State Of Connecticut
Connecticut Siting Council

Petition of BNE Energy, Inc. for a Declaratory Ruling for the Location, Construction and Operation of 4.8 MW Wind Renewable Generating Projects on Flagg Hill Road in Colebrook, CT ("Wind Colebrook South") and Winsted-Norfolk Rd in Colebrook, CT ("Wind Colebrook North")

Petitions 983 and 984

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SITING COUNCIL

Date: April 6, 2011

Pre-Filed Testimony of David R. Lawrence, MD

Q1. Please identify yourself and your address.

A- I am David R. Lawrence, MD. I reside at 30 Flagg Hill Road, Colebrook, CT. I am a board certified practitioner of Internal Medicine. I have been in private practice in Northwest CT since January 1992.

Q2. What is the basis of your testimony to the Siting Council?

A- I have concerns about the siting of wind turbines in residential areas due to documented health risks if adequate setbacks are not established. Since to date there are no siting regulations in place in CT, the standard that the Council applies must take into consideration recommendations from scientific sources that ensure safe setbacks. Furthermore, this decision will set a precedence. The standards that the Council adopts will be the foundation for future wind turbine siting, increasing the importance of safe siting standards.

Q3. What is the basis for your concerns about setback distances?

A- There is safety in distance. Wind turbines emit sound energy that includes audible sound as well as infrasound. Infrasound has been documented to have acute medical effects in high doses over short periods. At lower doses over a prolonged period of time, there are also established negative health effects. The way to protect the exposed population is to ensure that there is a safe distance from the wind turbines. The current CT sound ordinance standards would allow infrasound exposure to exceed safe levels. Given the unique qualities of wind turbines, new standards must be established and enforced regarding protection from infrasound and other harmful noises. Standards set by wind turbine manufacturers do not adhere to science and do not afford adequate protection to neighboring residents.

Q4. What evidence do you have about the harmful effects of infrasound from acute exposure?

A.-The Health Protection Agency (HPA) of the United Kingdom compiled research regarding ultrasound and infrasound to establish safe limits on exposure in a paper Health Effects of Exposure to Ultrasound and Infrasound: Report of the Independent Advisory Group on Non-

Ionizing Radiation (February 2010). While the authors acknowledge that there is not a lot of research to review regarding infrasound, a number of available studies demonstrated that high energy exposure-usually about 100dBA-over short periods in a repeated fashion can have physiologic and psychological effects on animals and on humans. That is to say, the energy from infrasound can have a negative impact on living beings. A correlation can be drawn regarding long term exposure if one considers the negative effects of exposure to other energy sources. As an example, ultraviolet light in short repeated bursts can cause sunburn, while long term exposure can lead to skin cancers.

Q5. Since wind turbines are already setback to limit sound energy maximum to 55dBA daytime, 45 dBA nighttime, what are your concerns about exposure to infrasound from them?

A-) Levels of 55/45 dBA are clearly too high. CT environmental sound regulations were developed in the 1970's (CT Statutes Section 22:69-Effective Date June 15, 1978). They cannot possibly account for the unique issues of infrasound generated by wind turbines. A significant number of scientific investigators from around the globe have demonstrated that sound levels exceeding 30-35 dBA have negative health effects. In a series of studies by Pedersen and others in The Netherlands it has been shown that there is a significant increase in annoyance above 30-35 dBA. ("Response to Noise From Modern Wind Farms in The Netherlands", J Acoust Soc Am 126 (2), Aug 2009; "Wind Turbine Noise, Annoyance and Self-Reported Health and Well-being in Different Living Environments" Occup Environ Med 2007; 64: 480-486). The World Health Organization in its position papers "Guidelines For Community Noise" (1999) and "Night Noise Guidelines for Europe" (2009) , note that noise has detrimental effects on health above 30dBA, especially for "vulnerable populations", that is, children and the elderly. These negative health effects include sleep disturbance with associated issues of daytime fatigue, reduced performance and accidents, as well as cardiovascular disease, depression and mental illness. The WHO furthermore states that, "It should be stressed that a plausible biological model is available with sufficient evidence for the elements of the causal chain." HG Leventhal, a highly respected acoustics expert in the UK, has numerous publications regarding infrasound. In his paper "Low Frequency Noise and Annoyance" (Noise and Health, 2004, 6; 23, 59-72) he notes that infrasound and low frequency noise (10-200 Hz) "has been recognized as a special environmental noise problem", "that the A-weighted level underestimates the effects of low frequency noise," and that "there is a possibility of learned aversion to low frequency noise, *leading to annoyance and stress which may receive unsympathetic treatment from regulatory authorities.*" (emphasis added). In a report on the effects of infrasound and low frequency noise for the United Kingdom Department of Environment, Food and Rural Affairs (DEFRA), A Review of Published Research on Low Frequency Noise and its Effects (May 2003), Leventhal reviews the science behind his concerns. Quoting Leventhal (section 13.60: "There is no doubt that some humans exposed to infrasound experience abnormal ear, CNS, and resonance induced symptoms that are real and stressful. If this is not recognized by investigators or their treating physicians, and properly addressed with understanding and sympathy, a psychological reaction will follow and the patient's problems will be compounded. Most subjects may be reassured that there will be no serious consequences to their health from infrasound exposure *and if further exposure is avoided* they may expect to become symptom free."(emphasis added).

Q6. Are you familiar with a position paper authored by leading experts that dismiss concerns about infrasound?

