ultimately does not irrevocably commit to paying for these network upgrades and is, thus, forced out of the queue, Fair Bluff and Homer Solar will become responsible for paying for the interdependent upgrades.

That additional cost, which will be in excess of 200 million, would make Fair Bluff Solar and Homer Solar nonviable and cause them to exit the queue." Did I read that correctly?

A You did.

Q Okay. So this may seem like an obvious question, but can you state how the Friesian project, then, is viable, while these two nearly equal size projects would be nonviable if they were assigned the costs?

A Well, the Friesian project has the ability using -- because of its FERC jurisdiction and sale of power to a wholesale customer, could be reimbursed for those network upgrades.

Q All right. And as you're aware, in the oral argument that was held in this hearing room in September, the Commission issued -- following that, the Commission issued an Interlocutory Order finding that the Commission could consider those network upgrade costs in determining whether or not to grant a CPCN; is that correct?

A That was the decision that was made, yes.

Q Okay. Thank you. So looking at these projects we've discussed so far, the Friesian and the 230 MW of projects represented by Homer, Fair Bluff, and then the

additional 50 that you indicate may be in the development queue, this is somewhat of a package deal for Friesian, then, in terms of the revenue stream from the development of those projects will -- is factored into your decision to proceed with the Friesian project?

A The way that we -- as it said on my website, we always attempt to put together portfolios of projects. That's the way that we've financed projects in the past. It's worked well. So at this point, because of the -- our understanding of how the FERC process worked -- we had an experience with it in Georgia in Southern Company territory -- they were always evaluated as a package or a portfolio. The other 50 MW aren't part of that process, but that's just other projects that I have in development that are in the queue.

Q And so has Birdseye evaluated any cost sharing options with these other facilities to seek to make the -- share those costs among the various projects? Is that something that Birdseye explored?

A Well, we explored it with you and the Staff, what, two weeks ago, I guess, or three weeks ago at some level, but at this point I don't believe there's any mechanism for doing so.

Q But prior to filing the CPCN as a merchant

facility, did Birdseye explore that option?

A Cost sharing?

MR. LEVITAS: Excuse me. Could you clarify what option you're referring to?

MR. DODGE: So if --

CHAIR MITCHELL: Mr. Levitas, if you have an objection, direct it here. Let me rule on it.

MR. LEVITAS: Yes. Okay. Well, I'll object to the question for lack of clarity. I'm not sure what the predicate is for the option he's referring to.

CHAIR MITCHELL: All right. Thank you. Mr. Dodge, please restate the question.

MR. DODGE: Sure. I'm happy to clarify.

Q As I indicated, I asked a question regarding whether this was a package deal, meaning Friesian is looking at the revenues from these four projects together and proceeding with the development of -- kind of jointly developing those projects, while one may be a merchant plant and the other three are State-jurisdictional projects. And so my question was, prior to filing the merchant application in June of this year, did Friesian investigate any cost sharing or grouping of those projects to share those costs, rather than assign them -- than to proceed under the merchant plant application and

for those costs to be assigned solely to that project?

A I'm not -- I mean, I'm not sure I fully understand where you're going, but I can speak to the way we evaluated this portfolio. So going back to 2017 -- end of 2017, we've always looked at -- there appeared to be an opportunity to put together a portfolio. We've always looked at these network upgrades as separate investment. I think Friesian as a project is a very attractive project. We recognize that it was FERC-jurisdictional, which had some -- some differences from the State-jurisdictional projects, but essentially we have always evaluated and marketed projects as portfolios when we could. And so this has been evaluated as a portfolio because that was the process that we approach financiers about -- with. So there had never been a mechanism that I'm aware of, dating back to 2017, for there to be cost sharing amongst the projects, so I don't know that we really ever evaluated, other than having the meeting with you and the Staff.

Q All right. Thank you. Just one moment. So Mr. Bednar -- excuse me -- as we already discussed, your project did sell, a project -- the Maiden Solar facility to DEC that was a part of CPRE Tranche 1. And you described that Birdseye participated in the CPRE process;

is that correct?

A We did. Well, we -- I should say we indirectly -- we indirectly participated because we were a partner of the actual bidder.

Q So you are familiar with House 589 and the CPRE program?

A I am, the parameters.

Q Okay.

MR. DODGE: Chair Mitchell, I'd like to distribute another cross examination exhibit. Just as kind of a placeholder, I only have a couple of questions about this document, and then I will have a series of questions related to a confidential exhibit, but I probably can get through both of those lines of questioning in about the next 15 minutes.

CHAIR MITCHELL: Okay. Thank you, Mr. Dodge. Mr. Dodge, let's go ahead and mark the exhibit.

MR. DODGE: Okay. Thank you. Chair Mitchell, I'd like this document, which is the CPRE Independent Administrator Tranche 1 Final Report, to be marked as Public Staff - Friesian Panel Cross Examination Exhibit Number 3.

CHAIR MITCHELL: It shall be so marked.

MR. DODGE: Thank you.

(Whereupon, Public Staff - Friesian Panel Cross Examination Exhibit 3 was marked for identification.)

Q So Mr. Bednar, before I ask you a couple questions about some information within the report, the CPRE projects, the bids were based on a 20-year PPA that were submitted, so for the -- in terms of submitting a bid, they were submitted for a 20-year term and were -- as decrements to the Utility's approved avoided cost --

A Yes.

Q -- is that correct?

A Yes.

Q Okay. And subject to check, would you agree with me that the decrement thresholds used for Tranche 1 for projects seeking to interconnect to Duke Progress' transmission system were 58 -- these are based on the Utility's Option B hours from the Sub 148 avoided cost proceeding? Subject to check, would you agree that that's the basis for those decrements?

A Well, I would say I did not participate with any DEP projects in CPRE, so I am not as familiar with the DEP. All the projects that I was involved with were in DEC.

Q Okay. So those decrements, though -- and,

again, I can provide this, subject to check, if that's acceptable, but the summer on-peak rate was $58 per MWh that the decrement would be based on. The winter -- or non-summer, excuse me, non-summer rate was $74.40, and the energy only off-peak rate was $36.40. Subject to check, would you agree that that was the baseline for the decrements for CPRE Tranche 1?

A That sounds reasonable, yes.

Q Okay. And, excuse me, if you turn to the exhibit that we've distributed, the Executive Summary on -- which is labeled as page 1, Figure 1 --

A Uh-huh.

Q -- this table summarizes the projects that were procured through Tranche 1, and the average price or the average winning price for the selective projects. And for -- would you agree that as a result of Tranche 1 there were 465 MW procured in the DEC service territory, with an average price of $37.94 --

A Uh-huh.

Q -- and for DEP, 85 MW -- approximately 85 MW with an average price of $38.30?

A I see that, yes.

Q Okay. This report also has -- I don't have this -- this is an Appendix B in the report, so about the

fifth page from the back. I'm sorry, the -- I guess it's the fourth page in.

A Yeah.

Q This is Attachment 1, DEC and DEP Constrained Areas. You're familiar with this map, I'm sure, Appendix B to that document?

A Yeah. Yes.

