NORTH CAROLINA
PUBLIC STAFF
UTILITIES COMMISSION

July 29, 2022

Ms. A. Shonta Dunston, Chief Clerk
North Carolina Utilities Commission
4325 Mail Service Center
Raleigh, North Carolina 27699-4300

Re: Docket No. EMP-110, Sub 0 – CPCN for 120MW Located on Woodard Rd. Near Morning Rd. on its Western Side and Middle Tract Rd. to the East in Bertie County

Dear Ms. Campbell:

In connection with the above-referenced docket, I transmit herewith for filing on behalf of the Public Staff the second supplemental testimony of Evan D. Lawrence, Utilities Engineer, Electric Division.

By copy of this letter, we are forwarding copies to all parties of record.

Sincerely,

/s/ Robert B. Josey
Staff Attorney
robert.josey@psncuc.nc.gov

Attachment

BEFORE THE NORTH CAROLINA UTILITIES COMMISSION

DOCKET NO. EMP-110, SUB 0

In the Matter of Application of Sumac Solar LLC for a Certificate of Public Convenience and Necessity to Construct a 120- MW Solar Facility in Bertie County, North Carolina	)))))))	SECOND SUPPLEMENTAL TESTIMONY OF EVAN D. LAWRENCE PUBLIC STAFF – NORTH CAROLINA UTILITIES COMMISSION

BEFORE THE NORTH CAROLINA UTILITIES COMMISSION

DOCKET NO. EMP-110, SUB 0

SECOND SUPPLEMENTAL TESTIMONY OF EVAN D. LAWRENCE

ON BEHALF OF THE PUBLIC STAFF

NORTH CAROLINA UTILITIES COMMISSION

July 29, 2022

Q. PLEASE STATE YOUR NAME AND ADDRESS FOR THE RECORD.

A. My name is Evan D. Lawrence. My business address is 430 North Salisbury Street, Raleigh, North Carolina.

Q. BRIEFLY STATE YOUR QUALIFICATIONS AND DUTIES.

A. My qualifications and duties are included in Appendix A.

Q. WHAT IS YOUR POSITION WITH THE PUBLIC STAFF?

A. I am an engineer with the Electric Section – Operations and Planning in the Public Staff's Energy Division.

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

A. The purpose of my testimony is to make recommendations to the North Carolina Utilities Commission (Commission) on the application filed by Sumac Solar LLC (Sumac or Applicant) for a certificate of

public convenience and necessity (CPCN) for construction of a solar photovoltaic generating facility (the Facility) (Application). My testimony responds to the supplemental testimony filed by Applicant witnesses Donna Robichaud on June 1, 2022, and Amanda Mack on June 2, 2022.

BACKGROUND

Q. PLEASE PROVIDE A BRIEF HISTORY OF THE APPLICATION.

A. On April 16, 2020, Sumac filed its Application. The Application included the testimony of the Applicant's witness Kara Price. On May 12, 2020, witness Robichaud filed direct testimony in response to the Commission's April 28, 2020 Order Requiring Filing of Testimony, Establishing Procedural Guidelines, and Requiring Public Notice, which directed the Applicant to file additional testimony addressing the amount of network upgrades on Virginia Electric and Power Company, d/b/a Dominion Energy North Carolina's (DENC) transmission system or any other affected system's transmission system, if any, required to accommodate the operation of the Applicant's proposed facility.

On May 29, 2020, I filed direct testimony in this docket. In my testimony, I stated that the Applicant had allayed the Public Staff's concerns regarding the potential for significant upgrade costs that could ultimately be borne by the using and consuming public, but that

if this potential arose in the future, the Public Staff would re-evaluate its position on the issue.

On June 22, 2020, the Commission issued an Order Cancelling Expert Witness Hearing and Requiring Additional Testimony (June 22 Order). The June 22 Order required the Applicant to respond to a series of questions regarding system upgrades and related costs, interconnection studies, and the Applicant's plans for selling energy and capacity from the Facility.

On August 12, 2020, witness Robichaud filed supplemental testimony responding to the June 22 Order.

