STATE OF VERMONT
PUBLIC SERVICE BOARD

Docket No. 7508

Petition of Georgia Mountain Community Wind, LLC,	)
for a certificate of public good, pursuant to 30 V.S.A.	)
Section 248, authorizing the construction and operation	)
of a 5-wind turbine electric generation facility, with	)
associated electric and interconnection facilities, on	)
Georgia Mountain in the Towns of Milton and Georgia,	)
Vermont, to be known as the "Georgia Mountain	)
Community Wind Project"	)

Order entered: 5/31/2011

ORDER RE: SETBACK REQUIREMENTS

I. INTRODUCTION

On June 11, 2010, the Public Service Board ("Board") issued an Order and Certificate of Public Good ("CPG") approving construction of a wind generation facility by Georgia Mountain Community Wind, LLC ("GMCW"). The June 11 CPG included the following condition: "GMCW shall incorporate into the proposed Project design an appropriate set-back distance from adjacent property lines. The Board will conduct additional proceedings to determine an appropriate set-back distance from the turbines to the adjacent property lines."

In this Order, we determine that the appropriate set-back distance for GMCW's proposed Project is 55 meters.

II. BACKGROUND AND PROCEDURAL HISTORY

During the initial case in this Docket, the Landowner Intervenors raised concern that the location of the turbines, as initially proposed by GMCW, would result in the tips of the blades of

turbines 1, 2 and 3, being located at the FitzGerald property line.[1] In our discussion regarding the appropriate set-back, we concluded:

> GMCW argues that the Landowner Intervenors failed to present a demonstrable safety basis for imposing a setback requirement, such as a setback to the property line based on total turbine height. We disagree; the testimony presented by GMCW indicates that ice throw could impact neighboring landowners and that turbine collapse, while rare, can occur. Accordingly, a wind turbine with its base set as close as one rotor radius from the property line of an adjoining property owner has the potential to impact that owner. Furthermore, while the Board may impose conditions on GMCW to prevent public safety risks on its property, the Board does not have the authority to impose similar conditions (for example, signs to warn snowmobilers of potential ice throw) on adjoining landowners. For this reason, we conclude that a condition requiring GMCW to place the turbines a reasonable distance away from a property line is appropriate to mitigate potential public safety risks associated with ice throw and collapse. Further, we note that other state and local public agencies have addressed potential public health and safety impacts of wind turbines by establishing setbacks based on the size of the turbine, including the blades. Setbacks are not an uncommon requirement in land-use planning; the Vermont Supreme Court in *In re Letourneau*, 168 Vt. 539, 544 (1998) found that setback requirements, which reasonably relate to the public health, safety, and welfare, are a generally valid land-use tool.
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> At the technical hearing, the Board attempted to obtain from the Petitioner's witness other potential setback distances based on the specific properties of the Project site. However, Mr. Zimmerman did not provide any specific alternatives to the 150-foot proposed setback for the three turbines. We conclude that the record in this proceeding lacks sufficient evidence to determine a reasonable setback requirement for this Project. Accordingly, our approval of this Project is conditioned on our determination of a reasonable setback requirement in further proceedings to be held in this docket should GMCW choose to proceed with this Project.[2]

On November 22, 2010, GMCW filed testimony proposing a setback of 55 meters from the base of the turbine to any adjacent property line. GMCW plans to install four GE 2.75 MW

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1. GMCW proposed siting three turbines as close as one rotor radius length (50 meters) from the base of the turbines to the FitzGerald property line. Tr. 2/4/10 at 51-52 (Zimmerman); Jane FitzGerald pf. at 1-2; exhs. Petitioner-PC-2, 8-12.

2. Docket 7508, Order of 6/11/10 at 32-33.

turbines, with a 50-meter (164 foot) blade length, a hub height of 85 (278 feet) meters, and total height when measured to the tip of a blade in the vertical position of 135 meters (443 feet).[3]

On December 22, 2010, Scott and Melodie McLane and Jane and Heidi FitzGerald filed testimony.

On March 10, 2011, the Board held technical hearings on the issue of setbacks.

