Testimony of Peter Guldberg

Q.UPC:UHS/RPI.2-23: Regarding page 2, lines 15-16 and page 12 line 11:

a. Please provide all reports, analyses, and other work product prepared by you or under your direction relative to the Cape Wind project.

b. Confirm distance from nearest Cape Wind turbine to buoys G5 and R20. Reconcile your findings that Cape Wind would be inaudible at buoys G5 and R20 with distance to receptor in VT.

c. Did your work on the Cape Wind project include 1/3 octave band comparison, low frequency sound power data, full range of WTG operation (from cut-in to cut-out), and beating/impulse data? If so, provide all supporting documentation. If not, provide an explanation.

d. Provide calculations, data, and all other documents showing the analysis of impulse noise your firm performed for the Cape Wind project. Provide any data showing the time varying characteristics of the wind turbines proposed for that project.

A.UPC:UHS/RPI.2-23:

a. Objection. See Attachment A.UPC:UHS/RPI.2-23a which contains the report and all calculations prepared by me for the Cape Wind Project Draft EIS in 2004. Other analysis since that time has been directed to underwater sound effects for the Final EIS. Those internal work products are privileged and confidential to Cape Wind Associates, are not complete, and as they relate to underwater sound are not relevant to this proceeding.

b. The closest turbine to Buoy R20 is turbine 15-H at 797 meters. The closest turbine to Buoy G5 is turbine 1-F at 1,813 meters. The closest turbine to an inhabited point of land is 7,604 meters. As stated on page 5 of the Noise Appendix to the Cape Wind DEIS (Attachment UPC:UHS/RPI.2-23a), the measured existing sound levels at these buoys during wind conditions approximating the cut-in wind speed of the turbines were 46-51 dBA (L_{eq}) and existing sounds in the environment (at sea) were waves splashing on the boat hull, boat traffic, and aircraft overhead. The conclusion of inaudibility at these buoys relied on a comparison of turbine noise to these existing average sound levels.

For the UPC wind project in Vermont, the closest turbine to the closest sensitive receptor (P22) is much closer at 366 meters (CB-3) than either Buoy G5 or R20, and Chris Bajdek concludes that "the wind farm will be audible under certain conditions" at this and other receptors (CB-2, page 35). At the monitoring location M1 closest to receptor P22, the measured average (L_{eq}) sound levels were as low as 24 dBA.

There is no inconsistency in the conclusions of audibility between the two wind projects. The UPC project will be audible at nearby sensitive receptors, whereas Cape Wind will not because the closest inhabited land to Cape Wind (7.6 km) is 20 times farther away than a similar receptor for UPC (0.37 km).

The existing sound levels in the Sheffield/Sutton mountain environment when the UPC wind project would be operating may be as low as 24 dBA due to the unique features of a ridge top installation above a mountain valley. By contrast, existing sound levels in the flat marine environment of Cape Wind would be substantially higher when winds are sufficiently strong to operate the turbine generators. In addition, the size and spacing of the turbines in the two wind projects are not comparable.

c. Yes, yes, yes, and no. See Attachment A.UPC:UHS/RPI.2-23a. No impulse noise analysis was performed for Cape Wind. The beating/impulse noise documented by G.P. van den Berg in measurements near the Rhede Wind Park took place at very close distances of 600 to 700 meters (Exhibit UHS/RPI-PG-5, pages 6 and 12). By contrast, the closest inhabited point of land to the closest turbine for Cape Wind is over 10 times that distance (7.6 km). Also, the beating, or amplitude modulation, of noise from turbines requires relatively close spacing of the turbines, otherwise the sound from one turbine is sufficiently attenuated by atmospheric absorption before it reaches an adjacent turbine. The UPC wind park has close turbine spacing (as close as 250 meters, see Exhibit UPC-CB-3) comparable to the close spacing at the Rhede Wind Park (300 meters, see Exhibit PG-5, page 6.) By contrast, Cape Wind's turbine spacing is much larger at 1,000 meters (Attachment UPC:UHS/RPI.2-23a, Figure 38).

d. See A.UPC:UHS/RPI.2-23c.