On October 15, 2020, the Applicant filed a letter informing the Commission of the sale of the Facility to EDF Renewables Development, Inc. (EDF Renewables), and indicating that the Applicant would provide supplemental testimony regarding EDF Renewables and notify the Commission of any changes to the contents of the application resulting from the sale.

On November 16, 2020, the Applicant filed a supplemental application and the direct testimony of witness Emily Dalager, Project Development Manager with EDF Renewables. Also on November 16, 2020, I filed supplemental testimony to make additional recommendations based on new information regarding the cost of

transmission upgrades which was filed in the August 12, 2020, supplemental testimony of witness Robichaud, and the comments filed in Docket No. E-100, Sub 170.

On May 27, 2021, the Applicant filed the Generator Interconnection Affected System Study Report for PJM Interconnection cluster AD1.

Also on May 27, 2021, the Applicant filed a Motion to Stay in this proceeding, so that all parties would have the benefit of additional interconnection related information that was not yet available. The Commission granted this request on June 3, 2021.

Q. PLEASE PROVIDE A BRIEF SUMMARY OF THE APPLICANT'S TESTIMONY FILED ON JUNE 1 AND 2, 2022.

A. On June 1, 2022, and on June 2, 2022, the Applicant filed second supplemental testimony of witnesses Robichaud and Mack, respectively. Witness Robichaud provided updates to the status of the interconnection studies and associated costs that Sumac has received, as well as updated levelized cost of transmission (LCOT) estimates. Witness Mack provided an update to the information contained within the CPCN application.

Sumac has reduced the Facility's capacity from 120 MW_{AC} to 80 MW_{AC} to avoid causing large impacts to the PJM system which would have required substantial cost to the Applicant. Initially the Facility

did have two PJM interconnection queue positions: AD1-022, which is 80 MW_{AC}; and AD1-023, which was 40 MW_{AC}. As a result of the removal of the AD1-023 interconnection request, the withdrawal of other projects from the queue, and the reclassification of system upgrades required for Sumac to interconnect, the cost of the PJM required upgrades for the Facility decreased from $135,990,000 to $14,073,759.

AFFECTED SYSTEM UPGRADES

Q. PLEASE DESCRIBE THE PLANNED INTERCONNECTION OF THE FACILITY.

A. The Facility will interconnect to the Cashie-Trowbridge 230 kilovolt (kV) transmission line owned by Virginia Electric and Power Company, d/b/a DENC. Since DENC is part of PJM Interconnection, LLC (PJM), the Applicant is required to enter into an interconnection service agreement with both entities.

Q. WHAT HAS DUKE ENERGY PROGRESS, LLC PROVIDED REGARDING THE EFFECT OF PJM CLUSTER AD1 ON ITS SYSTEM?

A. In 2021, Duke Energy Progress, LLC (DEP) released two versions of its Affected System Study Report for PJM cluster AD1. However, because of PJM's queue reform and PJM's development of a revised

System Impact Study in May 2022, DEP released a revised affected system study report for PJM cluster AD1 on June 8, 2022.[1]

Q. PLEASE DESCRIBE DEP'S AFFECTED SYSTEM STUDY REPORT RELEASED ON JUNE 8, 2022.

A. This report is the second revision of the AD1 affected system study. It is attached as **Lawrence Exhibit 1** and contains the table below on page 4:

Table 2: Upgrades and Contributing Requests

Overloaded Transmission Facility	Contributing Requests	Upgrade Description	Upgrade Cost	Time to Complete (months)
Rocky Mount – Battleboro (DVP) 115kV line	AD1-022 AD1-056/057	Reconductor 8.54 miles	$31 M	30
Rocky Mount – Battleboro (DVP) 115kV line	AD1-022 AD1-056/057	PJM project to reconfigure 115kV lines	-	-
Greenville – Everetts (DVP) 230kV line	AD1-022 AD1-056/057 AD1-074/075/076	Rebuild 1.87 miles of aging double circuit 230kV towers, ISD 6/1/2027	$19 M*	36*
Greenville – Everetts (DVP) 230kV line	AD1-022 AD1-056/057 AD1-074/075/076	Reconductor 1.87 miles of one side of double circuit 230kV line plus terminal equipment	$0.35 M*	36*

* Transmission Planning or Class 5 estimates

The Rocky Mount-Battleboro line upgrade listed above is planned for PJM cluster AC1, and DEP does not attribute this upgrade to PJM cluster AD1. The first revision to the study was released on

[1]Witness Robichaud's June 1, 2022, testimony was filed before DEP's June 8, 2022, release of its revised affected system study report for PJM cluster AD1, which indicated that Sumac would be responsible for approximately $350,000 in network upgrades.