Q All right. And so the large pink outline on the lower portion of southeast North Carolina and, I guess, northeast South Carolina, that's the constrained area that we're talking about today, or part of this is part -- the area --

A Yes.

Q -- where the Friesian constraints are experienced. And so as part CPRE Tranche 1, this was designated as a constrained area, but projects could still bid into that zone; is that correct?

A Yes.

Q Okay. All right. I may come back to this document a bit later in the cross examination.

MR. DODGE: Chair Mitchell, at this time I'd like to distribute a confidential cross examination exhibit. This document is the PPA that was included as Exhibit 7 with the application, the Amended Exhibit 7,

the PPA between NCEMC and Friesian, and we may need to clear the room for those parties who aren't subject to review of that document.

CHAIR MITCHELL: Okay. Mr. Dodge, will your questions get into confidential information?

MR. DODGE: Unfortunately, yes, I think a couple of the key terms I'd like to focus on.

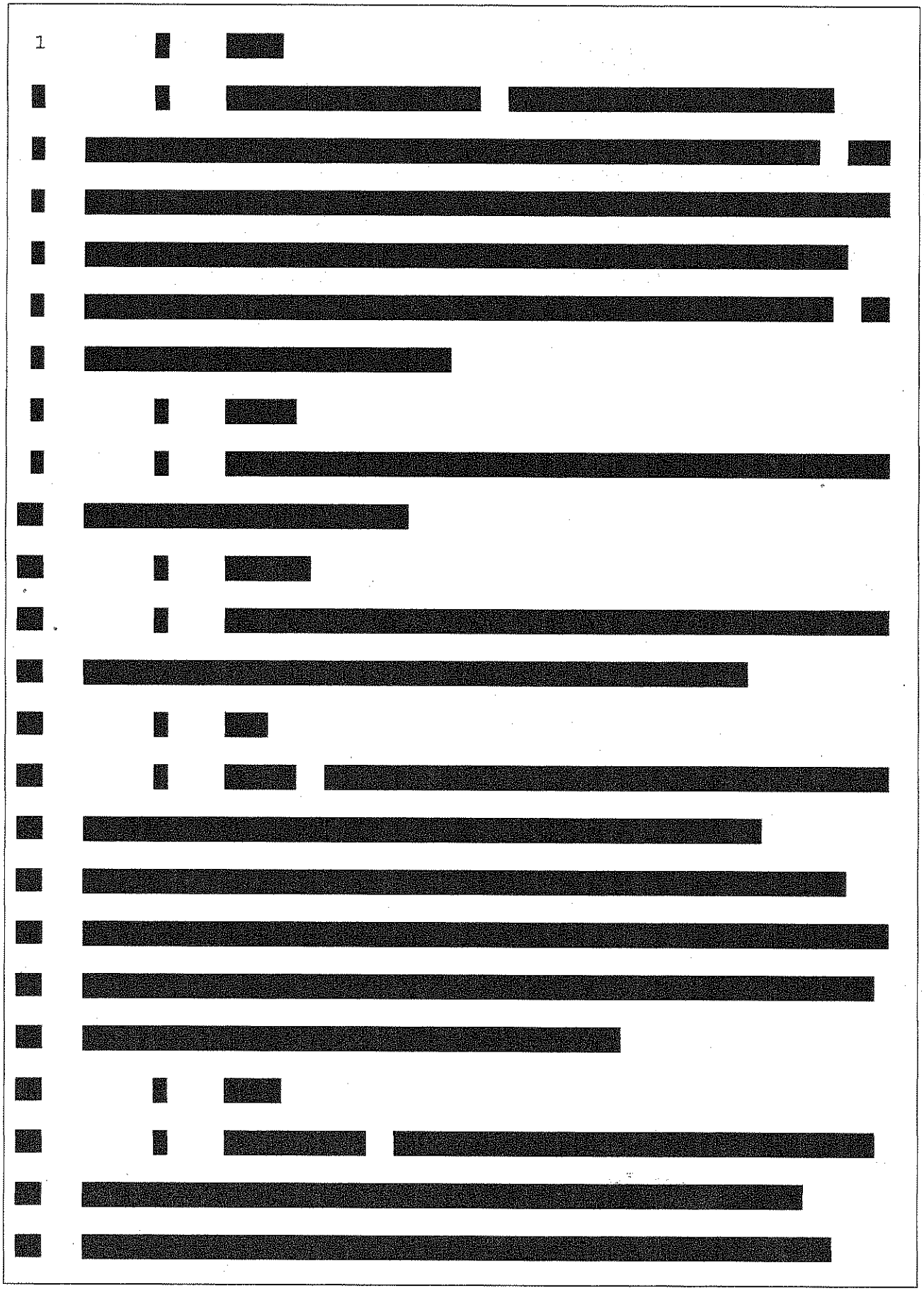
CHAIR MITCHELL: Okay. Thank you. Let's go ahead and clear the room. Anyone not under a confidentiality agreement with the Applicant, please clear the room, and we will call you back in.

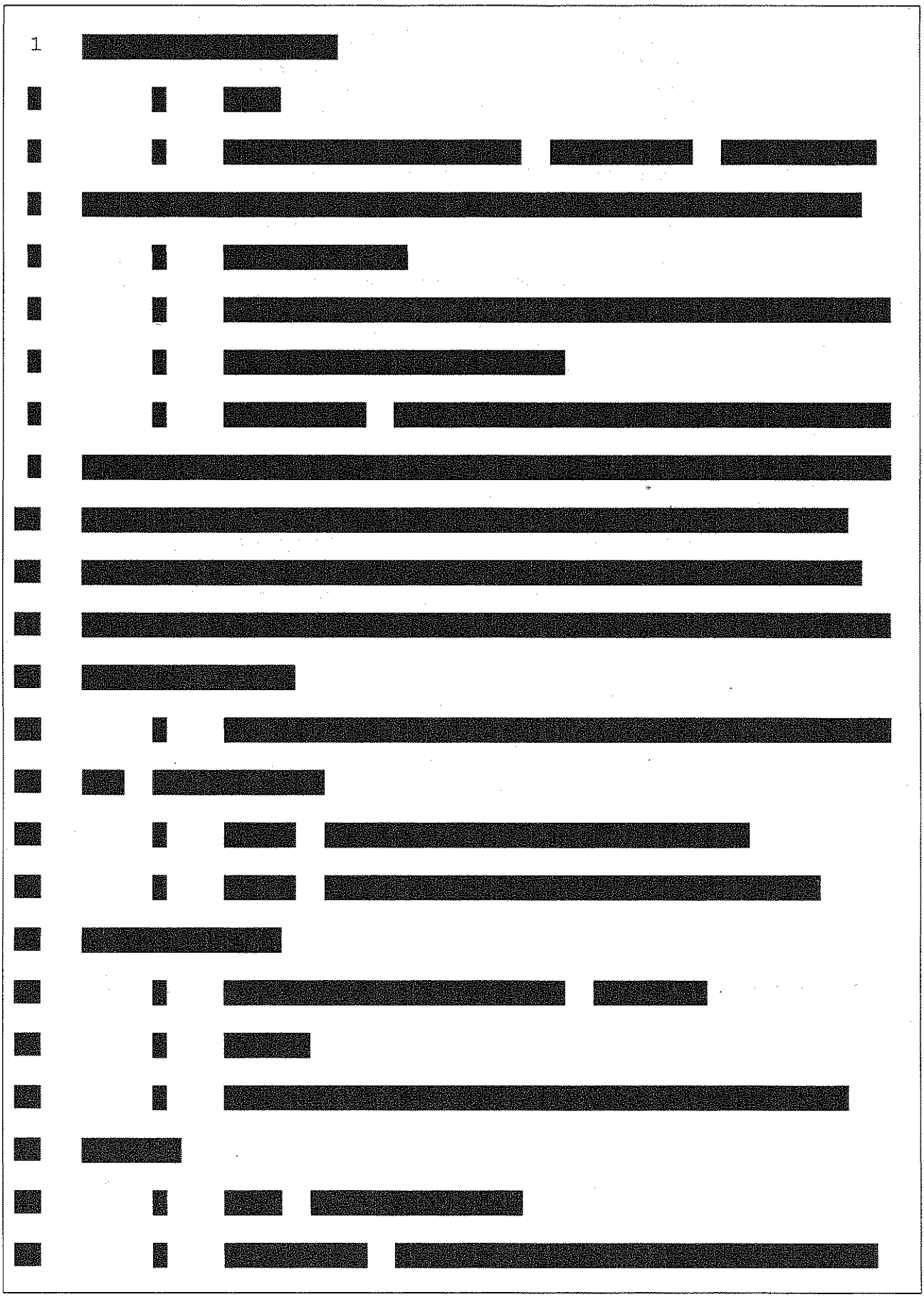
MR. DODGE: It should be just a few minutes, less than 10 minutes.

