BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF SOUTH DAKOTA

IN THE MATTER OF THE APPLICATION BY AVANGRID RENEWABLES, INC. FOR A PERMIT FOR A WIND ENERGY FACILITY IN DEUEL COUNTY, SOUTH DAKOTA, FOR TATANKA WIND FARM

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PRE-FILED DIRECT TESTIMONY OF MARK MULLEN, ON BEHALF OF TATANKA RIDGE WIND, LLC

June 17, 2019

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Q. Please state your name, employer and business address for the record.

A. My name is Mark Mullen and I am a Regional Director – Engineering with Avangrid Renewables, LLC., the Owner of Tatanka Ridge Wind Project, LLC. My office location is 1125 NW Couch Street, Suite 700, Portland, OR 97209.

Q. Briefly describe your educational background.

A. I have a Bachelor of Science in Civil Engineering from Colorado State University (1982) and a Master of Business Administration from the University of Phoenix (1988). I am a registered Professional Engineer in the State of Colorado (No. 25480).

Q. Briefly describe your professional experience.

A. I have been employed in the energy industry for over 35 years, providing engineering, project management, and development support to nuclear, gas, coal, ethanol, wind and solar facilities. I have been employed by Avangrid Renewables for approximately 10 years, providing technical support to the development of both wind and solar generation projects, including the Tatanka Ridge Wind Project.

Q. Have you attached a resume or CV.

A. Yes, my resume is attached.

Q. Have you previously submitted or prepared testimony in this proceeding in South Dakota?

A. No, I have not.

Q. What is the purpose of your direct testimony?

A. My testimony will support the portions of the application which discuss and illustrate the construction and potential decommissioning of the project. Those sections are 4, 7.0-7.1.7, 11.6, 19, and 20.

Q. What type of foundation will be used?

A. Although the final design is not yet complete, Tatanka Ridge plans to use a spread footing foundation design. Foundations for the towers will be approximately 60 feet in diameter, with a depth of approximately 10 feet, and will use approximately 300-400 cubic yards of concrete. Except for approximately 6 inches that will remain aboveground to allow the tower to be appropriately bolted to the foundation, the tower foundation will be underground. A specific foundation design will be chosen based on a geotechnical investigation conducted at each turbine location.

The excavated area for the turbine foundations will typically be approximately 90 feet in diameter. During construction, a larger area approximately a 200-foot radius may be used to store turbine components and material, lay down the rotors, and maneuver cranes and equipment during turbine assembly. The final limits of disturbance will be determined by the Contractor and subject to easement and permit conditions.

Q. How will construction impact the roads in the project area?

A. Where practicable, existing public roads, private roads and field paths will be utilized to access Project components. The existing roads may require improvements before, during or following construction. Where necessary, new access roads will be constructed between existing roadways and Project components. The new and improved access roads will be all-weather, gravel surfaced and generally up to approximately 16 feet in width. During construction, some of the access roads will be widened to accommodate movement of the turbine erection crane, with temporary widths of up to 50 feet.

Separate access may be required for the cranes used to erect the wind turbines. In such cases, temporary crane paths will be utilized between turbine locations. Following completion of

construction, the temporary crane paths will be restored pursuant to the contractual easement obligations. The final access road design will be dependent on geotechnical information obtained during the engineering phase.

Large construction cranes may spend as little as one day at each turbine site before moving on to the next. Cranes are sometimes moved cross-country rather than by using the developed access roads. There are a number of reasons for such cross-country movement including efficiency and economics. Taking a more direct route saves time. Breaking down the crane is time-consuming and costly. This type of cross-country walking enables the crane to be moved without complete de-rigging and disassembly. Walking cranes on county roads or state highways is generally avoided as that could impede traffic and damage roads. Where cranes are required to travel cross-country, workers may lay down some form of cribbing, bedding or mats to support the weight of the crane depending upon the underlying ground conditions. The cribbing or mats will be removed following passage of the crane, to be re-used elsewhere.

Q. Will the project utilize a laydown area? If so, what can you tell us about that?

A. Tatanka may grade a temporary laydown/staging areas of up to approximately 10 acres within the Project Area on land under lease (Figure 2). Two potential locations for the laydown/staging area have been identified. Should an O&M facility not be constructed within the Tatanka Ridge site, the area identified for the O&M facility may also be utilized as a construction laydown/staging area. The laydown/staging area will provide parking for construction personnel, staging area for equipment and material deliveries and potentially maintain an on-site temporary concrete batch plant during construction. If a temporary batch plant is determined to be required for the Project, to supply concrete for foundations onsite, it will be strategically placed to avoid cultural resources and other known constraints and will

temporarily impact approximately 5 acres of the 10-acre laydown/staging area.

The laydown/staging area will also be used to conduct minor maintenance on construction equipment and vehicles and to store fuel. On-site fuel storage will have secondary containment and will be inspected regularly, with containment being remediated promptly in accordance with the Project's Spill Prevention, Control and Countermeasures (SPCC) Plan. Fuel handling activities and spill remediation will also adhere to the procedures outlined in the Project's SPCC Plan.

