

09hr_SC-CUER_CRule_10-057_pt12



Details:

(FORM UPDATED: 08/11/2010)

WISCONSIN STATE LEGISLATURE ... PUBLIC HEARING - COMMITTEE RECORDS

2009-10

(session year)

Senate

(Assembly, Senate or Joint)

Committee on ... Commerce, Utilities, Energy, & Rail (SC-CUER)

COMMITTEE NOTICES ...

- Committee Reports ... **CR**
- Executive Sessions ... **ES**
- Public Hearings ... **PH**

INFORMATION COLLECTED BY COMMITTEE FOR AND AGAINST PROPOSAL

- Appointments ... **Appt** (w/Record of Comm. Proceedings)
- Clearinghouse Rules ... **CRule** (w/Record of Comm. Proceedings)
- Hearing Records ... bills and resolutions (w/Record of Comm. Proceedings)
(**ab** = Assembly Bill) (**ar** = Assembly Resolution) (**ajr** = Assembly Joint Resolution)
(**sb** = Senate Bill) (**sr** = Senate Resolution) (**sjr** = Senate Joint Resolution)
- Miscellaneous ... **Misc**

RE: Senate Hearing by Committee on Energy October 13

Author: Herbert S. Coussons, MD

Video testimony at: <http://www.youtube.com/watch?v=nUQdeUXapDQ>

Introduction

Thank you for reading and considering my comments. I am writing to express my disappointment with the process and outcome of the PSC and Wind Siting Council guidelines. It appears that the council ignored more and more evidence that shows health, safety and financial stress in communities that are burdened against their will with large industrial wind turbines. In fact in their recommendations on pages 19 thru 22, the constantly acknowledge sources that support strict guidelines to protect against disturbing noise, yet they chose to included more loose or weaker guidelines in their final conclusion. These weaker guidelines will result in annoyance, complaints, disturbed sleep and ultimately adverse health in a certain percentage of Wisconsin residents that can be mitigated from the outset by increasing the setback.

It is clear from extensive testimony, that more studies are needed to guarantee the safety of those living close to industrial wind turbines. What is the harm in adopting the most conservative guidelines until these studies can be completed? It is always easier to add more turbines than to remove turbines once they are there. Dr McFadden concluded, "*The evidence does not support a conclusion that wind turbines cause adverse health outcomes.*" Yet other expert testimony has exactly the opposite conclusion that when sited close to people, there will be an adverse health effects in a certain percentage of the population. Studies continue to determine the proper siting distance that will mitigate these health consequences. In a public presentation in Brown County Dr McFadden agreed that there is likewise "*no evidence to claim that industrial wind systems are safe*" and to claim that they are safe is not only misleading, but false." At best the jury is out and the evidence can be used to make claims by both sides of the argument. Because of this I believe it is premature to endorse the support the Rulemaking document as published on August 9, 2010 until more conclusive evidence is available.

I have reviewed the scientific literature. I have seen the testimony of residents that live in wind turbine communities in Wisconsin and elsewhere. I have reviewed the medical records of residents that have suffered from adverse health consequences. I have visited wind developments. And I have come to the same conclusions as many of studies from the US, Canada, New Zealand and the whole of Europe. *Large industrial wind turbine developments do not belong in close proximity to locations where people live and work.* I hope to show valid, accepted and reproducible data that put guidelines on siting distances.

At 30-40dB measurable objective sleep disturbances are seen.

At 40-55dB adverse health effects are seen.

Above 55dB is dangerous to public health.

Experience has shown industrial wind turbines cause noise that exceeds 40 dB when in close proximity. Noise deteriorates over distance. Allowing for proper distance will mitigate the

noise levels both experienced and predicted by independent research and the wind industry. *The safest minimum distance to protect the health and safety is to allow for less than 40dB, which correlates to 0.5 miles or 2640 feet. The optimal distance in a rural setting would allow for no more than a 10dB increase in ambient noise which would correlate to just over one mile.*

Yet the Wind Siting council came to a different conclusion, "The Council does not believe that the rules should include a noise-related setback requirement. Setback distance is only an indirect measure of exposure to noise... Evidence from studies of other sources of environmental noise, suggests that a daytime noise threshold of 50 dBA is well below the threshold at which measurable adverse health effects (e.g. hearing impairment, high blood pressure) from noise are seen." This completely ignores the World Health Organization exhaustive work on environmental noise and sleep disturbance. This is not surprising as the Wind Siting Council in majority is made up of individuals who are supported by the wind industry, or they belong to organizations whose "modus operandi is to identify barriers to renewable energy development, and come up with strategies for overcoming those problems, whether they be low buyback rates, permitting challenges, or regulatory roadblocks." In fact when Dr McFadden was asked to be an expert witness, he declined stating he was not an expert in wind energy health effects. After completing my own research I believe that a biased and uninformed group such as this is incapable of rendering a recommendation that looks out for the interests of the citizens in Wisconsin as they face decades of permanent development by the wind industry. The guidelines ignore local communities' public opinion and the rulemaking process has left local residents facing the threat of large wind developments feeling powerless and unable to have a voice in the politics of a permanent alteration to their way of life.

Background

As Wind Energy projects continue to expand across Wisconsin and as the need for energy independence becomes more urgent, controversy over siting regulations has become a dividing point in communities across the state. The recent applications for projects in northeast Wisconsin make safe siting guidelines the center of the argument. In local townships such as ours in Wrightstown, Holland, Morrison, and Glenmore, hours of emotionally charged meetings and conflicted town supervisors have led to only more controversy. A vote of town's members as slanted as 245-18 overwhelmingly does not support the Ledge Wind project. These same conflicts are seen world wide as wind energy projects develop. It is clear that studies are presented both supporting and refuting to notion that wind turbines harm people's health. It is my opinion as a physician that the best evidence support that *building large wind energy turbines in close proximity to humans has a negative impact on the health.*

Medical Facts

Normal sleep is essential for health and well-being. The science of sleep study has established the population averages for the amount of time it takes to fall asleep. The number of awakenings during the night and the number of sleep arousals that are standard. (American Academy of Sleep Medicine 2005.)

Disturbed sleep is defined as problems falling asleep, excessive awakening, excessive sleep arousals, difficulty resuming sleep after awakening, and an overall lack of restorative sleep.

Environmental sleep disorder is when outside factors such as noise cause sleep disturbance, insomnia, or results in daytime fatigue. These problems result in deficits of concentration, attention and cognitive performance, reduced vigilance, malaise, depressed mood, and irritability. The effects are seen in all ages and both genders.

Long-term sleep disturbance has great influence on metabolic and hormonal function. C-reactive protein is an inflammatory marker associated with the development of atherosclerotic plaques in the coronary vessels and is associated with increased risks of strokes and heart attacks. CRP as a risk predictor of strokes and heart attacks increases as sleep disturbance increases. (Meier-Ewert et al., 2004)

Leptin is secreted at night and helps to regulate appetite and glucose metabolism. When humans are sleep deprived, weight gain and impaired glucose tolerance is seen.

Cortisol has also been studied as a separate marker of disease related to environmental sleep disturbance. Higher cortisol levels are seen in individuals that are sleep deprived. Higher cortisol levels lead to increased blood pressure and impaired glucose tolerance. In fact the risk of heart attacks is two fold higher in those with insomnia. (Hyyppa and Kronholm, 1989) Many other health hazards can be directly related to sleep disturbance, including decreased immunity and susceptibility to viral illness, and many other consequences related to daytime fatigue such as work injuries, poor school performance and auto accidents. It has been shown that fatigue may impair driving more than alcohol. Work injuries may be increased, and children suffer from behavioral problems and decreased school performance. Children have problems with learning, attention and memory. These are all substantiated medical facts that stand alone as they relate to sleep disturbances. Many causes of sleep disturbance such as shift work, sleep apnea and environmental have been shown to cause the same group of adverse health effects. In summary, the overall health impact is that *death rates increase as sleep decreases* (Patel et al., 2004; Tamakoshi and Ohno, 2004) And according to Kripke et al. 1979, reduced sleep may be a greater independent risk factor for death than smoking or hypertension.

Environmental factors

Noise disturbs sleep. Many studies over the last 30 years show there are physical responses to noise as it disturbs sleep. EEG changes, blood pressure and heart rate, body movement and restlessness, and awakening can all be measured in the common sleep study. Environmental factors such as airport noise, road traffic, railway noise, and neighbor noise have all been reported as sources of sleep disturbance. They all follow a similar curve in that as noise levels increase so do complaints of sleep disturbance. At 40 dB less than 5% of individuals show night time sleep disturbance. At 50dB about 6% have sleep disturbance. At 55dB up to 10% have sleep disturbance. At 60dB as high as 15% have sleep disturbance. (European Commission, 2004) The neighbor induced noise is worth a closer look as up to 20% of neighbors are disturbed by voices, water running, toilets, TV, radio and music as well as neighbors pets. This is important in consideration of siting wind turbines because most locations targeted for development are rural (though not sparsely populated in southern Brown County). These areas tend to be quieter at night than urban areas. The people that chose to live there do not have background ambient noise, making any additional noises more noticeable.

Experience is the Best Teacher

Wind Turbine noise is disturbing to those who live close to them. Planners of wind turbine developments need to take into account the noise complaints from existing sites and the real world examples of the noise disturbance caused by wind developments. Many of these sites have been in place for years and those that are in close proximity to people are rife with complaints, law suits and unhappy landowners. Proper siting away from people will prevent such complaints. (Hanning, 2009) Surveys of residents living in close proximity to industrial wind turbines show high levels of sleep disturbance and annoyance. In Kewaunee County 52% of individuals living within 2400 feet found noise to be problematic. 32% within 4800 feet and 4% greater than 1 mile were disturbed. 67% reported disturbed sleep if they lived within 1200 feet. (Kabas 2001) In Sweden 2 studies yield similar results with complaints of disturbance rise as the noise levels increased from 32.5 dBA to 40 dBA. (Pederson and Persson 2007) Multiple other surveys from France, New Zealand, Canada, The United Kingdom, the Netherlands, Sweden and others show similar results. The conclusion that industrial wind turbine noise is disturbing to people that live close to the developments is a fact. We should learn from others mistakes and not subject the people of Wisconsin to repeat the problems seen across the United States and the world. It is clear that proper siting by increasing the distance of the wind turbines from people will prevent the noise complaints. The deterioration of noise over distance is very predictable and several models exist for industrial wind turbines. (UK Department of Transport and Industry 2006; Kamperman and James 2008)

What is the Best Distance?

At least 14 published recommendations follow the same logic. Wind turbines cause noise. Noise disturbs sleep. Sleep disturbance has a bad effect on health. The conclusions of many sound studies show that the noise decreases as the distance from the turbine increases. (Therault Acoustics, 2009 for Invenergy) Figure 9 "Predicted Noise Level Contours - Area" Shows that the entire Area shaded red will exceed 40dB. To reach an ambient level of less than 35 dB a home must be at least one mile away from the nearest turbine. To the northeast of the Ledge Wind Project that distance exceeds 2 miles. This agrees with the 14 studies tabulated in Dr Hanning's article "Sleep Disturbance and Wind Turbine Noise" (2009) Table 1 on page 33 summarizes these recommendations published between 1994 and 2009 by engineers, scientists, lawyers and physicians. The recommended setbacks vary from >0.62 miles to 1.55 miles with an average of 1.2 miles. At these distances the noise levels will be less than 45 dB. According to the WHO in their 2009 authoritative document on noise and sleep disturbance, *levels between 32 dB and 42 dB will disturb sleep and noise levels of 50dB or higher have been proven to cause health consequences.* The same study uses 21dB as a threshold for rural nighttime sleep.

According to Invenergy, the sample data from the Therault study, the ambient noise in 8 locations in rural Brown county were measured. The highest noise recorded was an isolated 56 dBA and the predominant level of daytime noise was 32dB. The ambient nighttime noise averaged 25 dBA. According to the WHO standards, between 32 and 42dB or a 10dB level above ambient sound will be disruptive. *If we use Invenergy's sound contour map, then a setback of one mile will be required to safely fall within these standards.*

Best Choice

The council has a decision to make. With the known data on sound and sleep disturbance, with other wind farm failures by close siting, and with the wind industries predictions of sound in the wind farm – *will the council make the best recommendation for the people living in Wisconsin and take steps to be conservative by placing a setback of one mile from where people live, work, and attend school? This is the best choice based on the current data to ensure the safety of those living within a development by keeping the noise levels less than 40dBA*

Or will the council compromise the standards knowing that up to 50% people will experience disrupted sleep and 5% may suffer health effects if ½ mile is used? Or worse yet if 1250 feet is used, then up to 67% will complain of disturbed sleep and up to 15% will see adverse health effects.

TABLES

Table 1 From Hanning 2009; Recommendations for setback of residential properties from industrial wind turbines.

<u>Authority</u>	<u>Year</u>	<u>Notes</u>	<u>Rec'd miles</u>	<u>Rec'd Kilometers</u>
Frey and Hadden	2007	Scientists. Turbines >2MW	>1.24	>2
Frey and Hadden	2007	Scientists. Turbines <2MW	1.24	2
Harry	2007	UK Physician	1.5	2.4
Pierpont	2008	US Physician	1.5	2.4
Welsh Affairs Select Committee	1994	Recommendation for smaller turbines	0.93	1.5
Scottish Executive	2001	Visual recommendation included	1.24	2
Adams	2008	US Lawyer	1.55	2.5
Bowdler	2007	UK Noise engineer	1.24	2
French National Academy of Medicine	2006	French physicians	0.93	1.5
The Noise Association	2006	UK scientists	1	1.6
Kamperman and James	2008	US Noise engineers	>0.62	>1
Kamperman	2008	US Noise engineers	>1.24	>2
Bennet	2008	NZ scientist	>0.93	>1.5
Acoustic Ecology Institute	2009	US Noise engineers	0.93	1.5

Table 3 from World Health Organization 2009; Effects of different levels of night noise on the population's health.

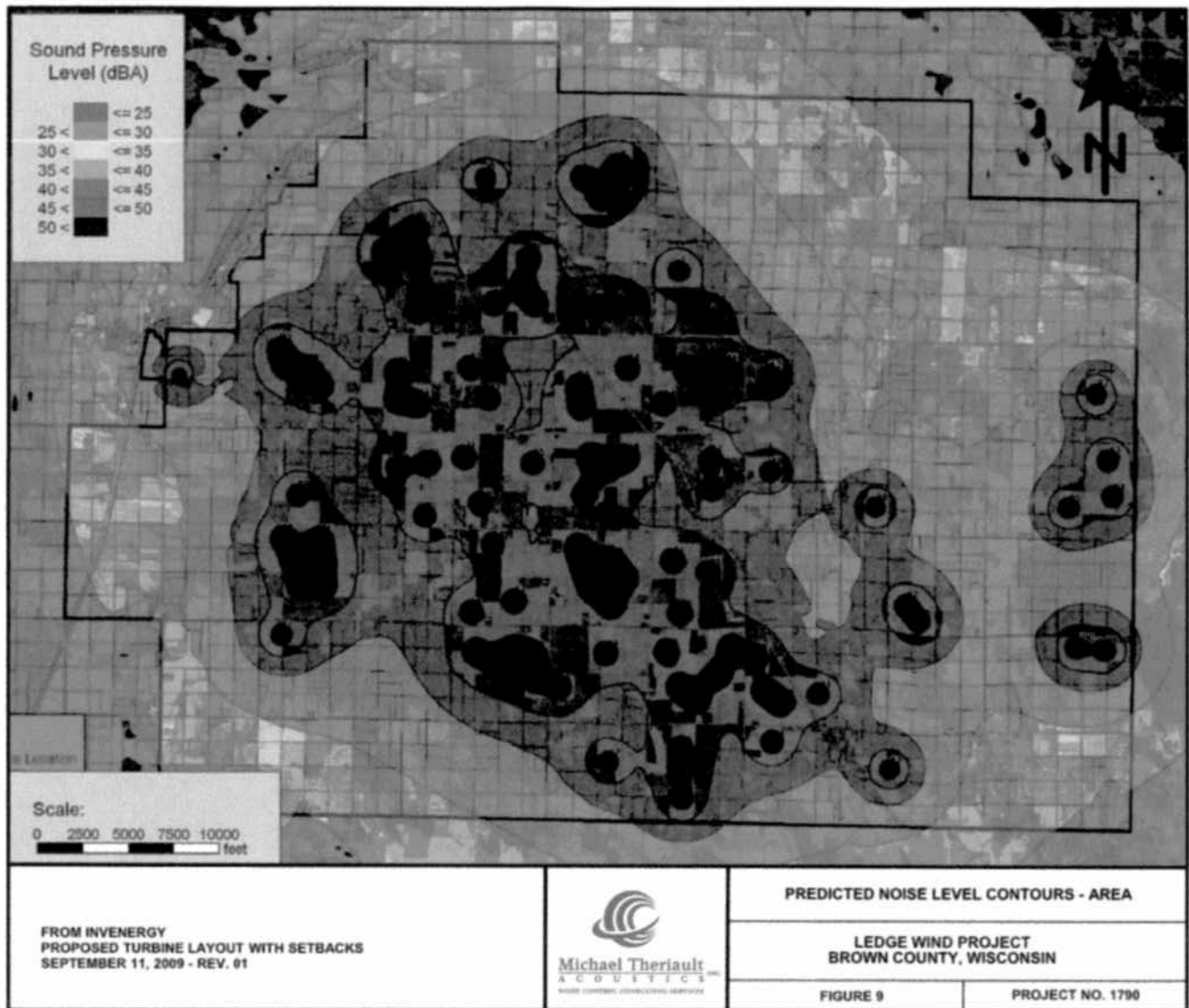
Average night noise level over one year	Health effect observed in the population
Up to 30dB	Although individual sensitivities and circumstances may differ, it appears that up to this level no substantial biologic effects are observed.
30 to 40 dB	A number of effects on sleep are observed; body movements, awakening, self-reported sleep disturbance, arousals. The intensity of the effect depends on the nature of the source and the number of events. Vulnerable groups (elderly, children and chronically ill) are more susceptible.
40-55 dB	Adverse health effects are observed among an exposed population. Many people have to adapt their lives to cope with the noise at night.
Above 55 dB	The situation is considered increasingly dangerous for public health. Adverse health effects occur frequently, a sizeable portion of the population is highly annoyed and the sleep disturbed. There is evidence that the risk of cardiovascular disease increases.

