

**STATE OF VERMONT  
PUBLIC SERVICE BOARD**

Docket No. 7250

Amended Petition of Deerfield Wind, LLC for a certificate )  
of public good authorizing it to construct and operate 17 turbine, )  
34 to 35.7 MW wind generation facility, and associated transmission )  
and interconnection facilities, on approximately 80 acres in the )  
Green Mountain National Forest, located in Searsburg and )  
Readsboro, Vermont, with 7 turbines to be placed on the east side )  
of Route 8 on the same ridgeline as the existing GMP Searsburg )  
wind facility (Eastern Project Area), and 10 turbines along the )  
ridgeline to the west of Route 8 in the northwesterly orientation )  
(Western Project Area) )

**PREFILED REBUTTAL TESTIMONY OF  
KENNETH KALISKI, P.E.**

**ON BEHALF OF DEERFIELD WIND, LLC**

**July 3, 2008**

Summary:

Mr. Kaliski responds to issues raised by several parties in this proceeding regarding noise levels from the Project, and presents the results of his revised noise modeling reflecting the 15-turbine project layout.

1 **Q. Please state your name and occupation.**

2 Response: My name is Kenneth Kaliski. I am an engineer, working with Resource  
3 Systems Group, Inc (RSG).  
4

5 **Q. Have you previously filed testimony in this proceeding?**

6 Response: Yes. I have submitted direct, supplemental, and second-supplemental  
7 direct testimony in this matter.  
8

9 **Q. What is the purpose of your rebuttal testimony?**

10 Response: I respond to issues raised by other parties in this proceeding regarding  
11 noise levels from the Project, and present the results of my revised noise modeling  
12 for the 15-turbine project layout.  
13

14 **Q. By way of background, please summarize your prior testimony.**

15 Response: My earlier testimony reported on the results of an analysis of noise  
16 impacts that RSG conducted on the Deerfield Wind Project. In the last revision of  
17 the Project (December 2007), 17 Gamesa G80 wind turbines were proposed in two  
18 arrays in Searsburg and Readsboro, Vermont. We found that the Project, including  
19 the substation, would not exceed World Health Organization guidelines that are  
20 intended to protect against sleep disturbance and moderate daytime annoyance. In  
21 addition, the Project would not create prominent discrete tones as defined by the  
22 ANSI S12.9 Part 3.  
23

1 **Q. Have you reviewed the revised project layout dated July 2008, consisting of 15**  
2 **turbines (8 on the western string and 7 on the eastern string)?**

3 Response. Yes.

4  
5 **Q. Is the revised project layout within the Project area that you originally**  
6 **investigated?**

7 Response. Yes.

8  
9 **Q. How do the sound levels of the turbines to be used in the revised project**  
10 **layout compare with the turbine type that you modeled in your prior assessment?**

11 Response. The project currently proposes to use two types of wind turbines: the  
12 Gamesa G87 and G80. They are both rated at 2 MW. The G87 has a rated sound  
13 power level of 107.5 and the G80 has a sound power level of 104.9. G87s will be  
14 used in the western array. In the eastern array, Turbines E2 and E3 will be G87s and  
15 the remainder will be G80s.

16 The sound power levels for the G87 and G80 are consistent with the  
17 recommendation in our November 2007 noise report at page 33 (*Deerfield Exhibit*  
18 *KK-4*) that sound power levels from the turbines should not exceed 107.5 dBA (or,  
19 that other combinations of sound power levels, wind turbine siting, and changing the  
20 number of wind turbines be used to achieve the same result).

21  
22 **Q. Have you performed any additional work in connection with the revised**  
23 **project layout?**

1        Response. Yes. I revised the sound modeling based on the 15-turbine layout and  
2        the switch from all Gamesa G80 turbines to a mix of G87s and G80s.

3

4        **Q.        What are the results of your revised noise modeling?**

5        Response. Based on the standard ISO 9613-2 modeling procedure, the model shows  
6        that the highest modeled sound level from the proposed Deerfield project would be  
7        40 dBA. This level would occur at a single residence east of the northernmost  
8        turbine – at the western-most home on Putnam Road (Deerfield Wind informs me  
9        that this property is currently under agreement). With the proposed Deerfield  
10       project and the existing Searsburg project operating concurrently, the combined  
11       modeled sound level is 43 dBA at a residence east of the southern-most project  
12       turbine. This is one dB lower than forecast in our previous testimony for the  
13       project. Noise contour maps showing the modeling results for the “Deerfield Only”  
14       and “Deerfield with Searsburg” cases are *Exhibits DFLD-JZ-32a, b*. The changes  
15       to the modeling section of my noise report are reflected on the attached *Exhibit*  
16       *DFLD-KK-5*.

