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Dear Commissioner Quackenbush and Director Bakkal:

This submission responds to Renewable Energy Question #15, regarding Michigan's experiences in the siting of new generating sources.

Siting new generating sources is typically very difficult. People often become quite concerned about how a new generating source can harm their quality of life, particularly their health.

In recent years this has been especially true in the development of wind farms in Michigan, where local officials and residents are almost always completely unfamiliar with the issues such developments raise. This unfamiliarity makes it very easy for those who, for whatever reason, are opposed to wind power development to alarm these officials—and their neighbors—using misleading claims about wind power's alleged harmful health effects.

The Michigan Land Use Institute saw this when Duke Energy, in 2011 and 2012, tried, and eventually failed, to develop a 212-MW wind farm in Benzie and Manistee Counties. We decided to examine claims by the project's opponents that wind farms harm public health, property values, and local tourism.

By far, the most alarming claims were those made about health effects from living near (defined by wind opponents as within 1.25 miles) wind turbines.

Attached are news articles authored by MLUI staff, scientific reports authored by a wide range or researchers, and a recent blog that look at those claims.

Following is a list and summary of each of those attachments:

MLUI#2—News Report:

Scientists See No Basis for Turbine 'Infrasound" Claims

This January 2011 MLUI news article offers a history of the emergency of health claims involving wind turbine noise, particularly 'infrasound'—sound so low-pitched that humans cannot hear it—and the use of those claims to call for very large 'setbacks' that would, if enforced, virtually eliminate wind-power development in most parts of the state. The article surveyed several then-recent reports about claims concerning infrasound's allegedly harmful nature. However, the article reports, investigators who used valid, peer-reviewed methods for their studies could find no plausible link between exposure to infrasound and any of its

alleged effects.

MLUI#3—News Report:

Two Acoustic Scientists Explain Infrasound

This January 2012 MLUI news article is a Question & Answer session with two scientists who do a great deal of research on sound and noise, especially in outdoor settings. Each answered the same set of questions independently, and their answers reveal that infrasound is ubiquitous, which raises questions about health claims involving these very low-frequency sounds.

MLUI#4—AWEA-Sponsored In-Depth Meta-Analysis

Wind Turbine Sound and Health Effects—An expert panel review (2009)

This meta-analysis of more than 140 previous studies of the topic and related subjects was conducted by a panel of experts with very substantial credentials. The panel found: ***a)*** *"no evidence that the audible or sub-audible sounds emitted by wind turbines have any direct, adverse physiological effects."* ***b)*** *"ground-borne vibrations from wind turbines are too weak to be detected by, or to affect, humans." And* ***c)*** *"sounds emitted by wind turbines are not unique. There is no reason to believe, based on the levels and frequency of exposure of the sounds and the panel's experience with sound exposures in occupational settings, that the sounds from wind turbines could plausibly have direct, adverse health consequences."*

MLUI#5—Australian National Health and Medical Research Council

Wind Turbines and Health: A Rapid Review of the Evidence (2010)

This study is the least-documented of the ones we have reviewed. Its authors are not identified, but they reviewed more than 30 reports on noise and other turbine characteristics. It concludes: "There are no direct pathological effects from wind farms and any potential impact on humans can be minimized by following existing planning guidelines."

MLUI#6—Ontario Medical Officers Report

The Potential Health Impact of Wind Turbines (2010)

This survey of extant literature on wind turbine noise was performed by the office of the Ontario Chief Medical Office of Health. It considered approximately 50 studies, reports, conference papers and other material. It concluded that "while some people living near wind turbines report symptoms such as dizziness, headaches and sleep disturbance, the scientific evidence available to

effects. The sound level from wind turbines at common residential setbacks is not sufficient to cause hearing impairment or other direct health effects, although some people find it annoying."

MLUI#7—Independent Research Group in Sweden

Infrasound and low-frequency noise from wind turbines: exposure and health effects (2011)

Researchers from Sweden's Royal Institute of Technology, Karolinksa Institute, the Swedish National Road and Transport Research Institute, and Stockholm University conducted a literature review of more than 50 studies. Its concluding paragraphs note, "There is no evidence that infrasound at these levels [i.e., standard setbacks from turbines] contributes to perceived annoyance or other health effects. … the levels do not exceed levels from other common noise sources, such as road traffic noise. … Except for [audible] noise annoyance, no consistent effects on health due to wind turbine noise have been reported. … It has been argued that infrasound and low-frequency noise from wind turbines may cause serious health effects in the form of 'vibro-acoustic disease', 'wind turbine syndrome', or harmful infrasound effects on the inner ear. However, empirical support for these claims are lacking."