Table 2 from Theriault 2009 for Invenergy; Summary of ambient noise levels in the Ledge Wind project assessment

Location	Description	0600-0800	1200-1400	1800-2000	2200-2400
1	Blake Rd	26	26	24	19
2	Cooperstown	31	33	34	29
3	Mill Road	34	36	34	27
4	Dickenson Road	29	37	34	31
5	Morrison Road	29	34	29	28
6	Park Road	31	31	28	20
7	Refuge Road	35	36	56	27
8	Mill/Blake Road	31	32	28	23

According to subsequent predictions, the rise in ambient noise will be 15-24 dBA based on 1000 ft setbacks. This exceeds the WHO guidelines for absolute noise levels and relative rise in noise in noise levels. The solution to keep the noise levels within acceptable range is to increase the setback.

HSZ



This Invergency map supports the setbacks recommended in the chart and my opinions above.

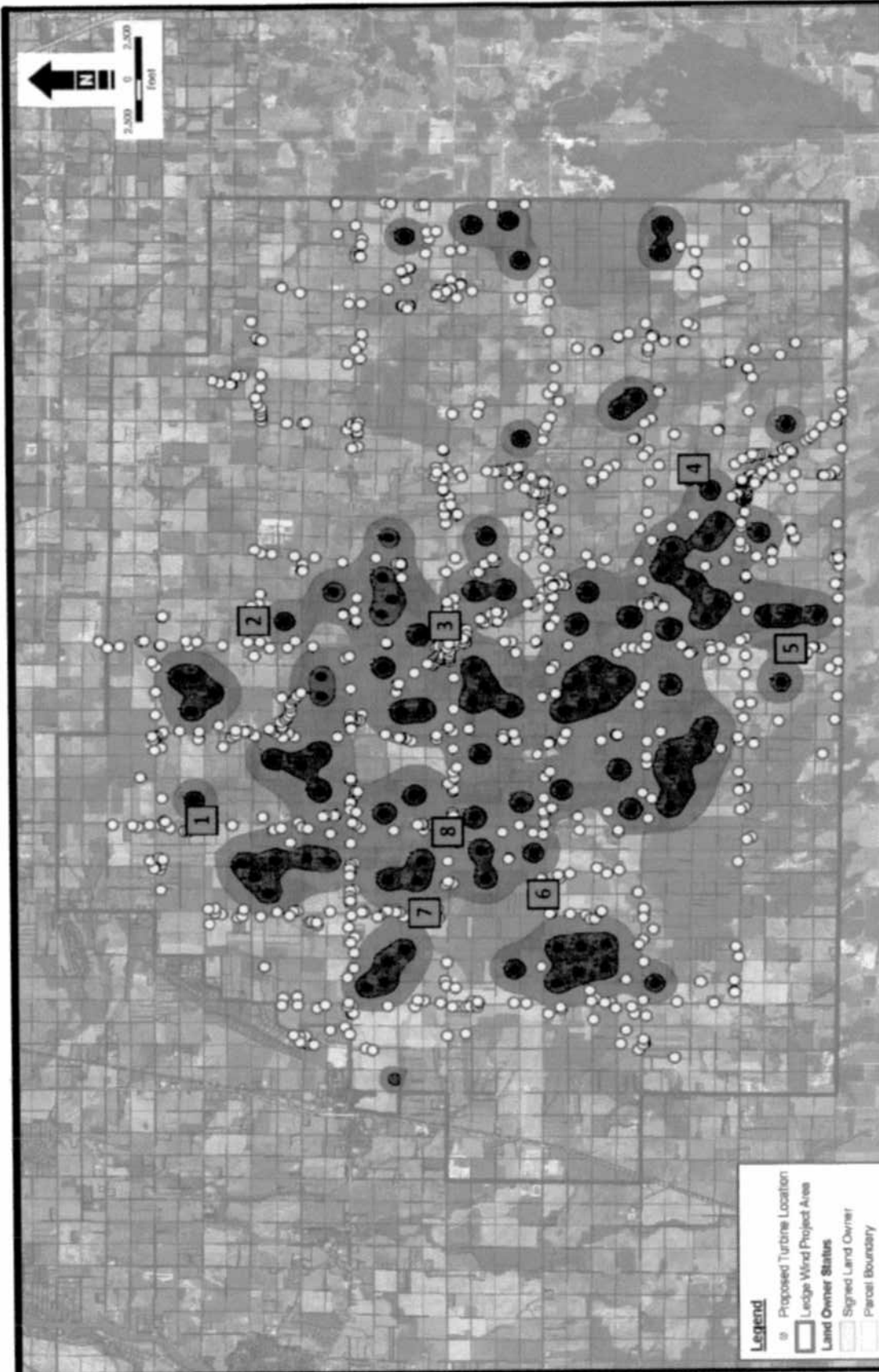
The goal is to have noise that disturbs sleep and impacts health eliminated.

As you can see, all areas shaded red exceed 40 dBA. And all areas shaded Orange will exceed 35dBA. To be outside of the 40 dBA ring, one must live 2500 feet from the nearest turbine. To be outside of the 35 dBA ring one must live over one mile from the nearest turbine. This agrees with the summary in the Hanning paper.

In the chart below consider all of the homes in the areas of 45 to >50 dBA. Then consider the WHO statement on noise from 40-55 dBA "Adverse health effects are observed among an exposed population. Many people have to adapt their lives to cope with the noise at night."

146c

AE



AMBIENT NOISE LEVEL MONITORING LOCATIONS 1 THROUGH 8

LEDGE WIND PROJECT
BROWN COUNTY, WISCONSIN

FIGURE 4 PROJECT NO. 1790

Michael Theriault
ACOUSTICS
NOISE CONSULTING SERVICES

Background Graphic Represents Noise Level Predictions From Computer Generated Acoustical Model. Dark Blue Regions Represent Levels Greater than 50 dBA; Light Purple Regions Represent Levels Greater than 45 dBA, up to and including 50 dBA. Yellow Points Represent Residential Structures; Black Points Represent Turbines.

Also consider the schools and businesses located in this area. Clearly the solution to this problem is in PROPER, SAFE siting. That siting guideline should include a minimum distance of ½ to 1 mile based on independent research and data from the wind industry.

“There is no medical doubt that audible noise such as emitted by modern upwind industrial wind turbines sited close to human residences causes significant adverse health effects. These effects are mediated through sleep disturbance, physiological stress and psychological distress. This is settled medical science.”

An Analysis of the American/Canadian Wind Energy Association sponsored “Wind Turbine Sound and Health Effects An Expert Panel Review, December 2009.” Peer reviewed and published January 2010.

Summary and Conclusion

Sleep is basic and important to human health. When sleep is disturbed, health suffers.

Noise disturbs sleep.

Above 30dB sensitive individuals complain.

At 30-40dB measurable objective sleep disturbances are seen.

At 40-55dB adverse health effects are seen.

Above 55dB is dangerous to public health.

Experience has shown industrial wind turbines cause noise that exceeds 40 dB when in close proximity.

Noise deteriorates over distance.

Allowing for proper distance will mitigate the noise levels both experienced and predicted by independent research and the wind industry.

The safest minimum distance to protect the health and safety is to allow for less than 40dB, which correlates to 0.5 miles or 2640 feet.

The optimal distance in a rural setting would allow for no more than a 10dB increase in ambient noise which would correlate to just over one mile.

As a physician and resident of Wisconsin in an area targeted for large industrial wind turbines, I ask the committee to make the best recommendation for the people living in Wisconsin and take steps to be conservative by placing a setback of one mile from where people live, work, and attend school. This is the best choice based on the current data to ensure the safety of those living within a development.

Or will the council compromise the standards knowing that at 2640 feet sleep complaints will develop? What percentage of residents is an acceptable compromise when action now by proper siting will prevent these problems?

Respectfully, Herbert S. Coussons, MD



State of Wisconsin
County of Brown

On this day October 17th 2010, personally appeared before me,
Herb Cousins, MD,

to me known to be the person described in and who executed the within and
foregoing instrument, and acknowledged that he/she signed the same as his/her
voluntary act and deed, for the uses and purposes therein mentioned.

Kerri J. Schmidt
Notary's Signature

10/20/13
Notary's Expiration Date

Notary's Seal





8/24 mtg.

Bill McClenahan

Joe Oswald

Joe Strahl

Jeff Veranteken

OVERVIEW OF WIND SITING RULEMAKING PROCESS

Joint comments on the draft wind siting rules were filed with the Public Service Commission by 38 businesses, organizations, and labor groups, including the following.

Emerging Energies of Wisconsin, LLC
Horizon Wind Energy, LLC
Midwest Wind Energy, LLC
Invenergy Wind Development, LLC
RENEW Wisconsin
Wind on the Wires

Operating Engineers Local 139
Wisconsin Laborers District Council
Wisconsin State Council of Carpenters
Wausaukee Composites, Inc.
Wind Capital Group, LLC
Bonestroo, Inc.

The Joint Comments of Renewable Energy Businesses and Organizations tailor the draft rule to meet the requirements of Act 40 while providing reasonable and workable rules for landowners, political subdivisions, and developers. Reasonable wind siting standards will allow wind projects to move forward. Overly burdensome provisions that do not protect health or safety will add costs and burdens to wind development with little or no benefit to our state or individual landowners.

The Wind Siting Council—a diverse, 15-member body appointed to review existing information on wind energy development and advise the Public Service Commission in drafting the rules—has consulted with experts in the areas of health and safety, acoustics and sound, and real estate to evaluate issues related to wind energy. The Council delivered its final recommendations to the Public Service Commission earlier this month; the recommendations are generally consistent with the Joint Comments on major issues.

Act 40, through its direction to the PSC to create uniform wind siting standards, is intended to eliminate the uncertainty, project delays, and economic losses developers face in challenging, through litigation, a political subdivision restriction that violates 66.0401(1), which expresses our state policy favoring renewable energy development.

Act 40 specifically directs the PSC to “promulgate rules that specify the restrictions a political subdivision may impose on the installation or use of a wind energy system *consistent with the conditions specified in s. 66.0401 (1m) (a) to (c).*” Those conditions require any restriction placed on a wind energy system to:

- (1) Serve to “preserve or protect the public health or safety;”
- (2) Not “significantly increase the cost of the system or significantly decrease its efficiency;” or
- (3) Allow for “an alternative system of comparable cost and efficiency.”

Consistent with this statutory directive in Act 40, each provision of the wind siting rules must satisfy one of those three conditions. If a provision does not satisfy one of the three conditions, it must be removed from the final rules. The Legislature has carefully and deliberately provided a framework for encouraging wind energy development in our state, and the PSC must be faithful to that policy and legal directive in formulating these rules.

- leases & easements
- statutory authority

ISSUES WITH CURRENT DRAFT FINAL RULES

PSC staff issued a revised version of its proposed rules last week. The PSC has considered the staff proposal at two open meetings within the past week, and will make final revisions tomorrow. Several provisions of the draft rules are inconsistent with Act 40, in both law and policy, and PSC revisions have not yet addressed most of these issues.

I. STATUTORY AUTHORITY.

Two general issues of statutory authority under Act 40 have arisen based on the current draft of the proposed rules. First, the PSC has included several provisions that do not comply with 66.0401(1). These provisions are unrelated to health or safety and either increase the cost or decrease the efficiency of wind energy systems. Examples include:

- Regulation of wind energy lease and easement provisions (PSC 128.11);
- Requirement to accommodate all land uses within one-half mile (PSC 128.12);
- Setback of 3.1 times height from nonparticipating residences (PSC 128.13);
- Requirement to use "best commercially available technology" to mitigate commercial and personal communications interference (PSC 128.16);
- Requirement to pay for all stray voltage testing within one-half mile (PSC 128.17);
- Allowing political subdivisions to require payments to nonparticipating landowners in an amount based on lease payments to participating landowners (PSC 128.33).

Second, the PSC has included several provisions in the draft rules that would regulate wind energy systems directly, even without a political subdivision ordinance. Act 40 only provides the Commission authority to establish the rules a political subdivision may apply; it provides no authority for the PSC to directly regulate wind energy systems.

II. SETBACKS.

The draft rules include a setback of 3.1 times wind turbine height from community buildings and nonparticipating residences. This results in a setback of over 1,500 feet for many newer, more efficient turbines with taller towers. The siting council recommended a safety setback of 1.1 times wind turbine height, and there is no health or safety justification for a larger setback, which will increase development costs.

III. REAL PROPERTY PROVISIONS.

The draft rules include extensive provisions regulating lease and easement agreements between developers and landowners. There is no health or safety reason for regulating contracts between private parties, and these regulations will increase transaction costs.

IV. SOUND, SHADOW, AND SIGNAL.

The draft rules include detailed provisions regulating the types of mitigation a developer must use to meet the sound, shadow, and signal standards in the rule, including requiring curtailment. Developers should have the flexibility to determine which mitigation measures are both effective and cost-effective based on the circumstances.

Wisconsin Legislative Council Rules Clearinghouse

Ronald Sklansky
Clearinghouse Director

Terry C. Anderson
Legislative Council Director

Richard Sweet
Clearinghouse Assistant Director

Laura D. Rose
Legislative Council Deputy Director

CLEARINGHOUSE REPORT TO AGENCY

[THIS REPORT HAS BEEN PREPARED PURSUANT TO S. 227.15, STATS. THIS IS A REPORT ON A RULE AS ORIGINALLY PROPOSED BY THE AGENCY; THE REPORT MAY NOT REFLECT THE FINAL CONTENT OF THE RULE IN FINAL DRAFT FORM AS IT WILL BE SUBMITTED TO THE LEGISLATURE. THIS REPORT CONSTITUTES A REVIEW OF, BUT NOT APPROVAL OR DISAPPROVAL OF, THE SUBSTANTIVE CONTENT AND TECHNICAL ACCURACY OF THE RULE.]

CLEARINGHOUSE RULE 10-057

AN ORDER to create chapter PSC 128, relating to the siting of wind energy systems.

Submitted by PUBLIC SERVICE COMMISSION
05-17-2010 RECEIVED BY LEGISLATIVE COUNCIL.
06-14-2010 REPORT SENT TO AGENCY.

RS:REL

LEGISLATIVE COUNCIL RULES CLEARINGHOUSE REPORT

This rule has been reviewed by the Rules Clearinghouse. Based on that review, comments are reported as noted below:

1. STATUTORY AUTHORITY [s. 227.15 (2) (a)]

Comment Attached YES ✓ NO

2. FORM, STYLE AND PLACEMENT IN ADMINISTRATIVE CODE [s. 227.15 (2) (c)]

Comment Attached YES ✓ NO

3. CONFLICT WITH OR DUPLICATION OF EXISTING RULES [s. 227.15 (2) (d)]

Comment Attached YES NO ✓

4. ADEQUACY OF REFERENCES TO RELATED STATUTES, RULES AND FORMS [s. 227.15 (2) (e)]

Comment Attached YES NO ✓

5. CLARITY, GRAMMAR, PUNCTUATION AND USE OF PLAIN LANGUAGE [s. 227.15 (2) (f)]

Comment Attached YES ✓ NO

6. POTENTIAL CONFLICTS WITH, AND COMPARABILITY TO, RELATED FEDERAL REGULATIONS [s. 227.15 (2) (g)]

Comment Attached YES NO ✓

7. COMPLIANCE WITH PERMIT ACTION DEADLINE REQUIREMENTS [s. 227.15 (2) (h)]

Comment Attached YES NO ✓

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CLEARINGHOUSE RULE 10-057

Comments

[NOTE: All citations to “Manual” in the comments below are to the Administrative Rules Procedures Manual, prepared by the Legislative Reference Bureau and the Legislative Council Staff, dated September 2008.]

