



**NORTH CAROLINA
PUBLIC STAFF
UTILITIES COMMISSION**

July 22, 2020

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

Re: Docket No. EMP-108, Sub 0 – Application for a Certificate of Public Convenience and Necessity for a 110-MW Solar Facility in Halifax County, North Carolina

Dear Ms. Campbell:

In connection with the above-referenced docket, we transmit herewith for filing on behalf of the Public Staff the supplemental testimony and exhibit of Jay B. Lucas, Utilities Engineer, Electric Division.

By copy of this letter, we are forwarding a copy of the redacted version to all parties of record by electronic delivery. The confidential version will be provided to those parties that have entered into a confidentiality agreement.

Sincerely,

/s/ Nadia L. Luhr
Staff Attorney
nadia.luhr@psncuc.nc.gov

NL/cla

Attachment

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Jul 22 2020

BEFORE THE NORTH CAROLINA UTILITIES COMMISSION

DOCKET NO. EMP-108, SUB 0

In the Matter of)	
Application of American Beech Solar)	SUPPLEMENTAL
LLC for a Certificate of Public)	TESTIMONY OF
Convenience and Necessity to)	JAY B. LUCAS
Construct a 110-MW Solar Facility in)	PUBLIC STAFF – NORTH
Halifax County, North Carolina)	CAROLINA UTILITIES
)	COMMISSION

BEFORE THE NORTH CAROLINA UTILITIES COMMISSION

DOCKET NO. EMP-108, SUB 0

Supplemental Testimony of Jay B. Lucas

On Behalf of the Public Staff

North Carolina Utilities Commission

July 22, 2020

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

3 A. My name is Jay B. Lucas. My business address is 430 North
4 Salisbury Street, Raleigh, North Carolina.

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

6 A. I am an engineer in the Electric Division of the Public Staff
7 representing the using and consuming public.

8 **Q. WOULD YOU BRIEFLY DISCUSS YOUR EDUCATION AND**
9 **EXPERIENCE?**

10 A. Yes. My education and experience are outlined in Appendix A of my
11 supplemental testimony.

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

3 A. The purpose of my supplemental testimony is to make further
4 recommendations to the Commission on the request for a certificate
5 of public convenience and necessity (CPCN) filed by American
6 Beech Solar LLC (Applicant), to construct a 110-megawatt AC
7 (MW_{AC}) solar photovoltaic (PV) electric generating facility near
8 Scotland Neck in Halifax County, North Carolina (the Facility).

9 Specifically, my supplemental testimony responds to the
10 Commission's Order Requiring Additional Testimony (Order) issued
11 on June 22, 2020, and the supplemental testimony of the Applicant's
12 witness, Whitney Rubin, filed on July 9, 2020.

13 **Q. PLEASE PROVIDE A BRIEF HISTORY OF THE APPLICATION.**

14 A. The Applicant applied for a CPCN on January 28, 2020, and included
15 with its application the direct testimony of its witness, Whitney Rubin.
16 The Facility will be constructed as Phase I, 80 MW, and Phase II, 30
17 MW. However, both phases will share the same point of
18 interconnection on the Scotland Neck – South Justice 115 kilovolt
19 (kV) transmission line owned by Dominion Energy North Carolina
20 (DENC). Since DENC is part of PJM Interconnection (PJM), the
21 Applicant is required to enter into an interconnection service

1 agreement with both entities. On April 15, 2020, I filed direct
2 testimony recommending that the Commission approve the
3 application subject to certain conditions.

4 Because of the increase in the number of merchant plant
5 applications, the Commission issued its June 22, 2020 Order
6 requiring that the Applicant and the Public Staff file additional
7 testimony on the following items:

8 1. Provide the Levelized Cost of Transmission (LCOT)
9 information for any required transmission system upgrades or
10 modifications.

11 2. Provide any interconnection study received for the proposed
12 facility. If you have not received a study, provide a date by when the
13 study is expected to be completed.

14 3. Are you aware of any system other than the studied system
15 that is or will be affected by the interconnection? If yes, explain the
16 impact and basis.

17 4. If the Applicant proposes to sell energy and capacity from the
18 facility to a distribution utility regulated by the Commission, provide a
19 discussion of how the facility's output conforms to or varies from the
20 regulated utility's most recent IRP.

1 5. If the Applicant proposes to sell energy and capacity from the
2 facility to a distribution utility not regulated by the Commission but
3 serving retail customers in North Carolina (e.g., a co-op or muni),
4 provide a discussion of how the facility's output conforms to or varies
5 from the purchasing distribution utility's long-range resource plan.

