### WHAT ESTABLISHED SCIENCE TELLS US ABOUT THE HEALTH IMPACTS OF GRID SCALE WIND TURBINES

### AND WHY THE PRECAUTIONARY PRINCIPLE SHOULD DRIVE PUBLIC POLICY ON THIS ISSUE

July 10, 2016,

Compiled by Wayne C. Spiggle, M.D. <wspiggle@mac.com>

## • LIVING IN PROXIMITY TO WIND TURBINES DOES CAUSE DISEASE:

- Noise & Health, an Inter-Disciplinary Journal, published a study finding that residents living within 6500 feet of a turbine feel an overall diminished quality of life. Those exposed to turbine noise at 5000 feet also experienced significantly lower sleep quality and rated their environment as less restful. The study concluded: "night time wind turbine noise limits should be set conservatively to minimize harm, and, on the basis of our data, we suggest that setback distances need to be greater than 2 km in hilly terrain. (1). Fourteen studies in the academic literature have come to similar conclusions and are included in the bibliography of this brief.
- The National Academy of Sciences Institute of Medicine says that: "Sleep disorders and sleep deprivation are an unmet public health problem." (2)
- Many prestigious medical centers, including Harvard University have cautioned "In the short term, a lack of adequate sleep can affect judgment, mood, ability to learn and retain information, and may increase the risk of serious accidents and injury. In the long term, chronic sleep deprivation may lead to a host of health problems including obesity, diabetes, cardiovascular disease, and even early mortality." Research has overturned the dogma that sleep loss has no health effects, apart from daytime sleepiness. (3)
- Children and teens are particularly susceptible to sleep deprivation. A study published in the Journal of The American

Academy of Child and Adolescent Psychiatry, found a strong link between insufficient sleep and aggression, delinquent behavior, and attention problems among 7- to 12-year-old children. (4)

- The prestigious WHO has cited numerous studies showing that sleep deprived children can be less reflective, more impulsive and hyperactive and show poorer attention span. WHO also accepts the research that some children and teens show reduced academic performance and learning when exposed to fractured sleep. One such study is referenced. It concludes:
  "Observational and experimental studies have shown that noise exposure leads to annoyance, disturbs sleep and causes daytime sleepiness, affects patient outcomes and staff performance in hospitals, increases the occurrence of hypertension and cardiovascular disease, and impairs cognitive performance in schoolchildren." (5)
- The WHO notes that outside noise of 30 to 40 decibels (dB) may cause some harm to children and the elderly; but above 55 dB the situation is considered increasingly dangerous for public health. WHO night noise guideline for safe sleeping indoors is 30 dB. (6)
- A 2014 article published on line by PLoS One, (claims to be a peer-reviewed open access journal), documented that exposure to wind turbine noise does increase the risk of sleep disturbance in a dose-response relationship. Of the many other claimed health effects of wind turbine noise exposure reported in the literature, they could find no conclusive evidence. The article cited the need for future study. (7)
- A peer reviewed article published recently in the Canadian Journal of Rural Medicine came to this conclusion:

"Conclusion: If placed too close to residents, IWTs (industrial wind turbines) can negatively affect the physical, mental and social well-being of people. There is sufficient evidence to support the conclusion that noise from audible IWTs is a potential cause of health effects. Inaudible low-frequency noise and infrasound from IWTs cannot be ruled out as plausible causes of health effects. " (8)

### • WHY DOES PUBLIC POLICY GENERALLY ALLOW WIND TURBINES TO BE CLOSE ENOUGH TO HOMES TO CAUSE HARM?

- Until recently, most information about grid scale wind has come from industry sources. Like the tobacco industry of a few decades ago, this industry has been quite disingenuous and successful in contending that there is no scientific evidence that exposure to wind turbine noise causes disease.
- Reports on wind development written for the government tend not to address health effects on people living in the vicinity of turbines.
- As a result, very few members of the public, including policy makers, are aware the significant physical and mental harm of people living close to wind turbines.

