

**BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF SOUTH DAKOTA**

**IN THE MATTER OF THE APPLICATION OF
CROWNED RIDGE WIND, LLC FOR A FACILITIES PERMIT TO
CONSTRUCTION A 230 KV TRANSMISSION LINE AND NEW REACTIVE POWER
COMPENSATION SUBSTATION**

Docket No. EL17-

**DIRECT TESTIMONY AND EXHIBITS
OF DANIEL MAYERS**

December 4, 2017

INTRODUCTION AND QUALIFICATIONS

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. Daniel Mayers, 700 Universe Blvd., Juno Beach FL 33408.

Q. BY WHOM ARE YOU EMPLOYED AND IN WHAT CAPACITY?

A. I am the Director of Transmission Engineering within the Engineering & Construction (“E&C”) organization at NextEra Energy Resources, LLC (“NEER”). NEER is a principal affiliate of NextEra Energy, Inc. NEER, through its affiliated entities, is the world’s largest generator of renewable energy from the wind and sun, generating over 19,000 MWs in 29 states and Canada. NextEra, through its subsidiaries, also owns approximately 8,500 circuit miles of high-voltage transmission lines and 770 substations in North America. NEER affiliates in the State of South Dakota own the following wind facilities: Day County Wind, South Dakota Wind Energy Center, and Wessington Springs Wind.

Q. WHAT IS THE ORGANIZATIONAL RELATIONSHIP BETWEEN NEER AND CROWDED RIDGE, LLC?

A. Crowned Ridge Wind, LLC (“the Applicant”) is an indirect, wholly-owned subsidiary of NEER.

Q. WHAT ARE YOUR RESPONSIBILITIES ?

A. As the Director of Transmission Engineering, one of my primary roles is to coordinate or provide support for the development of new transmission lines and substations, including

1 right-of-way ("ROW") identification and selection, land acquisition, permit acquisition,
2 system engineering, specification and standards development, material and services
3 procurement, construction management, commissioning, system integration, compliance
4 and project close-out in heavily regulated, environmentally-sensitive, and multi-system
5 operational environments.
6

7 **Q. PLEASE DESCRIBE YOUR BACKGROUND AND QUALIFICATIONS**

8 A. I have over 34 years of experience in transmission system planning, substation, and
9 transmission line design and engineering, transmission line siting and permitting, project
10 management, and construction at both Florida Power & Light Company and NEER. I
11 hold a Bachelor of Science Degree in Electrical Engineering from the University of
12 Pittsburgh and a Master of Science Degree in Engineering Management from the
13 University of South Florida.
14

15 **Q. HAS THIS TESTIMONY BEEN PREPARED BY YOU OR UNDER YOUR**
16 **DIRECT SUPERVISION?**

17 A. Yes.
18

19 **Q. HAVE YOU TESTIFIED BEFORE THE SOUTH DAKOTA PUBLIC UTILITIES**
20 **COMMISSION OR ANY OTHER REGULATORY COMMISSION?**

21 A. I have not testified before the South Dakota Public Utilities Commission. I have,
22 however, filed testimony on behalf of NEER affiliates before the Public Utility
23 Commission of Texas ("PUCT") in Docket Nos. 40020 and 42469, which related to two

1 rate cases of Lone Star Transmission, LLC (“Lone Star”), and testified before the PUCT
2 in Docket No. 38230, which related to Lone Star’s earlier application for a certificate of
3 convenience and necessity. I also filed testimony before the State of New York Public
4 Service Commission in Docket Nos. 13-T-0455 and 13-T-0456 related to NextEra
5 Energy Transmission New York, Inc.’s proposals to develop the Marcy to Pleasant
6 Valley transmission project and the Oakdale to Fraser transmission project, respectively.
7 I also testified before the Maine Public Utilities Commission in Docket 2014-00048 in
8 support of New Hampshire Transmission, LLC’s proposal to develop a transmission
9 solution to address reliability problems in Northern Maine. Finally I have testified
10 before the California Public Utilities Commission in Application No.: 15-08-027 for a
11 Certificate of Public Convenience and Necessity for the Suncrest Dynamic Reactive
12 Power Support Project.

13
14 **PURPOSE OF TESTIMONY**

15 **Q. PLEASE DESCRIBE THE PURPOSE OF YOUR TESTIMONY.**

16 **A.** The purpose of my testimony is to set forth: (1) the technical specification for the
17 proposed transmission line (also referred to as a generation tie line); (2) an overview of
18 the proposed route, the transmission routing and siting criteria and alternative routes; and
19 (3) the processes associated with engineering, construction, operation and maintenance of
20 the transmission line and new reactive power compensation substation.