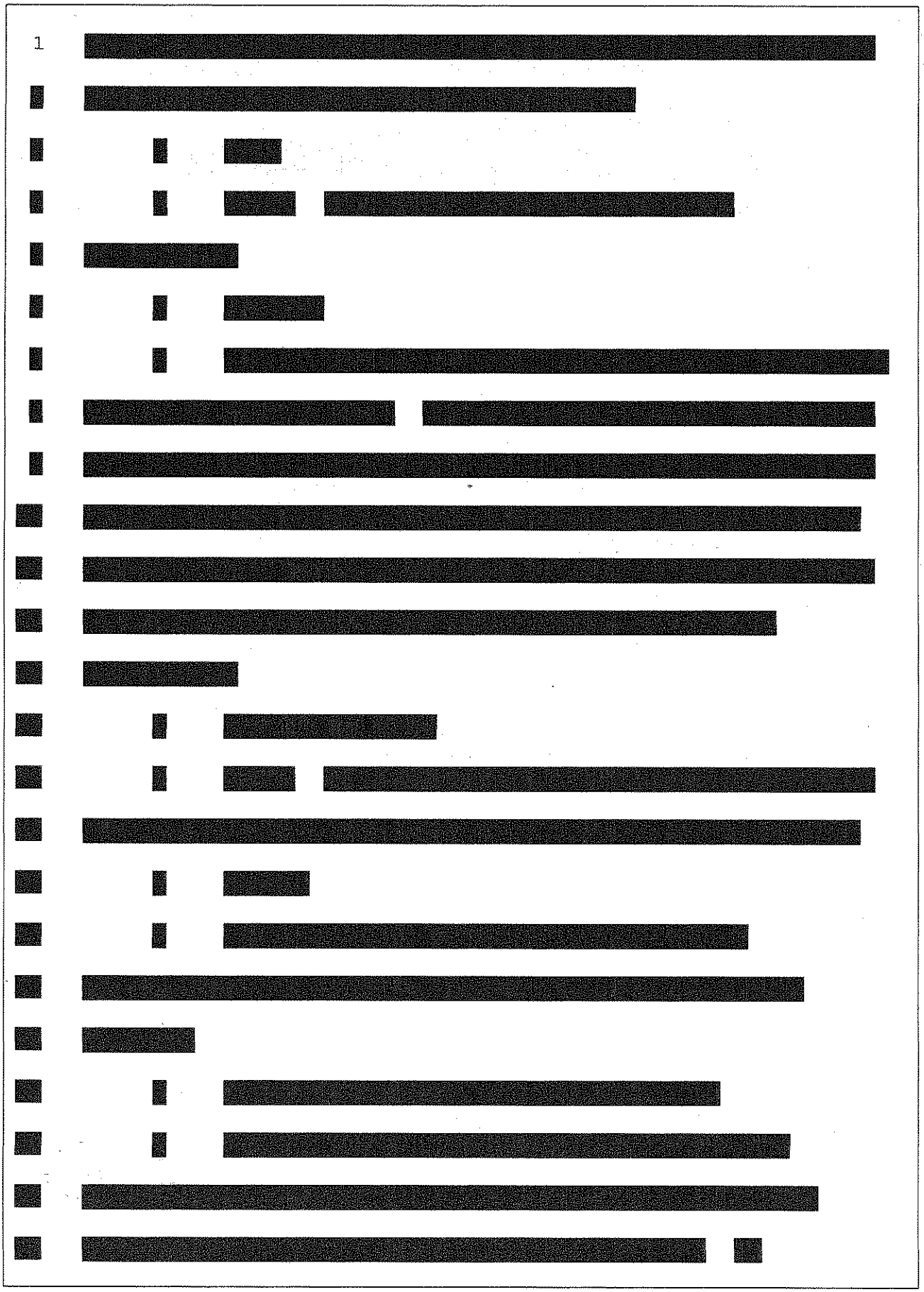
(Because of the proprietary nature of the testimony contained on pages 147 through 154, it was filed under seal.)

