

Community & Consumer Resources

Wind and Health

Public Act 295 of 2008 requires the Public Service Commission (Commission) to submit a report to the Legislature on the effect that setback requirements and noise limitations under local zoning or other ordinances may have on wind energy development. In January, 2010, the Commission published the MICHIGAN PUBLIC SERVICE COMMISSION ON THE IMPACT OF SETBACK REQUIREMENTS AND NOISE LIMITATIONS IN WIND ZONES IN MICHIGAN.

In this report, the Commission concluded no evidence presented to the Commission suggests that a one-size-fits-all approach would work for the entire state and that decisions regarding appropriate setback distances and noise levels should remain under the province of local planning and zoning authorities (at this time). Furthermore, the Commission noted that related issues should be guided by two fundamental principles:

First, setback distances and noise limitation should be determined based on the best available scientific evidence.

Second, these matters should be decided at the local level where feasible so that the needs of local citizens can be appropriately considered.

Wind Turbine Flicker

Shadow flicker occurs when the sun is low in the sky and a wind turbine creates a shadow on a building. As the turbine blades pass in front of the sun, a shadow moves across the landscape, appearing to flick on and off as the turbine rotates. The location of the turbine shadow varies by time of day and season and usually only falls on a single building for a few minutes of a day. Shadows that fall on a home may be disruptive.

Shadow flicker can be addressed in a variety of ways, including landscaping to block the shadows or stopping the turbines during the sensitive times. Many municipalities regulate the amount of wind turbine flicker through zoning ordinances.

Wind and Noise

Noise is measured in decibels. Decibel means the unit of measure used to express the magnitude of sound pressure and sound intensity. Db(A) means the sound pressure level in decibels. It refers to the “a” weighted scale defined by ANSI – a method for weighting the frequency spectrum to mimic the human ear. Noise issues are complex and many communities do not have any detailed noise standards. Community-based noise standards typically would consider the potential of noise for bodily injury, long term health effects, interference with speech and other activities, and sleep disturbance.

Normal conversation is in the range of 50-65 Db(A). EPA and World Health Organization documents indicate that 55 Db(A) is too low to produce hearing loss or long-term health effects. Related to speech interference, EPA has estimated that the distance between persons would have to be 4 meters before there would be any interference. Finally, related to sleep disturbance, the World Health Organization notes that “80-90% of the reported cases of sleep disturbance in noisy environments are for reasons

other than noise originating outdoors” and “habituation to night-time noise events occurs.” EPA has noted that the typical sound level reduction of buildings in cold climates is 17 Db (windows opened) and 27 Db (windows closed) so 55 Db outdoors would be reduced to no more than 28-38 Db indoors. Even with the lack of speech interference, reports continue, however, from individuals that complain that noisy wind turbines keep them awake.

Wind farms exist in countries all across the globe and have Db(A) levels ranging from 70 Db(A) to 40 Db(A). In Michigan, installations range from 60 Db(A) to 40 Db(A). While a range of effects such as annoyance, anxiety, hearing loss, and interference with sleep, speech and learning have been reported *anecdotally*, there is no published scientific evidence to support adverse effects of wind turbines on health. Most recently, a report from Australia’s National Health & Medical Research Council found that *“there is currently no published scientific evidence to positively link wind turbines with adverse health effects”* including a study of wind farms in Britain that found that the sound associated with modern wind turbines *“is not a source which will result in noise levels which may be injurious to the health of a wind farm neighbor.”* The Australia study also found that phenomena such as shadow flicker and blade glint do not support concerns over health, and concerns over electromagnetic radiation from wind turbines are moot because the electrical cables are shielded with metal armour. Regardless of these scientific findings, reports continue from individuals – and groups of individuals – who complain that wind turbines cause them adverse health effects.

Within this same context, the World Health Organization states that *‘There is no reliable evidence that sounds below the hearing threshold produce physiological or psychological effects’*. A panel review in North America found no evidence that audible or sub-audible sounds emitted by wind turbines have any direct adverse physiological effect.

Michigan State University and Wind Zoning

In 2007, the MSU Extension published Extension Bulletin WO – 1053, - [Michigan Land Use Guidelines for Siting Wind Energy Systems](#) with recommend the sample zoning language standards. In 2007, the MSU Extension published Extension Bulletin WO – 1053, - Michigan Land Use Guidelines for Siting Wind Energy Systems with recommend the sample zoning language standards. In July 2011, a group led by a pair of Michigan State University professors (Ken Rosenman and Jerry Punch), along with retired Consumers Energy engineer William MacMillan, issued a [report that called for stricter regulations](#) on four main issues related to wind turbines: physical safety, shadow flicker (caused by shadows cast when sunlight hits a turbine’s turning blades), conflict resolution and the most contentious issue related to turbines: noise levels. Please see the [MSU news story](#).

