

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

**IN THE MATTER OF THE APPLICATION OF
CROWNED RIDGE, II LLC FOR A FACILITIES PERMIT TO
CONSTRUCT A 300.6 MEGAWATT WIND FACILITY**

Docket No. EL19-

**DIRECT TESTIMONY AND EXHIBIT
OF MARK THOMPSON**

July 9, 2019

INTRODUCTION AND QUALIFICATIONS

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Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. Mark Thompson, 700 Universe Blvd., Juno Beach FL 33408.

Q. WHAT IS YOUR JOB AND WHAT ARE YOUR JOB RESPONSIBILITIES?

A. I am the Manager of Wind Engineering within the Engineering & Construction (“E&C”) organization at NextEra Energy Resources, LLC (“NEER”). As the Manager of Wind Engineering, one of my primary roles is to coordinate or provide support for the development of new wind sites that include underground collector systems, substations, and transmission lines. I also provide support in permit acquisition, system engineering, specification and standards development, material and services procurement, construction management, commissioning, system integration, compliance, and project close-out in heavily regulated, environmentally-sensitive, and multi-system operational environments.

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

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

Q. PLEASE DESCRIBE YOUR BACKGROUND AND QUALIFICATIONS

A. I have over 17 years of experience in design, engineering, permitting, project management, and construction at both Florida Power & Light Company and NEER, including wind plants and their associated facilities. I hold a Bachelor of Science Degree in Electrical Engineering from the University of Technology, Jamaica in 1996 and a

1 Master's in Business Administration Degree from Nova Southeastern University in
2 Florida in 1999. My resume is attached as Exhibit MT-1.

3
4 **Q. HAS THIS TESTIMONY BEEN PREPARED BY YOU OR UNDER YOUR**
5 **DIRECT SUPERVISION?**

6 A. Yes.

7
8 **Q. HAVE YOU PREVIOUSLY TESTIFIED BEFORE THE SOUTH DAKOTA**
9 **PUBLIC UTILITIES COMMISSION?**

10 A. Yes, I submitted testimony in Docket EL18-019 related to Crowned Ridge Wind II's
11 request for a facility permit for a transmission line and in Docket No. EL19-003 related to
12 Crowned Ridge Wind, LLC's wind application.

13
14 **PURPOSE OF TESTIMONY**

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

16 A. The purpose of my testimony is address the design, construction, operation and
17 maintenance ("O&M"), and decommissioning of the proposed CRW II Facility ("Wind
18 Facility" or "Project").

19
20 **DESIGN AND CONSTRUCTION**

21 **Q. PLEASE DESCRIBE THE TECHNICAL DESIGN SPECIFICATIONS OF THE**
22 **WIND TURBINES.**

1 A. The Crowned Ridge Wind Farm would consist of 132 three bladed, horizontal-axis wind
2 turbines. The Project will utilize GE 2.3MW turbines with 116-meter (381-foot) rotor
3 diameter and 90-meter (295-foot) hub height. GE 2.3MW turbines with 116-meter (381-
4 feet) rotor diameter and an 80- meter (262-foot) hub height will also be utilized in select
5 locations.

6
7 The tubular towers proposed for the Project are conical steel structures and consist of 3
8 tubular steel sections with bolted connections. A steel door at the base of the tower
9 provides secure access. An internal ladder with fall protection, which is connected to the
10 steel wall of the tower, provides access to the top of the tower. The turbines will be
11 grounded in accordance with National Electrical Safety Code (“NESC”) standards and
12 comply with all Federal Aviation Administration (“FAA”) requirements. The towers
13 will be painted off-white to minimize visual impact.

14
15 The main mechanical and electrical components of the wind turbine are housed in the
16 nacelle. The nacelle is mounted on a sliding ring that allows it to rotate, or “yaw,” into
17 the wind. The nacelle components include the drive train, gearbox, and generator. The
18 nacelle is housed in a steel-reinforced fiberglass shell that protects internal machinery
19 from the environment. The housing is designed to allow for adequate ventilation to cool
20 internal machinery. The nacelle is externally equipped with an anemometer and a wind
21 vane to measure wind speed and direction. The generated electricity is conducted through
22 cables within the tower to the down tower assembly mounted at the base of the turbine
23 tower. A rotor assembly is mounted on the drive shaft and operates upwind of the tower.