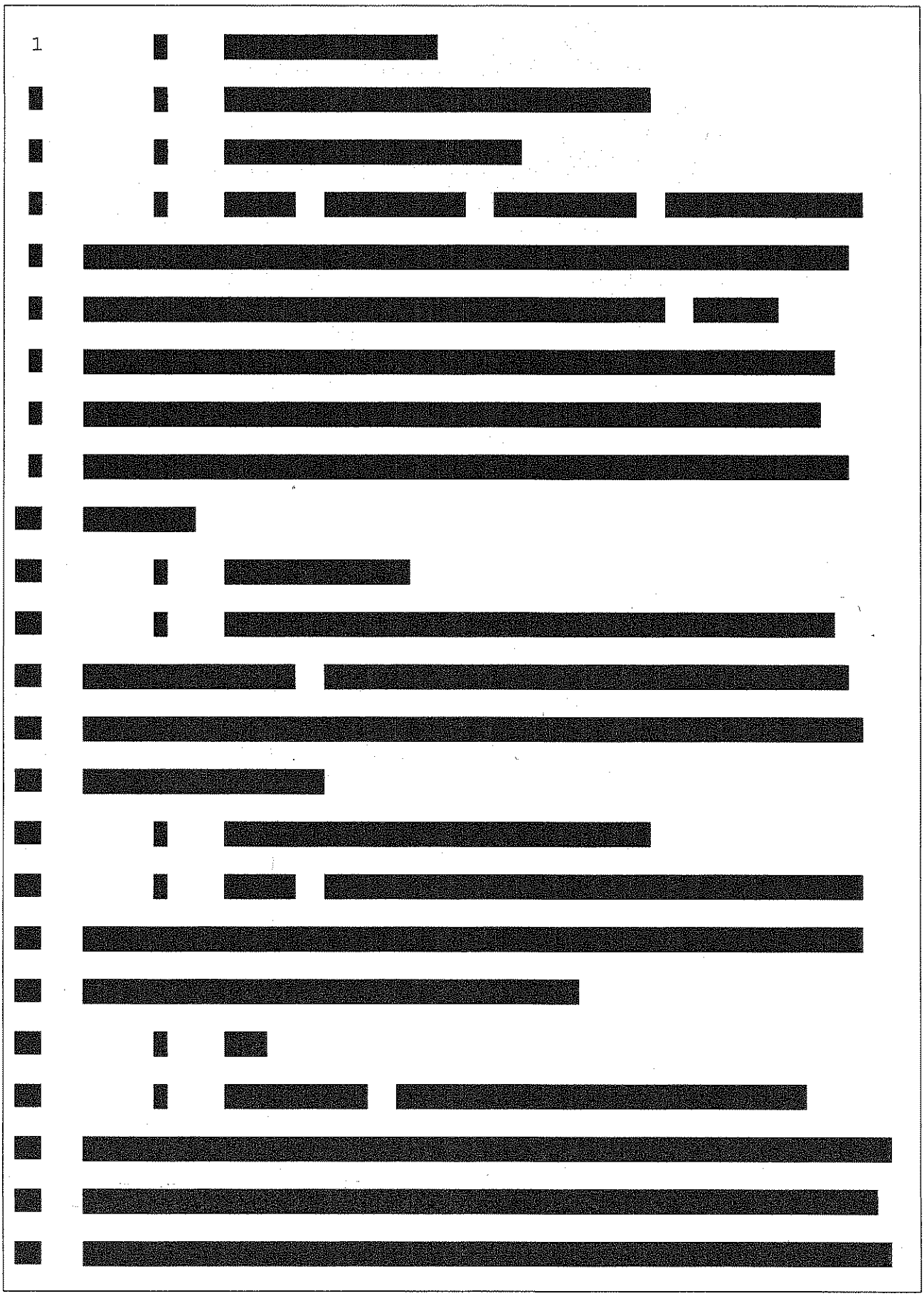
(Because of the proprietary nature of the following testimony, it was filed under seal.)

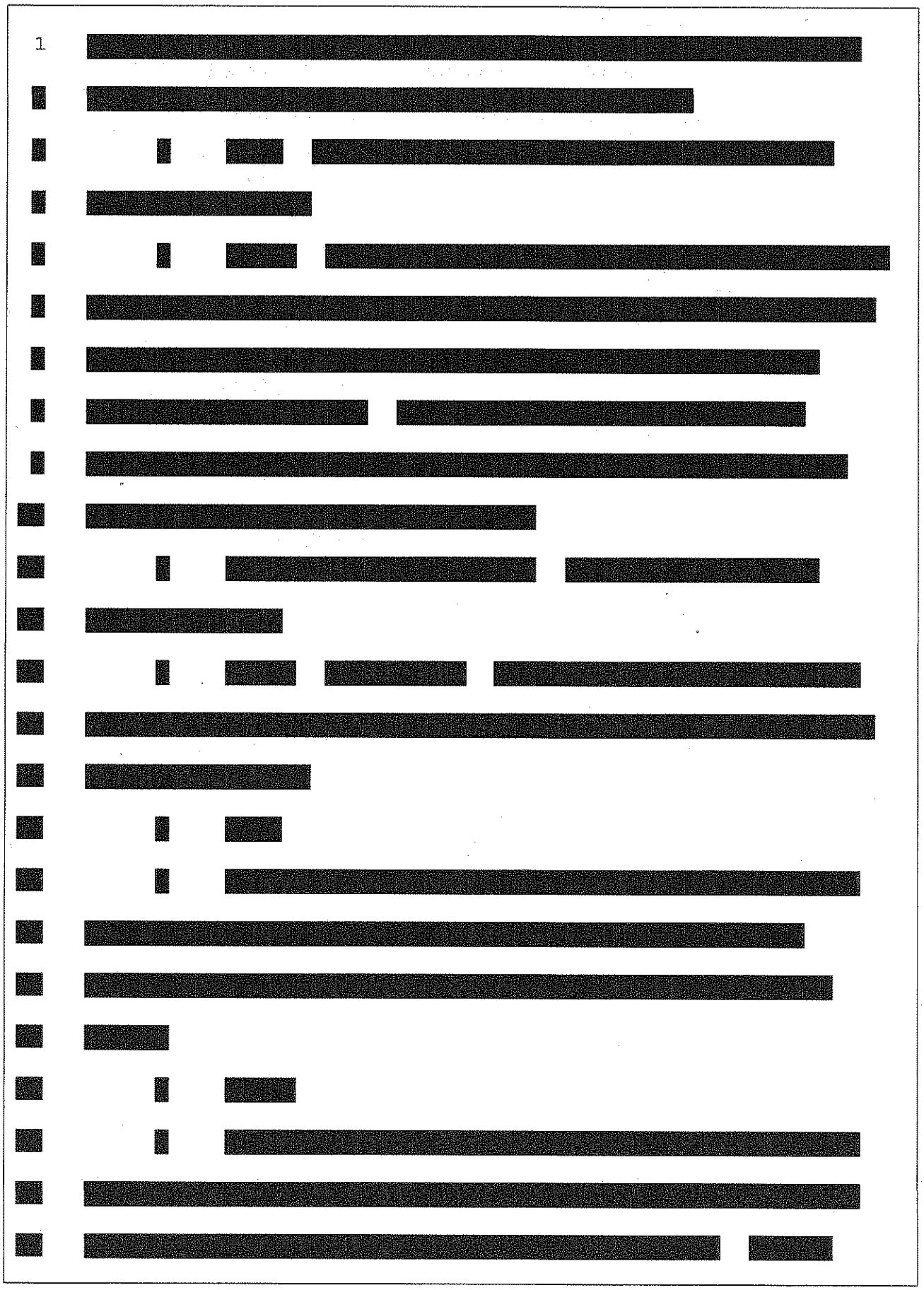
[redacted]