# • THE PUBLIC HEALTH PROFESSION IS TRYING TO CORRECT THIS SITUATION.

- For the last 15 years or so, the public health profession has reported how wind turbines harm human health (see above) and has endorsed the <u>Precautionary Principle</u> to respond to the many technological events that are becoming part of the experience of society. (9)
- According to the precautionary principle, the burden of proof is placed on the industry associated with the problem, not the people who are being aggrieved. Public policy is not deferred until absolute scientific proof is settled. The WHO puts it this way: "The Principle states that in the case of serious or irreversible threats to the health of humans or the ecosystem, acknowledged scientific uncertainty should not be used as a reason to postpone preventative measures". (10)

 Precaution is at the heart of public health protection. For example, current regulations pertaining to tobacco, environmental lead and pharmaceuticals are based on precaution and prevention. Initially, especially with tobacco and lead related diseases, the tendency was to wait on scientific proof, with disastrous results.

### • POLICY MAKERS ARE BEGINNING TO RESPOND TO PUBLIC HEALTH PROFESSIONALS ON THE WIND TURBINE ISSUE.

The most important initiatives are to establish setbacks from turbines to residences that acknowledge what is known about the probability of sleep deprivation. This is particularly true in Europe where the experience with wind installations has been longer and the most pervasive:

- The Bavarian government has a "10-H-law" that calls for a setback distance to the nearest residential area of ten times a turbine's total height. This is based on data that show sleep-depriving noise from turbines is a function of their height. A turbine 150 meters high (492 feet) would be kept 1500 meters (4921 feet) away from homes. In May, 2016, the Bavarian Constitutional Court affirmed this law. (11)
- A second German state, Rhineland-Palatinate, (southern Germany) plans to impose a minimum of 1,100 meters (3609 feet) between wind developments and nearest housing.
- Ireland has a bill that says the distance from a wind turbine to a house should be 10 times its height. (12)

Jurisdictions in the United States are also realizing that large wind turbine installations are harmful and people are beginning to resist their placement:

• In November 2014, after five years of study and experience the Brown County Board of Health declared the Shirley Wind project in Wisconsin to be a "human health hazard". The now resigned director of the Brown County Health Department refused to accept the conclusion of the Board of Health. On May 18, 2016 the matter was referred to the Brown County Board of Supervisors. The results of this review are pending. (13)

- Many local jurisdictions are establishing safer setbacks:
  - Umatilia County, Oregon, and Riverside, California have ordinances stipulating a setback of 10,561 ft.
  - Catarunk, Maine and Moscow, Maine 8,000 ft.
  - 13 times the turbine height Montville, Maine and Buckfield, Maine.
  - o 6,000 ft. Fayette County PA.
  - 5,280 ft. Trempealeau County, Wisconsin, Sumner, Maine & Hillsdale County, Michigan.

Other locales are sited in this reference. (14)

- In a letter to constituents dated May 19, 2016, Tennessee Senator Lamar Alexander shared the following information:
  - "In October, the residents of Irasburg, Vermont, voted 274 to 9 against a plan to install a pair of 500 foot turbines on a ridgeline visible from their neighborhoods."
  - "In New York, three counties opposed 500 to 600 foot wind turbines next to Lake Ontario"
  - In Kent County, Maryland, Apex Clean Energy, is trying to put down 25 to 35 500-foot turbines a quarter-to a half-mile apart across thousands of acres of farmland,"
  - "According to the Baltimore Sun, Stephen S. Hershey Jr., a local state legislator, introduced a bill that would give county officials the right to veto any large-scale wind project in their jurisdiction.

Senator Alexander sent this newsletter to ask his constituents to oppose the proposed Crab Orchard Wind Project wind in Cumberland County, Tennessee. (15)

- There is now a proposal in the NC State Legislature that would provide a setback of at least 1 ½ miles from a neighboring property line. (16)
- In December 2015, the Board of Zoning Appeals, Allegany County, Maryland, unanimously denied an application for variances that would have placed the Dans Mountain Wind Project within 1000 feet from residences. (16)

#### COMMENT

- Established science shows that wind turbines cause sleep deprivation wich in turn causes ill health and diseases.
- Increasingly, jurisdictions are recognizing this and are developing setbacks for wind turbines that protect the public health. A distance of 10 times the height of the turbine to the nearest residence is emerging as a safe setback, while lesser distances fail to protect the public health.
- Until such regulations become the norm, people who live adjacent to wind turbines will continue to suffer and public resistance to this industry can be expected to increase.
- Regulatory authorities could find themselves in a position in the future where they are successfully prosecuted for breaches of their duty to protect the community from harm.

