

BEFORE THE POWER SITING BOARD OF THE STATE OF OHIO

In the Matter of the Application of Hardin Wind)
Energy, LLC for a Modification to its Certificate to)
Install and Operate a Wind-Powered Electric) **16-2404-EL-BGA**
Generation Facility in Hardin County, Ohio.)

Members of the Board:

Chairman, Public Utilities Commission	Ohio House of Representatives
Director, Development Services Agency	Ohio Senate
Director, Department of Health	
Director, Department of Agriculture	
Director, Environmental Protection Agency	
Director, Department of Natural Resources	
Public Member	

To the Honorable Power Siting Board:

Please review the attached Staff Report of Investigation, which has been filed in accordance with Ohio Power Siting Board rules. The application in this case is subject to an approval process as required by Section 4906.03 of the Ohio Revised Code.

Sincerely,



Patrick Donlon
Director, Rates and Analysis
Public Utilities Commission of Ohio

OPSB STAFF REPORT OF INVESTIGATION

Case No.: 16-2404-EL-BGA (modifying 09-0479-EL-BGN, 11-3446-EL-BGA, and 16-0469-EL-BGA)

Project Name: Hardin Wind Farm

Project Location: Hardin County

Applicant: Hardin Wind Energy LLC

Application Filing Date: December 19, 2016

Inspection Date: Field inspection not necessary

Report Date: February 21, 2017

Applicant's Waiver Requests: None

Staff Assigned: D. Collins, M. Bellamy, A. Conway

Application Description

In Case No. 09-0479-EL-BGN, the Ohio Power Siting Board (Board) authorized Hardin Wind Energy LLC (Applicant) to construct a major utility facility, specifically a wind-powered electric generating facility consisting of up to 200 turbine sites with a combined generation capacity of 300 megawatts (MW). The facility would be located in Hardin County, Ohio. The Applicant filed the original Application for a Certificate of Environmental Compatibility and Public Need on July 10, 2009. The Applicant filed a revised application on September 18, 2009, and the Board issued an Opinion, Order, and Certificate (the Original Certificate) on March 22, 2010, for the construction of the wind farm (Hardin Wind Farm).

On June 3, 2011, the Applicant filed an application to modify the Original Certificate, in Case No. 11-3446-EL-BGA (11-3446), which the Board approved on August 29, 2011. The 11-3446 application proposed to construct the Hardin Wind Farm in three phases; use taller turbine models; and relocate turbine layouts, collection lines, access roads, and associated facilities.

On June 5, 2014, the Applicant filed Case No. 14-1030-EL-BGA, which the Applicant later withdrew. The Board issued an Entry to dismiss Case No. 14-1030-EL-BGA on November 12, 2015.

On March 24, 2016, the Applicant filed Case No. 16-0469-EL-BGA (16-0469). The Applicant proposed adding the GE 2.3-116 80-meter hub height (2.3 MW) turbine model for use in this project. On April 27, 2016, the Applicant filed a supplement seeking consideration of the GE 2.3-116 turbine model with a hub height of 94 meters. On December 16, 2016, the Applicant filed another supplement seeking to remove specified turbine locations from consideration in this project and express its commitment to additional provisions. On February 2, 2017, the Board approved 16-0469 subject to the conditions set forth in the Original Certificate, 11-3446, and the additional conditions recommended by Staff in 16-0469.

On December 19, 2016, the Applicant filed the present application seeking consideration of the GE 2.5-116 (2.5 MW) turbine model with a hub height of 90 meters for use in this project. The turbine locations and location of the project's associated facilities would remain unchanged.

Application Review

The only modification in the Applicant's present filing is the inclusion of a new upgraded turbine model (GE 2.5-116), with a slightly greater per-turbine capacity and an intermediate hub height, to the list of acceptable turbine models for this project. As such, Staff's review of the Applicant's request is solely focused on this turbine model and whether its addition to the list of acceptable turbine models would impact any of the stipulated conditions or result in a material increase in environmental impact as compared to the original project.