MLUI#8—Massachusetts Depts. of Environmental Protection and Public Health

Wind Turbine Health Impacts: Report of Independent Experts (2012)

A panel of seven experts from Harvard University, Boston University, the University of Massachusetts, the University of New England, and Massachusetts General Hospital conducted an extensive literature review. The review references more than 100 studies and a bibliography of more than 120 related articles. While the study's conclusions are among the most finely parsed that we have reviewed, and offer very precise, step-by-step conclusions, the conclusions are broadly similar to those of the above-listed studies. Massachusetts' two most important statements, in our view, are: "There is insufficient evidence that the noise from wind turbines is directly (i.e., independent from an effect on annoyance or sleep) *causing health problems or disease"; and "Available evidence show that the infrasound levels near wind turbines cannot impact the vestibular system." This report also offers a valuable set of "best practices" for siting wind turbines to best mitigate possible audible noise complaints.*

MLUI#9—National Association of Regulatory Utility Commissioners

Assessing Sound Emissions from Proposed Wind Farms & Measuring the Performance of Completed Projects (2011)

This original research was conducted by Hessler Associates Inc., consultants in engineering

recommends limiting noise from turbines, as measured at the turbine-facing side of an occupied building, to no more than 45 decibels ('A' scale). The report found no resident objections to sounds below 40 dBA at existing parks, and less than 2 percent of nearby residents objecting when sound levels are between 40 and 45 dBA. The report strongly cautions against allowing sound levels to routinely exceed 45 dBA. Hessler completely rejects concerns about infrasound from modern-day wind farms: "In general, the widespread belief that wind turbines produce elevated or even harmful levels of low frequency and infrasonic sound is utterly untrue, as proven repeatedly and independently by numerous investigators. … Th[is] mistaken belief…can also be attributed, perhaps even more definitely, to wind-induced microphone error, where wind blowing through virtually any windscreen will cause the low end, and only the low end, of the frequency spectrum to substantially increase due to self-generated distortion. … The measurement will appear to show high levels of low frequency noise—whether a wind turbine is present or not."*

**References 11 through 16.*

MLUI#10—Desmogblog.com Article Covers Two New Studies about Turbine Sound

Research Finds Wind Farm Health Concerns Probably Caused by Anti-Wind Scare Campaigns

This article summarizes findings of two brand-new Australian studies. The first was published earlier this month in Health Psychology, *a peer-reviewed journal of the American Psychological Association. It found subjects who were warned about infrasound-caused symptoms who were then "exposed" to infrasound frequently displayed the symptoms—whether or not they were actually exposed. Conversely, individuals who were told infrasound couldn't harm them felt no symptoms when "exposed," whether or not they actually were. The other study, an exhaustive survey of people living near wind farms in Australia, found significant rates of health complaints in communities where anti-wind activists had warned of potential turbine-caused health problems, while people in communities where activists had not appeared nor warned of health problems had few, if any, complaints. This study is now being peer reviewed.*

Michigan Land Use Institute believes that it is very important to use proper siting techniques, including sufficient setbacks from occupied buildings, to protect people from the possibility of turbine mechanical failures or fires, and from the modest amounts of audible sound that all turbines produce.

MLUI endorses the Hessler finding that occupied structures should be far enough away from turbines that their sound is, except under unusual (but real) atmospheric conditions, no louder than 45 dBA. This suggests a setback of approximately 1,600 feet, although local topography can modify that limit, as Hessler explains.

But quality research has repeatedly found that infrasound is not and cannot be a source of health problems, and that claims to the contrary are, at best, highly questionable.

public health and safety, but that do not bend to what are highly exaggerated claims about the effects of unheard turbine noise, i.e, infrasound. Township and county officials typically are not well educated about any of the considerations and findings raised in this letter, and, because they are often elected officials, they are vulnerable to fear-based campaigns to stop wind power development.

When such projects are stopped, the local community loses out on significant boosts to its tax base and local employment. Moreover, the state's economic growth is held back, broader environmental damage from power-generation emissions are not reduced, and the state's movement toward global leadership in clean energy manufacturing and deployment are slowed.

Thank you very much for your consideration of these matters. It is our hope that your agencies will let science be its guide in all things related to energy—including proper siting guidance for wind power—which is clean, increasingly inexpensive, and a highly potent job stimulator for Michigan manufacturers, installers, and operators.

Respectfully submitted,

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