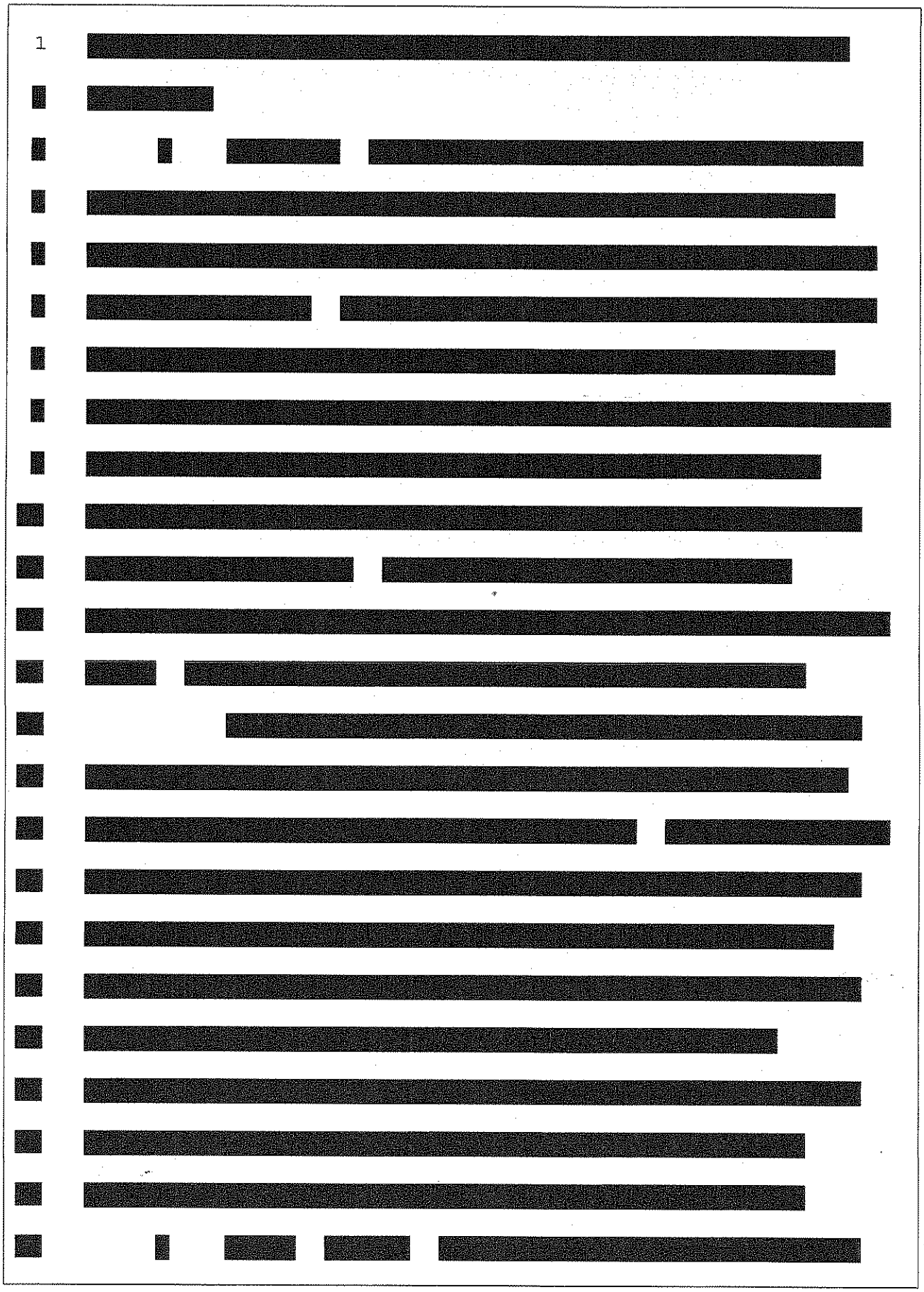












[redacted]

(Testimony on the open record resumed.)

MR. DODGE: All right. Thank you. I appreciate the -- allowing me to ask those questions in confidential session.

CONTINUED CROSS EXAMINATION BY MR. DODGE:

Q Mr. Bednar, I'm going to be moving to your supplemental testimony, I think, for the next series of questions, if you have your supplemental direct testimony with you.

A Uh-huh.

Q So can you turn to page 5 of your supplemental testimony? And starting -- starting on line 16, you ask a critical question, and I just want to make sure we're kind of on the same page of what we're discussing here in this proceeding before the Commission. So you ask "Are the Friesian network upgrades necessary to add new generation resources in southeastern North Carolina," and your response is "Yes." And I just want to make sure what we're here to talk about today is the public convenience and necessity for the Friesian project, correct?

A Yes.

Q We're -- and the commensurate need for the network upgrades to accommodate that project?

A Yes.

Q We're not here -- this is not a hearing on Duke Progress' Integrated Resource Plan or the -- the Clean Energy Plan that is pending -- being considered by the Department of Environmental Quality at this time, is it?

A I believe that's part of the necessity.

Q And it's not a hearing addressing Duke Progress' plan, their proposed future natural gas facilities, either, is it?

A I believe it's integral for this discussion.

Q So turning to page 6, we'll be on line 23. I'm sorry, not line 23 -- line 18. On line 18 you state that the Friesian project is the most efficient way for the network upgrades in question to be completed. Do you see that statement?

A I think I say by the end of 2023.

Q Yes. I'm sorry. That's line 18 there. Yes. Line 23. So what do you mean by "efficient"? Can you describe -- does that mean the fastest or does that mean the most cost effective?

A Well, I think it's -- I think it's both. I think it's the fastest because I believe that in order to meet the goals of DEQ and Duke, that it's important to have additional solar resources available to integrate into the system, and also because there's a mechanism

where private capital can fund those upgrades. We've already invested two years of design planning and funding to get the project underway and it's going to take four years to build them. And if we do not proceed, then that process stops with no alternative for it to be restarted.

Q All right. And -- excuse me -- Mr. Bednar, wouldn't you agree that differing or avoiding the need to upgrade transmission or distribution equipment or to extend the life of the existing equipment has real value to customers?

A Not if we're going to integrate more solar or bring more generation and investment to the southeastern part of the state.

Q But to the extent a deferral of approximately $250 million is done, in terms of being the most efficient, as you describe it, or cost effective, wouldn't that deferral or delay of three years, as you said, until 2027 have reduced potential cost to ratepayers by not having to carry those costs for the three-year period?

A I disagree. I believe it's important because in order to integrate the least cost solar into the Duke system, you need to have participation of the southeastern part of the state. We've already -- Charlie

has identified that the system is already at capacity. I think given weather events, all the elements of risk, that having the system in that part of the state at capacity is not a prudent way to proceed, and we have capital -- private capital that is able to fund these upgrades in a timely manner so that additional investment can come to southeastern North Carolina.

Q All right. And I want to focus now on that portion, that discussion about southeastern North Carolina --

A Sure.

Q -- and their being able to participate in the development of the solar in the state. Turning to page 8 and 9, you describe the reasons why it's preferable to locate solar facilities in southeastern North Carolina, and you list a number of factors, and I'll just summarize them --

A All right.

Q -- to an extent here. You list large tracts of open flat land, underlying geology, as well as available transmission capacity, is influencing the costs a developer faces in siting new solar facilities; is that correct?

A I believe so, yes.

Q Okay.
A What line are we on?
Q It's a summary of --
A Oh, okay.
Q -- pages 8 and 9. You have the reasons why, and I was just trying to --
A Okay. I understand. Yeah.
Q -- highlight the main criteria here that you list. And I would agree with you that development in North Carolina, to date, solar development in the state has agreed with your assessment, and there has been a significant amount of development in that part of the state already.

MR. DODGE: Chair Mitchell, I'd like to distribute the last cross -- I'm sorry -- well, I have two more, but the second-to-last cross examination exhibit I have planned for today at this time.

