

**BEFORE THE PUBLIC UTILITIES COMMISSION  
OF THE STATE OF SOUTH DAKOTA**

**IN THE MATTER OF THE APPLICATION BY DEUEL HARVEST WIND ENERGY LLC  
FOR ENERGY FACILITY PERMITS OF A WIND ENERGY FACILITY AND A  
345-KV TRANSMISSION LINE IN DEUEL COUNTY, SOUTH DAKOTA FOR THE  
DEUEL HARVEST NORTH WIND FARM**

**SD PUC DOCKET EL18-053**

**PRE-FILED SURREBUTTAL TESTIMONY OF DR. JEFFREY ELLENBOGEN  
ON BEHALF OF DEUEL HARVEST WIND ENERGY LLC**

April 11, 2019

1 **I. INTRODUCTION**

2

3 **Q. Please state your name.**

4 A. My name is Jeffrey Ellenbogen.

5

6 **Q. Have you previously provided testimony in this docket?**

7 A. Yes. I provided Supplemental Testimony on February 14, 2019, and Rebuttal  
8 Testimony on April 1, 2019.

9

10 **II. PURPOSE OF TESTIMONY**

11

12 **Q. What is the purpose of your Surrebuttal Testimony?**

13 A. The purpose of my Surrebuttal Testimony is to respond to the rebuttal testimony  
14 submitted by Robert Rand on behalf of Intervenor Christina Kilby.

15

16 **III. RESPONSE TO RAND**

17

18 **Q. On page 4 of his testimony, Mr. Rand references a 2018 World Health  
19 Organization (“WHO”) “wind turbine noise guideline.” Are you familiar with  
20 the referenced guideline?**

21 A. Yes, in 2018, the WHO published a document titled “World Health Organization  
22 Environmental Noise Guidelines for the European Region” (“WHO Noise Guidelines”  
23 or “WHO ’18”).

24

25 **Q. Were wind turbines the central focus of WHO Noise Guidelines?**

26 A. No. Noise from wind turbines was a section of a larger document that was otherwise  
27 addressing noises from other sources, including road, rail, aircraft, and leisure.

28

29 **Q. What were the recommendations by WHO concerning noise from wind  
30 turbines?**

31 A. It “conditionally recommended” reducing noises levels produced by wind turbines  
32 below 45 dB  $L_{den}$ .

33

34 **Q. The recommendation is “conditional.” Is that important?**

35 A. Yes. WHO has two classifications of recommendations in this document: “strong” or  
36 “conditional.”

37

38 **Q. How does WHO define a “strong” recommendation?**

39 A. The WHO states: “A strong recommendation can be adopted as policy in most  
40 situations. The guideline is based on the confidence that the desirable effects of  
41 adherence to the recommendation outweigh the undesirable consequences. The  
42 quality of evidence for a net benefit – combined with information about the values,  
43 preferences and resources – inform this recommendation, which should be  
44 implemented in most circumstances.” (See p. xvii)

45

46 **Q. How does WHO define a “conditional” recommendation?**

47 A. The WHO states: “A conditional recommendation requires a policy-making process  
48 with substantial debate and involvement of various stakeholders. There is less  
49 certainty of its efficacy owing to lower quality of evidence of a net benefit, opposing  
50 values and preferences of individuals and populations affected or the high resource  
51 implications of the recommendation, meaning there may be circumstances or  
52 settings in which it will not apply.” (See p. xvii)

53

54 **Q. Does WHO define the implication of using “low quality” research?**

55 A. Yes. WHO provides the following definition: “Low quality: further research is very  
56 likely to have an important impact on the certainty of the effect estimate and is likely  
57 to change the estimate.” (See p. 16.)

58

59 **Q. In your opinion, has there been further research that would have an important  
60 impact with respect to recommended guidelines for wind turbine noise?**

61 A. Yes, a body of research from Health Canada, the main findings of which were  
62 published in 2016, is the largest and most comprehensive study of potential health  
63 implications from wind turbine noise. I discussed this research in greater detail in  
64 my Supplemental and Rebuttal Testimonies.

65

66 **Q. In what way might Health Canada findings be used to update WHO '18?**

67 A. Health Canada was not seeing health effects from wind turbine noise, even at 46  
68 dBA. Mr. Mike Hankard will discuss how the 46 dBA in Health Canada relates to  $L_{den}$   
69 in his Surrebuttal Testimony.