September 9, 2021, and is included as Attachment C to witness Robichaud's June 1, 2022 testimony. In this first revision, the requirement to reconductor 1.87 miles of the Greenville-Everetts 230kV line was included, but at an estimated cost of $10 million for the Applicant. Between the release of revision 1 and revision 2 of the affected system studies, DEP determined that this section of line needed to be replaced due to aging components nearing the end of their useful life. This rebuild is expected to cost a total of $19 million and be completed in 2027.

Q. WHAT IS THE COST FOR THE UPGRADE TO THE GREENVILLE-EVERETTS 230 KV LINE?

A. The incremental cost to upgrade the line amounts to $350,000. To be clear, the rebuilding of the line (the $19 million cost) is not attributed to new generation. This rebuild is set to be completed regardless of whether new generation connects to the grid. Additionally, only a small portion of this line is in DEP with the remaining portion being in PJM. Completion of these affected system upgrades by DEP will allow the Facility to interconnect without adverse impacts on DEP's transmission system.

Q. WHAT IS YOUR OPINION ON THE WORK TO BE COMPLETED ON THE GREENVILLE-EVERETTS 230 KV LINE AND THE ASSOCIATED COST?

A. At this time, I am not prepared to comment on the necessity or appropriateness of the rebuilding of this section of line. This rebuild would be evaluated during the general rate case in which DEP requests cost recovery. However, to complete the rebuild and reconductoring at the same time leads to efficiencies that are apparent within the changes from the first revision of the affected system study to the second revision. For 1.97 miles of reconductoring alone, the cost was an estimated $10 million. Since DEP is rebuilding the line, the incremental cost represents the costs of higher capacity lines. The Public Staff believes that DEP should operate, maintain, and build the system in the most efficient manner possible. Completing this upgrade while this other work is happening takes advantage of cost efficiencies and would be the optimum path if this reconductoring occurs.

Q. HOW MUCH OF THE AFFECTED SYSTEMS UPGRADE COST WILL THE APPLICANT PAY?

A. At this time, the Applicant's portion of the affected system upgrade cost is unknown. While the Applicant is the lowest queued project in the AD1 cluster that triggers the relevant affected system upgrade, witness Robichaud states that Macadamia Solar LLC (Macadamia) is negotiating an Affected System Operating Agreement (ASOA) with DEP to fund the affected system upgrade without reimbursement from DEP ratepayers. Witness Robichaud goes on to state,

however, that Sumac may enter into a side agreement with Macadamia to fund a proportional share of costs incurred under the ASOA.

ADDITIONAL PUBLIC STAFF CONCERNS

Q. PLEASE DESCRIBE THE PUBLIC STAFF'S ADDITIONAL CONCERNS REGARDING THE SECOND SUPPLEMENTAL TESTIMONY OF WITNESS ROBICHAUD.

A. On pages 8 through 10 of her second supplemental testimony, witness Robichaud responded to the concerns that I raised in my supplemental testimony filed on November 16, 2020. Her second supplemental testimony and my replies are below:

> I would first note that Mr. Lawrence's concerns, however legitimate, relate to the overall volume of merchant plant development [over 5,000 MW] in the region (including in Virginia) and have little or nothing to do with the question of whether the proposed Sumac Solar facility is consistent with the public convenience and necessity. Although Mr. Lawrence raises important questions about the possible impacts of merchant plant development on DEP ratepayers, Sumac Solar does not trigger any Upgrade on PJM or DEP's system that will be reimbursed by North Carolina ratepayers. Mr. Lawrence's general concerns are therefore not applicable here.