1. Statutory Authority

a. Section 66.0401, Stats., as affected by 2009 Wisconsin Act 40, provides in part that: (1) a political subdivision choosing to regulate wind energy systems must enact an ordinance that is no more restrictive than the applicable standards established by the commission by rule; and (2) the political subdivision may not deny or impose a restriction on an application for approval unless it enacts such an ordinance. Section 196.378 (4g) (b), Stats., created by Act 40, in turn directs the commission to promulgate rules specifying the restrictions a political subdivision may impose on the installation or use of a wind energy system. The commission nominally addresses the requirements in s. PSC 128.13 (2) (a) by stating that a political subdivision may not establish distance or height requirements different than those in ch. PSC 128.

However, the extent of the applicability of ch. PSC 128 is unclear. Section PSC 128.02 (1) (a) provides that the chapter applies to wind energy systems, but there is no indication of whether the rule is meant to regulate only the approval process engaged in by political subdivisions, as mandated by Act 40, or whether the standards in subch. II of ch. PSC 128 are also meant to apply directly to developers, owners, and operators of wind energy systems that operate at a capacity of less than 100 megawatts in a political subdivision without an appropriate ordinance. [See also s. 196.491, Stats.] If the rule is intended to apply to developers, owners, and operators of wind energy systems throughout the state in political subdivisions without an appropriate ordinance, the rule should clearly state this and the commission should clearly and carefully explain its statutory authority. If the rule is intended merely to comply with Act 40, the text of the rule should state clearly that the standards contained in the rule are those that must be contained in a

political subdivision ordinance that imposes an approval process on developers, owners, and operators of wind energy systems.

b. Section 66.0401 (4) (a) 3., Stats., as created by Act 40, provides that on the same day that an applicant makes an application for approval of a wind energy system, the applicant must mail or deliver written notice of the application to the owners of land adjoining the site of the wind energy system. Sections PSC 128.10 and 128.30 (5) contain additional notice requirements. What is the statutory authority for the additional requirements? [Arguably, the notice requirement in s. PSC 128.18 (5) is part of the enforcement process that the commission is required to regulate under s. 196.378 (4g) (c) 4., Stats.]

2. Form, Style and Placement in Administrative Code

a. The rule preface compares the rule to the law in the State of Ohio. While an agency may compare a rule to any state in the country, s. 227.14 (2) (a) 4., Stats., requires a comparison with similar rules in Illinois, Iowa, Michigan, and Minnesota. The rule preface should include information about Iowa law.

b. Section PSC 128.02 (2) is a broad grant of authority to the commission to take any action it desires without regard to ch. PSC 128. If the commission's intent is to create a system by which a variance may be obtained, some standards for granting a variance should be stated in the rule.

c. In s. PSC 128.10 (3) (a) and (b), "Department of Transportation" should be changed to the lowercase. It appears that s. "PSC 128.10 (5)" should be changed to s. "PSC 128.10 (4)."

d. Section PSC 128.14 (3) (f) provides that the commission must establish a noise measurement protocol that will be revised as necessary and made available to the public on the commission's website. It appears that the noise measurement protocol, or at least a reference to a recognized standard, should be incorporated into the text of the rule.

e. In s. PSC 128.17 (1), the sentence should begin with the phrase "A developer." [See also sub. (3).]

f. In s. PSC 128.18 (2) (a), the notation "Wis. Adm. Code" is unnecessary and should be deleted.

g. In s. PSC 128.31 (1), the notation "s." should be inserted before the reference to "PSC 128.40."

h. Section PSC 128.40 requires the commission to establish detailed application filing requirements for applications filed for political subdivision review of a wind energy system. The commission may revise these requirements and place the requirements on the commission's website. It appears that the filing requirements should be placed in the text of the rule.

5. Clarity, Grammar, Punctuation and Use of Plain Language

- a. The rule makes frequent use of the phrase “developer, owner, or operator.” When the disjunctive word “or” is used, and the rule imposes a mandate, is it clear who is required to comply with the rule? Will this be a matter typically settled by contract?
- b. In s. PSC 128.13 Table 1, should “participating residences” be changed to “participating properties,” which is a defined term under s. PSC 128.01 (13)? See also sub. (1) (d) and s. PSC 128.15 (1).
- c. In s. PSC 128.14 (3) (a), what does “seasonally-reduced” mean? In sub. (3) (d), “nighttime hours” should be defined. In sub. (3) (e), “under par. (f)” should be added after “noise measurement protocol.”

RESPONSES TO LEGISLATIVE COUNCIL REPORT

1. Statutory Authority

- a. Agree that clarification is needed. Changes have been made. Portions of the rule are intended to apply even when a political subdivision does not have a wind siting ordinance. This supports the legislative goal of having consistent statewide siting standards.¹¹ The statute, as affected by 2009 Wisconsin Act 40, shows that this was intended. "Application" is defined in s. 66.0401 (1e) (a), Stats., as "an application for approval of a wind energy system under rules promulgated by the commission...." Yet an application must be filed whether or not a political subdivision has an ordinance. In s. 66.0401(4) (a) 2., Stats., a deadline is set for an application's completeness determination when a political subdivision does not have a wind siting ordinance. Section 66.0401(4) (a) 3., Stats., requires notice to landowners on the same day that an application is filed with the political subdivision. Thus, whether or not a political subdivision has an ordinance, the PSC rules apply.

In addition, s. 196.378 (4g) (c) 1., Stats., states that the commission must promulgate rules that specify what information and documentation must be in a wind energy system application to demonstrate that the system complies with the PSC rules on matters such as setback, shadow flicker, etc. Since an application must be filed whether or not the political subdivision has an ordinance, then all applications must detail how the system will comply with PSC rules.

Further, although a political subdivision is limited in the manner it may regulate a wind energy system under s. 66.0401(1m), the commission is not. Section 196.378 (4g) (6) authorizes the commission to promulgate rules that not only apply to health and safety, but to topics such as visual appearance, lighting, "or other matters."

Finally, the commission has rulemaking authority independent of s. 196.378 (4g), Stats. The commission has the authority to promulgate rules under s. 227.11 (2) (a), Stats., "interpreting the provisions of any statute enforced or administered by it, if the agency considers it necessary to effectuate the purposes of the statute." The commission administers and enforces both ss. 66.0401 and 196.491, Stats. The proposed rules must be taken into consideration when deciding under s. 196.491, Stats., whether to grant a CPCN to a wind project with a capacity of greater than 100 kilowatts. In order

¹¹ 10/1/09 press release from the governor's office states "The bill requires the Public Service Commission to establish uniform standards regulating the construction and operation of wind energy systems."

that all wind projects be examined using consistent standards, the standards must, at a minimum, be part of the consideration whenever a wind system is proposed.

- b. Section 196.378 (4g) (b), Stats., allows the commission to develop rules about matters other than those listed in the statute. Section 66.0401 (4) (a) 3., Stats., deals with notice that a wind energy system application has been filed. Section PSC 128.10 deals with a notice before the application is filed. It serves a different purpose than the notice that an application has actually been filed. Section PSC 128.30 (5) deals with information that must be included with the notice that an application for a large wind energy system has been filed.

2. Form, Style and Placement in Administrative Code

- a. Agree. Change made.
- b. Disagree. This provision appears in multiple commission rules, and has done so dating back to the 1950s. This flexibility is important given the very quick changes that can occur in the industries regulated by the commission, especially in a developing area such as wind energy. Further, this rule is unique in its inter-relationship between political subdivisions and the commission. Unusual complications may arise as a result of this. The rule is not totally open-ended. The commission must examine the facts and circumstances of an individual case and can only change requirements if there is an unusual or exceptional circumstance.
- c. Agree with both suggestions. Changes made.
- d. Disagree. This protocol is posted to the commission's website where it is widely available but can be changed as necessary. The issues of noise and noise measurement are quickly evolving and the protocol may need changing more frequently than rules would allow.
- e. Agree. Changes made.
- f. Agree. Change made.
- g. Agree. Change made.
- h. Disagree. Consistent with the commission's prior practice with filing requirements, the requirements are posted to the website where they are widely available but can be changed as necessary. The requirements may need to be revised more often than rules would allow, especially since this is the beginning of a new process.

5. Clarity, Grammar, Punctuation and Use of Plain Language

- a. Agree in part. Requirements and those responsible for meeting those requirements will change during the life of a wind energy system. The language “developer, owner or operator” was used in an attempt to prevent a responsible party from claiming it was not the party named in the rule. The intent in using this language was to convey that the person responsible for the wind energy facility at the time in question is responsible for the meeting the requirement at that point in time. However, the language has been changed to clarify this matter.
- b. Disagree. In s. PSC 128.13 Table 1, “participating residences” should not be changed to “participating properties” because there are setback requirements from residences and separate setback requirements from property lines.

Agree. In ss. PSC 128.13(1)(d), the language was intended to include both “participating residences” and “participating properties.” Changes made.

Disagree. In s. 128.15 (1), the language is intentionally limited to residences.

- c. Agree. Changes made.

BEFORE THE PUBLIC SERVICE COMMISSION OF WISCONSIN

Wind Siting Rules

Docket No. 01-AC-231

JOINT COMMENTS OF RENEWABLE ENERGY BUSINESSES AND ORGANIZATIONS

The renewable energy businesses and organizations listed below appreciate the opportunity to jointly comment on the proposed wind siting rules issued May 18, 2010. We thank Commission staff for the effort they put forth in developing the draft rules, and we offer the following comments and recommendations for incorporation in the final wind siting rules to be issued by the Commission.

Together, our businesses have been involved in the development of approximately 150 megawatts of wind energy in Wisconsin and we are currently engaged in the planning and development of at least an additional 1,500 megawatts. We provide thousands of Wisconsin homes and businesses with a clean, safe, and reliable source of energy. We are committed to the responsible development of our wind energy facilities, and we view collaboration and cooperation with local communities and landowners as essential to the long-term success of wind energy and the sustainable growth of our businesses.

We take very seriously considerations of the health and safety of landowners, residents, and other community members who live, work, and recreate near our wind energy facilities. We have each developed certain practices over many years of experience determining what standards are necessary to protect public health and safety based on factual and scientific information. This experience provides a firm foundation for the comments and recommendations we provide below.

Additional information about us, including our development activities in Wisconsin, is found in Appendix A.¹

Bonestroo, Inc.
EcoManity, LLC
Element Power, LLC
Emerging Energies of Wisconsin, LLC
Energize, LLC
Eric Welch, P.E.
Geronimo Wind Energy, LLC
Half Moon Power, LLC
Horizon Wind Energy, LLC
John Hippensteel, P.E.
Iberdrola Renewables, Inc.
Invenergy Wind Development, LLC
L&S Technical Associates, Inc.
Lake Michigan Wind & Sun, Ltd.
Lean, Clean Energy Services
Kettle View Renewable Energy, LLC
Midwest Wind Energy, LLC
Natural Resources Consulting, Inc.
North Wind Renewable Energy, LLC
Northern Power Systems, Inc.
Operating Engineers Local 139
RENEW Wisconsin
Renewegy, LLC
Rich Hasselman, Consultant
Ritger Law Office
Sagrillo Power and Light
Seventh Generation Energy Systems, Inc.
St. Croix Valley Sustainability Solutions, LLC
Sustainable Living Group
Timmerman's Talents, LLC
Wausaukee Composites, Inc.
Wave Wind, LLC
WES Engineering, Inc.
William Utley, Community Wind Energy, LLC
Wind Capital Group, LLC
Wind on the Wires
Wisconsin Laborers District Council
Wisconsin State Council of Carpenters

¹ These comments represent the general consensus view of our renewable energy businesses and organizations on the issues discussed herein. Although certain signatories may have differing views on certain provisions, we all generally support the type of reasonable, workable provisions discussed below.

I. INTRODUCTION.

As the Commission considers the appropriate provisions to include in the Final Wind Siting Rules, it is important to recall the context in which the Wisconsin Legislature enacted Act 40, and the wind development situation that still exists pending approval of the final rules. Over 600 megawatts of planned wind energy facilities are currently stalled in Wisconsin due to overly burdensome, unreasonable, and arbitrary restrictions certain political subdivisions have placed on wind development.

These restrictions contravene Wisconsin law and policy as stated in Wis. Stat. § 66.0401(1) (2008) that support and encourage wind energy development. Through that provision, “the State delegated the authority to execute and administer its established policy of favoring wind energy systems, and the statutory scheme was intended to create avenues for political subdivisions to assist the State.”² Certain political subdivisions abused that delegation, concluding, in error, that they could “as a matter of local policy disfavor wind energy systems, even severely restrict them, so long as the policy is tied to one of the three conditions in § 66.0401(1).”³

Although *Ecker Brothers* disavowed that notion of local wind energy policy overriding state wind energy policy, there continues to be a need to address the uncertainty, project delays, and economic losses developers face in challenging, through litigation, a political subdivision restriction that violates 66.0401(1). This need is fulfilled by Act 40 and its direction to the Commission to create uniform wind siting standards. Act 40 furthers our state policy that favors renewable energy. As mentioned, this policy is well

² *Ecker Bros. v. Calumet County*, 2009 WI App 112, ¶ 23, 321 Wis.2d 51, 772 N.W.2d 240 (emphasis omitted).

³ *Id.* at ¶ 17.

illustrated in 66.0401 and its legislative history.⁴ The original enactment of 66.0401 indicates “that the legislature determined it appropriate to give political subdivisions the power to assist in the creation of renewable energy systems and thus become an integral and effective factor in the State’s renewable energy goal.”⁵

Our state policy favoring renewable energy is also clearly indicated in our state energy policy that prioritizes renewable energy in meeting our energy needs, and in our renewable portfolio standard, which provides for our state to receive increasing amounts of renewable energy through 2015.⁶

Act 40 specifically incorporates this favorable renewable energy policy into the rulemaking authority it grants to the Commission, by directing the Commission to “promulgate rules that specify the restrictions a political subdivision may impose on the installation or use of a wind energy system *consistent with the conditions specified in s. 66.0401 (1m) (a) to (c).*”⁷ Those conditions require any restriction placed on a wind energy system to:

- (1) Serve to “preserve or protect the public health or safety;”
- (2) Not “significantly increase the cost of the system or significantly decrease its efficiency;” or

⁴ As discussed by the court in *Ecker Brothers*:

When enacting the original versions of Wis. Stat. §§ 66.0401 and 66.0403, the legislature expressed concern about the diminishing supplies of nonrenewable energy resources, and it observed that renewable energy systems could address this concern. To encourage the use of renewable sources of energy, the legislature resolved to remove legal impediments to such systems in four ways: (1) codifying the right of individuals to negotiate and establish renewable energy resource easements; (2) clarifying the authority of, and encouraging, political subdivisions to employ existing land use power for protecting access rights to the wind and sun; (3) creating a procedure for issuing permits to owners and builders of active solar and wind energy systems; and (4) encouraging political subdivisions to grant special exceptions and variances for renewable energy resource systems.

Ecker Brothers, 2009 WI App 112, ¶ 22 (internal citations omitted).

⁵ *Id.* at ¶ 23.

⁶ See Wis. Stat. §§ 1.12; 196.378(2).

⁷ Wis. Stat. § 196.378(4g)(b) (emphasis added).

(3) Allow for “an alternative system of comparable cost and efficiency.”⁸

Consistent with this statutory directive in Act 40, each provision of the wind siting rules must satisfy one of those three conditions.

We have therefore reviewed the draft rules considering whether each requirement (1) protects public health or safety, (2) does not significantly increase the cost or decrease the efficiency of the system, or (3) allows for a comparable alternative system. We encourage the Commission to do the same. If a provision does not satisfy one of the three conditions, it must be removed from the final rules. The Legislature has carefully and deliberately provided a framework for encouraging wind energy development in our state, and we must be faithful to that policy and legal directive in formulating these rules.