Briefs were filed on April 5, 2011, by GMCW, Mr. McLane, the FitzGeralds, and the Department of Public Service ("Department")

Reply briefs were filed on April 20, 2011, by the above parties and the City of Burlington Electric Department ("BED").

III. POSITIONS OF THE PARTIES

GMCW states that the evidence it presented at the hearings indicates that "the level of risk to public safety is acceptable and appropriate" and the set-back distance proposed by GMCW "is sufficient to protect the public from undue adverse impacts to health and safety." GMCW contends that, due to operational controls associated with icing conditions, the risk of any ice throw is minuscule, and the risk of large ice dropping from the stationary turbine rotors onto adjoining land is negligible. Additionally, GMCW states that "the risk of blade throw or tower collapse is not a realistic threat to the public, considering that wind turbines are subject to rigorous design standards and an exhaustive analysis in the certification process, including ongoing inspections."

GMCW asserts that "[i]t would be arbitrary and unreasonable to impose a height-based setback simply because other jurisdictions have done so, without a demonstration that such a setback is necessary." GMCW states that the Board should not base its decision on any assumptions related to potential construction on adjoining properties in close proximity to the turbines, as development near the turbines is unlikely due to steep slopes and zoning restrictions. Finally, GMCW states that Section 248 is focused on the public good rather than individual property rights.

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3. Zimmerman supp. pf. at 5.

The Department recommends that the Board establish a property line setback of 1.1 times the total height of the tower, measured when the rotor blade is extended vertically from the tower at its highest point, from property lines. The Department further proposes that site-specific, risk-based setbacks should be permitted where the developer cannot meet that standard. In this case, the Department contends that, although GMCW has presented site-specific, risk-based information, the lands near the project are heavily used for recreation and logging, and could be developed in the future. Given the use near the project site, the Department recommends that the Board require a setback distance of 1.1 times the tower height, unless the adjoining property owners provide waivers. The Department recommends that the Board impose the following conditions:

> There shall be a setback distance of at least 1.1 times the turbine height, measured when the rotor blade is extended vertically from the tower at its highest point height, from the nearest property line, measured from the base of the wind turbine(s), unless a waiver of this standard is obtained from adjoining property owners.
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> If a waiver is obtained, there shall be a setback distance of at least 55 meters from the nearest property line, measured from the base of the wind turbine(s).
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> If a waiver is obtained, prior to operation, Petitioner shall prepare an Icing Mitigation Plan, subject to review by the Department and approved by the Board, which sets forth the protocols used to determine whether turbines present a safety risk to the public from icing and the procedures used to place those turbines in Pause mode, in which the units are inoperative.

Mr. McLane states that GMCW has not proposed any mitigation strategies to address the risks of blade failure or tower collapse, and the operational protocols to stop turbine operation during icing periods are insufficient because GMCW will not have personnel at the site and will rely on remote detection equipment. In addition, Mr. McLane contends that the proximity of the turbines to the property line will interfere with the property rights of the adjoining landowner. Mr. McLane further states that the Board has not directly addressed the issue of setbacks in prior cases. Finally, Mr. McLane states that the manufacturer of the turbines, through a document on setback considerations, recommends setbacks greater than the 55 meters proposed by GMCW.

The FitzGeralds assert that GMCW's proposed setback is insufficient to protect the safety of people using property adjacent to the project site. The FitzGeralds state that the adjacent property is used by hikers, snowshoers, horseback riders, campers, snowmobilers, and all-terrain vehicles. Additionally, the FitzGeralds contend that, while GMCW can post warning signs around the project area on its own land, GMCW does not have authority to do so on adjoining land, and adjoining property owners should not have to do so. The FitzGeralds further state that a 55-meter setback would restrict the development and use of the adjoining property. The FitzGeralds state that "while it is important to look at a scientific assessment of the risks, findings of science should inform the decision but not be the only consideration. A reasonable setback should be based on what an average person would consider to be fair and appropriate."

BED states that it has entered into a power purchase agreement with GMCW for the project's output and "has publicly expressed an interest in purchasing the development rights to the GMCW project . . . ." BED states that its interests "may be negatively impacted if the GMCW project is not approved as proposed" because BED has made significant investment in the GMCW project in evaluating the power purchase agreement and the possibility of purchasing the development rights.

