

BEFORE THE POWER SITING BOARD OF THE STATE OF OHIO

**In the Matter of the Application of Hardin Wind)
Energy, LLC for a Fifth Modification to its Certificate)
to Install and Operate a Wind-Powered Electric) 18-0677-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.

Respectfully submitted,



Tamara S. Turkenton
Director, Rates and Analysis
Public Utilities Commission of Ohio

OPSB STAFF REPORT OF INVESTIGATION

Case Number: 18-0677-EL-BGA (associated with prior case numbers, 09-0479-EL-BGN, 11-3446-EL-BGA, 16-0469-EL-BGA and 16-2404-EL-BGA)

Project Name: Hardin Wind Farm

Project Location: Hardin County

Applicant: Hardin Wind Energy LLC

Application Filing Date: April 25, 2018

Inspection Date: Not Applicable

Report Date: June 6, 2018

Applicant's Waiver Requests: None

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

Application Background and Description

In Case No. 09-0479-EL-BGN, the Ohio Power Siting Board (Board) authorized Hardin Wind 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 up to 300 megawatts (MW). The facility would be located in Hardin County. 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, in Case No. 11-3446-EL-BGA (11-3446), which the Board approved on August 29, 2011. In the 11-3446 application, the Applicant proposed to construct the Hardin Wind Farm in three phases, using taller turbine models, and relocating turbine layouts, collection lines, access roads, and associated facilities.

On June 5, 2014, the Applicant filed Case No. 14-1030-EL-BGA (14-1030), which the Applicant later withdrew. The Board issued an Entry to dismiss 14-1030 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 all conditions currently existing for this project.

On December 19, 2016, the Applicant filed Case No. 16-2404-EL-BGA (16-2404). The Applicant proposed increasing the capacity from 2.3 MW to 2.5 MW by changing the turbine model from the GE 2.3-116 turbine model with a hub height of 94 meters to the GE 2.5-116 with a hub height of 90 meters. On March 2, 2017, the Board approved the application.

On April 25, 2018, the Applicant filed the present application seeking to increase the capacity of the GE 2.5-116 turbine model from 2.5 MW to 2.7 MW (with a new model number of GE 2.7-116) using the previously approved 90 meter hub height. The Applicant also requested approval to use the GE 2.5-127 turbine model with a hub height of 89 meters for use at this project. The turbine locations and location of the project's associated facilities would remain unchanged.

Application Review

The modifications in the Applicant's present filing are the inclusion of a new turbine model (GE 2.5-127), with a slightly lower hub height. The Applicant also proposes to increase the capacity for a current turbine model (GE 2.5-116) from 2.5 MW to 2.7 MW (GE 2.7-116) using the previously approved height of 90 meters. The Applicant is not proposing to revise the location of any turbine or associated facility through this application. Additionally, the overall facility maximum nameplate capacity of 300 MW approved in the Original Certificate would remain the same. Staff's review of the Applicant's request is focused on these turbine model changes only and whether their 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 80m or 94m hub height in 16-0469. The Board later certificated the Applicant's use of the GE 2.5-116 turbine model, at 2.5 MW, in 16-2404. The dimensions of the previously certificated turbine models and the turbine models proposed in this application, the GE 2.7-116 and the GE 2.5-127, are detailed in the following table:

	Turbine Model (hub height)	Rotor Diameter	Tip Height
Proposed	GE 2.5-127 (89m)	417 feet	499 feet
	GE 2.7-116 (90m)	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 (80m)	381 feet	453 feet
	GE 2.3-116 (94m)	381 feet	499 feet
	GE 2.5-116 (90m)	381 feet	486 feet

Applicable to the Original Certificate, 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, 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 the requirements, the applicable setbacks for the proposed and previously certificated models are detailed in the following table:

	Turbine Model (hub height)	Residential Setback	Property Line Setback
Proposed	GE 2.5-127 (89m)	959 feet	549 feet
	GE 2.7-116 (90m)	941 feet	535 feet
Approved	GE 1.5 xle	886 feet	438 feet
	GE 1.6-100	914 feet	541 feet
	GE 2.3-116 (80m)	941 feet	498 feet
	GE 2.3-116 (94m)	941 feet	549 feet
	GE 2.5-116 (90m)	941 feet	535 feet

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 2.7-116 and GE 2.5-127 turbine models and their ability to withstand high winds.

In relation to high wind speeds, Staff determined that the addition of the proposed turbine models 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 2.7-116 and GE 2.5-127 turbine models.

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 models.

In relation to the safety manual, Staff determined that the addition of the proposed turbine models 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 2.7-116 and GE 2.5-127 turbine models.

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 2.7-116 and GE 2.5-127 turbine models 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, 16-0469, and 16-2404.

Therefore, in relation to noise impact, Staff determined that the proposed turbine models would not pose any material increase in environmental impacts as compared to the previously certificated project and that conditions 36 and 37 of the Original Certificate adequately address the potential noise impact of the proposed GE 2.7-116 and GE 2.5-127 turbine models.

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.

The proposed GE 2.7-116 turbine model has the same rotor diameter and turbine locations as the certificated GE 2.5-116 turbine model and therefore would not increase the shadow flicker impact. The shadow flicker report of the proposed GE 2.7-116 turbine model shows that it is modeled to impart more than 30 hours per year of shadow flicker to 31 non-participating residences, which is the same as the certificated GE 2.5-116. Additionally, the shadow flicker report shows that the GE 2.5-127 is modeled to impart more than 30 hours per year of shadow flicker to 52 non-participating residences. Although there is an increase of non-participating residences modeled to receive more than 30 hours per year of shadow flicker, the Applicant has committed to adhere to Condition 34 of the Original Certificate, which limits the annual impact of shadow flicker at a non-participating residence to 30 hours. Before construction the Applicant will demonstrate that no residences are modeled to receive more than 30 hours per year of shadow flicker.

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 2.7-116 and GE 2.5-127 turbine models.

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, 16-2404, 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 shutoffs 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 the proposed GE 2.7-116 and GE 2.5-127 turbine models. Therefore, in relation to blade shear and ice throw, Staff determined that the proposed turbine models 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 2.7-116 and GE 2.5-127 turbine models.

Conclusion

Staff finds that the impacts associated with the proposed additional turbine models would not result in a material increase in environmental impact, as compared to the previously certificated project. Additionally, Staff determines the addition of the proposed turbine models would not impact the Applicant's ability to comply with the conditions of the Original Certificate, but rather the conditions of the Original Certificate 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, provided that the certificate continues to include all conditions previously specified by the Board as applicable to this facility.

Recommended Condition:

The Applicant shall adhere to all conditions of the Opinion, Order, and Certificate for the Hardin Wind Farm in Case No. 09-0479-EL-BGN as modified by this application and associated prior applications.

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