II. OVERVIEW OF HEALTH AND SAFETY ISSUES.

In considering whether a provision in the rules serves to protect public health or safety, it is vital that considerations of health and safety issues rely on factual and scientific information. Opponents of wind energy have asserted a multitude of unsubstantiated, misinformed, and false claims about health and safety matters. These claims should not be given any weight. Factual and scientific information does not support the conclusion that wind turbines cause or are associated with adverse health outcomes.⁹

A. Sound.

The sound heard from wind turbines at a distance, as with other local sources of sound, is affected by many factors, including the wind direction, meteorological conditions,

⁸ Wis. Stat. § 66.0401(1m).

⁹ See Jevon D. McFadden, MD, MPH, Presentation to Wisconsin Wind Siting Council, *Wind Turbines: A Brief Health Overview* (May 17, 2010); AUSTRALIAN NATIONAL HEALTH AND MEDICAL RESEARCH COUNCIL, WIND TURBINES AND HEALTH (July 2010), available at http://www.nhmrc.gov.au/_files_nhmrc/file/publications/synopses/evidence_review__wind_turbines_and_health.pdf.

vegetation, and other barriers. Site-specific acoustic models can anticipate sound levels at nearby receptors for consideration during project siting. The sounds emitted from wind turbines can be mechanical, from internal equipment such as the gearbox or yaw drive, or aerodynamic, from air moving past the rotor blades. Current turbine designs effectively reduce mechanical sound through soundproofing; therefore, the aerodynamic sound, often described as a “whooshing” sound, is what can normally be heard.

In 2009, the American Wind Energy Association (AWEA) and the Canadian Wind Energy Association (CanWEA) established a multidisciplinary scientific advisory panel comprised of medical doctors, audiologists, and acoustical professionals to review current literature available on the perceived health effects of wind turbines. The panel concluded that wind turbine sounds are not unique. Based on the levels and frequencies of the sounds, the panel found no reason to believe that turbines could plausibly have direct, adverse physiological effects.¹⁰ The panel concluded the following:

(a) Subaudible, low-frequency sound and infrasound from wind turbines do not present a risk to human health.

(b) Sound from wind turbines does not pose a risk of hearing loss or any other adverse health effect in humans.

(c) Some people may be annoyed at the presence of sound from wind turbines; annoyance is not a pathological entity.

¹⁰ W. DAVID COLBY, ET AL., WIND TURBINE SOUND AND HEALTH EFFECTS: AN EXPERT PANEL REVIEW (2009), available at http://www.awea.org/policy/regulatory_policy/documents/AWEA_and_CanWEA_Sound_White_Paper.pdf.

(d) A major cause of concern about wind turbine sound is its fluctuating nature; some may find this sound annoying, depending primarily on personal characteristics as opposed to the intensity of the sound level.

The conclusions from this panel have been supported and reiterated recently through a report by the Ontario Chief Medical Officer of Health. The Ontario report was prepared with the assistance of a technical team of representatives from several Ontario health organizations.¹¹ The report concludes that scientific evidence does not support a direct causal link between wind turbine sounds and adverse human health impacts. The report concludes that low frequency sound, infrasound, and vibration from wind turbines are not sufficient to have human health effects. Instead, the report found that complaints about wind turbine sound commonly arise from annoyance or personal attitude, including concerns about fairness and equity of wind development.

A report by the Australian National Health and Medical Research Council published this month also confirms these findings, concluding: "There are no direct pathological effects from wind farms."¹² Accordingly, there is no demonstrated link between wind turbine sound and human health. Alleged health impacts, particularly the now thoroughly discredited theory of "wind turbine syndrome," have no factual or scientific basis.

B. Shadow Flicker.

Shadow flicker occurs when the blades of a turbine pass in front of the sun to create a recurring shadow on an object. Computer models can determine the days and times during the year that specific buildings in close proximity to turbines may experience

¹¹ CHIEF MEDICAL OFFICER OF HEALTH, THE POTENTIAL HEALTH IMPACT OF WIND TURBINES (2010), available at http://www.health.gov.on.ca/en/public/publications/ministry_reports/wind_turbine/wind_turbine.pdf.

¹² AUSTRALIAN NATIONAL HEALTH AND MEDICAL RESEARCH COUNCIL, *supra* note 9.

shadow flicker. Shadow flicker has no demonstrated human health impacts. Opponents of wind energy sometimes allege that shadow flicker can cause epileptic seizures. There is no factual or scientific data to support those allegations. Shadow flicker from wind turbines occurs much more slowly than the “strobe light effect” associated with seizures.¹³

C. Groundwater.

Concerns about fracturing karst bedrock are not based on any known issues with wind development affecting groundwater. Every existing wind project in Wisconsin—Butler Ridge, Cedar Ridge, Blue Sky Green Field, Forward, Montfort, Rosiere, Lincoln, Byron, and Glenmore—is situated in an area identified as a potential karst location.¹⁴ With 306 wind turbines installed in potential karst areas since 1998,¹⁵ there are no known issues with groundwater contamination from wind turbine construction. Wind turbine foundations in most cases are no more invasive than the average single-residential basement excavation (ten feet deep and 50 feet in diameter, with underground cabling at four feet below grade).

D. Other Health Considerations.

As we continue to grapple with the immense problem of climate change and its threatened health and societal impacts, wind energy stands out as an abundant, affordable, and readily available energy supply option while reducing carbon dioxide (CO₂) emissions. The U.S. Department of Energy concludes that wind power can supply 20 percent of our electricity by 2030 and reduce projected emissions of CO₂, the leading greenhouse gas, by

¹³ Andrew R.D. Smedley, et al., *Potential of Wind Turbines to Elicit Seizures Under Various Meteorological Conditions*, *EPILEPSIA* (Nov. 16, 2009).

¹⁴ See Wisconsin Geological and Natural History Survey, Map Showing Areas for Karst Potential in Wisconsin, <http://www.uwex.edu/wgnhs/karstmap.htm>.

¹⁵ See RENEW Wisconsin, Commercial Wind Energy Installations in Wisconsin, <http://www.renewwisconsin.org/windfarm/windwisconsin.htm>.

25 percent.¹⁶ Additionally, each megawatt-hour of wind generation can prevent the loss of up to 600 gallons of water from fossil fuel power plant cooling. This equals over 20 billion gallons of water conserved by the 35,000 megawatts of wind energy installed and operating in the United States at the end of 2009.¹⁷

The entire fleet of wind turbines operating in the United States as of the end of 2009 will also prevent the emission of over 57 million tons of CO₂ each year.¹⁸ Drastically changing climates could have serious human health impacts. Wind energy produces less than two percent of the emissions from coal combustion per megawatt-hour, even considering the manufacturing process.¹⁹

Wind energy can also help improve air quality, which has a direct impact on human health. An estimated 800,000 people in Wisconsin—approximately 14 percent of the population—suffers from some form of lung disease, including asthma, chronic obstructive pulmonary disease (COPD), and lung cancer.²⁰ Particulate matter in the air, often as a result of fossil fuel power plant emissions, has been shown to affect cardiovascular and respiratory health. Unhealthy levels of particle pollution can even cause otherwise healthy people to get sick.²¹ By offsetting more polluting forms of energy generation, wind energy can improve air quality and our health. In 2009, wind projects in operation in the United

¹⁶ U.S. DEPT OF ENERGY, 20% WIND ENERGY BY 2030: INCREASING WIND ENERGY'S CONTRIBUTION TO ELECTRICITY SUPPLY (2008), available at http://www.20percentwind.org/20percent_wind_energy_report_revOct08.pdf.

¹⁷ AWEA, WINDPOWER OUTLOOK 2010, available at http://www.awea.org/pubs/documents/Outlook_2010.pdf.

¹⁸ *Id.*

¹⁹ Letter from Willet Kempton, University of Delaware, and Jonathan Levy, Harvard School of Public Health, to Delaware Public Service Commission, May 3, 2007, available at <http://www.ceoe.udel.edu/windpower/DE-Qs/IRP-KempLevy-Health.pdf>.

²⁰ Testimony by Dona Wininsky, American Lung Association of Wisconsin (Tr. 431).

²¹ American Lung Association, Particle Pollution, <http://www.stateoftheair.org/2010/health-risks/health-risks-particle.html>.

States prevented 200,000 metric tons of sulfur dioxide and 80,000 metric tons of nitrogen oxides from polluting our air.²²

Accordingly, in addition to having no demonstrated negative impacts on human health or safety, wind energy could have a significant positive impact on human health when air quality and climate change issues are considered. These considerations should guide the determination by the Commission of whether provisions in the final rules serve to protect health or safety.

III. COMMENTS ON PROPOSED RULES.

With this context, we offer our comments on the proposed rules and our recommendations for the final rules. We have carefully and thoroughly reviewed the rules based on the framework we discussed above. Where we do not comment on a particular provision of the rules, we support its inclusion in the final rules.

Although we will address the provisions of the rule in order below, we would like to note one provision in particular at the outset. In PSC 128.33, we would replace subsection (2) with the following: "A political subdivision shall not place any condition or regulation on a wind energy system except as specifically provided in this chapter. Any condition or regulation on a wind energy system not specifically provided in this chapter shall be deemed more restrictive than this chapter in contravention of s. 66.0401(1m), Stats."

This change is the most essential request we are making to assure that the rules are consistent with the legal and policy requirements of Act 40.

The draft rules provide political subdivisions with substantial discretion; as discussed above, this is contrary to the intention of Act 40 and the renewable energy policy

²² AWEA, WINDPOWER OUTLOOK 2010, *supra* note 17.

of Wisconsin. Certain political subdivisions have demonstrated a willingness to abuse delegated authority, as discussed in *Ecker Brothers*. We are willing to work collaboratively and cooperatively with political subdivisions to establish mutually agreeable provisions beyond the requirements of the rules. However, we cannot develop wind projects in Wisconsin if current uncertainty regarding political subdivision requirements continues. If the purpose and intent of Act 40 are to be served, the rules must occupy the field regarding wind energy development.

A. Definitions (PSC 128.01).

In the definition of “developer,” we would delete “regardless of whether the person will own or operate the wind energy system” and replace it with “excluding third-party consultants.” As drafted, the language has the unintended consequence of including engineers, technical advisors, attorneys, and other consultants as developers, subject to the requirements of the rules. Only the actual project developer should be included.

In the definition of “participating property,” we would delete paragraph (b). In paragraph (a), we would modify the last part of the sentence to state “on or in the vicinity of the property.” This change assures that developers with existing good neighbor or wind easement agreements with neighboring landowners would not need to execute new agreements with landowners containing the specific language required in the draft rule.

We would remove the definitions of “wind easement” and “wind lease” for the reasons discussed in paragraph (D) below.

B. Applicability (PSC 128.02).

In paragraph (1)(b)5., we would add “unless the developer files a new application after the effective date of this chapter” to the end of the sentence. As drafted, this provision

would retain the roadblock for projects that are stalled as a result of overly burdensome political subdivision requirements. We think this is unintended. A developer who has previously filed an application with a political subdivision should be able to file an application for the same project under the new rules.

We would add a new paragraph (1)(b)6. that states: "Except as required by s. 196.491 (3) (dg), a wind energy system that is a large electric generating facility as defined in s. 196.491 (1) (g)." This change clarifies that the rules do not directly apply to facilities with a capacity of at least 100 megawatts, but that the Commission will consider the rules in CPCN proceedings as required by Wis. Stat. § 196.491(3)(dg).

In paragraph (1)(c), we would remove the language requiring new Commission rules for turbines with a maximum blade tip height exceeding 500 feet. Some turbines currently in production are already approaching that threshold, such as the Nordex N100 and the Vestas V112 with a maximum blade tip height of 492 feet.²³ We are not aware of any issues that would require different rules for turbines over 500 feet. Larger turbines are able to reach better wind resources, thereby increasing overall system energy production.²⁴

In subsection (2), we would delete the language beginning with "applying requirements" and replace it with "granting a variance to an individual wind energy system from any requirement provided in this chapter." One purpose of the rules is to provide certainty to wind developers in the application and approval process. Appropriate

²³ See Nordex Gamma Generation Product Data Sheet N100, available at http://www.nordex-online.com/fileadmin/MEDIA/Gamma/Nordex_Gamma_N100_USA.pdf; Vestas V112-3.0 MW Brochure, available at <http://www.vestas.com/en/wind-power-plants/procurement/turbine-overview/v112-3.0-mw.aspx>.

²⁴ See Nordex Gamma Generation Platform Brochure, available at http://www.nordex-online.com/fileadmin/MEDIA/Gamma/Nordex_Gamma_USA.pdf.

standards established in the rule eliminate the need to subject a project to greater or different restrictions than provided in the rules.

C. Notice Requirements (128.10).

In paragraph (1)(a), we would change the notice requirements to 30 days before application filing or 60 days before construction. We regularly coordinate with political subdivisions and landowners openly prior to application filing, because we recognize that community support for a project is an important aspect of successful project development. The apparent purpose of the notice requirement in the rules is to provide political subdivisions with sufficient time to obtain the necessary resources to prepare for the required application review and plan any public hearings. A formal notice requirement of six or nine months would not serve that purpose better than 30 or 60 days notice.

We would also change the notice requirement for landowners to owners of property adjacent to participating property, rather than all landowners within one mile. This requirement is consistent with Wis. Stat. § 66.0401(4)(a)3., which requires notice of application filing only to adjacent landowners.²⁵

For small systems, we would require notice to adjacent landowners, not the political subdivision, 30 days prior to construction. The application review process for a small system should be no greater a burden for the political subdivision than reviewing a standard application for a building permit, and therefore the purpose of the notice period for large systems is not present.

²⁵ See Wis. Stat. § 66.0401(4)(a)3. ("On the same day that an applicant makes an application for approval under subd. 1. for a wind energy system, the applicant shall mail or deliver written notice of the application to the owners of land adjoining the site of the wind energy system.")

In paragraph (1)(b)1., we would remove “complete” and add “projected” prior to “number.” In paragraph (1)(b)2., we would replace “planned” with “projected” and add to the end of the sentence “provided the developer shall not be required to show specific turbine locations.” In paragraph (1)(b)4., we would require notice of “major or material” permits. These three changes are intended to give the political subdivision sufficient information to determine the scope of its review, without requiring the developer to provide specific system information that may change prior to the application date. We would apply paragraph (1)(b)5. only to large systems, as a small system is unlikely to be located in more than one political subdivision.

In subsections (2) through (4), we would change the notice requirements to 30 days before application filing and 60 days before construction. Similar to the reasons stated above for political subdivisions, the purpose of the notification to these agencies is to provide them with an opportunity to prepare for the application review process. We would also only apply these notice requirements to large systems, given the limited impacts of small systems on environmental, transportation, and emergency service issues.

We would replace the language in paragraph (3)(b) with the following: “A developer of a large wind energy system shall consult with the Department of Transportation and incorporate into large wind energy system delivery decisions required permitting considerations from the Department of Transportation.” This language is intended to mirror the DNR notification requirement and better reflects existing DOT authority regarding wind projects.²⁶

²⁶ See Wis. Stat. §§ 348.25-348.27 (requiring permits for oversize or overweight loads, but not requiring the type of extensive planning contemplated in the draft rule).

We would delete paragraph (4)(a)1., which requires notification to all emergency first responders serving a location, given the potentially large scope and uncertainty of this notice requirement. The notice requirement in paragraph (4)(a)2. to all official first responders of a political subdivision satisfies the intent of the notice requirement and contains certainty as to which entities the developer needs to notify.

D. Real Property Provisions and Existing Property Uses (PSC 128.11-12).

Reflecting on the requirement of Act 40 that each provision of the wind siting rules satisfy one of the three conditions in Wis. Stat. § 66.0401(1m), we request deletion of these provisions in their entirety. Although some of these provisions may be included in our existing lease and easement agreements, we strongly object to any regulation of agreements between private parties. We are especially concerned with provisions that would require disclosure of confidential terms of our agreements.

We operate with agreements that are fair and equitable to landowners. As with other business transactions, we offer landowners reasonable contract terms that provide them with fair compensation in exchange for the provisions we need to develop our projects. We also accommodate existing property uses in our development of projects. These are voluntary agreements, and landowners have the opportunity to review them and seek advice and counsel, if desired, before signing. Although the state has elected to regulate private contracts in certain industries where unscrupulous practices may exist, such as payday lending, we are not aware of any circumstances that would justify regulating wind energy contracts.²⁷

²⁷ At the public hearing in Fond du Lac, Edward Ritger, an attorney who has represented landowners in entering into lease and easement agreements with developers in several wind projects in the state, testified that

E. Siting Criteria (PSC 128.13).

At the end of paragraph (1)(a), we would add the following: “based on the buildings, residences, property lines and other physical conditions existing on the earlier of the date an application for approval of a wind energy system is filed with the political subdivision or the start of construction.” This change will provide certainty for developers in making setback decisions.