Air Quality

Currently, Michigan generates about 60% of its electricity from coal. Wind energy has the potential to reduce Michigan’s reliance on coal while offering air quality benefits for human health.

Community Noise Standards

Decisions concerning wind noise levels fall under the province of local planning and zoning authorities in Michigan. Of importance for local planning and zoning authorities is the fact that a consistent methodology for measuring wind Db(A) levels does not exist. Public opinion polls in Michigan show that 95% of residents believe that the development of renewable energy is somewhat or very important for the state’s economic recovery. Communities considering wind energy projects will find that citizens will have a number of concerns. Thus it is important that local authorities clarify the methods used to determine noise levels before crafting local ordinances for wind that are consistent with other such ordinances in the community. Local authorities may also wish to review current industry best practices with regard to wind noise levels and related zoning ordinances. (See: [Zoning Guidelines](#)).

More Information

For more information on Wind and Health issues as they relate to local zoning and siting, please see:

[Environmental Research Letters, Infrasound and Low Frequency Noise from Wind Turbines: Exposure and Health Effects](#)

[Grand Valley State University, Wind Power and Human Health: Flicker, Noise and Air Quality](#)

[Report by Michigan State University Professors, Recommended Zoning for Wind Energy Systems](#)

[MSU Extension, Extension Bulletin WO – 1053, Michigan Land Use Guidelines for Siting Wind Energy Systems](#)

IEA Wind, [Implementing Agreement for Cooperation in the Research, Development, and Deployment of Wind Energy Systems](#)

Berglund B and Lindvall T (1995). *Community Noise*. Archives of the Center for Sensory Research 2(1).

Michigan Public Service Commission, [MICHIGAN PUBLIC SERVICE COMMISSION ON THE IMPACT OF SETBACK REQUIREMENTS AND NOISE LIMITATIONS IN WIND ZONES IN MICHIGAN](#), January, 2010.

[NREL County Commissioners Planning Book](#) – distributed at the 2007 meeting of the Michigan Association of Counties.

Environmental Law Institute, [State Enabling Legislation for Commercial-Scale Wind Power Siting and the Local Government Role](#)

World Health Organization on Wind Noise:

<http://www.euro.who.int/en/what-we-do/health-topics/environmental-health/noise>

<http://www.who.int/docstore/peh/noise/guidelines2.html>

Public Engagement

MSU Land Policy Institute Factsheet Series on Wind Farm Development in Coastal Communities

In July 2011 the Michigan State University, Land Policy Institute, published a series of factsheets on a project to measure the perceptions of the impact of wind energy generation in coastal communities. The published factsheet from this study can be found at:

- [Perceptions of the Impact of Wind Energy Generation in Coastal Communities – Trust and Fairness](#)

- [Perceptions of the Impact of Wind Energy Generation in Coastal Communities – Impact Perceptions](#)
- [Perceptions of the Impact of Wind Energy Generation in Coastal Communities – Project Overview](#)

A key finding from the “Impact Perceptions” Factsheet is the “tension between the benefits of wind farms that are perceived as accruing at large scales (state, national) and the negative impacts that are perceived as accruing very locally.” The report notes that, “clarity on exactly what the positive and negative impacts of a potential wind energy development are would be in the best interest of the public and the developers. Without strong communication and education regarding the impacts, it is difficult for community members to make informed choices, which may lead to what has been characterized as NIMBY resistance, as they seek to mitigate perceived risks.”

Gratiot County Wind Energy Project

Public engagement is critically important for successful wind projects. Several key documents serve as guidance for local communities: In Michigan, the Gratiot County Wind Energy project is considered by many to be a model for successful Public Engagement on Wind Energy Projects – for more information on the Gratiot County Public Engagement process, please contact Richard F. (Rich) Vander Veen, III, Tel: (616) 437-3177, email: rfv3@mackinawpower.com. The Great Lakes Renewable Energy Association (GLREA) as well as both DTE Energy and Consumers Energy also have expertise in working with communities on public engagement and wind energy.

Community Dispute Resolution

To help minimize costly disputes at the local community level, the Michigan Energy Office has developed a Community Dispute Resolution Program in Michigan to provide communities with contact information for individuals with specific expertise in wind-related Community Dispute Resolution, as well as information on the Community Dispute Resolution Program (CDRP) program and Wind Zoning best practices.

(See: [Community Dispute Resolution Program for Wind](#))

Michigan State University, Recommended Zoning for Wind Energy Systems

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Wind Farms in Michigan

Traverse City Wind Turbine



Gratiot County Wind Development



