



**NORTH CAROLINA  
PUBLIC STAFF  
UTILITIES COMMISSION**

July 7, 2021

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

Re: Docket No. EMP-102, Sub 1 – CPCN for 150MW Solar Located East  
of NC 11 South and North of NC 30 in the Town of Bethel NC Pitt  
County

Dear Ms. Campbell:

Attached for filing in the above-referenced docket is the supplemental  
testimony of Dustin R. Metz, Utilities Engineer, Electric Section, Energy Division.

By copy of this letter, I am forwarding a copy to all parties of record by  
electronic delivery.

Sincerely,

Electronically submitted  
s/ Gina C. Holt  
Staff Attorney  
[gina.holt@psncuc.nc.gov](mailto:gina.holt@psncuc.nc.gov)

Attachment

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BEFORE THE NORTH CAROLINA UTILITIES COMMISSION

DOCKET NO. EMP-102, SUB 1

In the Matter of  
Application of Pitt Solar, LLC, for a )  
Certificate of Public Convenience and )  
Necessity to Construct a 150-MW Solar )  
Facility in Pitt County, North Carolina ) PUBLIC STAFF – NORTH  
) CAROLINA UTILITIES  
) COMMISSION

**BEFORE THE NORTH CAROLINA UTILITIES COMMISSION  
DOCKET NO. EMP-102, SUB 1**

**SUPPLEMENTAL TESTIMONY OF DUSTIN R. METZ**

**On Behalf of the Public Staff**

**North Carolina Utilities Commission**

**July 7, 2021**

1 **Q. PLEASE STATE YOUR NAME AND ADDRESS FOR THE**  
2 **RECORD.**

3 A. My name is Dustin R. Metz. My business address is 430 North  
4 Salisbury Street, Raleigh, North Carolina.

5 **Q. BRIEFLY STATE YOUR QUALIFICATIONS AND DUTIES.**

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

7 **Q. WHAT IS YOUR POSITION WITH THE PUBLIC STAFF?**

8 A. I am an engineer in the Electric Section – Operations and Planning  
9 in the Public Staff’s Energy Division.

10 **Q. HAVE YOU PREVIOUSLY FILED TESTIMONY IN THIS DOCKET?**

11 A. Yes. I filed my initial testimony in this docket on November 12, 2020.

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

3 A. The primary purpose of my supplemental testimony is to respond to  
4 the Commission's May 7, 2021, Order in this docket regarding the  
5 application for a certificate of public convenience and necessity  
6 (CPCN) (Application) for a solar facility filed by Pitt Solar, LLC (Pitt  
7 Solar or Applicant). The Commission requested both the Applicant  
8 and the Public Staff to file additional testimony to address the  
9 Commission's issues and questions contained in the Order.  
10 On June 1, 2021, the Applicant's witness, Linda Nwadike, filed  
11 second supplemental testimony in response to the Order.

12 **Q. PLEASE DESCRIBE THE PITT SOLAR FACILITY.**

13 A. The application in this docket for the Pitt Solar facility (Facility) is the  
14 result of the Applicant merging two solar projects, the first being an 80  
15 MW<sub>AC</sub> facility which was a part of the Applicant's original CPCN  
16 application filed in Docket No. EMP-102, Sub 0, and the second being  
17 an additional 70 MW<sub>AC</sub> facility, bringing the project total to 150 MW<sub>AC</sub>.  
18 PJM assigned the original 80 MW<sub>AC</sub> project queue number AC1-189,  
19 and assigned the 70 MW<sub>AC</sub> project queue number AF2-080.

1 **I. PUBLIC STAFF’S RECOMMENDED CONDITIONS**

2 **Q. DO YOU BELIEVE THAT ANY OF THE CONDITIONS PROPOSED**  
3 **IN YOUR NOVEMBER 12, 2020 TESTIMONY ARE NO LONGER**  
4 **NECESSARY?**

5 A. No, I believe that the conditions proposed in my original testimony  
6 remain valid and are in the best interest of ratepayers given the  
7 current amount of interconnections, both operating and in various  
8 stages of development, in PJM’s North Carolina territory. Without the  
9 conditions proposed in my original testimony, North Carolina electric  
10 customers would have no immediate protection against the  
11 uncertainty of system impacts. The wide range of uncertainty and  
12 risk associated with unknown system impacts could affect reliability,  
13 costs, and who is ultimately responsible for paying for those costs for  
14 safe operation of the generation Facility. A purpose of the electric  
15 grid is to provide reliable and economic electric service to customers  
16 who have paid for it.

