



**NORTH CAROLINA
PUBLIC STAFF
UTILITIES COMMISSION**

October 26, 2020

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

Re: Docket No. E-22, Sub 588 – DENC Application for Approval of Renewable Energy and Energy Efficiency Portfolio Standard Cost Recovery Rider Pursuant to G.S. 62-133.8 and Commission Rule R8-67

Dear Ms. Campbell:

In connection with the above-referenced docket, I transmit herewith for filing on behalf of the Public Staff the following:

1. Confidential testimony of Jeffrey T. Thomas, Utilities Engineer, Electric Section, Energy Division;
2. Notice of Affidavit; and
3. Affidavit of Iris Morgan, Staff Accountant, Accounting Division.

By copy of this letter, I am 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,

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

Attachments

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BEFORE THE NORTH CAROLINA UTILITIES COMMISSION

DOCKET NO. E-22, SUB 588

In the Matter of

Application of Virginia Electric and Power)
Company, d/b/a Dominion Energy North)
Carolina, for Approval of Renewable)
Energy and Energy Efficiency Portfolio)
Standard Cost Recovery Rider Pursuant)
to N.C.G.S. § 62-133.8 and Commission)
Rule R8-67)

TESTIMONY OF
JEFF T. THOMAS
PUBLIC STAFF – NORTH
CAROLINA UTILITIES
COMMISSION

**BEFORE THE NORTH CAROLINA UTILITIES COMMISSION
DOCKET NO. E-22, SUB 588**

**Testimony of Jeff T. Thomas
On Behalf of the Public Staff
North Carolina Utilities Commission**

October 26, 2020

1 **Q. PLEASE STATE YOUR NAME, BUSINESS ADDRESS, AND**
2 **PRESENT POSITION.**

3 A. My name is Jeff T. Thomas. My business address is 430 North
4 Salisbury Street, Dobbs Building, Raleigh, North Carolina. I am an
5 engineer with the Energy Division of the Public Staff – North Carolina
6 Utilities Commission.

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

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

9 **Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?**

10 A. The purpose of my testimony is to present to the Commission the
11 Public Staff's recommendations on: (1) the Application for approval
12 of the Renewable Energy and Energy Efficiency Portfolio Standard
13 (REPS) cost recovery rider, filed by Virginia Electric and Power
14 Company, d/b/a Dominion Energy North Carolina (DENC or the
15 Company), (2) DENC's 2019 REPS Compliance Report, and (3)

1 DENC's final 2020 Study Report on the Kitty Hawk Microgrid
2 research project. The Company filed its application, pursuant to N.C.
3 Gen. Stat. § 62-133.8 and Commission Rule R8-67, on August 11,
4 2020, and made an errata filing on September 28, 2020. The
5 Company's filing is supported by the direct testimony and exhibits of
6 George E. Hitch, and the direct and errata testimony and exhibits of
7 Elizabeth B. Lecky and Emilia L. Catron.

8 **Q. HOW IS YOUR TESTIMONY ORGANIZED?**

9 A. My testimony first presents a summary of the REPS Compliance
10 Report. I then discuss the REPS rider cost recovery request. Finally,
11 I present the Public Staff's analysis of the 2020 Kitty Hawk microgrid
12 report, including broader conclusions and concerns regarding the
13 microgrid research and development project that the Public Staff
14 would like to bring to the Commission's attention.

15 **I. REPS Compliance**

16 **Q. IS DENC PROVIDING REPS COMPLIANCE SERVICES TO ANY**
17 **OTHER ELECTRIC POWER SUPPLIERS?**

18 A. Yes. DENC provides REPS compliance and reporting services for
19 the Town of Windsor (Windsor) and maintains separate accounts for
20 itself and Windsor in the North Carolina Renewable Energy Tracking
21 System (NC-RETS). None of the administrative costs or costs of