CHAIR MITCHELL: Please do.

MR. DODGE: Thank you. Chair Mitchell, I'd like to request that this document, Solar Capacity by County, be marked as Public Staff - Friesian Panel Cross Examination Exhibit Number 5.

CHAIR MITCHELL: It shall be so marked.

(Whereupon, Public Staff - Friesian

Panel Cross Examination Exhibit 5 was marked for identification.)

Q Mr. Bednar, this is a summary of the -- excuse me -- the counties where solar are generally located in North Carolina to date, and this is derived from the NCSEA website that was used by Friesian in developing some of its information as well, so just noting the source here. I've added a column, though, on the right side of each of these -- the list of the 100 counties, indicating which are the Friesian constrained counties.

A Uh-huh.

Q So looking at the top four counties, and these are ranked right now by the amount of existing solar capacity, the top four counties in the state, Robe--- Robeson, excuse me, Cumberland, Bladen, and Duplin County are all viewed as constrained counties as a -- with regard to Friesian upgrades; is that correct?

A Yes.

Q And those projects in those four counties alone total almost -- over -- or almost 800 MW of capacity in that alone.

A All right.

Q And looking at the top 10 counties, you also add Scotland County which is where the Friesian project

would be located, and Anson County, which also have significant amounts of solar development as well, over 100 MW in each of those counties. So would you agree that these -- this part of the state has already experienced and has been active in the development of solar resources to date?

A Yes.

Q All right. And so if you looked at all 15 counties impacted by the Friesian project -- or the Friesian constrained area, there's approximately, in those 15 counties, the counties that are marked as Friesian constrained, over 1,374 MW of solar operating in those counties at this time.

A Okay. I trust your --

Q Okay.

A -- your number.

Q And it's just summarizing from this table. All right. So in the statement of position that was filed by the Duke Energy attorney, Mr. Jirak, he stated that there is more solar in this part of the state than most states in the United States. Is that -- do you recall that statement?

A I do recall the statement.

Q So the availability of the flat farmland that

reduces that site preparation or site development cost that you described, along with available transmission capacity in this part of the state, has already resulted in a significant amount of development, but what we're talking about is increasing that capacity to accommodate an even larger percentage of solar, potentially, moving forward?

A Well, I think we'd want to have partic--- I mean, the upgrades to the transmission system will allow them to participate. At this point there will be no further development of solar in that region.

Q And those upgrades in that area are largely needed, not because of the new projects coming, but because the existing capacity has been used up by the --

A Well, I think --

Q -- existing operational solar facilities.

A -- we've identified in Mr. Askey's testimony that they're needed because, A, the system is already at capacity and, B, if any generation, whether -- of any resource were to be added in that region, you're going to be doing these upgrades at any -- at some point in the future anyway. It is my proposition that the time is now if we're going to utilize the southeastern part of the state in order to advance the goals with the Governor and

also advance Duke's goals to create a lower carbon generation base.

Q Thank you. And I'm going to -- in just a few moments I'll try to wrap up my questions and let -- Ms. Cummings is going to ask a few questions about those --

A Sure.

Q -- those provisions as well, but before we do, I'd like to still talk about some of the other challenges that continue to add existing significant amounts of new solar in that portion of Duke Progress' balancing authority would create.

MR. DODGE: Chair Mitchell, I'd like to pass out my last cross examination exhibit at this time.

CHAIR MITCHELL: Please do.

MR. DODGE: Chair Mitchell, this is the Duke Energy Carolinas' and Duke Energy Progress' Competitive Procurement of Renewal Energy Program Initial Program Plan dated November 27, 2017, that was filed with the Commission. I request that it be marked as Public Staff - Friesian Panel Cross Examination Exhibit Number 6.

CHAIR MITCHELL: It will be so marked.

(Whereupon, Public Staff - Friesian Panel Cross Examination Exhibit 6 was marked for identification.)

MR. DODGE: Thank you.

Q So back to House 589 and the most recent kind of guidance provided to the Commission by the General Assembly on the development of additional renewable energy resources here in the state, the -- if you could turn to page 5 of this document, there's a Section 2.4 dealing with Allocation of Resources. Do you see that heading on page 5?

A Yes.

Q So, again, House 589 provided that the -- that Duke Energy Carolinas and Duke Energy Progress would procure up to 2,660 MW of new renewable resources in the state, provided that they were cost effective, and the cost effectiveness threshold was based on the Utility's avoided cost, consistent with the Commission-approved avoided cost methodology; is that correct?

A Yes.

Q Okay. So included in House 589 was an amendment to G.S. 62-110.8(c) that's described in this paragraph, and it provided that the utilities, excuse me, would have the authority to determine the location and allocated amount of the competitive procurement within their respective balancing authority areas. And the General Assembly specified three major categories for the

utilities to consider in making that determination, and those are summarized the three bolded -- three listed paragraphs here on page 5.

And, again, just a high-level summary of those, promoting or fostering the diversification of siting of those resources throughout the state, number one, the efficiency and reliability impacts of siting additional renewable energy facilities in each public utility service territory, and then three dealt with additional delivered costs that may -- the potential of those costs that may result by adding additional renewable energy facilities, such as ancillary costs, vocational, operational, and locational characteristics. And the next couple of pages, the utilities in this plan describe how they apply those three provisions. So I'd just like to walk through those briefly with you.

A Okay.

Q Excuse me. So -- and I just -- I will point out before we continue down this road, I recognize that this is guidance provided for the CPRE mandate which applies to Duke Energy Carolinas and Duke Energy Progress and not to resources procured by NCEMC, so -- or other wholesale customers. I do want to note, though, that this -- the Friesian project would be located in the Duke

Energy Progress East balancing authority; is that correct?

A Yes.

Q Okay. So if you could look at page 6 and 7, turning to page 6 and 7, the bottom of page 6, the last sentence reads that "Duke Energy Progress is a smaller BA than Duke Energy Carolinas. In 2016, Duke Carolinas' winter peak was approximately 17,250 MW, in comparison with the Duke Progress winter peak load of approximately 13,000 MW." And then turning to page 7, the middle paragraph states that as of October 30th -- 31st, 2017, the companies are contractually obligated to purchase from facilities approximately 3,500 MW of solar, and those are REPS and legacy PURPA contracts. And it indicates that approximately 80 percent of those projects are going to be located in the Duke Energy Progress territory; is that correct?

A That's what it reads, yes.

Q Okay. So turning to the top of page 8, the first paragraph reads, and I'll not try to recharacterize it, so I'll just read it, "If the total solar energy capacity in DEC and DEP were to be spread across the service territories based on the respective Utility's peak load, the Duke Energy Carolinas service territory

would have approximately 60 percent of the solar energy capacity rather than its current 20 percent." Did I read that correctly?

A Yes.

Q All right. So that's, again, based on an allocation looking at peak load, but looking at the system operational and reliability impacts at the bottom of page 8, the Utility identifies additional challenges that would be associated with increased capacity being added in the Duke Energy Progress service territory. And I'd like to just point you to a couple statements here that they provide.

A Okay.