The Board previously certificated the Applicant's use of the GE 1.5 xle and GE 1.6-100 turbine models in the Original Certificate and 11-3446, respectively. The Board certificated turbine model GE 2.3-116 with either an 80-meter or 94-meter hub height in 16-0469. The dimensions of the previously certificated turbine models and the proposed turbine model in this amendment, the GE 2.5-116, are detailed in the following table.

	Turbine Model (hub height)	Rotor Diameter	Tip Height
Proposed	<i>GE 2.5-116 (90 m)</i>	381 feet	486 feet
Approved	GE 1.5 xle	271 feet	398 feet
	GE 1.6-100	328 feet	492 feet
	GE 2.3-116 (80 m)	381 feet	453 feet
	GE 2.3-116 (94 m)	381 feet	499 feet

Applicable to the Original Certificate and subsequent modifications in 11-3446 and 16-0469, 750 feet in horizontal distance from the tip of the turbine's nearest blade at 90 degrees to the exterior of the nearest, habitable, residential structure is the minimum distance a turbine is authorized to be located in proximity to a habitable structure on an adjacent property, without property owner approval. Likewise, applicable to the Original Certificate, 11-3446, and 16-0469, the property line setback is equal to a horizontal distance, from the turbine's base to the property line of the wind farm property, equal to one and one-tenth times the total height of the turbine structure as measured from its base to the tip of its highest blade. Using these requirements, the applicable setbacks for the proposed and previously certificated turbine models are detailed in the following table:

	Turbine Model (hub height)	Residential Setback	Property Line Setback
Proposed	<i>GE 2.5-116 (90 m)</i>	941 feet	535 feet
Approved	GE 1.5 xle (100 m)	886 feet	438 feet
	GE 1.6-100	914 feet	541 feet
	GE 2.3-116 (80 m)	941 feet	498 feet
	GE 2.3-116 (94 m)	941 feet	549 feet

As shown in the table above, the proposed turbine model in this application would not require a greater setback than the largest of the previously approved turbine models.

Therefore, with regard to compliance with the required minimum setback distances for each turbine, Staff finds that the addition of the proposed turbine model does not create the need for any

additional conditions or result in a material increase in environmental impact when compared to the previously certificated project. Consistent with the Original Certificate, if the location of a wind turbine does not meet the applicable setback, it may not be constructed unless the Applicant secures appropriate executed waiver(s) of the minimum setback requirement.

High Winds

Wind turbines are designed to withstand high wind speeds. Staff reviewed the safety features of the GE 2.5-116 turbine model and its ability to withstand high winds.

In relation to high wind speeds, Staff determined that the addition of the proposed turbine model would not pose any material increase in environmental impacts as compared to the previously certificated project and that Conditions 44, 48, and 49 from the Original Certificate adequately address potential wind speed-related safety considerations relative to the proposed GE 2.5-116 turbine model.

Safety Manual

The Applicant is required to provide the generation equipment manufacturer's safety standards, such as a safety manual or similar document. Staff reviews this safety information to ensure safety requirements or recommendations are and will be upheld by the wind farm owner/operator and for inclusion in the wind farm operator's overall safety culture. Staff reviewed the safety manual and documents for the proposed turbine model.

In relation to the safety manual, Staff determined that the addition of the proposed turbine model would not pose any material increase in environmental impacts as compared to the previously certificated project and that Conditions 48, 49, 50, and 55 from the Original Certificate adequately address the potential safety considerations relative to the proposed GE 2.5-116 turbine model.

Noise

Noise would be generated during both construction and operation of the wind farm facility. Construction noise would be associated with construction equipment and construction procedures that are common to many large-scale construction activities. However, Staff determined that the adverse impact of this noise would be minimal because of the transient nature of the construction activities, the distance of the activities from most residential structures, the limitation of construction activities to normal daytime working hours, and noise mitigation that has been proposed in the application.