17 **Q. DO YOU PROPOSE ANY ALTERNATIVE SOLUTIONS TO**  
18 **COMPLEMENT YOUR RECOMMENDED CONDITIONS?**

19 A. Yes. I recommend that the Commission hold the entire application in  
20 abeyance for two reasons:

21 First, because it is uncertain at this time whether the affected system  
22 upgrades will be paid for by the cost causer (the Applicant) or the

1 affected system utility's electric customers. The cost responsibility is  
2 the subject of an open proceeding at the Federal Energy Regulatory  
3 Commission (FERC) as I describe later in this testimony.

4 Second, network upgrades and affected system upgrades for the  
5 second 70 MW<sub>AC</sub> phase of the Facility associated with the AF2  
6 cluster are unknown. As discussed below, the Public Staff has  
7 recommended numerous EMP CPCN applications for approval  
8 subject to conditions and certain cost estimates. At this time, the  
9 Public Staff believes it is reasonable for the Commission to require  
10 EMP applicants to provide the total network upgrades, including a  
11 completed affected system study, when applicable, before it makes  
12 a decision to grant a CPCN. The total network upgrades should be  
13 studied, and their costs estimated, prior to considering the  
14 application. Those study costs may subsequently be revised or may  
15 not be known with certainty until construction is complete;  
16 nevertheless, it is premature to evaluate and issue a CPCN, even  
17 subject to conditions, before total network upgrade costs and  
18 affected system study costs for the project's particular PJM cluster  
19 are available.

1 **II. RESPONSES TO THE ISSUES IDENTIFIED IN THE**  
2 **COMMISSION'S ORDER ISSUED ON MAY 7, 2021.**

3 **Q. PLEASE RESPOND TO THE COMMISSION'S ISSUE NUMBER 1**  
4 **REGARDING THE FILING OF THE FACILITY'S**  
5 **INTERCONNECTION STUDIES AND AFFECTED SYSTEM**  
6 **STUDIES.**

7 A. The Public Staff does not take issue with the studies provided by the  
8 Applicant in its June 1, 2021 filing, including witness Nwadike's  
9 explanations of studies that are not in the Applicant's possession.

10 **Q. PLEASE RESPOND TO THE COMMISSION'S ISSUE NUMBER 2**  
11 **REGARDING THE COSTS OF INTERCONNECTION FACILITIES,**  
12 **NETWORK UPGRADES, AND AFFECTED SYSTEM UPGRADES.**

13 A. Merchant power plants have the potential to cause network upgrades  
14 to both the interconnected transmission owner and an adjacent  
15 affected system owner. In this case, Duke Energy Progress, LLC  
16 (DEP), is the affected system owner. The affected system upgrades  
17 and their associated costs identified in the PJM studies for the  
18 Facility are only for the vicinity of the tie point (connection) between  
19 PJM and DEP and do not necessarily reflect other upgrades that may  
20 be required further away on DEP's transmission system as a result  
21 of the interconnection.

1           Regarding the Applicant's Facility, DEP initially estimated that the  
2           affected system costs for PJM Cluster AC1, consisting of the 80  
3           MW<sub>AC</sub> portion of this Application, and other solar facilities in PJM  
4           cluster AC1, would total \$15,000,000; however, the estimate was  
5           later revised to \$23,204,593. The estimated cost has continued to  
6           increase and is currently \$31,285,275, according to the second  
7           supplemental testimony of witness Nwadike. This updated estimate  
8           may still increase or decrease. It is my understanding that the most  
9           recent estimated construction costs provided by DEP are a Class IV  
10          estimate,<sup>1</sup> and are preliminary.

11          DEP has not completed an affected system study or cost estimate  
12          for PJM cluster AF2, which includes the 70 MW<sub>AC</sub> portion of the  
13          Facility. Future PJM clusters like PJM Cluster AF2, which PJM and  
14          DEP have not yet studied or may be subject to revision (changes in  
15          underlying assumptions in the power flow analysis), will likely create  
16          additional affected system costs for DEP. The total transmission cost  
17          impacts of a new generator are unknown until the affected system  
18          completes its own analysis, regardless of who ultimately bears cost  
19          responsibility.