1 Also, electric motors within the rotor hub vary the pitch of each blade according to wind
2 conditions to maximize turbine efficiency at varying wind speeds.

3 **Q. PLEASE DESCRIBE HOW THE TURBINES WILL BE CONSTRUCTED.**

4 **A.** The wind turbines will be constructed at a location that meets both permit and geological
5 subsurface requirements. These locations are documented on a site plan with permitted
6 access roads and crane path that would provide access during construction. At the
7 foundation location, topsoil would be stripped and stockpiled for reclamation. The
8 foundation is designed based on the physical attributes of the turbine tower (height and
9 weight) and the geological characteristics of the soil below the ground. Equipment is used
10 to excavate an 8 feet deep by 50 feet wide depression to facilitate the rebar cage, anchor
11 bolts, and concrete for the foundation. The concrete is transported from either an on-site
12 or off-site batch plant and poured over the nested rebar within the form. After the
13 concrete has been cured, the native soil is used to back fill/cover up the majority of the
14 foundation, leaving a one foot reveal known as pedestal, which will accommodate the
15 turbine tower. The base section of the tower is affixed to the pedestal with anchor bolts.
16 The mid and top sections are then sequentially connected with bolted flanges. The
17 remaining excavated soil will be used to construct a pad to facilitate set up for the crane
18 needed to raise tower sections, rotor, blades, and nacelle.

19
20 **Q. PLEASE EXPLAIN WHAT REMEDIAL ACTIVITIES WILL OCCUR AFTER**
21 **CONSTRUCTION.**

22 **A.** After construction is concluded, crane paths and construction access roads are reclaimed
23 to a width of approximately 16 feet to accommodate O&M activities. A post

1 construction erosion plan is implemented to prevent site degradation due to water runoff.
2 All wind turbine service roads constructed or widened for temporary construction efforts
3 will be removed, sub-based, e-compacted, and replaced with previously stockpiled native
4 topsoil such that the land is restored to pre-construction conditions.

5
6 **Q. PLEASE DESCRIBE THE DESIGN OF THE COLLECTOR SUBSTATION.**

7 A. The collector substation is a fully fenced facility located approximately in the geographic
8 center of the wind farm. The seven feet high fence is topped with one foot of barbed wire
9 for a total of eight feet. The fence has an 18-20 feet wide access gate for equipment and
10 vehicular access and man gate for personal access during operations. Located within the
11 fenced area are equipment such as 34.5 kilovolt (“kV”) medium voltage breakers,
12 switches, support structures with insulators, and bus work used to connect the collector
13 system to the generator step up unit (“GSU”). At the 230kV high voltage side of the
14 substation are switches, breakers, metering unit, support structures with insulators, and
15 bus work used to connect the substation to the transmission pull-off structures. The
16 design of the station takes into account the clearance requirement as recommended by
17 various governing bodies such as Institute of Electrical and Electronics Engineers and
18 NESC. A control house is located within the fenced area and it contains all the
19 controlling devices such as relay panels, Supervisory Control and Data Acquisition
20 (“SCADA”) Panels, communication panel, battery, and Programmable Logic Controls
21 needed for the safe and reliable operation of the site.

22

1 **Q. PLEASE DESCRIBE HOW THE COLLECTOR LINES WILL BE**
2 **CONSTRUCTED FROM THE TURBINES TO THE COLLECTOR**
3 **SUBSTATION.**

4 **A.** Each wind turbine will be connected to the Project's collector substation by underground
5 power cables called collection lines and fiber optic communication cables. A pad-
6 mounted transformer at each turbine location converts the power from 690 volt to 34.5
7 kV. The permitted paths for the collection lines are included in the construction design
8 drawings. The collection line contractor uses specialized equipment, known as trenchers,
9 to open trenches approximately 12 inches wide and at least 36 inches deep, while
10 simultaneously laying the power and fiber cables at the bottom of the trench. The trench
11 is then backfilled. Junction boxes are installed above-ground where splicing of collection
12 lines is required. In areas where trenching is not permitted, collection lines are installed
13 using horizontal directional bores.