17

18       **Q.        How often would you estimate that these sound levels would occur at the**  
19       **modeled receptors?**

20       Response. The contours shown in the exhibits cited above assume a moderate  
21       nighttime inversion with winds blowing from the source to the receiver. With more  
22       detailed modeling using 8,760 hours (one full year) of 2005 meteorological data from  
23       the ridgetop meteorological towers, we were able to calculate under what conditions

1 and how frequently these worst-case conditions would occur at the worst-case  
2 receiver cited above. Using meteorological adjustments similar to those described in  
3 Section 7.2.3 of our November, 2007 report (*Exhibit DFLD-KK-4*), we found that  
4 the highest sound levels for the combined Searsburg/Deerfield scenario would occur  
5 under neutral to strong inversions with southerly winds. Given that prevailing winds  
6 are from the west, the worst-case meteorological condition did not persist over an  
7 entire night. As a result, the highest modeled 8-hour average nighttime sound level  
8 was 43 dBA for the combined Searsburg/Deerfield impacts. At that, average  
9 nighttime levels between 40 and 43 dBA are expected to occur less than 10% of the  
10 year. The Project thus complies with the WHO's recommended nighttime guideline  
11 for protection against sleep disturbance of 45 dBA averaged over an 8-hour night.

12

13 **Q. Do the changes to the layout alter your original conclusion that Project-**  
14 **related noise will not result in undue adverse impacts on aesthetics or human health?**  
15 **Please explain.**

16 Response. No, it does not alter my original conclusion. While the sound power  
17 level of some of the turbines increased from our second supplemental direct  
18 testimony, the number of turbines decreased from 17 to 15. As a result, we found  
19 that the worst-case impacts are approximately the same as previously reported. Our  
20 conclusion that the Project will not result in undue adverse impacts on aesthetics or  
21 human health does not change.

22

1 **Q. Mr. Kane for the Department of Public Service suggests in his testimony that**  
2 **the noise compliance standard for the Project should consider the Board's Order in**  
3 **Docket No. 7156 (a 30 dBA interior noise limit) as well as the proposed U.S. Forest**  
4 **Service guideline (a 10 dB relative standard) (Kane pft at 11-12). Do you agree that**  
5 **these two standards should apply to the Project?**

6 Response: Mr. Kane's report cites the original Board's Order in Docket No. 7156.  
7 That Order required the UPC Sheffield project to emit no prominent discrete tones  
8 according to ANSI standards and limited indoor residential sound levels to 30 dBA  
9 (Ldn). The UPC order was revised in October, 2007 to change the measurement  
10 from 30 dBA Ldn (day-night average) to 30 dBA Leq<sub>1-hour</sub> (one-hour equivalent  
11 average). As I understand it, the Board based its noise limit in the UPC decision on  
12 the WHO guideline for protection from sleep disturbance, which is stated by the  
13 WHO as 45 dBA Ln (exterior) or 30 dBA Ln (interior) and thus assumes a reduction  
14 of 15 dB between outside and inside the occupant's bedroom. This reduction is the  
15 same that the U.S. EPA provides as a national average for the attenuation of outdoor  
16 noise by the exterior shell of the house with windows open.

17 Testing of compliance to an interior noise standard would require access to  
18 the bedrooms of neighbors to the project. While this may be reasonable in response  
19 to a specific complaint or enforcement action, it is overly intrusive especially if the  
20 applicant is expected to confirm compliance via post-construction sound monitoring.  
21 In my experience working on a large number of Act 250 and section 248 cases in  
22 Vermont over the years, I have generally seen noise standards expressed as outdoor  
23 rather than indoor limits. I believe this provides a reasonable basis for compliance

1 monitoring because residents are far more likely to permit access to the developer to  
2 install monitors outside their bedroom window than inside their bedrooms. Given  
3 the fact that nighttime compliance is most critical in this case, we would expect that  
4 most homeowners would not allow access.