Q. Will you construct an operations and maintenance facility?

A. Possibly. Tatanka Ridge will either utilize an existing O&M facility at the Coyote Ridge Wind Farm in Brookings County, or construct a new facility within the Tatanka Ridge site. If constructed on the Tatanka Ridge site, the O&M facility will be located within the Project Area, in a location with proper transportation, communications facilities and ease of access to Project facilities (Figure 2). Construction of the up to 5-acre O&M facility will require a building permit from Deuel County. O&M buildings are typically approximately 5,000 square feet and house the equipment and personnel necessary to operate and maintain the Project. Ambient conditions within the O&M facility will need to be maintained to meet equipment operating requirements and/or to support the presence of maintenance personnel. Heating may be provided by propane stored on site. Although the electric power demands of the O&M building and the operating equipment will be supplied from the grid, emergency power generation may also be available on-site via a diesel/propone engine/generator set.

There is a possibility that a new O&M facility may not be constructed on site and those services may be housed in an adjacent wind project facility. Should this option be selected, the O&M site identified may be used as a laydown/staging area as described previously.

Q. What will the project use to connect the towers electrically?

A. The proposed collector system layout based on the proposed turbine configuration is shown on Figure 2. From the step-up transformers, power will run through an underground and/or overhead system of collection cables, junction boxes, and electrical equipment, referred to as a collector system, that connects to the Project collection substation. Up to 46 miles of underground circuits may be installed by trenching, plowing or, where required, directionally boring the cables underground to avoid sensitive environmental conditions or meet other requirements. Generally, the electrical collector lines will be buried with marking tape to meet the appropriate electrical code. Tatanka will register the appropriate underground facilities with the South Dakota One-Call system.

Up to 10 miles of overhead collector may be installed instead of underground collectors at that location. Up to three overhead circuits may be constructed and supported on single poles along the overhead collector route.

Q. Will communications systems connect the towers? If so, tell us about them?

A. When installing the collector system, Tatanka will also install fiber optic communication systems connecting each of the Project's wind turbines to the Project collection substation and provide for communication among the wind turbines, collection substation, O&M facility and electrical grid as part of SCADA (see Section 4.2.6). If underground, the electrical and fiber optic cables will be placed in the same trench wherever possible and may include occasional aboveground junction boxes.

Q. What type of substation will be used by the project?

A. The collection substation will be located on the east side of the Project Area and will consist of a main power transformer, circuit breakers, switching devices, auxiliary equipment, a

control enclosure containing equipment for proper control, protection, monitoring and communications and associated equipment and facilities. The principal function of the substation is to increase the voltage from the 34.5 kV at the collector system to the voltage of the 345 kV transmission line, which will transport the electricity of the entire Project to the grid via the interconnection switching station. The collection substation will be located within a fenced area. The fence will be designed in accordance with industry standards to provide safety and security.

Up to 5 acres of land will be leased or purchased to facilitate construction and operation of the collection substation. As discussed in Section 4.2, Tatanka requests that the permit allow Project facilities, including the collection substation, to be modified as needed provided that the new locations are on land leased for the Project, cultural resource impacts are avoided and conditions specified in the Energy Facility Permit.

Q. What land requirements have you identified?

A. Temporary construction and long-term operational land requirements are identified in Table 4-3.

Q. Please briefly describe the construction process.

A. Construction is expected to require a period of between 9 to 16 months to complete. Tatanka anticipates beginning construction as early as possible in the spring of 2020 and completing construction by December of 2020. In general, the construction process will begin with the clearing and grading of laydown/staging areas, roads, O&M facility, and project substation sites. Work will then commence on the construction of access roads and excavation and construction of turbine foundations. Substation, collector system, and O&M facility construction will also be commencing. Once the turbine foundation concrete has cured sufficiently, turbine erection will commence. Following the completion of turbine erection and

facilities construction, turbine commissioning and plant startup will begin. Once commissioning and startup is complete, site restoration activities will be completed.

Q. Have you identified impacts to the surrounding residents and communities from construction? If so, please discuss them.

A. During the construction phase, temporary impacts are anticipated on some public roads in the vicinity of the Project Area, however local traffic will continue to have safe access though the area. Roads will be affected by the transportation of equipment to and from the Project. Construction traffic will use the existing township, county and state roadway system to access the Project and deliver construction materials and personnel. During the construction phase, several types of light, medium and heavy-duty construction vehicles will travel to and from the Project Area, as well as private vehicles used by construction personnel. Some roads may also be temporarily expanded along specific routes as necessary to facilitate the movement of equipment.

Construction activities will increase the amount of traffic using local roadways, but such use is not anticipated to result in adverse traffic impacts. Project personnel and contractors will be instructed and required to adhere to speed limits commensurate with road types, traffic volumes, vehicle types and site-specific conditions to ensure safe and efficient traffic flow. The Project will obtain road use agreements prior to starting construction.