During facility operation, noise would be associated with the nacelle and turbine blades when the units are generating electricity. Staff reviewed the potential noise impacts in both the Original Certificate and the present application. The noise study presented in this application showed that the proposed GE 2.5-116 turbine model would not impact any non-participating residence at sound levels greater than the ambient noise level plus five dBA, as required by the conditions of the Original Certificate, 11-3446, and 16-0469. The Applicant stated, and Staff confirmed, that the proposed GE 2.5-116 turbine model has the same or lower sound power output levels at all wind speeds than the GE 2.3-116 model.

Therefore, in relation to noise impact, Staff determined that the proposed turbine model would not pose any material increase in environmental impacts as compared to the previously certificated

project and that Conditions 36 and 37 of 16-0469 adequately address the potential noise impact of the proposed GE 2.5-116 turbine model.

Shadow Flicker

Shadow flicker from wind turbines occurs when rotating wind turbine blades pass between the sun and the viewer at low solar elevation angles. The shadow of the moving blades creates a visual effect known as shadow flicker.

Staff determined that rotor diameters and turbine locations for both the certificated and the proposed turbine models are the same, while the turbine hub height of the proposed model is lower (90 meters) than the previously approved model (94 meters). The lower hub height reduces the number of non-participating residences modeled to receive more than 30 hours per year of shadow flicker by one residence.

Therefore, in relation to shadow flicker, Staff determined that the proposed turbine model would not pose any material increase in environmental impact as compared to the previously certificated project and that Conditions 34 and 35 of the Original Certificate adequately address the potential shadow flicker impact of the proposed GE 2.5-116 turbine model.

Blade Shear and Ice Throw

Blade shear occurs when a wind turbine blade, or segment, separates from the rotor and is thrown or dropped from the tower. Ice throw occurs when accumulated ice on the wind turbine blades separates from the blade and falls or is thrown from the blade.

Staff reviewed the potential for blade shear and ice throw in the Original Certificate, 11-3446, 16-0469, and the present application. Both the previously certificated and proposed turbine models have ice detection equipment and safety features that would shut down a turbine if the buildup of ice caused excess vibrations or the speed to power ratio became too high. Also, the previously certificated and proposed turbine models have multiple safety features to address blade shear, including two fully independent braking systems, a pitch control system, and turbine shut-offs in the event of excessive wind speeds, excessive blade vibration, or stress. Further, the range of potential blade velocities and cut-out speeds for both the certificated and the proposed turbine models are the same, thereby resulting in similar probabilities for blade shear and ice throw associated with this turbine model at both a 2.3 MW and a 2.5 MW capacity. Therefore, in relation to blade shear and ice throw, Staff determined that the proposed turbine model would not pose any material increase in environmental impacts as compared to the previously certificated project and that the conditions of the Original Certificate adequately address the potential blade shear and ice throw impacts of the proposed GE 2.5-116 turbine model.

Conclusion

Staff's review of the Applicant's request regarding the proposed turbine model focuses solely on the potential impacts associated with the newly proposed turbine model and whether the proposed turbine model would impact any of the stipulated conditions or would result in a material increase in environmental impact when compared to the original project. The proposed addition of the turbine model to the list of authorized turbine models would not require a change in location of any turbine sites or non-turbine associated facilities. Staff finds that, with the addition of the proposed turbine model, the conditions of the Original Certificate, 11-3446, and 16-0469 are

adequate to ensure that adverse environmental impacts would continue to be minimized for this project.

Recommended Findings

Staff recommends that the Board approve the application related to the proposed inclusion of turbine model GE 2.5-116, which has a slightly greater per-turbine capacity and intermediate hub height, provided that the certificate continues to include the 59 conditions specified in the Opinion, Order, and Certificate for Case No. 09-0479-EL-BGN, the eight Conditions in 11-3446, and the six Conditions in 16-0469.

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Summary: Staff Report of Investigation electronically filed by Mr. Matt Butler on behalf of Staff of OPSB