1 Renewable Energy Certificates (RECs) assigned to Windsor were
2 included in DENC's requested REPS cost recovery rider.

3 **Q. DID DENC MEET ITS REPS OBLIGATIONS FOR 2019?**

4 A. Yes. DENC has set aside for retirement¹ sufficient RECs to meet its
5 overall obligation of 10% of 2018 retail sales.² It also met the
6 technology-specific set-aside requirements for: (1) solar, consisting
7 of 0.2% of retail sales; (2) swine waste, consisting of 0.04% of retail
8 sales;³ and (3) poultry waste, consisting of 15,937 RECs.⁴ The
9 overall obligation, less the three specific set-asides, is referred to as
10 the general obligation. A summary of RECs retired to meet the 2019
11 targets is presented in the table below. Sufficient RECs were also
12 retired by DENC on Windsor's behalf.

13 Pursuant to N.C.G.S. § 62-133.8(b)(2)(c), DENC may use energy
14 efficiency certificates (EECs) to meet no more than 25% of its total
15 requirement.⁵ This limitation on the use of EECs to meet the total
16 requirement does not apply to municipal suppliers such as Windsor.

¹ For each compliance year, DENC moves the appropriate number of RECs for retirement into a compliance sub account in NC-RETS. The Commission then retires the RECs upon its approval of its filing.

² 2018 North Carolina jurisdictional retail sales for DENC were 4,400,784 MWh. 2018 retail sales for Windsor were 50,426 MWh.

³ The swine waste requirement was modified by the Commission's December 16, 2019 Order Modifying the Swine and Poultry Waste Set-Aside Requirements and Providing Other Relief in Docket No. E-100, Sub 113 (2019 Delay Order) and the Commission's February 13, 2020 Errata Order in Docket No. E-100, Sub 113 (2019 REPS Errata Order). These Orders eliminated the requirement for municipalities.

⁴ The poultry waste requirement is based on a pro-rata share of the total poultry waste set-aside, established in the 2019 Delay Order and 2019 REPS Errata Order.

⁵ Beginning in calendar year 2021, this limit is raised to 40%.

1 In addition, DENC is allowed to obtain all of its RECs from out-of-
 2 state sources,⁶ whereas Windsor must obtain at least 75% of its
 3 RECs from in-state sources.⁷

Type of REC	DENC RECs Retired	Windsor RECs Retired
Swine	1,761	0
Poultry	15,937	182
Solar	8,802	101
Wind	330,231	0
Hydro	0	248
Biomass	51,962	4,516
Energy Efficiency (EE)	31,386	0
Total	440,079	5,047
Total General	413,579	4,764

4 **Q. HAVE YOU REVIEWED THE REPS COMPLIANCE REPORT?**

5 A. Yes. DENC's 2019 REPS Compliance Report is included as Exhibit
 6 1 to the testimony of DENC witness Hitch. Based on its review, the
 7 Public Staff believes that DENC's REPS Compliance Report meets
 8 the requirements of N.C.G.S. § 62-133.8 and Commission Rule R8-
 9 67(c). Accordingly, the Public Staff recommends that the
 10 Commission approve DENC's 2019 REPS Compliance Report.

⁶ N.C.G.S. § 62-133.8(b)(2)(e).

⁷ N.C.G.S. § 62-133.8(c)(2)(d).

1 **Q. WHAT RATES HAS DENC REQUESTED FOR ITS REPS RIDER?**

2 A. DENC's proposed monthly rates are shown in the table below. These
3 charges reflect the September 28, 2020 errata filing.

DENC's Rider Request Filed on September 28, 2020			
Proposed Monthly per Account Charges, with regulatory fee			
Customer Class	Rider RPE (Test Period)	Rider RP (Rate Period)	Total REPS Rate
Residential	(\$0.12)	\$0.25	\$0.13
General	(\$0.69)	\$1.40	\$0.71
Industrial	(\$4.64)	\$9.36	\$4.72

4 **Q. WHAT RATES DOES THE PUBLIC STAFF RECOMMEND FOR**
5 **THE EMF AND REPS RIDERS?**

6 A. The Public Staff agrees with the rates requested by DENC. These
7 monthly rates are below the cost caps set forth in N.C.G.S. § 62-
8 133.8(h)(4).⁸ With these recommended rates, the residential, general
9 service, and industrial classes are each at approximately 5.7% of
10 their annual cost caps.