70

71 **Q. But WHO Noise Guidelines were published in 2018, and Health Canada was  
72 published in 2016, so didn't WHO already incorporate Health Canada's  
73 findings into its guidelines?**

74 A. The timing did not allow for it. WHO stated: "It should be noted that, due to the time  
75 stamp of the systematic reviews, some more recent studies were not included in the  
76 analysis. This relates in particular to several findings of the Wind Turbine Noise and  
77 Health Study conducted by Health Canada...." (See p. 78.) In other words, the  
78 WHO '18 was published in the year 2018, but it did not have time to consider work  
79 as recent as 2016.

80

81 **Q. What is the significance of the fact that WHO '18 did not include Health  
82 Canada in its analysis?**

83 A. Health Canada studied potential health effects of more than 1,200 people living near  
84 existing and functioning wind turbines. They modeled noise levels up to 46 dBA and  
85 did not show relationships between wind turbine noise and health effects.

86

87 **Q. Did Health Canada consider annoyance?**

88 A. Yes. Health Canada did show an increase of annoyance at the higher levels of wind  
89 turbine noise they measured.

90

91 **Q. Is annoyance a health effect?**

92 A. No. Annoyance is not a health effect, it is a psychological experience. There are  
93 some that assert that “high annoyance” to be a health effect because of the concern  
94 that high annoyance could lead to health effects. However, as I testified previously,  
95 Health Canada did not find any adverse health effects from wind turbines, even from  
96 those who reported annoyance.

97

98 **Q. Did Health Canada show that noise from wind turbines causes high**  
99 **annoyance?**

100 A. Yes, Health Canada did demonstrate that wind turbines can cause high annoyance.  
101 It is important to understand that Health Canada reported that only about a quarter  
102 of their findings of high annoyance came from wind turbine noise, with the majority of  
103 annoyance coming from non-acoustical variables also associated with annoyance,  
104 such as blinking lights, the sight of turbines, concern for physical safety, and  
105 “attitudinal factors.”

106

107 **Q. Is high annoyance a risk factor for other health effects?**

108 A. In some instances, yes. However, Health Canada studied stress and cardiovascular  
109 outcomes and found no relationship to wind turbine noise and those outcomes.

110

111 **Q. Could you please summarize this complex discussion regarding WHO’s**  
112 **recommendations and how they might inform the Commission?**

113 A. To summarize, with respect to WHO and wind turbine noise: WHO made a  
114 conditional recommendation, which is based on lower quality evidence and is  
115 subject to change based on further research. That further research would include the  
116 Health Canada research, which was a large and comprehensive study that found no  
117 adverse health effects up to 46 dB  $L_{Aeq}$ , but which was not available early enough to  
118 be incorporated into the WHO guidelines.

119

120 **Q. Prior to the WHO Noise Guidelines document, had the WHO previously made**  
121 **recommendations concerning noise?**

122 A. Yes. In 2009, the WHO published “Night Noise Guidelines For Europe” (“WHO ’09”).

123

124 **Q. Did the WHO “Night Noise Guidelines For Europe” of 2009 mention noise from**  
125 **wind turbines?**

126 A. No. Although Mr. Rand refers to this document multiple times in his testimony, the  
127 document was silent concerning wind turbines.

128

129 **Q. Are either Wind Turbine Syndrome or Vibreo-Acoustic Disease listed among**  
130 **the “health topics” by the WHO?**

131 A. No. These are not listed as health topics by the WHO. I am not aware of any  
132 reputable medical or health organization that recognizes these items.

133

134 **Q. On page 37 of his testimony, Mr. Rand states that he has “experienced**  
135 **adverse health impacts” at several wind projects. Do you have a response to**  
136 **these assertions?**

137 A. Mr. Rand did not provide sufficient information in his written testimony to allow an  
138 analysis or assessment of his claims of adverse health effects. I understand that  
139 Deuel Harvest has requested additional information through discovery, and I would  
140 like to reserve the ability to discuss that information at the hearing, should Mr. Rand  
141 provide adequate information to allow for an analysis of his claims.

142

143 **IV. CONCLUSION**

144

145 **Q. Does this conclude your Rebuttal Testimony?**

146 A. Yes.

147

148 Dated this 11th day of April, 2019.

149

150



151 Dr. Jeffrey Ellenbogen