5 With respect to the U.S. Forest Service's Proposed Wind Energy Directives,  
6 Mr. Kane does not provide an explanation of why the Draft Directive should be  
7 incorporated into the Section 248 permit. It is my understanding that the Directive  
8 has not been finalized, and has been the subject of public review and comment -  
9 including comments related to whether the proposed noise guidelines are  
10 appropriate. In the case of wind turbines, for example, a relative standard is difficult  
11 to analyze since there is no one background sound level to which one can compare.  
12 Background sound changes by season, meteorological conditions, and time of day.  
13 In addition, to the extent that the Forest Service ultimately adopts a directive that  
14 includes the currently-proposed noise guideline or a modified version, it would seem  
15 that such a directive should guide the Forest Service's decision-making process  
16 through the federal EIS, rather than the Public Service Board's Section 248 decision.

17

18 **Q. Mr. Shea on his own behalf testifies that the noise from the existing Searsburg**  
19 **turbines is loud enough to wake him (Shea pft at 7). Can you please respond to his**  
20 **claim?**

21 Response: We do not know under what circumstances Mr. Shea is referring to, in  
22 terms of frequency of occurrence, if they are related to specific events such as  
23 malfunctions, etc. In any event, the maximum sound levels from the Deerfield

1 project are lower than the Searsburg project. This is in large part due to the fact that  
2 within one mile of Mr. Shea's home are 11 Searsburg turbines whereas only four  
3 Deerfield turbines (one of which is on the eastern array) are proposed to be within  
4 that distance.

5

6 **Q. Mr. Shea testifies that the noise from the proposed project “would increase**  
7 **the sound level in my house by an order of magnitude, to within 1 dBA of the World**  
8 **Health Organization’s permissible limit for human habitation.” (Shea pft at 7). Can**  
9 **you please respond this statement?**

10 Response: The definition of an “order of magnitude” is an increase by ten times,  
11 which is clearly not the case with the Deerfield project. Our modeling shows that at  
12 Mr. Shea's property, the impact of the existing Searsburg project is 42 dBA, while the  
13 proposed Deerfield project, alone, would be 38 dBA. The Searsburg plus Deerfield  
14 combined sound level is 43 dBA. Typically, an increase of one dBA would not be  
15 perceptible. In this case, the major difference in perception will be in the direction of  
16 the sound. Worst-case sound levels at Mr. Shea's home will not significantly change.

17 The World Health Organization (WHO) guidelines do not set “permissible  
18 limits for human habitation.” Nowhere in the WHO guidelines does it suggest that  
19 their recommendations are anything but recommendations for community noise  
20 standards based on the “level of the lowest adverse health effect” (Guidelines on  
21 Community Noise, page 63).

22

1 **Q. Mr. Shea cites testimonials from wind energy facilities in Maine and New**  
2 **York that document what he describes as “unacceptable noise levels” (Shea pft at 7).**  
3 **Can you please comment on the reports?**

4 Response: I do not know what documents Mr. Shea is referring to, whether those  
5 turbine installations are in any way similar to what is being proposed at Deerfield,  
6 whether those projects generate sound levels in excess of what is projected in this  
7 case, or what he means by “unacceptable.” Therefore, I cannot comment on the  
8 relevance of any of these testimonials. In any event, as explained above I do not  
9 believe that the proposed Deerfield Wind Project’s noise levels will exceed the  
10 relevant guidelines.

11

12 **Q. Ms. Linowes argues that Cadna A acoustical modeling is meant for ground-**  
13 **based noise sources and may not accurately predict noise from turbine hubs, citing**  
14 **the experience at the Mars Hill wind energy facility as evidence that shows the**  
15 **inaccuracy of Cadna A predictions (Linowes pft at 11). How do you respond?**

16 Response: I disagree. Cadna A can be an appropriate tool for wind turbine sound  
17 modeling, provided that the correct input parameters are used.

18 Cadna A follows the international standard ISO 9613-2, “Acoustics –  
19 Attenuation of sound during propagation outdoors – Part 2: General method of  
20 calculation.” This standard allows for a variety of settings. For example, one can use  
21 various types of ground attenuation, different ground conditions, and foliage. In a  
22 post-construction study conducted by RSG at a wind farm in Kansas, we found that  
23 the choice of ground attenuation alone could account for a difference of 4 to 5 dB.

1 We did not conduct the modeling for Mars Hill, so I cannot comment on the  
2 parameters used or the results of their preconstruction noise modeling. However, in  
3 the case of Deerfield, we are using the most accurate modeling parameters, based on  
4 our study of the Kansas turbines.

5

6 **Q. Does this conclude your testimony at this time?**

7 Response: Yes it does.