Q So actually, I'll just go to the one summary statement, I think on page 12, that summarizes the system operational and reliability impacts the most succinctly. If you turn to the top of page 12 in this document, just below the table -- just below Figure 10, the paragraph reads "Continued addition of solar generation in the Duke Energy Progress balancing area will exacerbate existing reliability challenges and increase the potential future risks of NERC noncompliance. The DEP BA's growing experience managing operationally excess energy and increasingly steep ramping requirements as additional

unscheduled and uncontrolled solar generation above 2,200 MW comes online will also increase the likelihood of emergency curtailment in DEP. These reliability issues also support the Company's planned CPRE program allocation between DEC and DEP balancing authorities." So when you're looking at where to site solar resources, from a balancing authority perspective and from a reliability perspective it's not just about flat, open land and access to transmission, is it?

A Well, I think we evaluate places to develop for lots of factors, one of which is what is the possibility of actually siting a project, so I don't know that this -- these criteria necessarily take into account at all where you can actually construct solar at scale. And I -- and so I think that we try to evaluate the best location, but it's also driven by where solar resource is the best, where we have the ability to get projects zoned, and where it can be constructed cost effectively.

Q So the -- excuse me. You -- in your testimony you indicate that Duke has provided information that 1,561 MW of solar resources that are interdependent with the Friesian -- are interdependent with the Friesian upgrades; is that correct?

A Yes.

Q And in your rebuttal testimony on page 3, I don't know if you want to turn there, page 3, line 16, you state -- excuse me -- on line 16, "While we do not know exactly which projects following Friesian will succeed, I would expect that the Friesian upgrades will be utilized by a minimum of 1,000 MW of later queued generation in the constrained area." And as we previously discussed, your projects, the Birdseye projects in the pipeline, would include almost a quarter of those 1,000 MW; is that correct?

A Yes.

Q All right. And those facilities and the other facilities that may constitute that 1,000 additional MW, those are not CPRE projects where there are operational controls provided to the utility to address some of these excess energy situations or ramping concerns, the operational impacts associated with intermittent resources that you identified?

A I don't think we can speak to which ones are -- I don't know of the 1,000 MW what will be part CPRE or some future procurement regime.

Q All right. So just to maybe clarify that number two, you're -- Mr. Askey, this is actually an exhibit from your testimony, but -- kind of addressing

the 1,000 MW that Mr. Bednar has referred to. I'm going to flip to your testimony. Mr. Askey, this is Appendix A to Exhibit B. This is the response, Friesian Holdings Data Request Number 2 of Duke Progress. In that statement -- or in the response to --

MR. JIRAK: Where are you?

MR. DODGE: I'm sorry. I'll let you flip to that.

MR. JIRAK: What document?

MR. DODGE: This is Mr. Askey's supplemental testimony -- supplemental direct testimony. We can bring you a copy up there if that would be helpful.

WITNESS ASKEY: Are you in the table on page 8?

MR. DODGE: Actually, I'm just in the first -- first paragraph.

Q So this is Data Request Number 2 of Duke Energy Progress, LLC to Friesian --

A (Askey) The attachment. Okay.

Q -- question number 1. And I can read this to you if --

A Yeah. Go ahead.

Q Okay. The statement of the second paragraph indicates that "As a general matter, the interconnection study process is designed to assess whether upgrades are

needed to accommodate a particular generating facility, but are not intended to assess whether a particular upgrade will accommodate a particular set of future potential generating facilities." And then they go on to state, "However, it is undoubtedly the case that the Friesian upgrades will at least partially facilitate the interconnection of more than 1,000 MW of additional generation." Did I read that correctly?

A You did.

Q Okay. And so we're talking about -- excuse me -- that 1,000 MW is a subset of the 1,561 MW that's currently interdependent on the Friesian upgrades; is that correct?

A To some extent, yeah. It could be a little bit more.

Q All right. And the partial facilitation means that it will address the interdependencies, but there may be additional upgrades associated with those projects that -- to allow them to also interconnect?

A That is correct.

Q Okay. Thank you.

A Uh-huh.

Q Excuse me. I'm going to skip to some additional questions to Mr. Askey at this time and try to

wrap things up. I appreciate, again, Mr. Askey, you being available today. In your supplemental testimony, if you have that with you?

A I do.

Q If you could turn to page 5.

A Uh-huh. Okay.

Q You state on line 15 -- excuse me -- that in addition to solar resources Duke Energy's 1,235-MW combined cycle plant in Cumberland County is interdependent on the Friesian upgrades; is that correct?

A That is correct.

Q Okay. And just to be clear, Duke has studied in the interconnection queue two 1,235-MW combined cycle facilities in Cumberland County.

A That's correct.

Q And -- which if we refer to them as Q398 and Q399, the first facility, Q398, which is proposed to come online in 2025 --

A Uh-huh.

Q -- that facility is not interdependent on the Friesian upgrades?

A It is not interdependent on those upgrades because it has a whole set of upgrades of its own.

Q Okay.

A It cannot come on with upgrading the system, just like any other generation project.

Q But nonetheless, it's not interdependent on the Friesian project. It triggers its own set of upgrades, but it's not an interdependent project?

A The Friesian upgrades are triggered by the loading on the East Fayetteville -- Fayetteville East Erwin 230 line. The construction of the facilities associated with Q398 create a brand new Cumberland to Erwin line that bypasses Fayetteville East. So it's a brand new corridor. I don't know if you're using the same right-of-way or not, but it's a brand new corridor of transmission facility.

Q And I don't disagree. Just to make the point, though, that -- those -- a project that is not dependent on the Friesian upgrades can be sited in the southeastern region of North Carolina. It may trigger its own set of substantial upgrades, I'm not disputing that, but --

A Right.

Q -- it can be sited without triggering the Friesian upgrades.

A And I'm not sure if Duke has studied the impact of doing the Q398 upgrade prior to doing the Friesian upgrades to avoid the Friesian project upgrades.

Q Excuse me. The second project, however, Q399 --

A Uh-huh.

Q -- it would not come online, based on the interconnection study, the information provided in the interconnection study, until 2027; is that correct?

A I'm not aware exact when the queue -- queuing period is, yes.

Q However, as we -- that project is interdependent with Friesian, the $223 million in upgrades?

A It triggers the same upgrades, yes.

Q Okay. As well as the $250 million upgrades that the Q398 project would trigger.

A Correct.

Q And it also would trigger an additional set of upgrades on its own as well; is that correct?

A The Q398, Q399 connect to the same substation. One connects at 500 kV, one connects at 230, so a loss of the 500 and loss of 230, you can end up impacting the same facility.

Q Okay. Great. Thank you. So Mr. Askey, you just listened to some of the discussion between Mr. Bednar and I about some of the other operational

challenges that the system operators for the Duke Energy Progress East Balancing Authority face with the increasing amounts of solar. By adding additional transmission capacity in that area, does that alleviate the type of ramping concerns or the type of excess energy concerns that were addressed -- that have been raised by Duke?