TECHNICAL SPECIFICATIONS OF THE PROJECT

Q. PLEASE DESCRIBE THE TECHNICAL SPECIFICATIONS OF THE PROPOSED PROJECT.

A. The Project involves the proposed construction of a new reactive power compensation substation and an approximately 34-mile 230-kilovolt (“kV”) generation tie line that would connect two 300 megawatt (MW) wind projects (Crowned Ridge Wind (“CRW”) and Crowned Ridge Wind, II (“CRW II”)) to the Big Stone South Substation owned by Otter Tail Power Company. As explained in more detail in the Application, there is currently under consideration a single circuit and double circuit transmission line design option for the Project. At this time, while the transmission line route has been established, the final determination as to whether a single-circuit or double-circuit transmission line will be constructed remains under consideration. In coordination with Otter Tail Power Company and the Midcontinent Independent System Operator, Inc. (“MISO”), the Applicant is conducting a series of power system studies which will identify the most appropriate design for the Project when the overall electric power system in the area is considered. The final determination of the Project design is anticipated in the first quarter of 2018. Design criteria will be in compliance with applicable statutes, North American Electric Reliability Corporation, and the applicable edition of the National Electrical Safety Code.

More specifically, the technical specifications for the proposed 230 kV transmission line are as follows:

SINGLE CIRCUIT OPTION:

- Tubular steel monopole structures will typically be 120 feet (“ft.”) above ground level. Angle, corner and in-line dead-end structures may consist of multiple poles and guy wires;
- Line length is approximately 34 miles;
- Single-circuit, three-phase transmission line comprised of twin-bundled (2) - 1590 kcmil aluminum conductor steel reinforced (“ACSR”) “Lapwing” conductors per phase, one optical ground wire (“OPGW”), and one additional shield wire where applicable;
- Typical structure span lengths range from 600 ft. – 1,000 ft.;
- Typical transmission construction easement, also referred to as the ROW width, is 150 ft., with additional easement width at turning and angle structures as applicable to account for factors such as terrain, span lengths, and the need for guying for larger line deflection angles or multiple structures for corners.
- The proposed transmission line will be located within the easement ROW; and
- Monopole design will be used for better suitability for farming operations and reduced permanent surface impacts.

DOUBLE CIRCUIT OPTION:

- Tubular steel monopole structures will typically be 140 ft. above ground level. Angle, corner and in-line dead-end structures may consist of multiple poles or guy wires;
- Line length is approximately 34 miles;
- Double-circuit, three-phase transmission line comprised of twin-bundled (2) - 795 kcmil ACSR "Drake" conductors per phase, two OPGWs, and two additional shield wires, where applicable;
- Typical span lengths range from 600 ft. – 1,000 ft.;
- Typical transmission construction easement/ROW width of 150 ft., with additional easement at turning and angle structures as applicable to account for factors such as terrain, span lengths, and the need for guying for larger line deflection angles or multiple structures for corners.
- The proposed transmission line will be located within the easement ROW; and
- Monopole design for better suitability for farming operations and reduced permanent surface impacts.

Q. PLEASE DESCRIBE WHY THE PROJECT IS NEEDED TO DELIVER ENERGY FOR CRW AND CRW II TO THE TRANSMISSION GRID.

A. The Project is needed to deliver the energy from CRW and CRW II to the transmission grid. To facilitate an understanding of the relationship between the two wind projects, their respective transmission lines and the final point of interconnection I have provided a map as Exhibit DM-1. I have also provided as Exhibit DM-2, a map

1 showing the Project route from the CRW collector substation to the Big Stone South
2 Substation. I have additionally provided in Exhibit DM-3 one-lines diagrams to add
3 additional detail and understanding. As Exhibit DM-2 shows, the Project begins at the
4 CRW collector substation located 4 miles south of the town of South Shore. The line then
5 progresses northeast and remains south of the cities of Stockholm and Milbank before it
6 terminates at Big Stone South Substation, which is approximately two miles southwest of
7 Big Stone City.

8
9 The CRW collector substation serves two purposes. The first purpose is to serve as a
10 termination point for the 34.5 kV collection lines from the wind turbines from CRW.
11 The voltage at the substation is then stepped up from 34.5 kV to 230 kV and the 300MW
12 of generation of CRW is transmitted and routed approximately 34 miles through a new
13 reactive compensation substation next to the Big Stone South Substation.