11 **III. Research Costs**

12 **Q. IS DENC SEEKING RECOVERY OF ANY MICROGRID COSTS IN**
13 **THIS PROCEEDING?**

⁸ Annual cost caps are \$27 for residential, \$150 for commercial, and \$1,000 for industrial customers.

1 A. Yes. DENC has requested recovery of **[BEGIN CONFIDENTIAL]**
2 **[REDACTED]**
3 **[REDACTED]**
4 **[REDACTED]**
5 **[REDACTED]**. **[END CONFIDENTIAL]**

6 **Q. ARE YOU RECOMMENDING THE DISALLOWANCE OF ANY**
7 **MICROGRID COSTS IN THIS PROCEEDING?**

8 A. No, I am not.

9 **Q. HAVE YOU REVIEWED DENC'S 2020 KITTY HAWK MICROGRID**
10 **REPORT?**

11 A. Yes, I have. The report was included as Exhibit 3 to the testimony of
12 DENC witness Hitch. I have also reviewed the interim reports on the
13 Kitty Hawk microgrid, covering years 2015,⁹ 2016,¹⁰ and 2017.¹¹

14 **Q. WHEN DID DENC FIRST PROPOSE THE MICROGRID?**

15 A. The microgrid, located at DENC's offices in Kitty Hawk, North
16 Carolina, was first proposed by DENC in its 2012 REPS rider
17 proceeding, Docket No. E-22, Sub 503. DENC stated that the
18 microgrid would be a three-year demonstration project (summer
19 2014 to summer 2017) and would provide an opportunity for the

⁹ Appendix C to the REPS Compliance Report filed in Docket No. E-22, Sub 525.

¹⁰ Appendix C to the REPS Compliance Report filed in Docket No. E-22, Sub 535.

¹¹ Appendix C to the REPS Compliance Report filed in Docket No. E-22, Sub 544 (2017 Report).

1 Company to study the capabilities of microgrid technology, focusing
2 on:

- 3 • Distributed renewable generation load factor and capacity factor
- 4 improvement;
- 5 • Reduction of distributed renewable generation intermittency;
- 6 • Peak-shaving and peak-shifting;
- 7 • Islanding during a utility outage (to reduce load on the existing
- 8 diesel back-up generator);
- 9 • Energy storage functionality; and
- 10 • Microgrid performance in an environment subject to salt spray.¹²

11 DENC stated that it would be collecting data using “24-hour
12 monitoring and control of the NC Microgrid Project functionalities.”¹³

13 The Company stated its intention that after the three-year
14 demonstration period, the project would “continue to operate and
15 offset load at the Kitty Hawk District Office.”¹⁴

16 **Q. CAN YOU SUMMARIZE THE TIMELINE OF THE KITTY HAWK**
17 **MICROGRID?**

18 A. Yes. DENC met its proposed construction timeline, and the project
19 was commissioned on July 22, 2014. It originally consisted of four
20 types of micro wind turbines (totaling 14.2 kW¹⁵), a 6-kW solar

¹² See Direct Testimony of Gary D. Courts, Docket No. E-22, Sub 503, at 4.

¹³ *Id.*

¹⁴ *Id.* at 8.

¹⁵ All ratings are in alternating current, unless stated otherwise.

1 photovoltaic (PV) array, 25-kW / 75-kWh lithium-ion batteries, and
2 associated conversion, control, monitoring, and protection
3 equipment. In July 2015, DENC added two 1.5-kW solid oxide fuel
4 cells. The entire microgrid was installed behind the meter and
5 integrated with existing on-site diesel generation.

