Fox Rothschild LLP
ATTORNEYS AT LAW

434 Fayetteville Street
Suite 2800
Raleigh, NC 27601
Tel (919) 755-8700 Fax (919) 755-8800
www.foxrothschild.com

KAREN M. KEMERAIT
Direct No: 919.755.8764
Email: kkemerait@foxrothschild.com

November 26, 2019

Ms. Kimberley A. Campbell, Chief Clerk
North Carolina Utilities Commission
430 N. Salisbury Street
Raleigh, NC 27603

RE: Application for Certificate of Public Convenience and Necessity for Friesian Holdings, LLC to construct a 70-MW Solar Facility in Scotland County, North Carolina NCUC Docket No. EMP-105, Sub 0

Dear Ms. Campbell:

On behalf of Friesian Holdings, LLC, we herewith submit the pre-filed Supplemental Direct Testimony and Exhibits of Brian C. Bednar in the above-referenced EMP docket.

Pursuant to Commission Rule R1-28(e), the Company plans to deliver 16 copies of its testimony and exhibits on November 27, 2019.

Should you have any questions concerning this testimony or exhibits attached thereto, please do not hesitate to contact me.

Sincerely,

/s/ Karen M. Kemerait

Karen M. Kemerait

skb

CC: All Parties of Record
Enclosures

BEFORE THE

NORTH CAROLINA UTILITIES COMMISSION

FRIESIAN HOLDINGS, LLC

DOCKET NO. EMP-105, SUB 0

PRE-FILED SUPPLEMENTAL DIRECT TESTIMONY

OF

BRIAN C. BEDNAR

November 26, 2019

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?

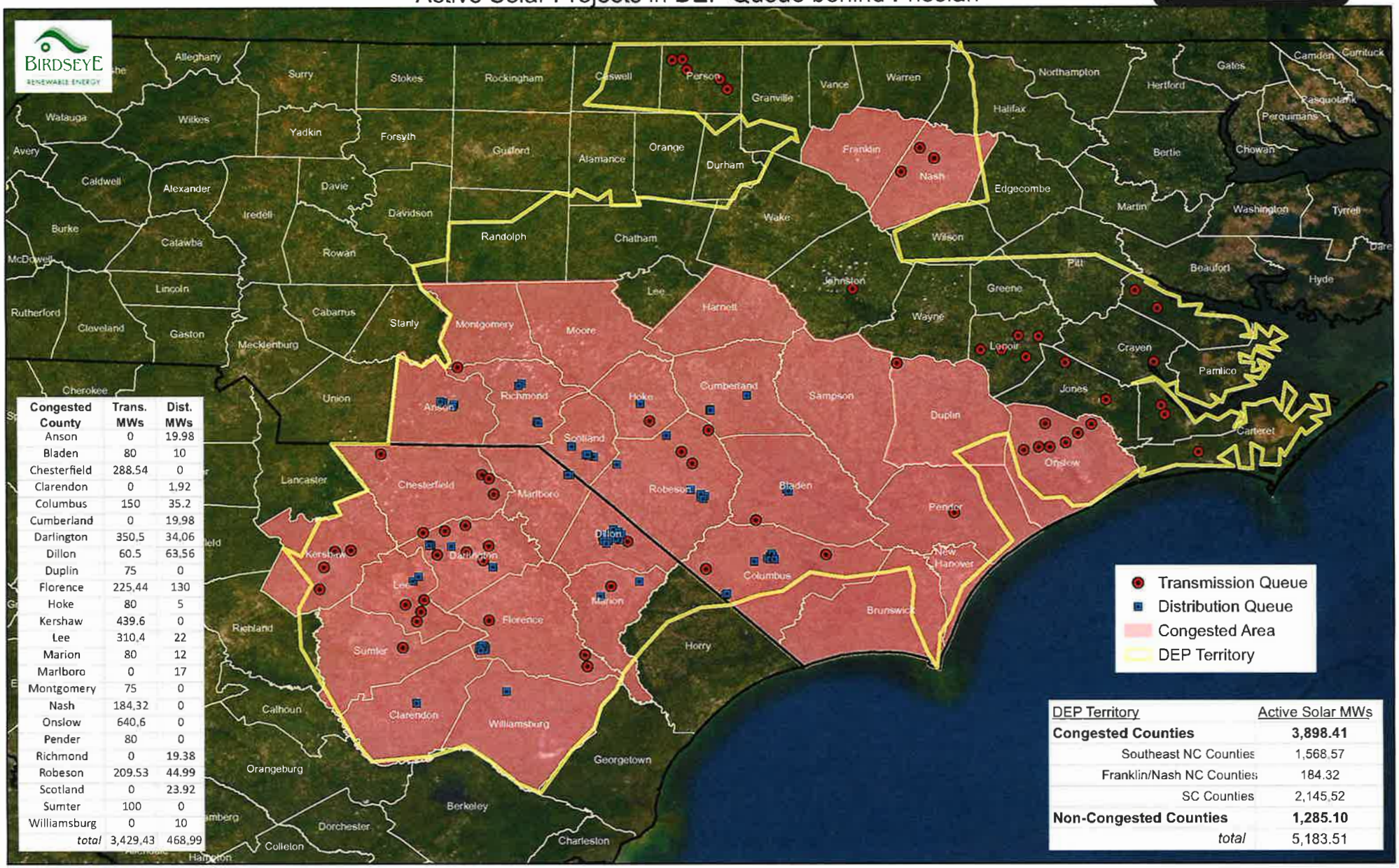
A. Yes. As discussed previously, most of DEP's service territory is closed to new generation as a result of transmission constraints, and Friesian provides the only immediately-actionable proposal to meaningfully address this issue. Duke has positively identified at least 1,561MW of solar resources beyond 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.

Active Solar Projects in DEP Queue behind Friesian



Congested County	Trans. MWs	Dist. MWs
Anson	0	19.98
Bladen	80	10
Chesterfield	288.54	0
Clarendon	0	1.92
Columbus	150	35.2
Cumberland	0	19.98
Darlington	350.5	34.06
Dillon	60.5	63.56
Duplin	75	0
Florence	225.44	130
Hoke	80	5
Kershaw	439.6	0
Lee	310.4	22
Marion	80	12
Marlboro	0	17
Montgomery	75	0
Nash	184.32	0
Onslow	640.6	0
Pender	80	0
Richmond	0	19.38
Robeson	209.53	44.99
Scotland	0	23.92
Sumter	100	0
Williamsburg	0	10
total	3,429.43	468.99

DEP Territory	Active Solar MWs
Congested Counties	**3,898.41**
Southeast NC Counties	1,568.57
Franklin/Nash NC Counties	184.32
SC Counties	2,145.52
Non-Congested Counties	**1,285.10**
total	5,183.51

Land Use Stratification, 2015