6 6. If the Applicant proposes to sell energy and capacity from the
7 facility to a purchaser who is subject to a statutory or regulatory
8 mandate with respect to its energy sourcing (e.g., a REPS
9 requirement or Virginia's new statutory mandate for renewables),
10 explain how, if at all, the facility will assist or enable compliance with
11 that mandate. Provide any contracts that support that compliance.

12 7. Provide any PPA agreements, REC sale contracts, or
13 contracts for compensation for environmental attributes for the
14 output of the facility.

15 On July 9, 2020, the Applicant filed the supplemental testimony of its
16 witness, Whitney Rubin, addressing the items in the Order.

17 **Q. HAVE YOU REVIEWED THE SUPPLEMENTAL TESTIMONY AND**
18 **EXHIBITS FILED BY WITNESS RUBIN?**

19 A. Yes. I have reviewed the supplemental testimony and exhibits of
20 witness Rubin. The exhibits are identified as her Attachments A
21 through K. I believe her response to the Commission's order is

1 largely complete, but I believe some areas of interest need further
2 explanation.

3 **Q. PLEASE SUMMARIZE WITNESS RUBIN'S SUPPLEMENTAL**
4 **TESTIMONY.**

5 A. Witness Rubin provided additional testimony and exhibits regarding
6 interconnection of the Facility and addressing the questions in the
7 Order. Her Attachments A through G are PJM interconnection
8 studies. PJM assigned queue number AC1-098/099 to Phase I of the
9 Facility and queue number AC2-083/084 to Phase II. The prefix for
10 these queue numbers, "AC1" and "AC2," indicate which cluster study
11 the projects are a part of. Cluster studies group multiple projects
12 together so they can be studied collectively by the interconnecting
13 utility. A cluster study has the potential for projects to be studied more
14 quickly and to be interconnected with lower total costs than if they
15 had been studied separately. Projects that jointly trigger Network
16 Upgrades can be assigned a portion of the cost based upon their
17 contribution to the need for the upgrades.

18 Attachment H is the PJM Interconnection Service Agreement that
19 provides an estimated upgrade cost of **[BEGIN CONFIDENTIAL]**
20 **[REDACTED] [END CONFIDENTIAL]** for Phase I, 80 MW. Witness
21 Rubin stated that the upgrade costs for Phase I will not be paid for
22 by ratepayers. Attachment I contains the Applicant's calculations for

1 the Levelized Cost of Transmission (LCOT) of **[BEGIN**
2 **CONFIDENTIAL]** [REDACTED] **[END CONFIDENTIAL]** per MWh for Phase
3 I. However, the interconnection services agreement (ISA) for Phase
4 II may not be available until November 2020, and witness Rubin has
5 not stated whether costs for Phase II will be paid for by rate payers.
6 She indicated that the Applicant does not anticipate significant costs
7 for Phase II that are above the costs for Phase I. The final upgrade
8 cost estimate will be provided in the ISA for Phase II.

9 The Facility will also affect transmission owned by Duke Energy
10 Progress, LLC (DEP). In December 2016, DEP completed an
11 affected system study report (Rubin Attachment J) in which it found
12 that solar projects in PJM's AB2 cluster could affect DEP's Rocky
13 Mount – Battleboro 115 kV line. DEP's estimated cost for Network
14 Upgrades caused by the AB2 cluster is \$15,000,000. In May 2020,
15 DEP completed another affected system study report (Rubin
16 Attachment K) in which it found that the Facility and four others in
17 PJM's cluster study AC1 could also affect the Rocky Mount –
18 Battleboro line. DEP's estimated cost for Network Upgrades caused
19 by the AC1 cluster is \$23,204,593.

20 **Q. WHAT IS THE PUBLIC STAFF'S OPINION ON THE**
21 **SUPPLEMENTAL TESTIMONY OF WITNESS RUBIN?**

1 A. Witness Rubin is clear that Network Upgrades in DENC territory that
2 are necessary to interconnect Phase I of the facility will not be paid
3 for by rate payers. However, she has not clearly indicated to what
4 extent DEP upgrades would be paid for by ratepayers. Her first full
5 sentence beginning on page 7, line 136, states, "If the upgrade were
6 constructed, responsibility for the upgrade would be allocated among
7 the projects in the AC1 cluster, and possibly additional projects in the
8 AC2 and/or subsequent clusters." She then states, "The Applicant is
9 un[a]ware of whether and to what extent the costs of such an
10 upgrade would be borne by transmission customers or by ratepayers
11 of DEP and/or PJM."