In Table 1, we would change the setback from occupied community buildings and nonparticipating residences to 1,000 feet. Several developers use this as a standard setback, and no justification has been provided for increasing the setback to a larger distance for health or safety reasons. Indeed, two recent decisions by the Minnesota Public Utilities Commission have applied a 1,000-foot setback from existing residences, absent waiver by the resident.²⁸ It is also important to remember that in addition to these minimum setbacks, a developer must comply with sound and shadow standards; therefore, a longer minimum setback is not required to mitigate sound and shadow impacts.

We would remove the setback from wetlands and waterways, which are already governed by DNR requirements.²⁹

For small systems, we would establish a setback of 1.0 times the maximum blade tip height from occupied community buildings, nonparticipating residences and property lines, public roads, and overhead communication, transmission, and distribution lines. A

he has not witnessed the type of unscrupulous contract practices alleged by those who oppose wind energy. Instead, developers have worked with landowners to incorporate desired changes into contracts. (Tr. 150-51).

²⁸ See Large Wind Energy Conversion System Site Permit for the EcoHarmony West Wind Project in Fillmore County Issued to EcoHarmony West Wind, LLC, at 16, Docket No. IP-6688/WS-08-973 (Feb. 3, 2010); Large Wind Energy Conversion System Site Permit for Elm Creek II Wind Project in Jackson and Martin Counties, at 8, Docket No. IP-6728/WS-09-553 (Feb. 25, 2010).

²⁹ See Wis. Admin. Code §§ NR 102-103.

larger setback is not justified based on experience with small systems in Wisconsin. There are numerous instances where small wind systems are installed close to participating residences and other occupied buildings without issue. These setbacks are also consistent with the Wisconsin model Small Wind Energy System Ordinance, developed by Focus on Energy and others.³⁰

In paragraph (1)(b), we would replace “foundation of a building” with “wall of an occupied building” to better reflect current setback measurement methods.

We would remove paragraph (1)(c), given the lack of clarity in the requirement. We site turbines responsibly to avoid large impacts to any particular landowner, but we are concerned with the open-endedness of this provision.

In paragraph (1)(d), we would also allow waivers of property line setbacks and remove the exception to allow landowners to consent to a lesser setback. In certain situations, for example, it may be desirable for both the developer and nonparticipating landowner to voluntarily agree to site a turbine closer than 1.1 times the blade tip height from a nonparticipating property line.

We would replace subsection (3) with the following: “The developer, owner or operator of a large wind energy system shall use reasonable efforts to avoid or mitigate interference with existing line-of-sight communication technologies.” This language more closely follows the requirement for other types of communication in the rules. There may be situations where it is feasible to place part of a project in the path of existing line of sight technologies and to coordinate with the political subdivision to develop alternatives.

³⁰ See Small Wind Energy System Ordinance (PSC REF# 131478).

F. Sound Criteria (PSC 128.14).

As discussed above, wind turbines produce a soft whooshing sound when the blades travel in front of the tower. On flat or gently rolling terrain, the aerodynamic sound of a wind generator dissipates with distance. When standing 1,000 feet away from a turbine, the sound output should not exceed 45-50 decibels, comparable to a kitchen refrigerator.³¹ A pair of post-construction sound level studies performed in 2008—one for the Forward Wind Energy Center near Brownsville and the other for the Blue Sky Green Field Wind Energy Center near Johnsburg—found that decibel levels increase only slightly from normal outdoor background noise at the setback point when a wind turbine is operating.³² As stated in the Forward report, “Test personnel generally needed to concentrate in order to identify turbine noise from that of wind-induced vegetation rustle. The most consistent sources of background sound at the measurement points were birds, distant traffic, and the rustle of vegetation due to wind.”³³

Although some opponents have advocated for a measurement standard based on the ambient sound level, such a standard is fraught with uncertainty for developers, including compliance testing impracticalities. The ambient sound level changes over time, whether that time period is a matter of hours or a matter of minutes or seconds. An established sound level at 50 dBA makes project planning and compliance testing much

³¹ NATIONAL RESEARCH COUNCIL OF THE NATIONAL ACADEMIES, ENVIRONMENTAL IMPACTS OF WIND-ENERGY PROJECTS 158 (2007); AMERICAN WIND ENERGY ASSOCIATION, WIND POWER MYTHS VS. FACTS, available at http://www.awea.org/pubs/factsheets/050629_Myths_vs_Facts_Fact_Sheet.pdf.

³² Application of Forward Energy LLC for a Certificate of Public Convenience and Necessity to Construct a Wind Electric Generation Facility and Associated High Voltage Electric Transmission Facilities, to be Located in Dodge and Fond du Lac Counties, Noise Level Testing for the Forward Wind Energy Center, Docket No. 9300-CE-100 (PSC REF# 100610) (Sept. 17, 2008) (“Forward Report”); Application of Wisconsin Electric Power Company for a Certificate of Public Convenience and Necessity to Construct a Wind Electric Generation Facility and Associated Electric Facilities, to be Located in Fond du Lac County, Post Construction Noise Survey, Docket No. 6630-CE-294 (Oct. 14, 2008) (PSC REF# 102715).

³³ Forward Report at 8.

more feasible, and has shown to be effective in limiting sound impacts, as demonstrated in the Forward and Blue Sky sound studies.

Therefore, in paragraph (2)(a), we would remove "or at an alternate wall as specified by the resident." We would replace paragraph (2)(b) with the following: "A developer shall operate the wind energy system in a manner that sound produced by the wind energy system does not exceed 50 dBA at any nonparticipating residence or occupied building existing on the earlier of the date an application for approval of a wind energy system is filed with a political subdivision or the start of construction." These changes provide certainty and predictability to a developer when conducting pre-construction sound studies. In particular, the language "sound produced by the wind energy system" clarifies that contributions from other sources of sound, such as factories and farm equipment, will not be included in determining compliance with the sound standard.

We would replace paragraphs (3)(a) through (e) with the following: "(a) A developer, owner or operator of a large wind energy system shall test for compliance with the sound limits upon complaint by a nonparticipating residence. (b) A developer shall evaluate compliance with the sound limits as part of pre-construction sound studies for a large wind energy system based on the commission sound measurement protocol in effect at the time of application filing." First, this change establishes a uniform decibel level during all hours and seasons. In our experience, 50 dBA is an acceptable sound level in all seasons, even in summer evenings when residents are more likely to have windows open; the 5 dBA difference would not protect public health, but would increase system costs and decrease efficiency if curtailment is required. Second, this change removes the open-ended language in paragraph (d) regarding certain undefined forms of audible sound; other than

an operational problem, which the developer would address to maintain system efficiency, we are unaware of wind turbines producing these types of sounds and therefore view this restriction as unnecessary and creating uncertainty.

In paragraph (3)(g), we would remove “is not an encumbrance on the real property.” We think this is merely a drafting error, as this language conflicts with the language that follows on the waiver running with the land.

G. Shadow (PSC 128.15).

As discussed above, shadow impacts do not pose any public health or safety issues. Further, incidences of shadow flicker are predictable and preventable. Through computer simulations, engineers can track the elevation of the sun and when it would pass behind moving blades. Developers can use that information to situate wind turbines to minimize occurrences of shadow flicker at neighboring households.³⁴ A number of changes are necessary, however, to make the shadow provisions workable for developers.

In subsection (1), we would add “to comply with sub. (2)” to the end of the second sentence to clarify that compliance with the shadow standard is the requirement and not elimination of shadow. We would also exempt small systems from the shadow requirements, as their shadow effects rarely extend beyond the property of the owner.

In subsection (2), we would clarify that the standard applies to nonparticipating residences “existing on the earlier of the date an application for approval of a wind energy system is filed with a political subdivision or the start of construction.” This change will provide predictability to developers in considering shadow in siting decisions. We would also change the standard to 45 hours “based on the projected weather-adjusted annual

³⁴ NATIONAL RESEARCH COUNCIL, *supra* note 31, at 160.

average through modeling.” This change clarifies that shadow studies will be based on projected actual conditions rather than worst-case scenarios. This change also allows for a more reasonable number of hours of shadow. As discussed above, there are no demonstrated health impacts of shadow; instead, it is an issue of aesthetics for landowners. We consider shadow in our siting decisions based on a reasonable impact to landowners, and offer compensation or mitigation to those who exceed a reasonable level. In Wisconsin, there are approximately 4,400 annual daylight hours; a standard of 45 hours allows for shadow up to about one percent of total daylight hours.

We would delete paragraphs (3)(b) through (d) and replace paragraph (3)(a) with the following: “A developer, owner or operator of a large wind energy system shall work with an owner of a nonparticipating residence to mitigate the effects of shadow flicker. The developer shall provide reasonable shadow flicker mitigation for a residence experiencing 45 hours per year or more of shadow flicker.” This change provides predictability to the developer in modeling shadow. We work with landowners to determine a reasonable solution for shadow, and have found this system workable. Given the lack of health or safety impacts for shadow, the requirements we removed would increase the cost of the system without any benefit to health or safety.

H. Signal Interference (PSC 128.16).

In subsection (1), we would remove the last sentence, given the inconsistency with the central purpose of these rules to provide uniform standards. In subsection (2), we would remove the second and third sentences, and in subsection (3), we would remove the third and fourth sentences. We coordinate with residents and political subdivisions to mitigate signal interference with the best method based on the circumstances. This change

removes provisions that would limit political subdivisions, residents, and developers to specific mitigation methods that may not be preferable or workable under the circumstances.

In all three subsections, we would clarify that the mitigation requirements only apply to signal interference “caused by the wind energy system” to clarify that developers are not responsible for preexisting signal interference. We would also exempt small systems from this section, as their potential to interfere with signals is minimal.

I. Stray Voltage (PSC 128.17).

Stray voltage issues with wind projects are rare, and are usually caused by problems in the existing distribution system or at the farm itself. While wind turbines, like all other objects that produce or use electricity, do create electromagnetic fields, the fields extend only about 10 feet from the turbine and associated transformer and are weaker than the electromagnetic fields produced by hairdryers.³⁵

In subsection (1), we would clarify that this requirement applies “at dairy operations upon request from an owner of a dairy operation within one-half mile of any large wind energy system facility,” rather than to all confined animal operations before and after construction. Requiring testing before and after construction, without cause, would increase system costs without any demonstrable benefit.

In subsection (3), we would clarify that the requirement to rectify problems arises only for stray voltage problems “that exceed stray voltage standards established by the commission.” As written, there is no standard for allowable levels of stray voltage.

J. Construction and Operation (PSC 128.18).

³⁵ WINDRUSH ENERGY, THE HEALTH EFFECTS OF MAGNETIC FIELDS GENERATED BY WIND TURBINES (2004).

We would remove paragraphs (1)(a) and (b). Developers construct the turbine with the manufacturer-provided finish and signage. We are concerned with the undefined and open-ended nature of these terms and, in any event, these provisions do not serve any health or safety purpose, but rather are related solely to aesthetics.

In paragraph (1)(g), we would remove the requirement to post signs at every access road intersection. We believe this requirement would be unnecessary in certain situations, for example, where there are multiple access roads on a large parcel of property owned by one property owner.

We would exempt small systems from the requirements of paragraphs (1)(c), (d), and (g) which are not well-suited to the design specifications of small systems.

We would remove paragraph (2)(c); it is in our interest to prevent threatening conditions on collector circuits, but we are concerned with potential liability this provision could create by establishing a legal duty to monitor and remove third-party facilities.

In paragraph (3)(b), we would clarify the restoration requirement to provide that "a developer shall, to the extent feasible, restore the project area to its pre-construction condition after construction is complete." The language is consistent with current property restoration practice. In paragraph (3)(c), we would clarify that the insurance is "with coverage amounts reasonably determined by the developer, owner or operator" to provide more certainty as to what this provision requires. We would exempt small systems from both of these paragraphs given the minimal construction impacts of small systems. Further, insurance for small systems is already required in specified amounts by PSC 119.³⁶

³⁶ See Wis. Admin. Code § PSC 119.05.

In paragraph (4)(c)2., we would remove the requirement to provide annual training. In paragraph (4)(d), we would remove the material after the first sentence. We would also remove paragraph (4)(e). We are committed to collaborating with local emergency officials to assure the proper handling of any emergency situations. However, we feel that a standard approach in this area is not in the best interest of emergency first responders, residents, or developers. We would like the ability to develop procedures and solutions that are most appropriate based on the circumstances. We would also exempt small systems from this section, given that any emergency situations with small systems would not pose any unique challenges for emergency first responders.

In paragraph (5)(a), we would remove the notice requirement to landowners as overbroad; we view the notice requirement to political subdivisions as sufficient to provide residents with access to complaint information, consistent with procedures for making other complaints within a political subdivision. In paragraph (5)(b), we would remove the material after the first sentence. We would like the ability to implement existing company complaint practices. We would also exempt small systems from this section.

K. Decommissioning (PSC 128.19).

We would exempt small systems from paragraph (1)(b), given the minimal decommissioning activity for small systems. We would replace paragraph (1)(c) with the following: "A wind energy system that generates no electricity for a continuous 24 month period is rebuttably presumed to be at the end of its useful life." This change simplifies and provides certainty to the decommissioning process and accommodates operational realities that may prevent a system from operating for extended periods. We would change the

time periods in paragraph (1)(d) to 12 months and 24 months, respectively, based on current practices.

In paragraph (1)(d), we would replace the first sentence with the following: "The requirement to decommission and remove a wind energy system shall not apply if it is likely the wind energy system will operate again in the future or if any of the following apply." This change accommodates the situation where a developer maintains the turbine towers but replaces other components of the system after its useful life. Wind turbine towers can be expected to last two to three lifecycles more than other turbine components, and therefore could be reused. We would add a new paragraph (1)(e)3. that states: "The wind energy system has been prevented from operating as a result of an event beyond the control of the developer, owner or operator." This change addresses the situation where events that would traditionally constitute *force majeure* prevent a system from operating.

We would remove subsections (2) and (5) to provide more certainty and uniformity for developers. These provisions could open the door for substantially varying standards by political subdivisions. In subsection (4), we would change the decommissioning for all property types to require the owner or operator, "to the extent feasible, to restore the project area to its pre-construction condition, provided that the owner or operator need not remove underground facilities more than four feet below grade." This change is consistent with current practices by several developers, which have not presented any problems.

L. Application and Notice Requirements (PSC 128.30).

In paragraph (1)(c), we would require filing of the "projected timeline," to accommodate common changes in construction schedules. We would remove paragraphs (1)(g) and (k) through (m). These provisions are open-ended and provide uncertainty for

developers as to what the rules actually require; these provisions could create inconsistency in political subdivision application approval processes. We would exempt small systems from the requirements of paragraphs (1)(d) through (m), given that small systems have little or no impact on these issues.

In subsection (5), we would require notice only for large systems and only to owners of property adjacent to participating property, rather than all landowners within one-half mile. This requirement is consistent with Wis. Stat. § 66.0401(4)(a)3., which requires notice of application filing only to adjacent landowners.³⁷ We would exempt small systems from the publication, public participation, and joint application review process requirements in subsections (5) through (7) given their limited community impact.

M. Application Completeness (PSC 128.31).

We would replace the first sentence in subsection (1) with the following: "A political subdivision shall determine whether an application for a large wind energy system is complete applying the application filing requirements under PSC 128.30." This change provides certainty for developers in the application process. As discussed further in Section (Q) below, additional detailed application requirements will not provide any benefit to the process. In this subsection, we would also add the following sentence: "Modifications by the developer to the location of wind energy system facilities shall not be a basis for a determination that an application is incomplete." This change accommodates changes in facility locations based on circumstances such as consultations with state agencies or newly

³⁷ See Wis. Stat. § 66.0401(4)(a)3. ("On the same day that an applicant makes an application for approval under subd. 1. for a wind energy system, the applicant shall mail or deliver written notice of the application to the owners of land adjoining the site of the wind energy system.").

discovered site conditions, and provides developers with assurance that a new application process is not required merely for a change in facility locations.

In subsection (2), we would clarify that a political subdivision may request additional information "required under this chapter," to eliminate the possibility of political subdivisions establishing different information requirements. We would also exempt small systems from the completeness determination in this section, as approval should not require more political subdivision consideration than for a standard building permit.

N. Political Subdivision Review (PSC 128.32).

In paragraph (1)(b) 4., we would add "unless the developer files a new application after the effective date of this chapter" to the end of the sentence. As discussed in Section (B) above, this change allows a developer who has previously filed an application with a political subdivision to file an application for the same project under the new rules.

We would replace subsection (2) with the following: "A political subdivision shall approve an application for a wind energy system if the system substantially complies with the requirements of this chapter." This change provides developers with the certainty that is currently lacking in political subdivision approval processes. As drafted, disputes would undoubtedly arise as to what is an "unreasonable denial." Developers need more predictability to make wind development in Wisconsin feasible and cost-effective.