A Well, the generation that's in the area of the Friesian projects -- you know, we've talked a lot about the amount of solar that's located in the area, but that -- in that area there is a lot of other generation facilities, the Brunswick Nuclear Plant, you have Robeson, you have Weatherspoon, you have the Sutton project. You also have Lee in the area. Those are dispatchable resources that, absent the nuclear project, are dispatchable resources that can control ramp rate issues fairly well. They address those very well. The transmission facilities gives them a lot of flexibility to control the system in the event -- under normal conditions with no outages, there are no issues, but under certain contingency conditions, and those are the ones we're talking about, the improvements allow them the flexibility to alleviate the issues without shedding any load or causing any problems on the system.

Q Okay. Thank you. In your rebuttal testimony, Mr. Askey --

A Uh-huh.

Q -- excuse me -- on page 2 of your rebuttal testimony --

A Okay.

Q -- if you could turn there. You state right at the bottom of that page on line 20 that Duke Progress' 2019 IRP indicates load growth of 9 (sic) percent overall; is that correct?

A That's correct.

Q All right. But as Public Staff Witnesses Metz and Lawrence testified to, Duke Energy Progress has now considered a winter planning system, and its capacity needs are driven by the winter needs; is that correct? Are you familiar with their IRP?

A I'm familiar to the extent that I know their winter peak is higher, yes.

Q All right. And would you agree that solar's contribution to winter peak is limited?

A Their daylight hours is consistent. It's not that different, from my understanding. I think from an IRP perspective, solar provides a lot of advantage in that you can -- general -- transmission investments are

lumpy. That's why we're dealing with a 220 MW -- $220 million issue right now, because historical additions of generation have eaten up the capacity in the system. So now we're to a point where we've got to make an investment. Generation investments are also lumpy, nuclear plants, coal plants, large CCs. Solar is the only one that Duke, through a competitive bid process, can bring on in a manner that is slow, and that they can do it as needed without a whole lot of lead time. So there is benefit in using the solar resources that are available throughout the state and the development of those resources, in addition to the fact that Duke's not, on the regulated side, developing the resources. These are being -- the development work, a service, probably 100 developer clients throughout the country. And for every project that's built, there's three that's not built. And in the process of doing that, they're taking on the risk of the land acquisition. They're taking on the risk of the permitting and the -- and getting involved with the communities and justifying the projects. These are costs that Duke regulated is not experiencing because other people are doing it, and that's a very huge benefit to the ratepayer.

Q And I appreciate those comments. Certainly,

there is a significant amount of risk assumed by private developers working on these projects. I appreciate that.

MR. DODGE: Chair Mitchell, I'd like to just take Judicial Notice, if possible, of the Utility's 2018 IRP -- Duke Progress' 2018 IRP, if that's acceptable. I'd just reference --

CHAIR MITCHELL: Hearing no objection, we'll take Judicial Notice of the 2018 DEP IRP.

MR. DODGE: I didn't want to provide copies of such a large document if I could help it, but I did want to just refer to one table in that. I'll share it with counsel briefly.

Q Mr. Askey, I've provided you a copy of the Duke Energy Progress 2018 IRP, not the 2019 update, but the 2018 IRP. And Chapter 9 that I've turned to the page for you deals with the solar capacity -- the capacity value of solar. And I'd just ask you to -- if you've had a chance to look at Table 9C on that page. And as a result of that analysis of the capacity value of solar, did -- at various penetration levels, what was the highest capacity value that Duke Progress assigned to solar?

A 3.2 percent.

Q 3.2 percent. And it decreased over time. As solar penetration increased, that capacity value

decreased. Is that shown in the table?

A To 2.7.

Q Okay. And that's for a tracking facility I think you're referring to there; is that --

A Right.

Q Okay. The non-tracking was less than 1 percent?

A Correct.

Q Okay. Thank you. And one last question, Mr. Askey. In your testimony -- and I'll flip to the page here -- this is in your rebuttal testimony, starting on page 5 -- excuse me -- you describe the North Carolina Transmission Planning Collaborative process --

A Correct.

Q -- that you participated in? And you state on lines 11 through 15 that in the Transmission Planning Collaborative, DEP and DEC present results from their NERC planning -- Transmission Planning Standard studies and the facility improvements that are needed from those studies, and go on to state that while generation assumptions are included in those studies, they are not designed to ensure the delivery of power from a specific generation location. But those facility improvements that are needed from those studies that come out of the

plan presented by Duke Carolinas and Duke Progress, those facility improvements would be rate based, typically; is that correct?

A Yes. If they find their way into the plan, they've already been approved for rate base.

Q All right. And then you describe -- excuse me -- on page 7 and 8 the -- some of the differences with PJM and the MISO -- excuse me -- and their transmission planning. And on page 7 -- excuse me -- excuse me -- page 7, line 3, you start -- you state "The utilities perform their own NERC Transmission Planning Standard," again, what we're talking about with the Transmission Planning Collaborative, "and identify the improvements to solve any contingency loading or voltage issues identified in the process."

A Uh-huh.

Q They also identify additional transmission resources that are needed to serve load, and those are combined -- those resources are combined to develop -- to create the Regional Transmission Plan, and I think as you state on page 8, those projects would -- that result from this study are rate based as well; is that correct?

A Uh-huh.

Q All right. And but you do state on page 8 --

you break down the costs in kind of three different categories, the directly assigned costs, the network improvements, and then those baseline upgrades that we were just talking about. And so on line 9 you state "For baseline upgrades the RTO can determine that a system improvement that is necessary to address a system deficiency is not being caused by the generator interconnection queue." And if that occurs, those costs can be assigned to the utilities on rate base, but if it's caused by the generator interconnection, who bears those costs?

A Usually, the generator in question will trigger it. That means that the cost is going to be incurred if they put it into their interconnection agreement. And most of the RTOs, those costs are socialized with the clustering -- the generation queue cluster you have a six-month window. All the generation that's involved with that cluster will contribute to the cost of the network upgrades as they contribute to them through the use of a distribution factor to see how much power flows from their facility across the facility in question and need.

Q And by "socialized," you mean those costs are shared by the participating generator interconnection in

that grouping study or that cluster?

A In -- except in the case of PJM. In the case of PJM, those -- that socialization can occur for a five-year period, successive queues which also contribute to those upgrades as well.

Q Okay. Thank you.

MR. DODGE: I believe that completes the questions I have for the witnesses. Ms. Cummings has some questions as well. Thank you.

CHAIR MITCHELL: Okay. We'll stop now for -- break for lunch. We'll be back on the record at 1:00.

(The hearing was recessed, to be continued at 1:00.)

STATE OF NORTH CAROLINA

COUNTY OF WAKE

C E R T I F I C A T E

I, Linda S. Garrett, Notary Public/Court Reporter, do hereby certify that the foregoing hearing before the North Carolina Utilities Commission in Docket No. EMP-105, Sub 0, was taken and transcribed under my supervision; and that the foregoing pages constitute a true and accurate transcript of said Hearing.

I do further certify that I am not of counsel for, or in the employment of either of the parties to this action, nor am I interested in the results of this action.

IN WITNESS WHEREOF, I have hereunto subscribed my name this 6th day of January, 2020.

Linda S. Garrett

Linda S. Garrett
Notary Public No. 19971700150