12 In May 2020, the Public Staff learned of potential upgrades to DEP's
13 portion of the Rocky Mount – Battleboro line that will be caused by
14 the solar projects in PJM cluster study AC1. The Public Staff was
15 informed by DEP that the estimated \$23,204,593 in Network
16 Upgrades will be paid for by DEP customers. On June 11, 2020, the
17 Commission issued a CPCN for the Halifax County Solar, LLC
18 facility, Docket No. EMP-107, Sub 0, which is also part of AC1.
19 However, on July 13, 2020, the Public Staff filed a motion for
20 reconsideration based on the information regarding the Network
21 Upgrade costs identified by DEP, which was not part of the record
22 when the CPCN was issued.

1 The Applicant in the present docket did not perform LCOT
2 calculations for DEP's estimate of \$23,204,593. However, I
3 calculated an LCOT of \$0.90 per MWh for the combined five projects
4 in the original AC1 queue in Rubin Attachment K and an LCOT of
5 \$5.58 if the Facility proceeds with no other projects being constructed
6 that affect the Rocky Mount – Battleboro transmission line. My
7 calculations for these two LCOTs are shown in **Lucas Exhibit 1**.

8 **Q. HAVE YOU COMPARED YOUR LCOT CALCULATIONS TO ANY**
9 **OTHERS?**

10 A. Yes. I have reviewed a 2019 Lawrence Berkeley National Laboratory
11 interconnection cost study (LBNL Study) to place the LCOT
12 calculations in perspective with data from other balancing authorities.
13 The LBNL Study compiled Network Upgrade costs associated with
14 303 generation projects reported in MISO's interconnection queue
15 as of 2019,¹ amounting to 49 GW, and 338 generation projects
16 reported in PJM's interconnection queue as of 2019,² amounting to
17 64 GW. They also reviewed 2,399 constructed projects, amounting
18 to 148 GW, that were recorded by EIA Form 860 from 2005-2012.
19 The LBNL Study uses publicly available interconnection studies to

¹ The MISO dataset originally contained 2,209 projects; 1,255 withdrawn projects were removed, and of the remaining 954 projects, 303 had public reports of interconnection costs.

² The PJM dataset originally contained 4,152 projects; 2,467 withdrawn projects were removed, and of the remaining projects, 338 had "reliable" public reports of interconnection costs.

1 calculate the costs associated with bulk network upgrades (similar to
2 the term “Network Upgrades” as used in this testimony) and point of
3 interconnection (POI) upgrades necessary to connect these
4 resources.

5 Lucas Table 1 below shows the results for the solar projects studied
6 in each jurisdiction, alongside the original AC1 Cluster and the
7 Facility by itself. While individual projects within the MISO, PJM, and
8 EIA dataset may have been assigned upgrade costs higher than the
9 average, it is clear that if the Facility is built by itself, the upgrades
10 are higher than the average for those projects reviewed in the LBNL
11 Study. If, however, the costs were allocated between all projects in
12 the original AC1 Cluster, the LCOT would be below the average for
13 those projects reviewed in the LBNL Study. The Public Staff
14 emphasizes that the upgrade costs found in the LBNL Study are
15 being used here as a guide to help put the Facility’s network upgrade
16 costs in context. Overall, the estimated costs currently known for the
17 Facility are close to the range of costs presented in the LBNL Study,
18 especially if at least one other project is constructed.

1

Lucas Table 1

<u>Project</u>	<u>Original AC1 Cluster</u> (a)	<u>Facility Only</u> (a)	<u>MISO (Solar)</u> (b)	<u>PJM (Solar)</u> (c)	<u>EIA (Solar)</u> (d)
Nameplate (MW _{AC})	495	80	3,277	10,057	2,187
Network Upgrades (\$M)	\$ 23.2	\$ 23.2	\$ 180	\$ 1,170	\$ 220
Network Upgrades (\$/kW)	\$ 47	\$ 290	\$ 56	\$ 116	\$ 103
LCOT (\$/MWh)	\$ 0.90	\$ 5.58	\$ 1.56	\$ 3.22	\$ 2.21

Notes

- (a) For the Original AC1 Cluster and the Facility, the figures only include costs in the Facility's Phase I that are known at this time and could possibly be borne by DEP's customers.
- (b) From Table 2 of the LBNL Study, representing 33 solar projects totaling 3,277 MW.
- (c) From Table 3 of the LBNL Study, representing 134 solar projects totaling 10,057 MW.
- (d) From Table 4 of the LBNL Study, representing 304 solar projects totaling 2,187 MW.