We would change the last sentence in paragraph (3)(a) to the following: "An approval may be subject to the conditions in s. PSC 128.33(1) and shall not be subject to any other conditions or regulations except as specifically provided in this chapter." For clarification, we would also add a sentence requiring political subdivisions to issue a decision within the time period specified in Wis. Stat. § 66.0401(4)(d)-(e). These changes are

intended to make the rules consistent with Act 40 in terms of allowable political subdivision conditions and regulations.

We would exempt small systems from subsection (4), given that the change in ownership of a small system is similar to the change in ownership of any other residential or commercial equipment. We would also exempt small systems from paragraph (5)(b), except for the application fee. Political subdivision review of a small system application should not require the use of outside consultants or experts.

In paragraph (5)(d), we would include a fee cap of 0.1 percent of the estimated cost of the system, for all systems. In paragraph (5)(e), we would add the following: “provided that the political subdivision must return any unused fee or reimbursement to the developer at the time of its final decision on the wind energy system application.” This fee cap will provide political subdivisions with sufficient resources to evaluate an application.

O. Political Subdivision Provisions; Record of Decision (PSC 128.33-34).

In paragraph (1)(a), we would change “current DNR guidelines” and “DNR recommendations” to “DNR requirements.” We would also exempt small systems from this requirement. In paragraph (1)(b), we would change “statewide or regional” to “required DNR.” These changes remove ambiguity as to the applicable DNR standards and accurately reflect current DNR legal authority for wind projects.

In paragraph (1)(c), we would delete “the proposed type and period of use of local roads” to avoid jurisdictional conflicts with DOT;³⁸ we would also delete “operation,” given the limited impact of wind project activities on roads during operation.

³⁸ See Wis. Stat. §§ 348.25-348.27.

We would delete paragraphs (1)(d) through (g). These requirements provide overly broad discretion to political subdivisions in areas that do not protect health or safety and would increase the cost of the system. In addition, paragraph (1)(f) could create conflicts with existing or future DNR groundwater requirements³⁹ and, as discussed above, there is no factual basis for arguments that wind projects endanger groundwater.

We would exempt small systems from the post-construction filing requirement in PSC 128.34(3) for reasons discussed herein for other small system exemptions.

Although some opponents of wind energy advocate for “property value protection plans,” there is no evidence that wind projects lower property values. Two nationwide studies have shown that wind turbines have not lowered property values or reduced selling prices.⁴⁰ Both studies analyzed property values and selling prices in a number of states and counties, including Kewaunee County.⁴¹ In some areas, wind turbines actually increase property values because the land is worth more for wind energy use than for agricultural or grazing use.⁴² Wind projects are also designed to preserve existing uses, including recreation.⁴³ One wind facility recently constructed in Wisconsin was designed to preserve existing snowmobile trails.⁴⁴

³⁹ See Wis. Admin. Code Chapter NR 40.

⁴⁰ See ECONORTHWEST, ECONOMIC IMPACTS OF WIND POWER IN KITTITAS COUNTY (2002), available at <http://efsec.wa.gov/kittitaswind/adj/prefiled/edg/80-2.pdf>; RENEWABLE ENERGY POLICY PROJECT, THE EFFECT OF WIND DEVELOPMENT ON LOCAL PROPERTY VALUES (2003), available at http://www.repp.org/articles/static/1/binaries/wind_online_final.pdf.

⁴¹ *Id.*

⁴² See Application of Forward Energy LLC for a Certificate of Public Convenience and Necessity to Construct a Wind Electric Generation Facility and Associated High Voltage Electric Transmission Facilities, to be Located in Dodge and Fond du Lac Counties, Final Decision 33, Docket No. 9300-CE-100 (July 18, 2005) (PSC REF# 37618).

⁴³ NATIONAL RESEARCH COUNCIL, *supra* note 31 at 153; AWEA, WIND POWER MYTHS VS. FACTS, *supra* note 31.

⁴⁴ See Application of Forward Energy LLC, Final Decision, *supra* note 31, at 14-15.

While wind facilities over 50 megawatts in capacity, like other utility generating facilities, are exempt from local property tax under Wisconsin law, municipalities and counties that host these wind farms receive a maximum payment from the state equal to \$2,000 per megawatt of capacity per year under the state utility credit (subject to per capita limits) and an additional \$2,000 per megawatt of capacity per year because wind facilities produce renewable energy (not subject to per capita limits).⁴⁵ Thus, for example, a typical 200 megawatt wind facility could produce up to \$800,000 per year in payments to the municipality and county that host the wind facility. For projects under 50 megawatts in capacity, developers have voluntarily agreed to make payments in lieu of property taxes.⁴⁶ These payments may help reduce the property tax burden of other landowners or provide additional services to residents that would otherwise be too costly under the base property tax levy.⁴⁷

Wind facilities also provide income to local landowners who agree to have wind turbines placed on their land, generally in the form of lease payments. In addition, wind facilities create well-paying local jobs during construction and operation of the facility.⁴⁸

⁴⁵ WISCONSIN LEGISLATIVE FISCAL BUREAU, SHARED REVENUE PROGRAM (COUNTY AND MUNICIPAL AID AND UTILITY AID) (2009), available at http://www.legis.state.wi.us/lfb/Informationalpapers/18_shared%20revenue%20program.pdf.

⁴⁶ For example, Shirley Wind, LLC agreed to make annual payments of \$4,000 per megawatt of capacity, to be shared by the Town of Glenmore, Brown County, and landowners within one-half mile. See Town of Glenmore Amended Conditional Use Permit Resolution No. 161 (May 10, 2007).

⁴⁷ See Application of Forward Energy LLC, Final Decision, *supra* note 42, at 35; Application of Wisconsin Electric Power Company for a Certificate of Public Convenience and Necessity to Construct a Wind Electric Generation Facility and Associated Electric Facilities, to be Located in Fond du Lac County, Final Decision 15, Docket No. 6630-CE-294 (Feb. 6, 2007) (PSC REF# 68958); AWEA, WIND POWER MYTHS VS. FACTS, *supra* note 31.

⁴⁸ NATIONAL RESEARCH COUNCIL, *supra* note 31, at 165.

The following table illustrates the level of direct payments made to local property owners, counties and municipalities through lease payments and local aid.⁴⁹

County	Township(s)	Project	Megawatts	Annual Local Aid	Estimated Annual Payments to Property Owners	Estimated Annual Combined Contribution to Local Economies
Dodge	Herman	Butler Ridge Wind Farm	54	\$216,000	\$297,000	\$513,000
Fond du Lac	Empire, Eden	Cedar Ridge Wind farm	68	\$272,000	\$374,000	\$646,000
Fond du Lac/ Dodge	Byron, Oakfield, Leroy, Lomira	Forward Energy Center	129	\$516,000	\$710,000	\$1,226,000
Fond du Lac	Marshfield, Calumet	Blue Sky Green Field	145	\$580,000	\$725,000	\$1,310,000
Total			396	\$1,584,000	\$1,806,000	\$3,390,000

Some wind energy opponents have also argued that nonparticipating landowners should receive compensation for “takings.” However, a recent federal appellate case firmly rejected the argument that issuing a conditional use permit for a wind project constitutes a taking of neighboring property.⁵⁰ Therefore, any provisions in the rule requiring developers to compensate landowners for asserted property value or use impacts outside of voluntary agreements are not justified.

P. Modifications; Monitoring and Mitigation (PSC 128.35-36)

In PSC 128.35(1)(a), we would add the following sentence: “For purposes of this paragraph, the term ‘material change’ shall not include a change in turbine model, a change

⁴⁹ See RENEW WISCONSIN, WISCONSIN WIND ENERGY INSTALLATIONS COMPLETED IN 2008, ECONOMIC IMPACT STATEMENT (Nov. 2008).

⁵⁰ *Muscarello v. Ogle County Board of Commissioners*, Nos. 08-2464 & 09-1381, 2010 WL 2541067 (7th Cir. June 24, 2010) (“[T]he alleged economic effects are a far cry from the denial of all economically beneficial or productive use of the land. The *Lucas* Court was careful not to create the impression that all zoning decisions that may diminish an owner’s potential uses of her property, or compel a less valuable use, are takings.”).

in the collection system or access roads, or a change in turbine location within 500 feet of the original turbine location, as long as such change complies with the setback, sound, shadow flicker, signal interference and stray voltage requirements of this chapter.” This change assures that common changes to wind projects during project development do not require reapplication. Certain project characteristics may change following approval based on agency consultations or newly discovered site conditions.

We would remove PSC 128.36; although we are willing to work with residents and political subdivisions to resolve complaints, this section provides substantial opportunity for varying requirements by political subdivisions and includes several open-ended and undefined standards that do not provide certainty for developers.

Q. Commission Procedure (PSC 128.40).

We would remove PSC 128.40. Establishing all filing requirements in the rules would be preferable in terms of providing predictability for developers and political subdivisions. Further, detailed filing requirements similar to those in CPCN proceedings may place undue burdens on smaller projects.

We would replace PSC 128.41(7)-(8) with the following: “The commission shall reverse or modify a political subdivision’s decision or enforcement action if the decision or enforcement action does not comply with this chapter or is otherwise unreasonable. The political subdivision’s decision shall be superseded by the commission’s decision and the commission may order an appropriate remedy.” This change is necessary for the rules to comply with Wis. Stat. § 66.0401(5)(d).

IV. CONCLUSION.

We thank the Commission for its consideration of these extensive comments and Commission staff for its work throughout this rulemaking process. The length of our comments is an indication of our interest in and commitment to developing wind projects in Wisconsin. With reasonable and proper uniform wind siting rules, Wisconsin can obtain the economic, environmental, and community benefits of increased wind development.

APPENDIX A

ECOMANITY, LLC is an energy consulting company focused on energy efficiency and renewable energy. The company goal is to help clients save money by reducing energy needs. EcoManity helps clients determine whether renewables (including small wind) and energy efficiency make sense for their situation. EcoManity currently has clients throughout Wisconsin that are considering installing small wind systems.

ELEMENT POWER, LLC is a renewable energy independent power producer that develops, acquires, builds, owns and operates utility-scale wind and solar power generation projects around the globe. North American operations are headquartered in Portland, OR and Regional offices are in Sacramento, CA and the San Francisco Bay Area; Minneapolis, MN; and Charlottesville, VA. European operations are headquartered in London, U.K., and Madrid, Spain with regional offices in Italy and Poland. Element is backed by a leading renewable energy private equity fund, Hudson Clean Energy Partners. Based in Teaneck, NJ and London, U.K., Hudson invests exclusively in companies focused on clean energy. Hudson is led by former senior executives of Goldman Sachs and Credit Suisse. Hudson's principals were early investors in several of the most successful renewable energy companies in the world, including Horizon Wind Energy, SunEdison, and First Solar.

Element Power has numerous wind and solar energy projects under development throughout North America. Element currently has wind and solar energy projects in operation in Spain and a development pipeline of over 4,000 megawatts (MW) in the U.S. alone. In Wisconsin specifically, Element Power is currently actively developing a 200 MW wind project in the eastern part of the state and is contemplating a significant expansion of its development portfolio in Wisconsin in the future.

EMERGING ENERGIES OF WISCONSIN, LLC is a Wisconsin-based renewable energy developer founded in 2003. Emerging Energies skillfully develops renewable energy projects to their highest potential while carefully balancing the interests of landowners, neighbors, utilities, municipalities, and investors. Construction is currently underway for the Shirley Wind Project, a state-of-the-art 20-megawatt wind energy facility developed by Emerging Energies in the Town of Glenmore. Emerging Energies is also developing other projects in the state.

GERONIMO WIND ENERGY, LLC is a utility-scale wind energy developer based in Edina, Minnesota, with two active wind farms in Minnesota and a development pipeline of wind farms in various stages of development throughout the Midwest with an aggregate nameplate capacity exceeding 4,000 megawatts of clean energy—roughly enough to power 1.5 million American homes. Geronimo has deep roots in agriculture as well as an appreciation and respect for farming practices and rural communities. As landowner advocates, the Geronimo development team is dedicated to improving the productivity of the American landscape by introducing rural communities to the benefits of wind energy.

HALF MOON POWER, LLC is a Milwaukee-based development company created to rapidly identify, secure and develop viable wind farm sites throughout the Midwest. Half Moon Power is dedicated to developing wind projects while pursuing long-term partnerships with landowners and consumers to help support America's growing demand for economical and clean energy. Half Moon Power has successfully built a portfolio of Midwestern wind farm sites representing over 800 MW of potential power with a further pipeline of quality wind sites throughout the region.

INVENERGY WIND DEVELOPMENT, LLC ("Invenergy") is a leading clean energy company focused on the development, ownership, operation and management of large-scale electricity generation assets in the North American markets. Invenergy and its affiliates currently have over 2,500 megawatts ("MW") of wind energy projects in construction or operation across the country. According to the American Wind Energy Association, Invenergy is the sixth largest owner of wind generation assets in the United States. Invenergy currently has 126 MW operating and over 350 MW of wind energy projects under development in Wisconsin.

LAKE MICHIGAN WIND & SUN, LTD. is a 29-year-old design-build engineering firm that has been involved with several large commercial wind energy projects in Wisconsin and throughout the world, primarily in conjunction with the wind assessment aspect, as well as in the small wind market.

LEAN, CLEAN ENERGY SERVICES is an MREA-trained site assessor, educator, and installer of small wind energy systems. Lean, Clean Energy has performed more than 60 site assessments in Wisconsin, Michigan, and Minnesota over the past six years and had led or been involved in the installation of 32.5 kilowatts of small wind energy in Wisconsin.

NORTHERN POWER SYSTEMS, INC. has over 30 years of experience developing and manufacturing advanced, innovative wind turbines. The company's next generation wind turbine technology is based on a vastly simplified architecture that utilizes a unique combination of permanent magnet generators and direct-drive design. Northern currently sources several manufacturing parts from Wisconsin's industrial sector for its 100kW turbine, as well as for its 2.2MW utility-scale turbine that is in development. With full-time offices in Wisconsin, a growing number of successful Small Wind (100kW) installations currently commissioned throughout the state, and a partnership with the University of Wisconsin in helping fund their Power Electronics Engineering program, Northern Power is strongly committed to the success of the Small Wind market in Wisconsin.

SEVENTH GENERATION ENERGY SYSTEMS, INC. ("SGES") is a non-profit engineering firm specializing in education, development and installation of renewable energy systems powered by the wind and sun. Founded in 2002, SGES is the leading installer of small wind systems in Wisconsin with over 1,000 kW of systems installed and another 500 kW of small wind systems in the pipeline for installation this year throughout Wisconsin. SGES also has 50 MW of community-scaled wind projects in the pipeline in Calumet, Green and Door counties under development. SGES employs 15 full-time and 5 part-time employees and is

enjoying rapid growth, adding Wisconsin jobs despite the barriers imposed through the balkanization of regulations in the state.

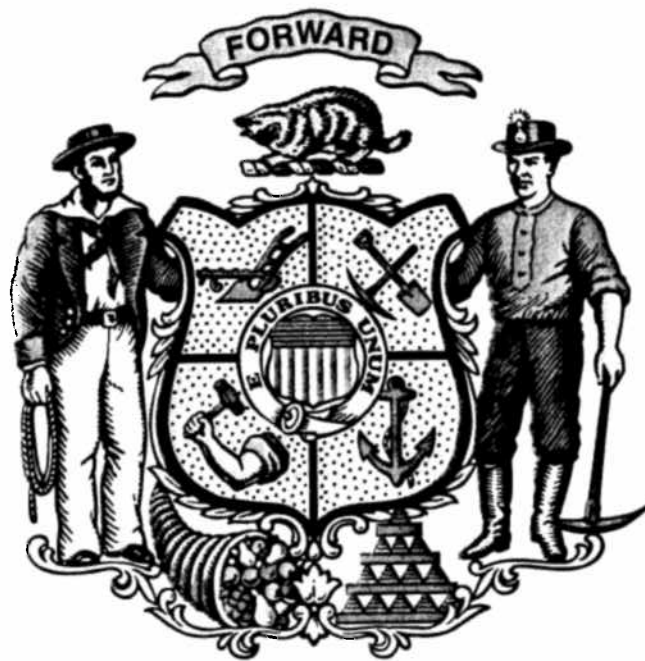
SUSTAINABLE LIVING GROUP (SLG) is dedicated to educating our community – Sheboygan, Wisconsin and surrounding areas – about the benefits of sustainable living practices and to network and promoting the people, businesses, and organizations that are already doing things that are sustainable. SLG has been working hard to promote sustainable living practices and we believe that wind power is a step in the right direction. At SLG, we believe that wind power is a better, cleaner source of power than most other alternatives in our area. The SLG group currently promotes and networks with small wind installers and owners in Wisconsin.

