

Docket No. 7156
Exhibit UPC-Cross- PG6
Admitted: _____

COMMONWEALTH OF MASSACHUSETTS

DEPARTMENT OF TELECOMMUNICATIONS AND ENERGY
and
ENERGY FACILITIES SITING BOARD

Cape Wind Associates, LLC and
Commonwealth Electric Company
d/b/a NSTAR Electric

EFSB 02-2/D.T.E. 02-53

REBUTTAL TESTIMONY OF
PETER H. GULDBERG
ON BEHALF OF
CAPE WIND ASSOCIATES, LLC

1 also eliminates gearbox and generator noise through the use of new technologies:
2 (1) both the gearbox and generator are mounted on elastomers to prevent
3 vibrations from reaching the bed plate (mechanical frame) and the supporting
4 tower, which in the past would resonate, creating noise; and (2) acoustical foam is
5 used inside the nacelle that houses the gearbox and generators to prevent airborne
6 sound from reaching the outside environment. In addition, the GE turbine has a
7 unique blade tip design with a sharp trailing edge that increases aerodynamic
8 efficiency, eliminates whistles and eliminates noise when the turbine reaches its
9 stall point.

10 In summary, the 1980s vintage, downwind-type machines Mr. Bender assumed in
11 his calculations are not comparable to the GE wind turbine that will be used for
12 the Cape Wind project. The GE design eliminates all of the principal noise
13 sources Mr. Bender notes in his testimony and is extremely quiet. The new
14 generation of quiet turbines are used throughout Europe in locations as close as $\frac{1}{4}$
15 to $\frac{1}{2}$ of a mile from residences without being audible.

16 **Q. In his response to Information Request EFSB-APNS-22, Mr. Bender claims**
17 **that "NASA studies show clearly that low frequency attenuation follows a**
18 **more gradual cylindrical spreading law from a distance of only 300m out to**
19 **approximately 30 km" and he refers to Att. CW-APNS-EB-1 in which Mr.**
20 **Bender presents as evidence a figure from a paper by Willshire and**
21 **Zorumski entitled "Low Frequency Acoustic Propagation in High Winds,"**
22 **Proceedings of the 1987 National Conference on Noise Control Engineering,**
23 **pp. 275-280. Do you agree with his statement?**

24 **A. No. The entirety of the NASA-sponsored research on this issue suggests that the**
25 **transition from spherical to cylindrical spreading of very low frequency sound**

1 starts around 2,000 meters (2 km), which is the assumption I used in acoustical
2 modeling for the Cape Wind project. As evidence, consider the Willshire and
3 Zorumski paper cited by Mr. Bender, which is attached in its entirety to this
4 testimony as Attachment B. Figure 1 (p. 276) of their paper shows eight data
5 points from a typical downwind propagation experiment done in the summer of
6 1985. Note that the first four points, covering distances out to 2 km, fit the
7 spherical spreading line well. In Figure 2, which gives average results for 40
8 experiments, Willshire and Zorumski state, "Spherical spreading is observed
9 between the first and second microphones [between 300 meters and 600 meters]
10 and then cylindrical spreading for greater propagation distances." So, the authors
11 do not believe cylindrical spreading starts at 300 meters as Mr. Bender has stated.
12 And, the authors' conclusion, drawn from a purely visual examination of Figure
13 2, is influenced by the reference point through which the lines for cylindrical
14 (dotted line) and spherical (solid line) spreading are drawn. I have slightly
15 modified Figure 2 of the Willshire and Zorumski paper to use the data point at 2
16 km as the reference point. That figure, attached to this testimony as Attachment
17 C, provides evidence that the transition from spherical to cylindrical spreading
18 starts at 2 km, not 600 m, and as we will see shortly, another NASA researcher
19 has confirmed that a sound channel forms starting around 2 km downwind.

20 Willshire and Zorumski note (p. 276) that another NASA researcher (James
21 Hawkins) has obtained good agreement between a ray tracing model and their
22 experimental data, including the transition from spherical to cylindrical spreading.