Q. How many workers will you need? Where will they live during construction?

A. The Project is expected to employ approximately 200 temporary construction workers during an estimated 8-month peak construction period to support Project construction. It is likely that general skilled labor is available in the surrounding counties or the state to serve the basic infrastructure and site development needs of the Project. Specialized labor will be required for

certain components of Project construction. It is likely that this labor will be imported from other areas of the state or from other states, as the relatively short duration of construction makes special training of local or regional labor impracticable.

The estimated number of construction jobs by classification and annual employment expenditures during construction are included in Table 17-1; however, the exact number of jobs during the peak of construction may be higher.

Q. Can you speak about decommissioning?

A. Yes. A Decommissioning Plan and estimated cost analysis was prepared for the Project and is included in Appendix R. The estimated net decommissioning costs for the Project are summarized in Table 4 of the Decommissioning Plan. The net decommissioning cost (in 2018 US dollars) is estimated to be $4,989,020 assuming salvage and no resale of Project components. The current cost of decommissioning the Project is estimated to be approximately $89,090 per turbine. This cost includes a partial offset from the salvage value of the towers, turbine components and electrical equipment. The detailed reclamation cost estimate is provided in Table 3 of the Plan.

Q. How will you coordinate activities with local emergency response?

A. Tatanka and its construction team will coordinate with first responders, including but not limited to air ambulance, local sheriff's office(s) and local fire services to develop an emergency management plan during construction and operation of the Project. Tatanka will also be in contact with local first responders to offer information about the Project and to answer any questions response teams may have regarding Project plans and details.

Q. Please describe the regional landforms of the proposed project area.

A. The proposed Project is located within the Coteau des Prairies division of the Central

Lowland physiographic region of South Dakota, a highland area between the Minnesota-Red River Lowland and the James River Lowland to the west. This landform is part of a plateau that extends through North Dakota into Canada. It is drained to the south by the Big Sioux River. Glacial drift thickness is approximately 600 to 800 feet in the vicinity of the project site and can generally be considered an approximate depth of materials overlying bedrock.

Q. What is the underlying geology of the region?

A. The surficial geology of the Project area consists of Quaternary and Upper Wisconsin glacial deposits. **Error! Reference source not found.** illustrates the surficial geology present within the Project area. Below the surficial deposits, a layer of glacial deposits occurs about 700-800 feet in thickness. The majority of this layer consists of late Wisconsin and pre-Wisconsin glacial tills, while there are also smaller areas of late Wisconsin and pre-Wisconsin glacial outwash of sand and gravel. The bedrock geology of the Project area consists of mostly Upper Cretaceous Kp – Pierre Shale with Kn – Niobrara Formation in the western portion of the Project area. The Niobrara Formation consists of chalks, marls, and chalky shales with some bentonite. The thickness of the Niobrara Formation in Deuel County ranges from about 100 to 150 feet and is likely thinner in the project area where the overlying Pierre Shale has been removed and the ancient bedrock channel has carved into the Niobrara Formation. The Pierre Shale consists primarily of light-gray to black shale. The total thickness of the Pierre Shale in Deuel County is less than 100 feet. **Error! Reference source not found.** shows the bedrock geology relative to the Project area.

Q. Is there significant risk of seismic activity or subsidence in the area?

A. No, the risk of seismic activity in the Project area is extremely low. According to the South Dakota Geologic Survey (SDGS), no earthquakes have ever been recorded in Deuel

County from 1870-2013. Furthermore, there are no active or inactive faults in the Project area vicinity. The risk for ground subsidence is minimal in the Project area. Most of the surficial soils are compact, there are no known underground mines in the area, and the natural geology is not a karst landscape; therefore, the potential for ground subsidence is negligible.

Q. Are there expected impacts on local geological conditions?

A. The geologic conditions within the Project Area are appropriate for the construction of the Project and will result in negligible impacts on geologic resources. Excavation, bearing and groundwater conditions are anticipated to be conducive to construction and operation of the Project facilities.

Q. Are there expected impacts to existing communication infrastructure?

A. No. Tatanka Ridge hired a consultant to conduct an analysis in 2019 to identify all communications towers and FCC-licensed communication antennas that exist in the Project vicinity (Appendix K). Additionally, a consultant was hired to identify licensed and applied coordinated non-federal microwave paths that could limit the placement of the Project wind turbines (Appendix L). This consultant also conducted an analysis in of AM and FM radio broadcast stations within 30 kilometers (km, 18.6 miles) of the Project (Appendix M). The results of these analyses show that Project will not adversely impact existing communication infrastructure.

Q. Are there expected impacts from stray voltage associated with the project?

No. Impacts from stray voltage typically result from improper grounding of electrical service to the farm (distribution lines) or on-farm electrical wiring. Transmission and collector lines do not create stray voltage because they do not connect to businesses or residences and they are typically grounded properly. Tatanka Ridge will take measures, such as proper grounding, to

prevent stray voltage.

Dated this 17day of June 2019.

/s/

Mark Mullen