14
15 The second purpose of the CRW collector substation is to serve as a point of connection
16 for a new 230 kV transmission line from the 300 MW CRW II. That approximately 14-
17 mile transmission line begins at the CWR II collector substation, which is located 8 miles
18 east of Watertown, and will terminate at the CRW collector substation (see also Exhibit
19 DM-1). In total, 600 MW of power from CRW and CRW II will then be transmitted
20 onto the 230kV transmission line and routed through the new reactive power
21 compensation substation and be delivered to the Big Stone South Substation. The Project
22 will dead-end on a transmission structure outside the Big Stone South Substation, where

Otter Tail Power Company will own the short span of transmission line that enters their Big Stone South Substation.

TRANSMISSION ROUTING AND SITING CRITERIA

Q. WHAT WAS THE TRANSMISSION ROUTING AND SITING CRITERIA USED TO DEVELOP THE TRANSMISSION ROUTE AND SITE THE PROJECT?

A. Section 8.0 of the Application sets forth the criteria used to develop the proposed transmission line route, as well as why the proposed route is preferred over alternative routes.

Q. EXPLAIN HOW THE IMPLEMENTATION OF THE CRITERIA RESULTED IN THE PROPOSED ROUTE?

A. As explained in more detail in the Application, the proposed route was selected due its alignment with the routing criteria, including the following:

- It is the shortest viable route from the CRW collector substation to the Big Stone South Substation;
 - It is designed to be consistent with feedback from Grant and Codington Counties on the placement of transmission structures outside their ROW;
 - It is designed to minimizes routing across agricultural fields, and, instead, runs along landowner boundaries and quarter section lines as much as possible;
 - It is designed to minimize the impact on human settlements and the environment;
- and

- It is designed to parallel an existing transmission corridor for 4.5 miles to reduce the aesthetic impact.

Q. WAS THE PROPOSED ROUTE DESIGN OPTIMIZED DURING ITS DEVELOPMENT?

A. Yes, the proposed route also included an optimization process. For instance, if the transmission line path from the CRW collector substation location originally went south to Troy that would have added 2.4 miles to the line and 4 turning structures. This alternative direction would eventually require the alternative route to revert back north to the currently proposed transmission corridor due to 2.75 contiguous miles of grassland easements existing from the southeast of Troy to the current proposed transmission corridor. These constraints were mitigated by the currently proposed route paralleling 160th Street, where grassland/wetland easements are not highly concentrated.

Q. PROVIDE AN OVERVIEW OF THE ALTERNATIVE ROUTES?

A. As explained in more detail in Section 8.0 of the Application, the two alternative routes for the proposed Project involve: (1) routing north than heading east to the Big Stone South Substation or (2) routing east than heading north to the Big Stone South Substation. Neither routing is preferred to the more direct north-by-northeast route that is proposed, because the alternative routes do not align with the selection criteria set forth in Section 8 of the Applicant when compared to the preferred route. For example, both alternative routes increase the length of the transmission line. They also result in specific

1 impacts, such as increased crossings of existing infrastructure and potential impacts to
2 environmentally sensitive areas that make them less preferable to the proposed route.
3

4 **Q. DO YOU ANTICIPATE ANY SIGNIFICANT CHANGES IN THE PROPOSED**
5 **ROUTE?**

6 A. I do not anticipate significant changes in the proposed route because, as Applicant
7 Witness Utton explains, the Applicant has worked closely with stakeholders, landowners,
8 local government officials, and local tribes in developing a proposed route. The active
9 engagement was helpful to develop a proposed route in that the Applicant does not have
10 the right of eminent domain; therefore, the Applicant anticipates the route will stay within
11 the one mile corridor study area. Further, given the study and avoidance to the extent
12 possible of environmental, cultural, physical, hydrological, terrestrial, aquatic, land use,
13 water and air quality, and community impacts, as explained in Sections 9 through 17 of
14 the Application, the Applicant does not anticipate further significant changes in the route
15 due to these concerns.
16

17 **Q. ARE THERE ASSOCIATED FACILITIES WITH THE TRANSMISSION LINE?**

18 A. Yes. There is the 230 kV CRW collector substation, which includes two 230-34.5kV
19 generation step-up transformers, circuit breakers, bus work, disconnect switches,
20 protection and control equipment, control building and low voltage cap banks. There is
21 also a new reactive power compensation substation that will be sited adjacent to Big
22 Stone South Substation to provide reactive power support and increase the deliverability

1 of the wind energy. Exhibit DM-2 provides a map showing where along the transmission
2 line the reactive power compensation substation will be located.