IV. FINDINGS

1. GMCW intends to install GE 2.75 MW turbines, with a 50-meter (164 foot) blade length, a hub height of 85 meters (278 feet), and total height when measured to the tip of a blade in the vertical position of 135 meters (443 feet). Zimmerman supp. pf. at 5.

2. GMCW is proposing to implement a winter operating protocol that will curtail operation of the wind turbines in the event of icing and when extreme weather conditions present unsafe conditions for the general public. Automatic controls would shut down the system under any of the following circumstances:

- The installed ice monitoring device(s) and heated wind sensors (installation subject to reliability testing) detect that unsafe conditions are present due to icing conditions;
- Ice accretion is recognized by the remote or on-site operator;

- Air temperature, relative humidity and other meteorological conditions at the site are conducive to ice formation;
- Air temperature is several degrees above 0 degrees Celsius after icing conditions; and
- Any other weather conditions which appear unsafe.

Exh. Petitioner ML-2 at 6.

3. There are approximately 16 to 18 icing days per year at the site. Exh. Petitioner ML-2 at 9.

4. An ice-throw and ice-drop risk analysis for the proposed project was conducted by GMCW's expert. The results of the ice-throw analysis indicate that, in the absence of any operating protocols, 90 percent of the time a piece of ice would land within 105 meters of the turbine base, and the remaining 10 percent of the time ice would land approximately 105 to 250 meters from the turbine base. Exh. Petitioner ML-2 at 10.

5. The results of the ice-drop analysis indicate that 90 percent of the time a piece of ice would land within 40 meters of the turbine base, and the remaining 10 percent of the time ice would land approximately 40 to 78 meters from the turbine base. Exh. Petitioner ML-2 at 10.

6. The risk analysis indicates that the risk of a fragment of ice dropping and landing in a square meter a specific distance from a project turbine is sharply reduced for distances beyond 55 meters (in the range of the overhang of the wind turbine). Only about one percent of the time will ice drops land beyond 55 meters from the turbine base. Exh. Petitioner ML-2 at 10-11.

7. The ice-drop analysis indicates that only very high winds in a specific direction may cause ice fragments of any significant mass to be blown from a stationary turbine beyond 55 meters from the turbine base. Exh. ML-2 at 10 (Figure 5.1); LeBlanc pf. at 3.

8. The probability of an ice fragment dropping in a particular square meter that is located 55 meters from the turbine base is approximately once in 9,600,000 years. Assuming 16 to 18 days of icing per year, this amounts to an individual risk for a stationary person present for all icing events located 55 meters from the turbine base of once in 278 years. LeBlanc pf. at 3.

9. The likelihood of full blade failure occurring at any speed is approximately 1 in 2,400 turbines per year. Failure of a tip or piece of a blade is even lower at approximately 1 in 4,000 turbines per year. LeBlanc pf. at 7.

10. There is an international standard, IEC 61400 Part 1 (International Electrotechnical Commission), for certification of wind turbines. The certification process evaluates the turbine design, testing, manufacture, and foundation design and includes a test of the safety system. The certification process also requires inspection of the wind turbine on a periodic basis, generally every two years. The inspection should include a detailed inspection of the blades. LeBlanc pf. at 4-5.

11. Certified turbines must have a safety system that is completely independent of the control system. The safety system must have two mutually independent braking systems that can bring the rotor speed under control. LeBlanc pf. at 5.

12. The certification process substantially reduces the probability of blade and tower failures, making the risk of injury from such a failure on par with natural hazards. LeBlanc pf. at 7-8.

V. DISCUSSION

In this Docket, GMCW has submitted site-specific information regarding the risk of ice throw and ice drop at the project site. In addition, GMCW has provided testimony regarding the certification process used by turbine manufacturers to significantly reduce the likelihood of turbine failure. Based upon the information presented, we conclude that the 55-meter set-back proposed by GMCW provides sufficient assurance that the project will not present a threat to public health and safety.