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<sup>1</sup> "Class 4 estimates are generally prepared based on limited information and subsequently have wide accuracy ranges. They are typically used for project screening, determination of feasibility, concept evaluation, and preliminary budget approval".  
[https://www.costengineering.eu/Downloads/articles/AACE\\_CLASSIFICATION\\_SYSTEM.pdf](https://www.costengineering.eu/Downloads/articles/AACE_CLASSIFICATION_SYSTEM.pdf) (p. 5)



1 In addition, PJM is currently revising its study process for the AC2  
2 cluster,<sup>2</sup> and the extent of this revision and the resulting impacts on  
3 affected systems in the region are unknown at this time. PJM's  
4 revision to the studies for the AC2 cluster demonstrates that the  
5 accuracy of the impacts and costs identified in PJM's initial system  
6 impact studies are uncertain at the time that the Public Staff reviews  
7 initial CPCN applications. Additionally, DEP's commitment to the  
8 cost estimates in its affected system study reports is limited. The  
9 affected system study report for PJM cluster AC1 contains the  
10 following statement as it pertains to DEP (the affected system):

11 Further, DEP retains the right to make modifications to  
12 power-flow cases as needed if additional information is  
13 available or if specific scenarios necessitate changes.

14 Ms. Nwadike on page 4 of her second supplemental testimony  
15 explains the uncertainty:

16 The Applicant anticipates that forecasts of projected  
17 future costs will change over time. With regards to  
18 PJM's estimates of its network costs, and the  
19 *responsibilities for those costs* [emphasis added], the  
20 estimates may change due to decisions related to other  
21 proposed projects included in earlier study queues on  
22 whether to move forward or to withdraw from the  
23 queue. Indeed, all costs identified in the PJM and Duke  
24 studies are estimated *costs that may change*  
25 [emphasis added] throughout the engineering and  
26 construction phases...of the total proposed 150MW  
27 Facility.

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<sup>2</sup> The applicants in Docket Nos. EMP-110 and EMP-111 have requested and been granted a stay of proceedings, stating in their Motion for Stay filed on May 27, 2021 that "PJM is currently in the process of re-tooling the system impact studies for projects in the AC2 cluster to account for changes in the interconnection queue. . ." (Motion for Stay at p. 5).

1 **Q. PLEASE EXPLAIN WHY AFFECTED SYSTEM COSTS CONCERN**  
2 **YOU.**

3 A. In my direct testimony, I stated that solar developers have proposed  
4 approximately 6.6 gigawatts of solar capacity for interconnection in  
5 PJM's North Carolina territory. The unknown affected system  
6 upgrades resulting from the amount of capacity and energy seeking  
7 to interconnect, combined with the potential for DEP's system  
8 impacts and costs creates risks to DEP ratepayers. Energy and  
9 capacity produced in PJM does not serve system needs in DEP but  
10 can negatively impact power flows on the DEP transmission system.

11 While PJM upgrade costs are typically allocated among the projects  
12 and clusters, DEP assigns affected system costs to the first project  
13 to trigger those upgrades, with no allocation to subsequent projects.  
14 If planned projects withdraw from a PJM cluster, costs could shift to  
15 another project. If the system impacts or cost recovery significantly  
16 changes for the Facility after the Commission has issued a CPCN,  
17 the Public Staff believes that it would be appropriate to re-evaluate  
18 the Facility and determine if it is still in the public interest.

19 **Q. PLEASE RESPOND TO THE COMMISSION'S ISSUE NUMBER 3**  
20 **REGARDING THE LEVELIZED COST OF TRANSMISSION**  
21 **(LCOT).**

22 A. I have reviewed the Applicant's confidential LCOT calculations in  
23 Exhibit 2 of the second supplemental testimony of witness Nwadike.

1 Witness Nwadike's methodology for calculating the LCOT is  
2 generally consistent with the methodology utilized by the Public  
3 Staff.<sup>3</sup> However, the affected system upgrade costs created by  
4 PJM's AF2 cluster are unknown, and, thus, the LCOT for the second  
5 phase 70 MW<sub>AC</sub> portion of the Facility cannot be calculated at this  
6 time. I believe that interconnection cost estimates for any project  
7 within the AF2 cluster are too speculative at this time; therefore, any  
8 current LCOT calculation for projects in the AF2 cluster is of no value  
9 in providing the Commission with a level of certainty or a benchmark  
10 of reasonableness in evaluating the costs of the Facility or potential  
11 impact to ratepayers.

12 **Q. DO YOU HAVE ANY ADJUSTMENTS TO THE APPLICANT'S**  
13 **LCOT CALCULATIONS?**

14 A. The LCOT calculation has five inputs: 1) the expected transmission  
15 upgrade costs, 2) the nameplate capacity, 3) the discount rate (rate  
16 of return required without inflation), 4) the capacity factor, and 5) the  
17 transmission asset life. Any change to one input can significantly  
18 impact the LCOT calculation.