### REFERENCES

- (1) Shepherd D, Mcbride D, Welch D, Dirks KN, Hill EM. **Evaluating the impact of wind turbine noise on health-related quality of life**. Noise Health 2011; 13:333-9
- (2) Institute of Medicine (IOM) Committee on Sleep Medicine and Research, Colten HR and Altevogt BM (ed.), Sleep Disorders and Sleep Deprivation: An Unmet Public Health Problem, Washington, DC: National Academy of Sciences, 2006.
- (3) http://healthysleep.med.harvard.edu/healthy/matters/consequences
- (4) **Sleep and Psychiatric Symptoms in School-Age Children**. Journal of American Academy of Child and Adolescent Psychiatry. 2000;39:502-508.
- (5) Dr Mathias Basner, MD, Wolfgang Babisch, PhD, Prof Adrian Davis, PhD, Mark Brink PhD, Charlotte Clark, Phd, Sabrine Janssen, PhD, Prof Stephen Stansfeld, PhD: Auditory and non-auditory effects of

noise on health, The Lancet, Volume 383, Issue 9925, 12-18, Page 1270.

- (6) WHO –**Night Time Noise Guidelines for Europe**. <u>http://www.euro.who.int/\_\_data/assets/pdf\_file/0017/43316/E92845.p</u> <u>df</u> pp. 25 -28.
- (7) <PLoS Onev.9(12); 2014PMC4256253>
- (8) Jeffery, Roy D. MD, Krogh, Carmen M.E., Horner, Brett BA, CMA: Industrial wind turbines and adverse health effects. Canadian Journal of Rural Medicine, 2014;19(1)
- (9) How to Apply the Precautionary Principle to Wind Energy Projects. Waubra Foundation. June 19, 2012. <docs.windwatch.org/How-to-Apply-the-Precautionary-Principle-to-Wind-Energy-Projects.pdf>
- (10) The precautionary principle: protecting public health, the environment and the future of our children. WHO-Europe, 2004. www.euro.sho.int/\_data/assets/pdf\_file/0003/91173/E83079.pdf
- (11) Süddeutsche Zeitung Christian Sebald May 9, 2016
- (12) <u>http://www.oireachtas.ie/documents/bills28/bil</u> ls/2014/1914/b1914d.pdf
- (13) Setbacks and noise regulations since 2010: <Kirby Mountain.blogspot.com>
- (14) Xiong\_Shirley\_Wind\_Decision\_Discredited\_\_BCCRWE\_Re quests\_County\_Board\_Officially\_Dismiss.pdf
- (15) Alexander urges Cumberland County Residents, All Tennesseans to Oppose Proposed Wind Farm – e-mail Newsletter, May 19, 2016 : <u>lamar@alexander.senate.gov</u>
- (16) NC Senate Bill 843: Renewable Energy Property Protection: Sen. Bill Cook & Sen. Andrew Brock: <ncleg.net>
- (17) Wind farm developer denied in Allegany County: Cumberland Times-News 11/17 2015 <u>http://www.your4state.com/news/news/wind-farm-denied-in-allegany-county</u>

### ADDITIONAL BIBLIOGRAPHY

AHA white paper: (go to library section): **If Wishes were Fishes: An examination of the common assumptions about electricity generation from wind.** <u>www.alleghenyhighlandsalliance.com</u>

Ibid. (go to library): Living 1600 Feet from a Wind Turbine (video)

Nessenbaum et al, Effects – Industrial Wind Turbine Noise, Sleep & Health, Noise and Health International Journal, September-October 20-

Shepherd K, McBride D, Welch D, Dirks KN, Hill EM, Evaluating the impact of wind turbine noise on health related quality of life. Noise Health Jul 11:13:333.9. Available from: http://www.noiseandheath.org/text.asp?2011/13/54/333/85502

Thorne, R. Victorian Wind Farm Review Updated June 2014

Hansen, Zajamsek, Hansen, Noise Monitoring, Waterloo Wind Farm