2 The LCOTs presented above are one way to evaluate the Network
3 Upgrade costs of a project or projects in relation to the amount of
4 energy they will produce. However, the Public Staff cautions that
5 unneeded upgrades do not serve the using and consuming public no
6 matter how much energy the projects necessitating the upgrades
7 produce. This is of particular concern if, as in this proceeding, the
8 cost of the upgrades would be borne by customers who will not
9 receive the energy produced.

10 **Q. HAVE CLUSTER STUDIES AFFECTED THE PUBLIC STAFF'S**
11 **REVIEW OF CPCN APPLICATIONS?**

12 A. Yes. On pages 13 and 14 of my direct testimony filed on November
13 19, 2018, in Docket No. E-100, Sub 101, I discussed the use of

1 grouping studies or cluster studies as one method to increase the
2 efficiency of interconnecting multiple generators. Now, multiple
3 cluster studies, and their increased complexity, are affecting
4 individual transmission lines.

5 Determining the total effect on the consuming public of multiple
6 generator projects in multiple cluster studies is difficult because of
7 the fluid nature of generator projects. Early interconnection studies
8 and their cost estimates can be unreliable as I describe immediately
9 below.

10 The second project on page 2 of Rubin Attachment K (AC1-086) is
11 Gaston Green Acres, LLC, Docket No. EMP-112, Sub 0, in
12 Northampton County. This solar facility was studied by DEP as 180
13 MW, but the application filed on July 15, 2020, now requests 300 MW
14 of capacity. The fourth project on page 2 of Rubin Attachment K
15 (AC1-189) is Bethel NC 11, LLC, Docket No. EMP-102, Sub 0, in Pitt
16 County. Most likely, this facility will not be built. On February 8, 2019,
17 the Commission issued an order determining that the application for
18 this facility would be deemed withdrawn if the applicant did not
19 provide additional information on or before April 9, 2019. The
20 applicant did not provide the additional information and the
21 Commission closed the docket.

1 Furthermore, a nearby 94-MW solar project, Sweetleaf Solar LLC,
2 Docket No. EMP-111, Sub 0, is not in PJM cluster study AC1. It is in
3 AD1 and not part of DEP's report (Rubin Attachment K). This project,
4 however, could affect the Rocky Mount – Battleboro transmission
5 line, as well as two other transmission lines. I believe, therefore, that
6 DEP's report in Rubin Attachment K is obsolete.

7 **Q. DOES THE CLUSTER STUDY REVIEW PERIOD AFFECT THE**
8 **PUBLIC STAFF'S REVIEW OF CPCN APPLICATIONS?**

9 A. Yes. The development of cluster studies and accurate cost estimates
10 for Network Upgrades can take years. PJM's feasibility study for
11 Phase II of the Facility (Rubin Attachment F) was completed in
12 September 2017, but final cost estimates in the ISA for the necessary
13 upgrades might not be ready until November 2020.

14 The Public Staff is often faced, as it is here, with providing a
15 recommendation to the Commission on approval of CPCN
16 applications without knowing the potential costs to the using and
17 consuming public for Network Upgrades.

18 **Q. PLEASE SUMMARIZE THE PUBLIC STAFF'S CONCERNS WITH**
19 **REVIEWING THE APPLICATION FOR THE FACILITY.**

20 A. As with Friesian Holdings, LLC (Friesian), Docket No. EMP-105, Sub
21 0, the Public Staff is concerned that a large amount of

1 interconnection costs for a solar facility could be borne by ratepayers
2 without providing them with any significant benefit. The Public Staff's
3 testimony of Evan D. Lawrence and Dustin R. Metz in the Friesian
4 proceeding included Table 1 on page 24, which is similar to Lucas
5 Table 1. With regard to the Friesian facility, DEP's customers faced
6 the potential to pay \$223.5 million in Network Upgrades that they did
7 not need for reliable and cost-effective electric service.