We are persuaded that implementing an icing protocol that will stop the turbine blades from turning in situations where ice accretion on the blades is present will minimize the risks associated with ice throw. Additionally, the GE turbines proposed to be installed by GMCW have undergone a certification process. The likelihood of a blade failure or tower collapse is extremely low during the operational lifetime of a turbine that meets these certification requirements.[4]

Even with operating protocols in place to prevent ice throw, accumulated ice may drop from a stationary turbine. The results of the ice-drop analysis conducted for the proposed project

4. LeBlanc pf. at 6-9.

indicate that there is less than a one percent chance that a piece of ice will land in a particular square meter that is located more than 55 meters from the tower base. In order to address public safety concerns, the analysis also evaluates risks to individuals present during an ice-drop event. Based on the site conditions, the probability of an ice fragment striking a stationary person 55 meters away in a particular square meter is once in every 278 years, assuming that the person is present during every potential icing event. GMCW has demonstrated that the risk to public safety of ice drop will be minimized by siting the turbines at least 55 meters from the property line.

GE recommends that its turbines be set back at least 1.1 times the turbine height, measured at the blade tip in the vertical position, when there are public uses within the set-back distance.[5] For areas with "remote boundaries to property not owned by wind farm participants," GE recommends that the setback be 1.1 times the blade length.[6] The GE guidelines further provide that if developers cannot meet the recommended set-back, they should contact the manufacturer to perform a detailed safety review based on site-specific factors. GMCW contends that the area near the property line is remote, while the FitzGeralds, Mr. McLane, and the Department contend that there is evidence of public use in the area, and the appropriate set-back distance should be larger than 1.1 times the blade length.

Currently, there are no residences or public roads within one-half mile of the proposed turbines.[7] In addition, while there is evidence that the adjoining property is used for recreational purposes, there is insufficient evidence to indicate that the area sees significant use for such purposes.[8] Even if an individual were present on the FitzGerald property line during an icing event, the probability of that person being struck by an ice fragment is exceedingly small. It is reasonable to assume that the risk is further minimized because it is even less likely that an individual would be present at the summit of Georgia Moutain during an icing event with severe

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5. Exh. Board 1 at 5.

6. *Id.*

7. *See,* Docket 7508, Order of 6/11/10 at 56 (finding 168, citing exh. Petitioner-KHK-2 at 16).

8. Tr. 3/10/11 at 159-162 (FitzGerald).

wind conditions than during an icing event without such conditions.[9] The set-back distance we establish today is not based upon general guidelines, such as the GE recommendation, but upon the risk-based assessment performed by GMCW. Furthermore, the GMCW site-specific assessment appears to be consistent with GE's recommendation for a detailed safety review.[10]

Evidence was presented during these proceedings regarding the set-back distances established in other jurisdictions, with many of the setbacks based on turbine height. The Department recommends that the Board adopt a standard set-back distance of 1.1 times the turbine height, measured at the tip of the blade in the vertical position, unless a developer can demonstrate that site-specific, risk-based set-backs should be permitted where the standard cannot be met. Given that GMCW has presented persuasive site-specific, risk-based evidence, we decline to adopt the Department's proposed standard at this time. We see no need to establish a general standard in this proceeding given that the evidentiary record allows us to conclude that, under the specific circumstances presented here, a 55-meter setback will protect public health and safety.

The FitzGeralds and Mr. McLane contend that a 55-meter set-back distance would interfere with the development rights of the adjoining landowners. The purpose of the Board's review under Section 248 is to determine whether a generation or transmission project will promote the public good of the state. In the course of this review, the Board considers the cumulative effect of impacts on individual landowners to the extent those impacts are relevant under the Section 248 criteria. While we strive to ensure that developers minimize the impact of a project on individuals, we cannot deny a CPG based solely on the fact that a project may now, or in the future, negatively impact an individual landowner's property rights.

In its *Bandel* decision, the Vermont Supreme Court stated that in a Section 248 proceeding, "The sole issue is the determination of whether or not under the criteria set forth in

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9. LeBlanc pf. at 3.