6 In August 2016, approximately two years into the demonstration
7 period, DENC employees at the Kitty Hawk office began to report
8 electrical problems, such as flickering lights, noise from the
9 fluorescent lights, intermittent operation of automatic sinks, and other
10 electrical problems. DENC believed that the problems may have
11 been the result of a lightning strike at the office. As a result, DENC
12 shut down the office and the microgrid to troubleshoot the problem.
13 The office was brought back online without the microgrid, and the
14 aforementioned electrical issues did not recur.

15 **Q. WHAT EFFORTS DID DENC TAKE TO BRING THE MICROGRID**
16 **BACK ONLINE?**

17 A. In the fall and winter following the event, DENC and its maintenance
18 provider, PowerSecure, replaced inverters and other defective
19 components in an attempt to bring the project back online. These
20 efforts were unsuccessful, and continued through the spring and
21 summer of 2017. PowerSecure eventually determined that the root
22 cause was capacitors and inductors designed to eliminate harmonics
23 from the inverters. Replacement parts were ordered and installed, at

1 PowerSecure's expense, on November 13, 2017. However, before
2 the project could be re-energized, DENC determined that there was
3 inadequate product support for certain replacement components and
4 did not re-energize the microgrid.

5 **Q. WHEN DID DENC MAKE THE DECISION TO NOT RE-**
6 **ENERGIZE?**

7 A. Following the abandoned attempt to re-energize in late 2017, DENC
8 made the decision to cease further attempts to bring the project back
9 online in early 2018. All microgrid components remained shut down.
10 Two years later, on February 10, 2020, PowerSecure performed a
11 preliminary audit of the facility and made recommendations as to
12 what work would be required to bring each component back online.

13 **Q. WHAT DID THE AUDIT FIND?**

14 A. The audit by PowerSecure found that **[BEGIN CONFIDENTIAL]**

15 [REDACTED]

16 [REDACTED]

17 [REDACTED]

18 [REDACTED]

19 [REDACTED]

20 [REDACTED]

21 [REDACTED]

22 [REDACTED]

1 [REDACTED]
2 [REDACTED]
3 [REDACTED]
4 [REDACTED]. [END CONFIDENTIAL]

5 **Q. WHAT ARE DENC’S PLANS FOR THE MICROGRID GOING**
6 **FORWARD?**

7 A. DENC has stated that it plans to bring the solar array back online,
8 and may restore the battery installation, possibly at a reduced
9 capacity. At this time, the Company has indicated that it will
10 permanently decommission the wind turbines and the fuel cells.
11 DENC has stated that it will not seek recovery of these costs through
12 future REPS riders.¹⁶

13 **Q. DO YOU HAVE ANY CONCERNS ABOUT THIS MICROGRID**
14 **PROJECT?**

15 A. Yes. As an initial matter, the Public Staff recognizes that research
16 projects will, by their nature, often utilize cutting-edge equipment and
17 novel technologies. It is expected that a research project will
18 experience challenges, both foreseen and unforeseen. Thus, the
19 significant voltage and harmonics issues experienced at the Kitty
20 Hawk microgrid that eventually led to it shutting down only two years

¹⁶ See Testimony of DENC witness Hitch, at 19.

TESTIMONY OF JEFF T. THOMAS
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1 For example, DENC stated that the batteries “exhibited reliability and
2 efficiency despite intensive use patterns” and, during the non-winter
3 months, were able to “facilitate at least two hours of daily demand
4 reduction greater than 25% with a high amount of consistency.”¹⁷
5 However, during its audit, PowerSecure stated that in order to
6 continue operations, “all batteries would likely need to be replaced
7 due to inactivity for such an extended duration.”¹⁸

8 **Q. DO YOU HAVE ANY OTHER CONCERNS TO BRING TO THE**
9 **COMMISSION’S ATTENTION?**

10 A. Yes. I believe that going forward, a higher level of scrutiny may be
11 necessary for proposed research projects. For example, during
12 discovery, the Public Staff found that DENC did not arrange for a
13 robust preventative maintenance schedule for any microgrid
14 equipment, which may have contributed to the difficulty in getting the
15 hydraulic lift, wind turbines, and other components back online.
16 Preventative maintenance is a critical component of ensuring that
17 any mechanical or electrical system continues to operate
18 satisfactorily. DENC initially claimed that the microgrid would
19 continue operation beyond the three-year demonstration period, but
20 DENC’s lack of preventative maintenance greatly decreased the
21 possibility of further operation.