19 In her supplemental testimony, Witness Nwadike provides a single  
20 LCOT calculation. However, I calculated a reasonable upper and

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<sup>3</sup> Public Staff Joint Testimony of Lawrence and Metz, EMP-105, Sub 0, Exhibit 2. LBNL Study, "Improving estimates of transmission capital cost for utility-scale wind and solar projects to inform renewable energy policy".

1 lower bound to test the sensitivity of witness Nwadike's LCOT  
 2 methodology to realistic alternative inputs. I developed potential  
 3 outcomes that adjust the LCOT for the AC1-189, 80 MW<sub>AC</sub> first phase  
 4 of the Facility, and the total Facility, which includes the first phase  
 5 and second phase, AF2-080, for 150 MW<sub>AC</sub>. The results are provided  
 6 in Table 1 below. Each row of Table 1 starts with the Applicant's as-  
 7 filed information and adjusts discrete categories based on the  
 8 description.

Table 1: LCOT Sensitivity		
	AC1-189 (\$/MWh)	AC1-189 & AF2-080 (\$/MWh)
As Filed by Applicant	\$1.94	\$3.36
Include a 1% Decrease in Annual Capacity Factor	\$2.01	<b>N/A</b>
Include a 15% Increase in Total Network Upgrades <sup>4</sup> and 1% Decrease in Annual Capacity Factor	\$2.31	<b>N/A</b>
Include AC1 Affected System Cost <sup>5 6</sup>	\$9.25	\$7.26

<sup>4</sup> Total Network Upgrades is the sum of both Network Upgrades and any Affected System Upgrades.

<sup>5</sup> This sensitivity assumes that the prior project, American Beech, EMP-108, Sub 0, which was assigned the Affected System costs, is not built and the Applicant is assigned the affected system costs. DEP's methodology assigns Affected System costs to the first project in a PJM cluster that triggers the costs. Should American Beech withdraw at any time prior to commercial operation, later projects could be exposed to the affected system upgrade costs currently assigned to American Beech.

<sup>6</sup> The AC1 Affected System Costs are a Duke Energy Class IV estimate. At this time, I did not assume a high or low range of the estimate in the overall calculation. AACE practices consider a Class IV estimate to have an expected accuracy range of -30% to +50%, and a 1% to 15% level of project definition complete at the time of the estimate. A Class IV

1 **Q. PLEASE DISCUSS YOUR FINDINGS FROM TABLE 1.**

2 A. Evaluating just the AC1-189 portion of the Facility and utilizing the  
3 Applicant's expected PJM network upgrades (~\$8.2M), the AC1-189  
4 portion of the Facility appears reasonable, given the facts and  
5 circumstances of this particular application. Table 1 shows the  
6 potential for increased affected system costs. Realistic alternative  
7 inputs for the LCOT that are applied to either the AC1-189 or the  
8 combined Facility (AC1-189 and AF2-080), greatly change the  
9 outcome of the LCOT calculation. Applying the AC1 affected system  
10 costs to either portion of this project significantly increases the overall  
11 LCOT, as shown in the last row in Table 1 above. The magnitude of  
12 this potential increase creates concern for the Public Staff. I did not  
13 complete a sensitivity for the combined Facility (AC1-189 and AF2-  
14 080), because as discussed above, the total network upgrades are  
15 unknown.

16 **Q. PLEASE PROVIDE AN EXAMPLE OF WHY AN LCOT COULD**  
17 **CHANGE IN THE FUTURE.**

18 A. A brief example of potential changes is in witness Nwadike's second  
19 supplemental testimony, Exhibit 1, Section 11.6, System  
20 Reinforcements. This section of her Exhibit 1 lists the project impact  
21 and dependencies of multiple projects spanning multiple PJM

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estimate adds more uncertainty to the total cost impacts evaluated in the early stages of the Application review.

1 clusters. The other embedded notes contained in witness Nwadike's  
2 Exhibit 1 demonstrate that the interconnection queue may change,  
3 and the cost or cost allocation to the AF2-080 portion of the Facility  
4 may change as well. Notes on pages 6 and 24 also state, "[p]lease  
5 be aware that as changes to the interconnection process occur, such  
6 as prior queued projects withdrawing from the queue, reducing in  
7 size, etc., the cost responsibilities can change and a cost allocation  
8 may be assigned to your project."