10. Although in its guidelines GE suggests that it be contacted for a site-specific analysis, GMCW has presented a credible, expert review of the risks associated with icing. We conclude that GMCW has sufficiently addressed potential safety risks at the site.

the statute the proposal for which a certificate is sought advances the public interest."[11] The Court continued: "Individual property rights not being at issue, they are not a basis for any special recognition of the property owners, nor do they support any special consideration for their protection in these proceedings."[12] Any development will have some impact on nearby landowners, and this project is no exception.[13] Furthermore, given the State of Vermont's policy supporting renewable energy[14] and the benefits that will be provided by the Project as detailed in our June 6 Order, we have determined that the wind turbines proposed by GMCW promote the public good.

In order to demonstrate that a 55-meter set-back distance is appropriate, GMCW is relying on evidence indicating that wind-turbine certification and a winter operating protocol will significantly reduce the risk of turbine operation on public health and safety. Accordingly, we require the turbines used at the site to meet IEC 61400-1 certification standards, and also require GMCW to file a winter operating protocol for Board approval, prior to commencement of construction.

For the reasons set forth above, we adopt the following conditions related to turbine setbacks, turbine certification, turbine testing, and winter operating protocols:

> (1) The turbines shall be set back a distance of at least 55 meters from the nearest property line, measured from the base of the wind turbine(s);
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> (2) Turbines for the proposed project shall meet IEC 61400-1 certification requirements, including periodic testing of the turbines and blades; and
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> (3) GMCW shall prepare a winter operating protocol, subject to review by the parties and approval by the Board prior to commencement of construction, which shall require that the proposed turbines be placed in pause mode under any of the

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11. *Vermont Electric Power Company, Inc. v. Bandel*, 135 Vt. 141, 145 (1977) (quoting *Auclair v. Vermont Electric Power Co.,* 133 Vt. 22 (1974)).

12. *Vermont Electric Power Company, Inc. v. Bandel*, 135 Vt. 141, 145 (1977).

13. Our jurisdiction in this proceeding is limited to review of the proposed project under Section 248 criteria. With regard to individual property owners, any claims involving nuisance or property rights are a matter for the civil courts, not this Board.

14. *See,* 30 V.S.A. § 8001.

following circumstances: (a) installed ice monitoring device(s) or heated wind sensors (installation subject to reliability testing) detect if unsafe conditions are present due to icing conditions; (b) ice accretion is recognized by the remote or on-site operator; (c) air temperature, relative humidity and other meteorological conditions at the site are conducive to ice formation; (d) air temperature is several degrees above 0 degrees Celsius after icing conditions; and (e) any other weather conditions that may result in the unsafe operation of the turbines.

VI. ORDER

IT IS HEREBY ORDERED, ADJUDGED AND DECREED by the Public Service Board ("Board") of the State of Vermont that:

1. The bases of the wind turbines erected by Georgia Mountain Community Wind, LLC ("GMCW") shall be at least 55 meters from the property line of any adjoining landowner.

2. Turbines for the proposed project shall meet IEC 61400-1 (International Electrotechnical Commission) certification requirements, including periodic testing of the turbines and blades.

3. GMCW shall prepare a winter operating protocol, subject to review by the parties and approval by the Board prior to commencement of construction, which shall require that the proposed turbines be placed in pause mode under any of the following circumstances: (a) installed ice monitoring device(s) or heated wind sensors (installation subject to reliability testing) detect if unsafe conditions are present due to icing conditions; (b) ice accretion is recognized by the remote or on-site operator; (c) air temperature, relative humidity and other meteorological conditions at the site are conducive to ice formation; (d) air temperature is several degrees above 0 degrees Celsius after icing conditions; and (e) any other weather conditions that may result in the unsafe operation of the turbines.

Dated at Montpelier, Vermont, this 31st day of May, 2011.

s/James Volz)
)
) PUBLIC SERVICE
)
s/David C. Coen) BOARD
)
) OF VERMONT
s/John D. Burke)

OFFICE OF THE CLERK

FILED: May 31, 2011

ATTEST: s/Susan M. Hudson
Clerk of the Board

NOTICE TO READERS: This decision is subject to revision of technical errors. Readers are requested to notify the Clerk of the Board (by e-mail, telephone, or in writing) of any apparent errors, in order that any necessary corrections may be made. (E-mail address: psb.clerk@state.vt.us)