TIMMERMAN'S TALENTS, LLC is a wind site assessor and full service installer of small wind energy systems based in Platteville.

WAUSAUKEE COMPOSITES, INC. is a leading manufacturer of highly engineered composite plastic and fiberglass components for Original Equipment Manufacturer (OEM) customers in the Wind Energy, Industrial Truck and Tractor, Mass Transit, Medical, Commercial Furnishings, Therapeutic Systems, Recreation, and Corrosion-Resistant Materials Handling industries, worldwide. The company operates four manufacturing facilities in Wisconsin and Michigan, where it has approximately 500 employees. WAUSAUKEE COMPOSITES, INC. has created more than 100 jobs in Wisconsin since 2007 in the manufacture of Class V utility-grade wind turbine generator nacelle housings, spinner hubs and nosecones for wind turbines producing more than 250 MW of generating capacity at our Cuba City, Wisconsin, and Wausaukee, Wisconsin manufacturing plants.

WIND CAPITAL GROUP, LLC, formed in 2005, is a successful Midwest-based wind farm developer, with a regional office in Madison, committed to using American technology and know-how to harness clean, renewable sources of energy, create jobs, generate opportunity, and help forge a path to American energy independence.

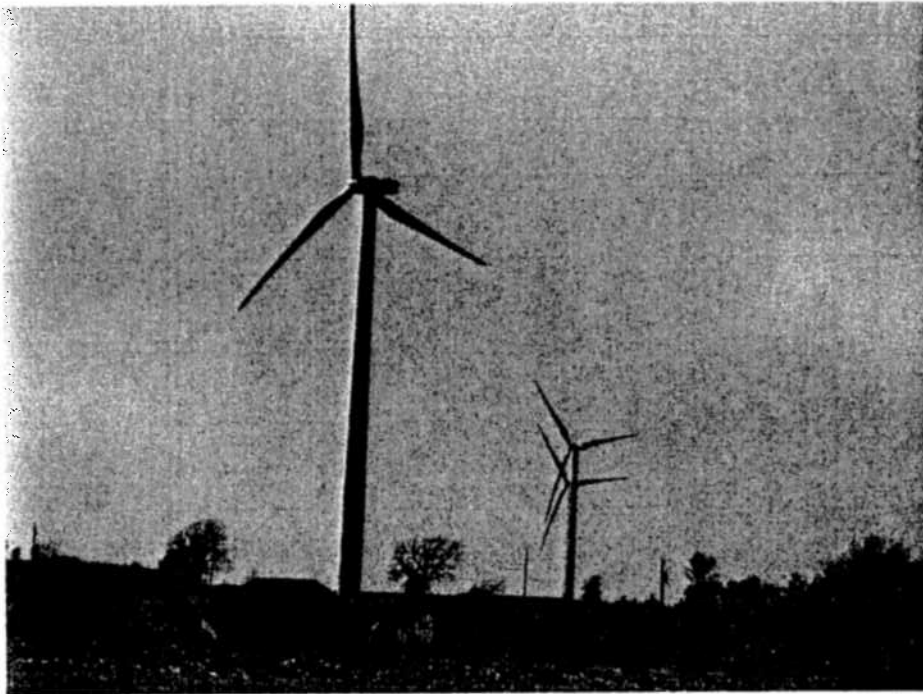
WIND ON THE WIRES is a non profit 501(c)3 organization comprised of wind developers, environmental organizations, tribal representatives, public interest groups, clean energy advocates and businesses providing goods and services to the wind industry. Our mission is to overcome the barriers to bringing wind power to market by addressing technical and regulatory issues, as well as through education and public outreach. Wind on the Wires works on a number of wind power issues, including building new transmission lines, improving use of the existing electricity grid, siting of wind projects, advocating for public policy that encourages wind development, and engaging the public on wind issues. We are a key regional partner of the American Wind Energy Association and work closely with them on wind power and transmission issues. For more information please visit our website at www.windonthewires.org.

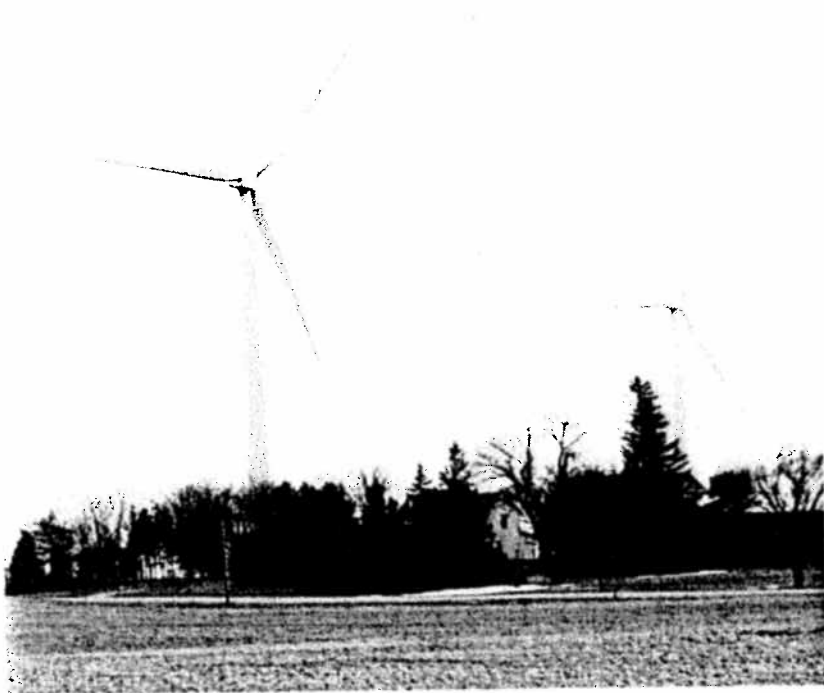


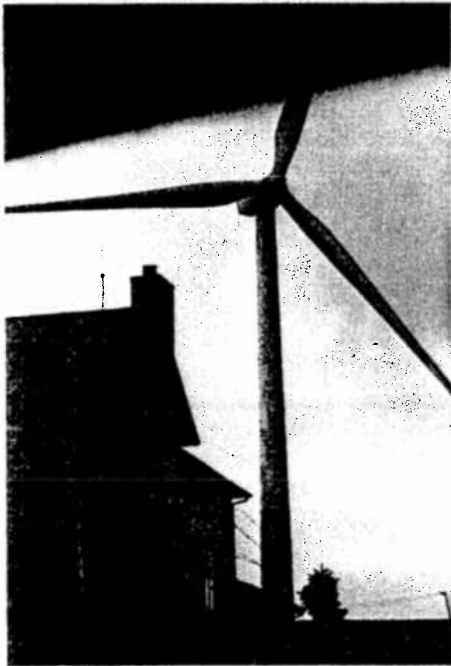
Photos of wind turbines sited between 1000 and 2000 feet from homes in the Invenegy Forward Project, Blue Sky/ Green Field, and Butler Ridge in Fond du Lac and Dodge Counties for reference.

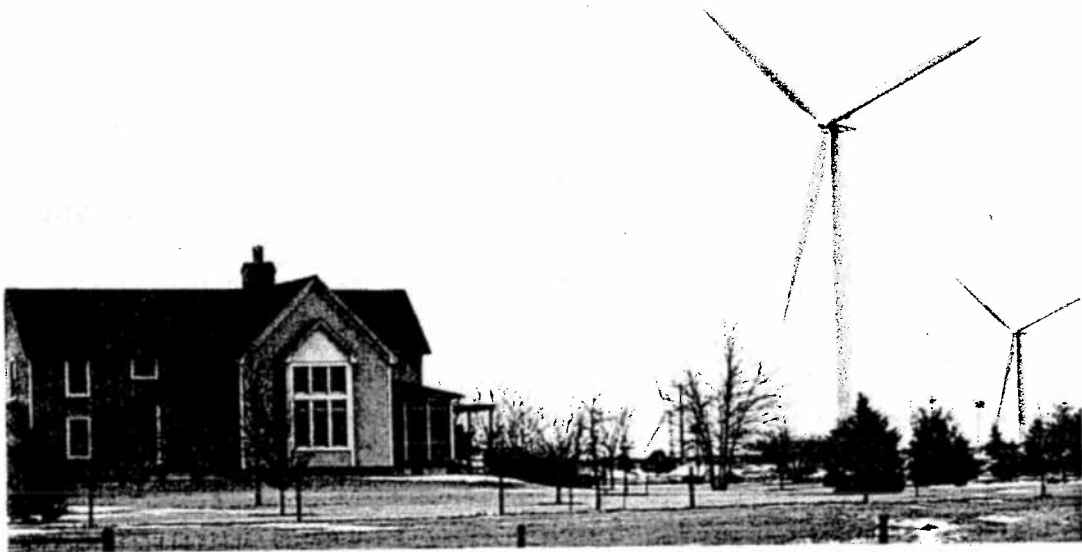
by Gerry Meyer, Jim Bembinster and Lynda Barry 2008-2010

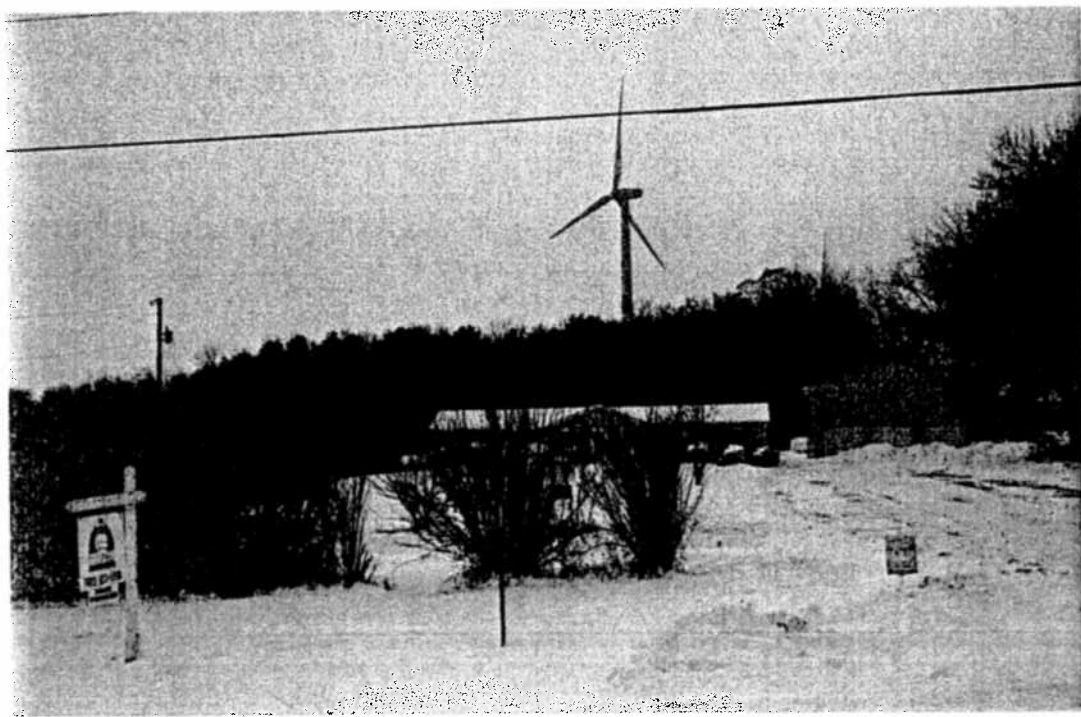
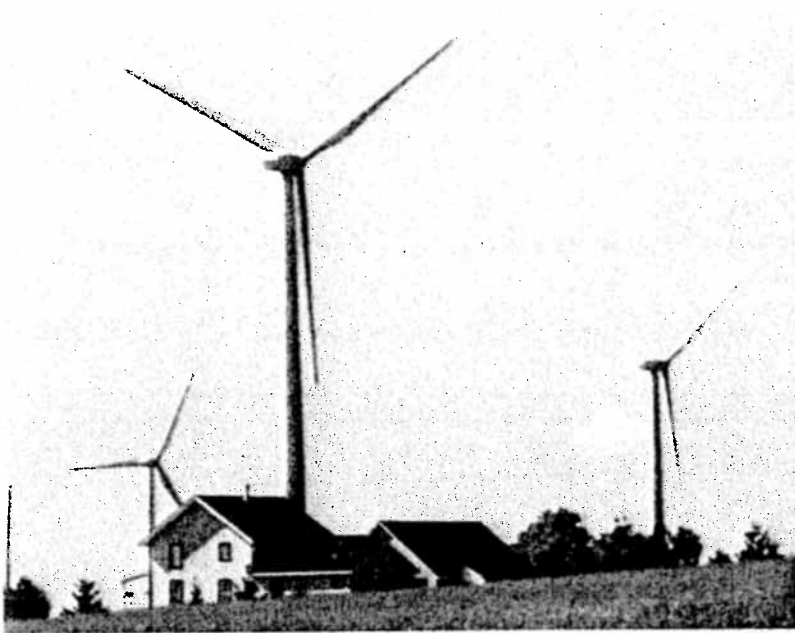
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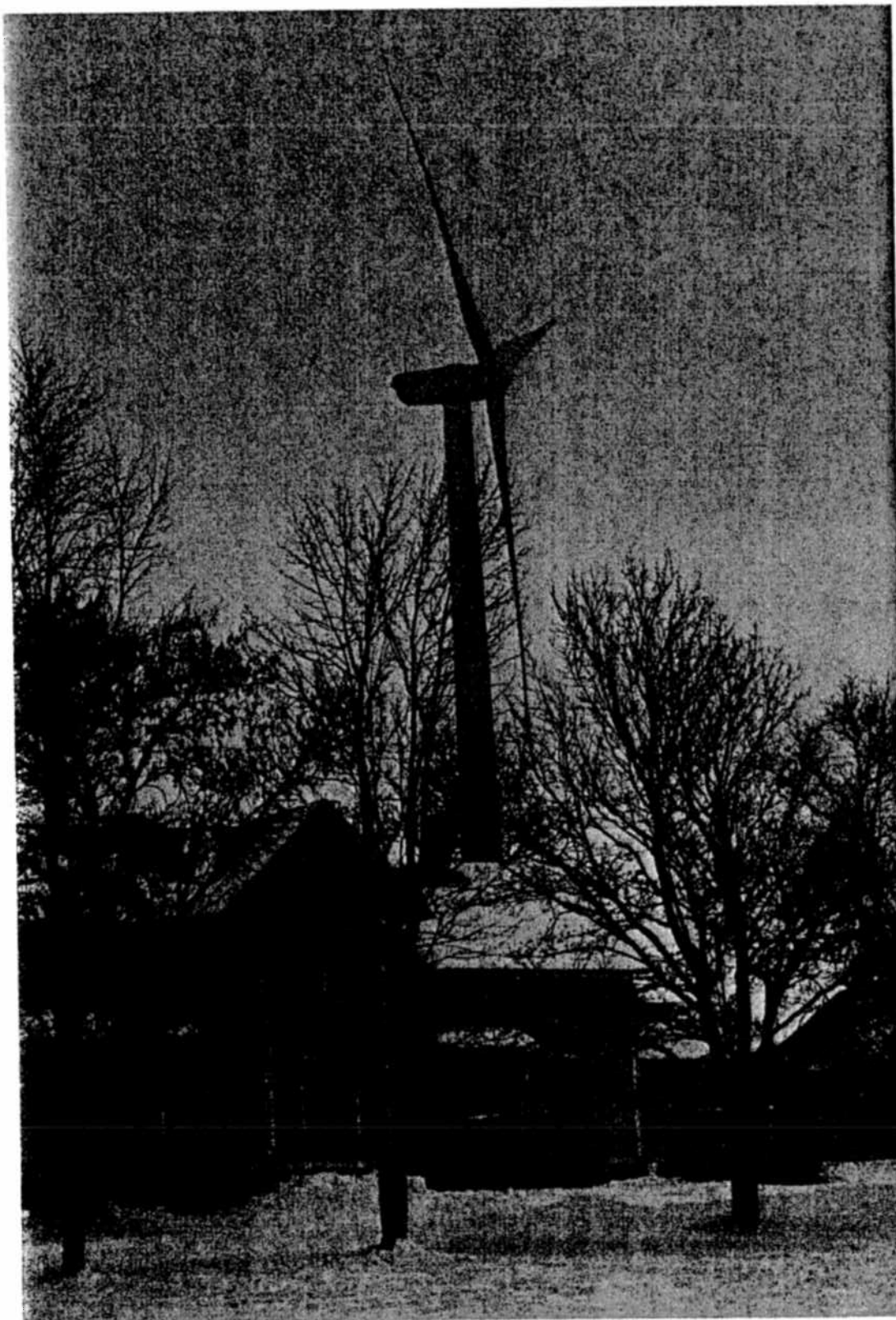














A collection of 400-foot wind turbines tower over farmland in the town of Malone in northern Fond du Lac County. The turbines are part of the 88-turbine Blue Sky Green Field wind farm. New regulations being considered by the state Public Service Commission could open the way for more wind farms in Wisconsin.