9 **Q. PLEASE RESPOND TO THE COMMISSION'S ISSUE NUMBER 4**  
10 **REGARDING REVOCATION OF THE CPCN IF THE APPLICANT**  
11 **SEEKS REIMBURSEMENT OF COSTS.**

12 A. In my initial testimony filed on November 12, 2020, I recommended  
13 that the Commission grant the CPCN with the condition that the  
14 Commission revoke or deny the CPCN if the Applicant seeks  
15 reimbursement for interconnection facility costs, network upgrade  
16 costs, affected system costs, or other related costs.<sup>7</sup> In its Verified  
17 Motion to Admit Testimony and Exhibits Without Cross and to Cancel  
18 Hearing, filed on December 16, 2020, the Applicant agreed to the  
19 Public Staff's conditions.

20 On page 6, lines 3-4 of witness Nwadike's second supplemental  
21 testimony filed on June 1, 2021, she states that, "[t]he Applicant

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<sup>7</sup> Testimony of Dustin Metz, Docket No. EMP-102, Sub 1, p.18 lines 4-8.

1 presently does not anticipate seeking reimbursement for these  
2 costs". However, she states:

3 That said, due to financing and operational  
4 considerations, the Applicant cannot consent to the  
5 issuance of a CPCN that is expressly made subject to  
6 revocation based on future policy decisions made by  
7 others over whom the Applicant has no control, such  
8 as other project developers, this Commission, or the  
9 Federal Energy Regulatory Commission (the "FERC").  
10 *Id.* at lines 5-9.

11 Witness Nwadike further states that the Facility cannot be financed  
12 if the CPCN is subject to revocation. *Id.* at lines 12-15.

13 **Q. HAVE THERE BEEN OTHER RECENT DEVELOPMENTS, WHICH**  
14 **HAVE ALSO AFFECTED THE PUBLIC STAFF'S**  
15 **CONSIDERATION OF EMP APPLICATIONS?**

16 A. Yes. On October 1, 2020, Duke revised its Affected System  
17 Operating Agreement (ASOA) template to assign the costs of  
18 affected system network upgrades directly to the interconnection  
19 customer, eliminating its prior policy of repayment to the  
20 interconnection customer for the affected system costs.<sup>8</sup>

21 In response to Duke's revisions to its ASOA, on May 12, 2021,  
22 Edgecombe Solar LLC (Edgecombe) filed a complaint (Edgecombe  
23 Solar Complaint) at FERC appealing Duke's Affected Systems

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<sup>8</sup> See Docket No. E-100, Sub 170, Duke Energy Initial Comments filed on October 7, 2020, at 4 (Section 6.1 of the "Affected System Operating Agreement template" for Duke Companies (DEP, Duke Energy Carolinas, and Duke Energy Florida) effective October 1, 2020, states "The Affected System Network Upgrades shall be solely funded by Customer.").

1 Business Procedures and revised ASOA, arguing that they are  
2 inconsistent with the utility's Open Access Transmission Tariff  
3 (OATT).<sup>9</sup>

4 In response to the Edgecombe Solar Complaint, on June 25, 2021,  
5 in Docket No. EMP-108, Sub 0, American Beech Solar filed a motion  
6 to stay its proceeding until FERC issues an order resolving the issues  
7 raised in the Edgecombe Solar Complaint. It is important to note that  
8 American Beech Solar agreed to the same Public Staff conditions to  
9 issuance of its CPCN that the Public Staff has recommended for Pitt  
10 Solar. Additionally, the Facility is contingent on system upgrades  
11 from American Beech Solar. Pending the outcome of FERC's  
12 decision on the Edgecombe Complaint, it is uncertain whether the  
13 conditions already agreed to by EMP CPCN applicants will be  
14 enforceable.

15 **Q. PLEASE RESPOND TO THE COMMISSION'S ISSUE NUMBER 5**  
16 **REGARDING FURTHER REVIEW OF COST CHANGES.**

17 A. In my direct testimony, I recommended that the Commission issue  
18 the CPCN subject to a condition requiring the Applicant to file any  
19 changes to the costs of the Facility within 30 days of becoming aware  
20 of the changes. That recommendation is still appropriate, and the

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<sup>9</sup> *Edgecombe Solar Energy LLC v. Duke Energy Progress, LLC, Duke Energy Carolinas, LLC, and Duke Energy Florida, LLC*, FERC Docket No. EL21-73-000. Edgecombe received a CPCN to construct a 75-MW solar facility in Edgecombe County, North Carolina in Docket No. EMP-101, Sub 0 by Commission Order dated November 13, 2020. The Public Staff is monitoring the status of the Edgecombe Solar Complaint at FERC.