My calculation of 5,000 MW in the PJM queue was only for North Carolina (any facilities in Virginia would be in addition to that value) and includes the Facility's capacity. It is also worth noting that the 5,000 MW calculation includes all projects that had an

interconnection request with a status of "Active" and does not include those in the "Engineering and Procurement," "In Service," "Partially in Service – Under Construction," or "Under Construction" phases. With those included, the value would have risen to more than 6,600 MW. If a merchant plant or group of merchant plants create undue costs or operational problems for consumers in North Carolina, then any or all of the plants may be inconsistent with the "public convenience and necessity."

Witness Robichaud also stated the following:

> I also believe that Mr. Lucas's concerns about DEP upgrades needing to be replaced are speculative. I have no reason to believe that DEP is planning upgrades that will soon need to be replaced, and there are several reasons to think that this will not occur in the foreseeable future. First, PJM's recently-announced queue reform proposal is likely to significantly reduce the number of projects in the PJM queue, by increasing readiness requirements and financial commitments for interconnection customers.

In 2017, DEP constructed affected system upgrades on the Rocky Mount-Battleboro line to accommodate PJM cluster AA2 at a cost of $711,805. DEP's planned upgrade of this line to accommodate PJM cluster AC1 will scrap most if not all of these upgrades, which should have lasted at least 40 years and not merely five years. DEP's customers paid for these upgrades. Additionally, PJM's queue reform has not reduced projects in North Carolina at this time. The planned generator capacity in PJM's North Carolina queue has

grown to 5,580 MW (as opposed to the 5,000 MW in my previous testimony), and over 7,800 MW as compared to the 6,600 MW above.

Moreover, witness Robichaud noted that:

> Second, even where new projects do cause impacts to DEP-[DENC] tie lines, interconnection solutions may be developed to avoid adding load those lines, like the n6618 network upgrade listed above. Rather than increase the capacity of the tie-line to handle flow, this upgrade is intended to direct flow away from the tie-line, reducing the likelihood that additional upgrades will be needed to accommodate additional generation on the system.

It is true that PJM can make transmission upgrades that reduce the need for DEP to make affected system upgrades. As evidenced by numerous affected system upgrades on the DEP system, the Commission and the Public Staff cannot be assured that PJM will construct this type of upgrade, if it is even possible, and cannot be assured that this type of upgrade will reduce affected system costs to a negligible level.

Finally, witness Robichaud stated in her testimony that:

> Third, the development of additional solar projects in DEP territory (which will likely be required to meet the decarbonization mandates of North Carolina H.B. 951) may result in additional power flows in DEP territory that will "push back" against flow from PJM, alleviating those tie-line constraints. In light of these factors I do not think it is reasonable to assume that additional merchant plant development in PJM's North Carolina

territory will necessarily result in unreasonable impacts on North Carolina ratepayers.

Power generation in DENC and DEP will never be perfectly balanced so that tie-lines will not be constrained. Generator outages, differing generator capacities, and differing cloud cover can create large imbalances. Furthermore, merchant plant development in PJM's North Carolina territory will soon result in unreasonable impacts on North Carolina ratepayers. DEP's current estimate for affected system upgrades to accommodate PJM cluster AC1 will cost its ratepayers $31 million. These upgrades will provide little, if any, benefit to those ratepayers.

RECOMMENDATIONS

Q. WHAT IS THE PUBLIC STAFF'S RECOMMENDATION ON SUMAC'S CPCN APPLICATION FOR THE FACILITY?

A. The Public Staff has reviewed the application, the testimony, and other evidence in the record and obtained through discovery. The Public Staff recommends that the Commission approve the Application,[2] subject to the following conditions:

[2] The Public Staff's recommendations in this testimony are based on the many factors unique to this proceeding and the circumstances surrounding the AD1 cluster. The recommendations herein should not be considered representative of the Public Staff's position in any other EMP proceeding.

1. The Applicant shall construct and operate the Facility in strict accordance with applicable laws and regulations, including any local zoning and environmental permitting requirements.

2. The CPCN shall be subject to Commission Rule R8-63(e) and all orders, rules and regulations as are now or may hereafter be lawfully made by the Commission.