Person Responsible for Response: Peter Guldberg
Administrative Unit: Acoustic Consulting
Date: August 23, 2006

Q.UPC:UHS/RPI.2-24: Regarding page 6, lines 8-24:

a. In your experience with other wind farm projects, how did you predict or quantify the beating effect at representative distances?

b. Please identify any data or models or calculations that your firm has used to predict the beating effect at representative distances.

c. What is the temporal nature of the beating effect?

d. Please provide all documents relied upon in responses a. – c.

A.UPC:UHS/RPI.2-24:

a. The beating effect requires a facility with multiple turbines. The other wind farm projects I have analyzed were either single turbine installations or the Cape Wind Project. There is no potential for the beating effect at the Cape Wind Project (see A.UPC:UHS/RPI.2-23c).

b. None. See A.UPC:UHS/RPI.2-23c.

c. See Attachment A.UPC:UHS/RPI.1-1.1077 pages 11 and 12. Measured sound levels vary with both a one-second impulse corresponding to the turbine blade passing the tower and with a 20-second beating frequency.

d. See Attachment A.UPC:UHS/RPI.1-1.1077 and Attachment A.UPC:UHS/RPI.2-23a.

Person Responsible for Response: Peter Guldberg
Administrative Unit: Acoustic Consulting
Date: August 23, 2006

Q.UPC:UHS/RPI.2-25: Regarding page 4, line 22. Please substantiate the claim that "Every WTG has tonal peaks." Include all relevant documents and scientifically collected studies that substantiate this statement.

A.UPC:UHS/RPI.2-25:

See Attachment A.UPC:UHS/RPI.1-1.1077, pages 8 through 13, including Figures 3, 4, 7 and 8. Distinct tonal peaks were measured for a wind park with similar sized turbines (1.8-MW) and similar receptor distances as the UPC Project. The tonal peaks are associated with the blade passage frequency and its harmonics, in-flow turbulence and blade trailing edge noise. These graphs are mostly of 1/3-octave bands and do not reveal the finer detail of many more tonal peaks found in a narrow-band frequency analysis required by International Standard IEC 61400-11. All such test reports for wind turbines in my possession are client confidential and may not be copied.

Person Responsible for Response: Peter Guldberg
Administrative Unit: Acoustic Consulting
Date: August 23, 2006

Q.UPC:UHS/RPI.2-26: Regarding page 6, lines 18-20: Provide topographic information surrounding the Rhede Wind Park in the form of a map or other visual representation. Compare the topography the Rhede Wind Park to the topography of the site for the proposed Sheffield Wind Farm.

A.UPC:UHS/RPI.2-26:

See Attachment A.UPC:UHS/RPI.1-1.1076, page 956, Figure 1. Information on topography at the Rhede Wind Park is not in the possession of Peter Guldberg.

Person Responsible for Response: Peter Guldberg
Administrative Unit: Acoustic Consulting
Date: August 23, 2006

Q.UPC:UHS/RPI.2-27: Regarding page 6, line 22. Provide a copy of the referenced "research study" prepared by the University of Groningen related to the Rhede Wind Park.

A.UPC:UHS/RPI.2-27:

See Attachment A.UPC:UHS/RPI.1-1.1076.

Person Responsible for Response: Peter Guldberg
Administrative Unit: Acoustic Consulting
Date: August 23, 2006

Q.UPC:UHS/RPI.2-28: Regarding page 7, line 20. Does the research performed by Van Den Berg consider or evaluate the effects of mountainous terrain on the beating or impulse noise produced by modern turbines? Provide all documents relied upon.

A.UPC:UHS/RPI.2-28:

Please refer to Attachment A.UPC:UHS/RPI.1-1.1077. No, in the referenced journal article, Mr. G.P. van den Berg does not discuss the effects of mountainous terrain on the beating or impulse noise produced by modern turbines. However, he told me in a recent email communication (Attachment A.UPC:UHS/RPI.2-28) that thumping noise from modern turbines has been reported by residents near wind turbines in mountainous terrain: "Many residents told me the same about wind farms in the Netherlands, the UK, New Zealand and Australia (most of which is in undulating or complex terrain): the noise is worst when it is calm (at their dwellings) and the turbines are well audible and produce a beating sound."

Person Responsible for Response: Peter Guldberg
Administrative Unit: Acoustic Consulting
Date: August 23, 2006