8 The Commission had similar concerns to the Public Staff regarding
9 the Friesian facility as indicated on page 23 of its Order Denying
10 Certificate of Public Convenience and Necessity for Merchant
11 Generating Facility issued on June 29, 2020:

12 This concern is especially prudent given a comparison
13 of the cost of comparable new solar energy facilities.
14 To this end, the Commission views the LCOT analysis
15 performed by the Public Staff as a benchmark of the
16 reasonableness of the Network Upgrades relative to
17 other similar transmission investments made to
18 interconnect generating facilities in North Carolina. And
19 the LCOT analysis performed by the Public Staff shows
20 just how unprecedented the cost of the Network
21 Upgrades are to costs realized on a national basis.

22 (Internal citation omitted).

23 The Public Staff has further concerns about the potential for Network
24 Upgrade costs to increase after recommending approval of the
25 CPCN application due to PJM's ISA for Phase II, other PJM cluster
26 studies, or other affected system studies by DEP.

1 In my direct testimony filed on April 15, 2020, I recommended that
2 the Commission approve the application for a CPCN. At the time, I
3 was not aware of any Network Upgrade costs necessary for the
4 Facility that could be paid for by retail customers in North Carolina.
5 According to PJM's interconnection website,³ the PJM queue for
6 DENC has over 5,000 MW of solar capacity currently under review,
7 which will most likely trigger significant Network Upgrades in the
8 future.

9 In the past, the Public Staff has been able to review each CPCN
10 application individually and make recommendations to the
11 Commission on an individual basis. This process has become more
12 complicated in terms of protecting the using and consuming public
13 because of the interdependency and high Network Upgrade costs of
14 some solar facilities.

15 **Q. WHAT IS THE PUBLIC STAFF'S RECOMMENDATION ON THE**
16 **APPLICATION FOR A CPCN?**

17 A. The Public Staff recommends that the Commission approve the
18 application and grant the certificate, subject to the following
19 conditions:

³ PJM, *New Services Queue*, <https://www.pjm.com/planning/services-requests/interconnection-queues.aspx> (last visited July 22, 2020).

- 1 1. The Applicant shall construct and operate the Facility in strict
2 accordance with applicable laws and regulations, including
3 any local zoning and environmental permitting requirements;
- 4 2. The CPCN shall be subject to Commission Rule
5 R8-63(e) and all orders, rules and regulations as are now or
6 may hereafter be lawfully made by the Commission;
- 7 3. The Applicant shall file with the Commission in this docket a
8 progress report on the construction of the Facility on an
9 annual basis; and
- 10 4. The Applicant shall file with the Commission in this docket any
11 revisions in the cost estimates for the construction of the
12 Facility or Network Upgrades within 30 days of becoming
13 aware of such revisions.

14 **Q. DOES THIS CONCLUDE YOUR SUPPLEMENTAL TESTIMONY?**

15 A. Yes, it does.

Jay B. Lucas

I graduated from the Virginia Military Institute in 1985, earning a Bachelor of Science Degree in Civil Engineering. Afterwards, I served for four years as an engineer in the Air Force performing many civil and environmental engineering tasks. I left the Air Force in 1989 and attended the Virginia Polytechnic Institute and State University (Virginia Tech), earning a Master of Science degree in Environmental Engineering. After completing my graduate degree, I worked for an engineering consulting firm and worked for the North Carolina Department of Environmental Quality in its water quality programs. Since joining the Public Staff in January 2000, I have worked on utility cost recovery, renewable energy program management, customer complaints, and other aspects of utility regulation. I am a licensed Professional Engineer in North Carolina.

**American Beech Solar EMP-108 Sub 0
Public Staff LCOT Calculations for
DEP's Network Upgrades**

Lucas Exhibit 1

Discount Rate 4.40%	4.40%
Transmission Asset Life 60 years	60
Annual Degradation 0.50%	0.50%

LCOT Calculation for Original AC1 Cluster

Nameplate (MWAC)	495
Capacity Factor	28.00%
Degradation (%/yr)	0.50%
Facility Life (yrs)	35
Transmission Asset Life (yrs)	60
Annual generation (MWh)	1,214,136
Total generation (MWh)	39,073,662
Network Upgrades	23,204,593
\$/MWh	0.5939
\$/kW	46.88

LCOT (\$/MWh)	0.90
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LCOT Calculation for American Beech Solar, LLC, Phase I only

Nameplate (MWAC)	80
Capacity Factor	28.00%
Degradation (%/yr)	0.50%
Facility Life (yrs)	35
Transmission Asset Life (yrs)	60
Annual generation (MWh)	196,224
Total generation (MWh)	6,314,935
Network Upgrades	23,204,593
\$/MWh	3.67
\$/kW	290.06

LCOT (\$/MWh)	5.58
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