3. The Applicant shall file with the Commission in this docket any significant revisions in the cost estimates for the construction of the Facility itself, interconnection facilities, network upgrades, or affected system upgrades, or any other significant change in costs, within 30 days of becoming aware of such revisions.

4. The Applicant shall file a copy of its Affected System Operating Agreement, if any, with the Commission at the same time such filing is made at the Federal Energy Regulatory Commission (at least 61 days prior to commencing construction on the upgrades).

5. The Applicant shall file with the Commission a copy of any agreement in which it is required to provide payment to fund all or a portion of any affected system upgrade.

6. If at any time the Applicant seeks reimbursement for any interconnection facilities, network upgrade costs, affected system costs, or other costs required to allow energization and operation of

the Facility, the Applicant shall notify the Commission no later than 60 days before seeking reimbursement.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes, it does.

APPENDIX A

QUALIFICATIONS AND EXPERIENCE

EVAN D. LAWRENCE

I graduated from East Carolina University in Greenville, North Carolina in May 2016, earning a Bachelor of Science degree in Engineering with a concentration in Electrical Engineering. I started my current position with the Public Staff in September 2016. Since that time, my duties and responsibilities have focused on reviewing renewable energy projects, rate design, renewable energy portfolio standards (REPS) compliance, and annual fuel rider proceedings. I have filed affidavits in Virginia Electric and Power Company, d/b/a Dominion Energy North Carolina's (DENC) 2017 and 2018 REPS cost recovery proceeding, testimony in DENC's 2021 fuel cost recovery proceeding, testimony in Duke Energy Progress, LLC's 2019 REPS cost recovery proceeding, an affidavit in Duke Energy Carolinas, LLC's (DEC) 2019 REPS cost recovery proceeding, testimony in DEC's 2022 fuel cost recovery proceeding, testimony in New River Light and Power's most recent rate case proceeding, testimony in Western Carolina University's most recent rate case proceeding, and testimony in multiple dockets for requests for certificates of public convenience and necessity.

Generator Interconnection Affected System Study Report

PJM Interconnection Cluster AD1

Revision 2

June 8, 2022
Duke Energy Progress
Transmission Department

PURPOSE

The purpose of this study was to determine under what conditions the DEP transmission system can accommodate PJM's interconnection cluster AD1. Cluster AD1 includes generation throughout the PJM interconnection, but only those with an impact on the DEP system were included in this study. The size and in-service dates of the projects vary. The following PJM queue requests are included in this analysis:

Queue #	MW	Interconnection Substation or Transmission Line
AD1-022	120	Cashie-Trowbridge 230 kV
AD1-056/057	94	Hornertown-Hathaway 230 kV
AD1-074/075/076	484	Trowbridge 230 kV

This Revision 2 follows the PJM retooling revisions of 12/2021 – 5/2022. The PJM retooling and this DEP report assume that reconductoring of the Rocky Mount – Battleboro 115kV line is the next upgrade to address overloading of this line. The schedule and funding of this reconductor project are not yet finalized.

The PJM 115kV reconfiguration project at Hathaway and Battleboro is confirmed as the next upgrade after the reconductor to address loading on the Rocky Mount – Battleboro 115kV line. The phase shifter option for the Rocky Mount – Battleboro 115kV line is removed from this report.

This report also considers the withdrawal of PJM queue # AD1-023.

ASSUMPTIONS

The following affected system study results are from a PJM power-flow model that reflects specific conditions of the system at points in time consistent with the generator interconnection requests being evaluated. The cases include the most recent information for load, generation additions, transmission additions, interchange, and other pertinent data necessary for analysis. Future years may include transmission, generation, and interchange modifications that are not budgeted for and for which no firm commitments have been made. Further, DEP retains the right to make modifications to power-flow cases as needed if additional information is available or if specific scenarios necessitate changes. For the systems surrounding the study area, data is based on the ERAG MMWG model. The suitability of the model for use by others is the sole responsibility of the user. Prior queued generator interconnection requests were considered in this analysis.