¹⁷ 2017 Report, at 8.

¹⁸ See Exhibit 3 to witness Hitch’s testimony, at 6.

1 In addition, none of the contracts with vendors, which were small
2 start-up companies, included any liability protections in the event that
3 these companies either went out of business or ceased support for
4 their products. In fact, DENC cites a lack of ongoing support for the
5 wind turbines and fuel cells as the main reason they will not be
6 recommissioned. DENC noted that it is difficult to enter into and
7 enforce long-term warranties with small start-up companies, and the
8 Public Staff agrees. However, future research projects should
9 attempt to strike a balance between new technologies and
10 established or proven companies.

11 **Q. DO YOU BELIEVE THAT THE KITTY HAWK MICROGRID**
12 **PROJECT PROVIDED VALUABLE KNOWLEDGE AND**
13 **EXPERIENCE TO DENC?**

14 A. With some caveats, yes. DENC has indicated that the staff that
15 developed the microgrid and worked to resolve the ongoing issues is
16 now tasked with developing microgrids in other areas in Virginia,
17 specifically the Locks Campus site. Broadly, the 2017 Report
18 summarizes the lessons learned, and while some of these lessons
19 may not have required a demonstration project for DENC to learn, it
20 is undeniable that DENC worked on this project at a time when
21 microgrids were very early in their development, and likely benefited
22 as a result.

1 The Public Staff’s biggest concern regarding the lessons learned is
2 that DENC, in its original application, stated that one of its research
3 goals was to explore how the facility functioned in island mode.
4 During discovery, DENC indicated that the facility had gone into
5 island mode three times during its two-year operational span.
6 However, the Public Staff notes that no detailed analysis of these
7 events was ever included in any of the reports filed with the
8 Commission. DENC provided limited data to the Public Staff on the
9 three events. The Public Staff learned that the microgrid was not
10 appropriately sized or configured to be able to provide power to the
11 Kitty Hawk office during an outage event. During the two extended
12 outage events on December 10, 2014 and October 7, 2015,¹⁹ the
13 microgrid did not provide any power to the office. No lessons learned
14 related to the islanding events were included in the 2017 Report.
15 The Public Staff believes that some important lessons could have
16 been learned during these islanding events, which involve the
17 complex processes of islanding from the grid, properly controlling
18 and coordinating power sources during islanding mode, and
19 eventually reconnecting to the grid. However, from the lack of
20 analysis and information available, it appears that DENC did not
21 learn as much as it could have from these events, and it has not

¹⁹ The third event, on January 13, 2016, only lasted approximately one minute.

1 provided any supporting information with regard to these islanding
2 events that might help improve microgrid projects in the future.

3 **Q. DOES THIS CONCLUDE YOUR TESTIMONY?**

4 A. Yes, it does.

QUALIFICATIONS AND EXPERIENCE

JEFF T. THOMAS

I graduated from the University of Illinois Champaign-Urbana in 2009, earning a B.S. in General Engineering. Afterwards, I worked in the manufacturing sector in operations management for several electronic manufacturing companies, such as General Electric and United Technologies Corporation. I left manufacturing in 2015 and attended North Carolina State University, earning a M.S. in Environmental Engineering. My educational experience includes cost benefit research on smart grid components at the Future Renewable Energy Electricity Delivery and Management (FREEDM) Systems Engineering Research Center, and power system modeling. My master's thesis focused on electric power system modeling, capacity expansion planning, and the effect of various state and nation-wide energy policies in North Carolina. After completing my graduate degree, I joined the Public Staff in November 2017. In my current role, I have worked on the implementation of HB 589 programs, utility cost recovery proceedings, renewable energy program management, customer complaints, Certificate of Public Convenience and Necessity applications, and other aspects of utility operations and regulation.