14
15 **Q. PLEASE DESCRIBE HOW THE METEOROLOGICAL TOWERS ("MET")**
16 **TOWERS WILL BE CONSTRUCTED.**

17 **A.** The permanent METs are installed in a predetermined location that gives the best
18 indication of the site's wind resource. The tower is selected based on the hub-height of
19 the turbines to be installed. The foundation for the MET tower will be designed to meet
20 the tower characteristics (height and weight) and the characteristics of the sub surface
21 soil. In order to install the MET tower, the contractor would complete the following
22 tasks:

- 23 • Clear and grub MET tower site;

1 by activating sensors that compare wind speed, ambient temperature and rotor (blade)
2 rpm to the power output of the turbine. If the ice buildup is at a level that causes the
3 turbine output to be outside expected limits set by GE, the turbine will automatically shut
4 down. In addition, ice buildup can be detected through higher than normal vibration, in
5 which case the turbines will shut down automatically.

6 Q. Will a cold weather package be used for CRW II?

7 A. Yes, CRW II's turbines will have an extreme cold weather package that allows the
8 turbines to operate in temperatures as low as - 40 degrees Fahrenheit.

9 **Q. PLEASE DESCRIBE WHAT IS INVOLVED IN THE O&M OF THE WIND**
10 **FACILITY.**

11 A. The Project is monitored 24/7 by a SCADA system. This system technology enables the
12 monitoring and controlling of the entire Project, including the wind turbines. The
13 SCADA system collects data and allows real time adjustments to be made to the turbines
14 to ensure optimum performance. The wind technicians are located on site at the O&M
15 building and constantly monitor via inspections the performance of the turbines to ensure
16 that they are operating in a safe, reliable, and efficient manner. The Commercial
17 Operations Center, a full-time remote monitoring and control facility located in Denver
18 Colorado, further ensures safe and reliable operations by providing remote real-time
19 monitoring of the Project 24 hours a day, 7 days a week.

20
21 **Q. HOW MANY PERSONNEL WILL BE EMPLOYED TO CONDUCT O&M?**

22 A. The Project site will employ approximately 7-12 employees, including wind technicians,
23 a wind technician lead, and a site manager, who have the following duties:

1 **Q. WILL THE WIND FACILITY BE DECOMMISSIONED AT THE END OF ITS**
2 **USEFUL LIFE?**

3 A. Yes.

4 **Q. WHO WILL BE RESPONSIBLE FOR THE DECOMMISSIONING COSTS?**

5 A. CRW II will be responsible for all decommissioning costs.

6 **Q. PROVIDE AN OVERVIEW OF THE DECOMMISSIONING PLAN.**

7 A. The decommissioning of the CRW II project will involve:

- 8 • Removal of 132 wind turbine generators and all existing above ground facilities;
- 9 • Removal of roads and staging areas that are not desired by land owners to remain in
10 place;
- 11 • Restore property or properties to pre-construction conditions;
- 12 • Restore property or properties with site specific characteristics such as topography,
13 vegetation, drainage and other unique environment features; and
- 14 • Repair county roads impacted by movement of oversized loads or heavy haul vehicles
15 and frequent vehicle trips.

16

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

18 A. Yes.

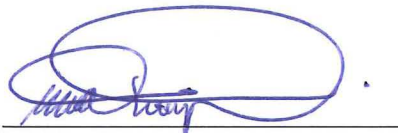
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3 STATE OF FLORIDA)

COUNTY OF PALM BEACH) ss
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I, Mark Thompson, 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.



Mark Thompson

Subscribed and sworn to before me this 26th day of June 2019.

SEAL



Notary Public

My Commission Expires _____