The results of this analysis are based on the Interconnection Customer's queue requests including generation equipment data provided. If the facilities' technical data or interconnection points to the transmission system change, the results of this analysis may need to be reevaluated.

RESULTS

Power Flow Analysis 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 0.92 pu and below, for the requested in-service year. 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.

Contingency analysis study results show that interconnection of these generation facilities result in the following thermal issues on the DEP system. Based on study results for 2021 summer, Table 1 shows thermal facility loadings:

Table 1: Power Flow Results

Overloaded Transmission Facility	Loading %	Contingency
Rocky Mount – Battleboro (DVP) 115kV line, 164 MVA	239.31	DVP_P7-1: LN 2058-2181: Rocky Mount-Hathaway (DVP) 230kV East and West lines Common Tower Outage
Greenville – Everetts (DVP) 230kV line, 478 MVA (DEP: 485 MVA)	118.77 (117.06)*	DVP_P7-1: LN 2058-2181: Rocky Mount-Hathaway (DVP) 230kV East and West lines Common Tower Outage

* DEP requires upgrades for loadings above 95%

Interconnection requests contributing to the overloaded facilities care shown in Table 2.

Table 2: Upgrades and Contributing Requests

Overloaded Transmission Facility	Contributing Requests	Upgrade Description	Upgrade Cost	Time to Complete (months)
Rocky Mount – Battleboro (DVP) 115kV line	AD1-022 AD1-056/057	Reconductor 8.54 miles	$31 M	30
Rocky Mount – Battleboro (DVP) 115kV line	AD1-022 AD1-056/057	PJM project to reconfigure 115kV lines	-	-
Greenville – Everetts (DVP) 230kV line	AD1-022 AD1-056/057 AD1-074/075/076	Rebuild 1.87 miles of aging double circuit 230kV towers, ISD 6/1/2027	$19 M*	36*
Greenville – Everetts (DVP) 230kV line	AD1-022 AD1-056/057 AD1-074/075/076	Reconductor 1.87 miles of one side of double circuit 230kV line plus terminal equipment	$0.35 M*	36*

* Transmission Planning or Class 5 estimates

The DEP portion of the Greenville-Everetts 230kV line (1.87 miles) is tentatively scheduled to be rebuilt by 6/1/2027 due to age and condition, but that in-service date is subject to change depending upon DEP's construction sequencing priorities for its transmission plan. Reconductoring the line to higher capacity can only be performed during or after the condition-based rebuild. If a generator developer would like an earlier or firm in-service date, the Interconnection Customer would be responsible for paying expediting costs of the rebuild, plus the larger conductor cost.

SUMMARY

This Generator Interconnection Affected System Study assessed the impact on the Duke Energy Progress system of new generation facilities interconnecting to the Dominion transmission system as part of the PJM AD1 cluster. Power flow analysis found overloading issues that must be mitigated. Required upgrades and assigned costs are listed below.

AD1-022 Assigned and Contingent Upgrades	**Assigned Cost**
Reconductor Rocky Mount-Battleboro 115kV line	$0
PJM project to reconfigure 115kV lines at Hathaway and Battleboro	-
Rebuild aging towers including Greenville-Everetts 230kV line	$0
Reconductor Greenville-Everetts 230kV line (DEP portion)	$350,000
Total for AD1-022	**$350,000**

AD1-056/057 Assigned and Contingent Upgrades	**Assigned Cost**
Reconductor Rocky Mount-Battleboro 115kV line	$0
PJM project to reconfigure 115kV lines at Hathaway and Battleboro	-
Rebuild aging towers including Greenville-Everetts 230kV line	$0
Reconductor Greenville-Everetts 230kV line (DEP portion)	$0
Total for AD1-056/057	**$0**

AD1-074/075/076 Assigned and Contingent Upgrades	**Assigned Cost**
Rebuild aging towers including Greenville-Everetts 230kV line	$0
Reconductor Greenville-Everetts 230kV line	$0
Total for AD1-074/075/076	**$0**

Study Completed by: William Quaintance
Bill Quaintance, PE, Duke Energy Progress

Reviewed by: Mark Byrd
Mark Byrd, PE, Duke Energy Progress