4 CONSTRUCTION PROCESS

5 **Q. PLEASE DESCRIBE THE CONSTRUCTION PROCESS?**

6 A. Provided the South Dakota Public Utilities Commission approves this Application, the
7 Applicant expects to start construction of the transmission line in October 2018. The
8 construction process begins with a route survey of the ROW boundaries and a delineation
9 of critical environmental areas and those additional areas of concern that the landowner
10 has specified in the easement agreements. The construction team will mobilize, and, as
11 required, initiate matting, clearing, grubbing and the installation of access roads.
12 Equipment and materials such as structures, conductor, optical ground wire, insulators,
13 hardware and materials will be delivered to laydown areas or directly to the pole location.
14 Pole locations within the ROW will be surveyed and staked.

15
16 Monopole installation is essentially a two-step process. One crew augers the hole in the
17 ground for the monopole and another crew embeds the pole directly into the ground and
18 backfills the hole. In certain specific locations drilled shaft concrete foundations will be
19 required. The tubular steel structures are framed with steel arms, insulators, hardware and
20 pulling blocks on the ground and assembled and set with cranes. The conductor will be
21 pulled through the pulling blocks and attached to the insulators. The shield wires will also
22 be pulled through pulling blocks and attached to arms on the tubular steel structure.

1 Splice boxes will be attached to the structure approximately 12 ft. above the base of the
2 tubular steel pole every 3-4 miles to facilitate fiber splicing.

3
4 On-site supervision will work with landowners during construction to minimize crop
5 damage and site accessibility issues, as well as work to minimize impact in the areas that
6 have been further identified by the Sisseton Wahpeton Oyate tribe. The construction
7 team will be responsible for maintenance of traffic, crew/landowner/public safety, and
8 will adhere to Occupational Safety and Health Administration standards. The Applicant's
9 construction supervision will also engage in safety and construction inspections to ensure
10 the contractor adheres to safe work practices and constructs the line in accordance with
11 the approved design.

12
13 **WHY IS THE PROJECT STARTING CONSTRUCTION IN 2018?**

- 14 A. The commercial operations date for CRW and CRW II is on or before December 31,
15 2019. A Project of this type generally can take 10-14 months to complete. Also, the
16 Project is required to be energized approximately 3-4 months earlier than CRW and
17 CRW II in order to allow sufficient time to commission the collection substation, reactive
18 power compensation substation, and subsequently the wind turbines. Thus, by starting
19 construction in 2018 all of these timelines and milestones can be met.

1 **Q. AFTER THE CONSTRUCTION IS COMPLETE, HOW WILL THE LINE BE**
2 **ENERGIZED?**

3 A. The Applicant expects to complete the Project's construction no later than October 2019.
4 The line will be inspected by the contractor, the Applicant, the engineer of record and the
5 environmental coordinator prior to energization to ensure that the line can be safely
6 energized. Once completed, the Applicant will coordinate with Otter Tail Power
7 Company to energize the line.

8 **OPERATION AND MAINTENANCE**

9 **Q. EXPLAIN HOW THE GENERATION TIE LINE WILL BE OPERATED AND**
10 **MAINTAINED.**

11 A. The Project will be operated by MISO in close coordination with Otter Tail Power
12 Company and the Applicant. As explained in more detail in the Application, the Project
13 will be maintained by Crowned Ridge in accordance with the applicable North American
14 Electric Reliability Corporation Reliability Standards, such as FAC-003 (vegetation
15 maintenance) and PRC-005 (relay maintenance).

16
17 **CONCLUSION**

18
19 **Q. DOES THIS CONCLUDE YOUR TESTIMONY?**

20 A. Yes.


STATE OF FLORIDA)
) ss
COUNTY OF PALM BEACH)

I, Daniel Mayers, being duly sworn on oath, depose and state that I am the witness identified in the foregoing prepared testimony and I am familiar with its contents, and that the facts set forth are true to the best of my knowledge, information and belief.


Daniel Mayers

Subscribed and sworn to before me this 4th day of
December 2017.

SEAL


Notary Public

My Commission Expires _____