A. The paper in question is Wind Turbine Sound and Health Effects: An Expert Panel Review (December 2009). It was sponsored by American and Canadian Wind developers and should stand as an embarrassment to them. The positions taken by the experts have omissions, misstatements, and unsupported conclusions. They offered little science to back their claims, and at times contradicted the science they presented. A fairly comprehensive critique with exposure of many of the misstatements was published as An Analysis of the American/Canadian Wind Energy Association Sponsored "WTSHE/EPR" (January 2010). I will add that when I read the report I felt that there were even more errors than the critics pointed out. All in all the "WTSHE/EPR" paper was poorly done and cannot be considered seriously in siting guidelines. As a troubling aside, HG Leventhal, quoted by me in question 5, was one of the co-authors, only in the industry sponsored paper he identifies himself differently than in his scientific publications, that is, as Geoff Leventhal. By co-authoring the paper, he stands in contradiction to his own work, even if it is tacit approval of the statements. I say that to point out that apparently even a highly respected researcher can bend the rules of integrity with the right incentives.

Q7. Do you have any comments about studies raised by researchers such as Nina Pierpont, MD and Amanda Harry?

A. I think that time will validate much if not all of the findings that these researchers claim. They are dismissed by the wind farm developers because they are not blinded studies and are based on reporting as opposed to concrete facts. However, given scientific studies in the lab and with study groups that show harm at acute, high level exposure, and studies that demonstrate annoyance and related health issues above 30-35 dBA, it is reasonable to think that wind related health issues as determined in these studies are real. The practice of medicine approaches evaluation and care of patients scientifically. Data is gathered, patients are assessed, and conclusions are based on probabilities. If someone is evaluated for a fever, even though there is a tremendously long list of possible causes, one can usually determine its cause through evaluation and taking into consideration likelihoods. In that way I believe that the researchers noted have sound reason to draw the conclusions they have. They do not contradict science, and are supported by known science.

Q8. In your opinion as a medical doctor, would you agree that annoyance can cause negative health effects?

A. Annoyance even vaguely defined would include emotional responses that could easily affect physical and psychological well being. As stated by WHO and others, annoyance is associated with sleep disorders, cognitive impairment, headaches, agitation, and depression among other issues. Annoyance is seen to be a factor that causes stress. In the practice of medicine we recognize stress as a risk factor for heart disease, high blood pressure, migraine and tension headaches, fibromyalgia, and anxiety and depressive disorders, to name some of the prominent problems. Therefore there is a natural connection with annoyance and physical and psychological disorders. In my clinical practice I have seen significant physical and health problems that have at least in part been caused and or made worse by stress.

Q9. How do you propose that the siting Council approach these petitions?

A. The siting council should establish safe standards prior to considering whether or not a petitioner meets standards. In that sense, the cart needs to get back behind the horse. Obviously, BNE will not meet the standards for safe siting if WHO noise guidelines are used.

Q10. How do you propose the Siting Council establish safe standards?

A. The Siting Council would do well to collate the abundance of data that is available from researchers and from experiences with existing wind farms. Siting guidelines should conform to WHO standards of limiting exposure to 30-35 dBA. Distance from the source, i.e. the wind turbines, is the only reasonable way to limit exposure. Kamperman and James ("Simple Guidelines for Siting Wind Turbines to Prevent Health Risks";Noise-Con 2008; 2008 July 28-31) review various sound considerations and propose guidelines that would setback wind turbines a minimum of 1000 meters. Pedersen and Waye ("Wind Turbine Noise, Annoyance and self-reported Health and Well-Being in Different Living Environments"; ref above Q.5) account also for site topography, stating: "Perception and annoyance were associated with terrain and urbanization: (1) a rural area increased the risk of perception and annoyance in comparison with a suburban area; and (2) in a rural setting, complex ground (hilly or rocky terrain) increased the risk compared with flat ground." Professor John Harrison recommends specifically addressing the additive noise impact of wind turbulence as well as the summation of direct sound plus sound reflected from the ground (i.e., coherent reflection) ("Disconnect Between Turbine Noise Guidelines and Health Authority Recommendations" white paper, Queen's University, Ontario). As an adjunct to the noted considerations, wind modeling with computer programs such as WindPro (EMD International A/S) or WindFarmer (GL Garrad Hassan) may be employed.

Q11. Are there any other health concerns that you have regarding wind turbines?

A. I do agree that ice shedding and the effects of flicker are legitimate health concerns. However, I would like to think that adequate setbacks related to low frequency and infrasound will obviate those problems.

Q12. Do you have any concluding remarks?

A. I believe that there is strong scientific evidence to conclude that wind turbines have inherent health risks related to low frequency and infrasound. I believe that the safety of the public must be upheld over the ideals of green energy production, and that to protect the public wind turbine setbacks must be long enough to minimize the intensity of the sound such that it does not exceed 30-35 dBA at the residences. The lower level should be applied for children and the elderly, who are the most vulnerable. The setbacks are to be determined not only by distance, but must also account for site topography, turbulence and coherent reflection. Furthermore, as this case sets a precedence for future wind turbine siting, the outcome of these hearings must uphold the greater good of the residents of CT regardless of political pressures and potential financial gains. This should be about what is right and correct, not "who wins the battle".

Under penalty of perjury I swear that the testimony I have given is true and is free of inaccuracy to the best of my ability.

David R. Lawrence, MD	Date	Winsted, CT
	4/7/2011	06098

Notary	Date	
	4/7/11	

HEATHER ABRAHAM
NOTARY PUBLIC
My Commission Expires Jan. 31, 2013

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David R. Lawrence, MD Pre-File Testimony-BNE Petitions 983 and 984

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Response to Noise From Modern Wind Farms in The Netherlands Pedersen, et al, Journal of the Acoustic Society Am 126 (2), Aug 2009

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Simple Guidelines for Siting Wind Turbines to Prevent Health Risks Kamperman, G and James, R Noise-Con 2008 Paper

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Computer Modeling For Wind Farm Development

WindPro EMD International A/S

WindFarmer GL Garrad Hassan