1 Public Staff believes it should continue to be a condition for all  
2 CPCNs with network upgrade costs. The recommendation is  
3 appropriate whether there are changes in estimated costs, project  
4 size (reduction in nameplate output), the utility's current OATT, or to  
5 the ASOA template that may result from the outcome of the  
6 Edgecombe Solar Complaint at FERC.

7 I further recommended in my direct testimony that the Commission  
8 deny or revoke the CPCN if the Applicant seeks reimbursement for  
9 interconnection costs, network upgrade costs, or affected system  
10 upgrade costs. In this instance, the Facility is in PJM territory, and  
11 the Applicant could seek reimbursement for affected system costs if  
12 Edgecombe prevails in its complaint at FERC. This reimbursement  
13 would ultimately be borne by DEP's ratepayers.

14 **III. CONCLUSIONS AND RECOMMENDATIONS**

15 **Q. WHAT ARE THE PUBLIC STAFF'S CONCLUSIONS AND**  
16 **RECOMMENDATIONS?**

17 A. If DEP's policy of assigning affected system costs to the Applicant is  
18 upheld at FERC, there is no risk that ratepayers will pay network  
19 upgrade costs, and the Commission should issue a CPCN to Pitt  
20 Solar. If Edgecombe prevails at FERC and the Applicant is eligible  
21 for reimbursement of affected system costs, the Public Staff  
22 recommends that the Commission require the Applicant to file

1 separate applications for each phase of the Facility and provide a  
2 separate analysis, including a LCOT for each phase.<sup>10</sup>

3 In addition, I request that the Commission consider my  
4 recommendations when evaluating other pending EMP applications.

5 These recommendations should aid the Commission in determining  
6 if each project/application is consistent with the provision of reliable,  
7 efficient and economical service in the state pursuant to N.C.G.S. §  
8 62-110.1(d).

9 The Public Staff recommends that the Commission stay the  
10 proceedings in this docket pending the outcome of the Edgecombe  
11 Solar Complaint. In the event Edgecombe prevails, the Public Staff  
12 recommends that the Commission only proceed to consider the  
13 current Application after PJM completes the AF2-080 system impact  
14 study, DEP completes the AF2 affected system study, and the  
15 magnitude of the impacts have been reviewed by the Public Staff.

16 **Q. DOES THIS COMPLETE YOUR TESTIMONY?**

17 A. Yes.

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<sup>10</sup> For EMP-102, Sub 1, the Public Staff recommends separate applications for each PJM Clustered project if the Edgecombe Complaint at FERC is resolved prior to the PJM AF2 affected system study completion by DEP.

**QUALIFICATIONS AND EXPERIENCE**

DUSTIN R. METZ

Through the Commonwealth of Virginia Board of Contractors, I hold a current Tradesman License certification of Journeyman and Master within the electrical trade, awarded in 2008 and 2009 respectively. I graduated from Central Virginia Community College, receiving Associates of Applied Science degrees in Electronics and Electrical Technology (Magna Cum Laude) in 2011 and 2012 respectively, and an Associates of Arts in Science in General Studies (Cum Laude) in 2013. I graduated from Old Dominion University in 2014, earning a Bachelor of Science degree in Engineering Technology with a major in Electrical Engineering and a minor in Engineering Management. I completed engineering graduate course work in 2019 and 2020 from North Carolina State University.

I have over 12 years of combined experience in engineering, electromechanical system design, troubleshooting, repair, installation, commissioning of electrical and electronic control systems in industrial and commercial nuclear facilities, project planning and management, and general construction experience, including six years with direct employment with Framatome, where I provided onsite technical support, craft oversight, engineer change packages and participated in root cause analysis teams at commercial nuclear power plants, including plants owned by both Duke and Dominion.

I joined the Public Staff in the fall of 2015. Since that time, I have worked on electric and natural gas general rate cases, fuel cases, natural gas annual reviews, applications for certificates of public convenience and necessity, service and power quality, customer complaints, North American Electric Reliability Corporation (NERC) Reliability Standards, nuclear decommissioning, National Electric Safety Code (NESC) Subcommittee 3 (Electric Supply Stations) member, avoided costs and PURPA, interconnection procedures and power plant performance evaluations; I have also participated in multiple technical working groups and been involved in other aspects of utility regulation.