Neighbors: Wind energy has its price

By CLAY BARBOUR
cbarbour@madison.com
608-252-6129

ST. CLOUD — Elizabeth Ebertz loves her garden, but the 67-year-old grandmother doesn't work in it much anymore.

The small vegetable patch, which has produced onions, carrots and tomatoes for many family dinners, sits behind her home, in a little valley about a half-mile from a dozen 400-foot-tall wind turbines.

The structures are part of the Blue Sky Green Field Wind Energy Center in northeastern Fond du Lac County, one of the state's largest wind farms, capable of producing energy for about 36,000 homes.

Unfortunately, said Ebertz, the turbines also produce enough noise to chase her from the garden — and most nights, disturb her sleep.

"Sometimes it sounds like a

racetrack or a plane landing," she said. "You wouldn't believe how loud it gets."

The state Public Service Commission is considering a new set of wind farm regulations that could free up the industry and promote growth in Wisconsin, a state that has lagged the rest of the Midwest in using wind as an alternative energy source.

The PSC, which regulates state utilities, is expected to send the proposal to the Legislature by the end of the month.

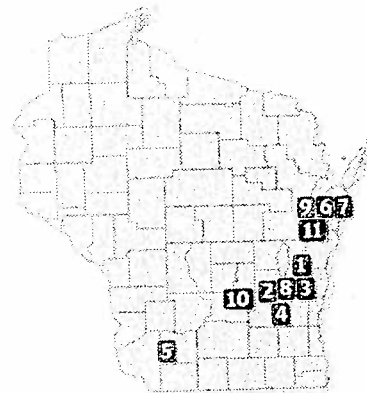
If passed, the measure could go a long way toward helping Wisconsin reach its goal of generating 10 percent of its energy from renewable sources by 2015. Renewable sources account for 5 percent of the state's energy now.

The measure could also end what was years of localized fights — often spurred by well-funded

Please see **TURBINES**, Page A9

Wind farms in Wisconsin

Proposed regulations could mean a flood of new wind farms across Wisconsin, after years of the state lagging behind the rest of the Midwest.



County	No. of turbines	Megawatts generated
1. Fond du Lac	88	145
2. Dodge/Fond du Lac	86	129
3. Fond du Lac	41	68
4. Dodge	36	54
5. Iowa	20	30
6. Kewaunee	17	11
7. Kewaunee	14	9
8. Fond du Lac	2	1
9. Brown	2	1
Under construction		
10. Columbia	90	162
11. Brown	8	20

SOURCE: RENEW Wisconsin State Journal



"I wish those things were never built here. ... Sometimes it sounds like a racetrack or a plane landing. You wouldn't believe how loud it gets."

ELIZABETH EBERTZ, turbine neighbor

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STEVE APPS - State Journal

Allen Hass, 56, looks over crops on his farm in Malone in Fond du Lac County. Hass hosts three wind turbines on his 600 acres, something he now regrets. He said the construction of the turbine damaged some of his farmland and the turbines have caused him health problems.

Turbines

Elizabeth Ebertz

Continued from Page A1

1-920-795-4133

anti-wind organizations — that have effectively killed at least 10 proposed wind farms in the past eight years and scared off several others.

But for those such as Ebertz, the rules mean more people will have to deal with wind turbines and the problems that come with them.

"I wish those things were never built here," Ebertz said. "They're just too close to people. I wish they were gone."

State far behind neighbors

Wisconsin spends about \$1.5 billion on imported energy every year and ranks 16th in the country in available wind.

According to the American Wind Energy Association, Wisconsin has the capacity to produce up to 449 megawatts of energy from its existing wind farms — enough to power about 110,000 homes.

Yet the state trails other Midwestern states in wind energy production. Minnesota wind farms produce 1,797 megawatts, Illinois produces 1,848 and Iowa generates 3,670. "It's not even close," said Barnaby Dinges, an AWEA member and lobbyist from Illinois. "Wisconsin is danger of falling out of the wind game altogether. It's getting a reputation as inhospitable to the wind industry."

Dinges has lobbied for six wind farms in the past five years, three of them in Wisconsin. He said the state has a number of well-organized anti-wind groups that have endangered its 10 percent goal.

"This isn't like any grass-roots opposition we have seen elsewhere," he said. "These aren't just concerned citizens going to meetings. These are mass mailings,

billboards, full-page ads. It's more professional and it costs a lot of money!"

Jenny Heinzen — a professor of wind energy technology at Lakeshore Technical College, which has state campuses in Manitowoc, Cleveland and Sheboygan, and a member of the state's Wind Siting Council — said she has been amazed by the opposition.

"I have my suspicions that they are getting help from some groups from outside the state, but that has never been confirmed," she said, referring to persistent rumors of coal and natural gas companies helping kill wind projects here.

There are a lot of people who live near wind farms and never report problems. Still, the state is home to several anti-wind groups, including the Brown County Citizens for Responsible Wind Energy, the WINDCOWS, the Calumet County Citizens for Responsible Energy, Healthy Wind Wisconsin and the Coalition for Environmental Stewardship.

These groups have some powerful supporters, including several prominent lawyers, lobbyists and former state Sen. Bob Welch and Carl Kuehne, former CEO of American Foods Group.

But officials with the anti-wind groups say most of their members are simply residents who do not like the thought of living near a wind farm.

"We heard that criticism before — that we are a front group for oil and gas companies — but it's just not true," said Lynn Korinek, a member of WINDCOWS. "We are a group of about 200 members who hold rummage sales to fund our fight. There are no special interests behind us, believe me."

Some claim health problems

Most of the state's anti-wind groups say they have nothing against wind energy, they simply disagree with how it is imple-

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"The only mitigation of sleep disturbance from industrial wind turbine noise is a setback of at least 1.5 km," Christopher Hanning, MD

Posted By [admin](#) On July 2, 2009 @ 6:00 am

"In my expert opinion, from my knowledge of sleep physiology and a review of the available research, I have no doubt that wind turbine noise emissions cause sleep disturbance and ill health."



[1]

Christopher Hanning, MD

Leading British sleep specialist, Dr. Christopher Hanning ^[2], explains the profound repercussions of wind turbines disrupting sleep—a matter the wind turbine salesman at your last town meeting, along with the wind industry in general, refuse to acknowledge, much less address in any realistic manner. Having reviewed a considerable body of clinical evidence (note: wind salesmen and acousticians are not clinicians), Hanning calls for setbacks of *at least* 1.5 km (1 mile). (Nina Pierpont, MD, PhD, would consider that inadequate. She calls for 2 km = 1.24 mi):

"The only mitigation of sleep disturbance from industrial wind turbine noise is a setback of at least 1.5km, and probably greater. This estimate is based on data from present installations, many of which have a much smaller rated capacity than those proposed by [Nuon Renewables](#) ^[3] [a wind developer proposing a wind plant in Swinford, UK]"— Christopher Hanning, MD, "[Sleep Disturbance and Wind Turbine Noise](#) ^[4]" (June 14, 2009), p. 27.

» From [Hanning's report](#) ^[4]:

Sleep is a universal phenomenon. Every living organism contains, within its DNA, genes for a body clock which regulates an activity-inactivity cycle. In mammals, including humans, this is expressed as one or more sleep periods per 24 hours. Sleep was previously thought to be a period of withdrawal from the world designed to allow the body to recuperate and repair itself. However, modern research has shown that sleep is primarily by the brain and for the brain. The major purpose of sleep seems to be the proper laying down and storage of memories, hence the need for adequate sleep in children to facilitate learning and the poor memory and cognitive function in adults with impaired sleep from whatever cause.

Inadequate sleep has been associated not just with fatigue, sleepiness and cognitive impairment but also with an increased risk of obesity, impaired glucose tolerance (risk of diabetes), high blood pressure, heart disease, cancer and depression. Sleepy people have an increased risk of road traffic accidents.

Humans have two types of sleep, slow wave (SWS) and rapid eye movement (REM). SWS is the deep sleep which occurs early in the night while REM or dreaming sleep occurs mostly in the second half of the night. Sleep is arranged in a succession of cycles, each lasting about 90 minutes. We commonly wake between cycles, particularly between the second and third, third and fourth and fourth and fifth cycles. Awakenings are not remembered if they are less than 30 seconds in duration. As we age, awakenings become more likely and longer so we start to remember them.

Noise interferes with sleep in several ways. Firstly, it may be sufficiently loud or annoying to prevent the onset of sleep or the return to sleep following an awakening. It is clear also that some types of noise are more annoying than others. Constant noise is less annoying than irregular noise which varies in frequency and loudness, for example, snoring, particularly if accompanied by the snorts of sleep apnoea (breath holding). The swishing or thumping noise associated with wind turbines seems to be particularly annoying as the frequency and loudness varies with changes in wind speed and local atmospheric conditions. While there is no doubt of the occurrence of these noises and their audibility over long distances, up to 3-4km in some reports, the actual cause has not yet been fully elucidated (Bowdler 2008). Despite recommendations by the Government's own Noise Working Group, UK research in this area has been stopped.

Secondly, noise experienced during sleep may arouse or awaken the sleeper. A sufficiently loud or prolonged noise will result in full awakening which may be long enough to recall. Short awakenings are not recalled as, during the transition from sleep to wakefulness, one of the last functions to recover is memory (strictly, the transfer of information from short term to long term memory). The reverse is true for the transition from wakefulness to sleep. Thus only awakenings of longer than 20-30 seconds are subsequently recalled. Research that relies on recalled awakenings alone may underestimate the effect.

Noise insufficient to cause awakening may cause an arousal. An arousal is brief, often only a few seconds long, with the sleeper moving from a deep level of sleep to a lighter level and back to a deeper level. Because full wakefulness is not reached, the sleeper has no memory of the event but the sleep has been disrupted just as effectively as if wakefulness had occurred. It is possible for several hundred arousals to occur each night without the sufferer being able to recall any of them. The sleep, because it is broken, is unrefreshing, resulting in sleepiness, fatigue, headaches and poor memory and concentration (Martin 1997)—many of the symptoms of "wind turbine syndrome." Arousals are associated not just with an increase in brain activity but also with physiological changes, an increase in heart rate and blood pressure, which are thought to be responsible for the increase in cardiovascular risk. Arousals occur naturally during sleep and increase with age (Boselli 1998), which may make the elderly more vulnerable to wind turbine noise. Arousals may be caused by sound events as low as 32 dBA and awakenings with events of 42dBA (Muzet and Miedema 2005), well within the measured noise levels of current "wind farms" and the levels permitted by ETSU-R-97. Arousals in SWS may trigger a parasomnia (sleep walking, night terrors etc.). Pierpont (2009 and personal communication) notes that parasomnias developed in some of the children in her study group when exposed to turbine noise.

Arousals are caused by aircraft, railway and traffic noise. In one study of aircraft noise, arousals were four times more likely to result than awakenings (Basner 2008a&b). Freight trains are more likely to cause arousals than passenger trains, presumably because they are slower, generating more low frequency noise and taking longer to pass (Saremi 2008). The noise of wind turbines has been likened to a "passing train that never passes," which may explain why wind turbine noise is prone to cause sleep disruption.

It is often claimed that continual exposure to a noise results in habituation, i.e., one gets used to the noise. There is little research to confirm this assertion, and a recent small study (Pirrer et al. 2009) looking at the effects of traffic noise on sleep efficiency suggests that it is not so.

Sleep disturbance and impairment of the ability to return to sleep is not trivial, as almost all of us can testify. In the short term, the resulting deprivation of sleep results in daytime fatigue and sleepiness, poor concentration and memory function. Accident risks increase. In the longer term, sleep deprivation is linked to depression, weight gain,

diabetes, high blood pressure and heart disease. There is a very large body of literature, but please see Meerlo et al., 2008, Harding and Feldman, 2008 and Hart et al., 2008 for recent work on this subject. A more general review can be found on Wikipedia: http://en.wikipedia.org/wiki/Sleep_deprivation ^[5]

In weighing the evidence, I find that, on the one hand, there is a large number of reported cases of sleep disturbance and, in some cases, ill health as a result of exposure to noise from wind turbines, supported by a number of research reports that tend to confirm the validity of the anecdotal reports and provide a reasonable basis for the complaints. On the other, we have badly designed industry and government reports which seek to show that there is no problem. I find the latter unconvincing.

In my expert opinion, from my knowledge of sleep physiology and a review of the available research, I have no doubt that wind turbine noise emissions cause sleep disturbance and ill health.

Table 1. Recommendations for setback of residential properties from industrial wind turbines

Note 1. The 2km limit from edges of towns and villages seems to have been set more for visual than noise reasons

Authority	Year	Notes	Recommendation	
			Miles	Kilometres
Frey & Hadden	2007	Scientists. Turbines >2MW	>1.24	>2
Frey & Hadden	2007	Scientists. Turbines <2MW	1.24	2
Harry	2007	UK Physician	1.5	2.4
Pierpont	2008	US Physician	1.5	2.4
Welsh Affairs Select Committee	1994	Recommendation for smaller turbines	0.93	1.5
Scottish Executive	2007	See note 1.	1.24	2
Adams	2008	US Lawyer	1.55	2.5
Bowdler	2007	UK Noise engineer	1.24	2
French National Academy of Medicine	2006	French physicians	0.93	1.5
The Noise Association	2006	UK scientists	1	1.6
Kamperman & James	2008	US Noise engineers	>.62	>1
Kamperman	2008	US Noise engineer	>1.24	>2
Bennett	2008	NZ Scientist	>0.93	>1.5
Acoustic Ecology Institute	2009	US Noise engineers	0.93	1.5

[6]

Christopher Hanning, MD, "Sleep Disturbance and Wind Turbine Noise" (June 14, 2009), p. 33

» [Click here](#) ^[4] to read the entire report (PDF)

Article printed from Wind Turbine Syndrome: <http://www.windturbinesyndrome.com>

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URLs in this post:

- [1] Image: <http://www.windturbinesyndrome.com/wp-content/uploads/2009/07/chris-hanning-350x466.jpg>
- [2] Leading British sleep specialist, Dr. Christopher Hanning: http://images.google.com/imgres?imgurl=http://www.intushealthcare.eu/uploads/images/christopher_hanning.jpg&imgrefurl=http://www.intushealthcare.eu/medical-advisory-board.html&usq=__fhVlavLCnxTAebvjYPh0b5zG9Rw=&h=200&w=150&sz=7&hl=en&start=20&sig2=Z-kMn-QRU5gDFqQntSswrw&tbnid=w9S1GtS2YNfDrM:&tbnh=104&tbnw=78&prev=/images%3Fq%3DChris%2BHanning%26gbv%3D2%26ndsp%3D18%26hl%3Den%26safe%3Doff%26sa%3DN%26start%3D18&ei=YVhNSte1L8yFmAflhYm0BA
- [3] Nuon Renewables: <http://www.nuonrenewables.com/home.htm>
- [4] Sleep Disturbance and Wind Turbine Noise: <http://www.windturbinesyndrome.com/wp-content/uploads/2009/07/wind-turbine-noise-and-sleep.pdf>
- [5] http://en.wikipedia.org/wiki/Sleep_deprivation: http://en.wikipedia.org/wiki/Sleep_deprivation
- [6] Image: <http://www.windturbinesyndrome.com/wp-content/uploads/2009/07/hanning-447x756.jpg>

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As a retired Postal Service employee I am covered by federal health insurance. The very first time I went to the companies web site this is what greeted me on the home page. Very fitting.

Gerry Meyer
W6249 County Road Y
Brownsville WI 53006-1103

From <http://fepblue.org> federal employees Blue Cross insurance
[Sleep Needs and Insomnia](#)

We've been doing a giant experiment on ourselves by turning night into day. In the millennia before electricity lit up our nights, we slept about 10 hours a night. Today Americans average just under 7 hours' sleep on weeknights, and a half hour more on weekends. That's a whopping 20 hours less sleep each week. And 20% of us sleep less than 6 hours a night.

What are the effects of this radical change? For the most part, we don't know. The scientific study of sleep is still young. We're just beginning to chart the territory, from the basics of normal sleep patterns through the woes of insomnia and further to the exotic lands of sleep disorders called parasomnias, where mild-mannered men howl like wolves and women ravage their kitchens for food while fast asleep. It's a fascinating journey for scientists as they discover the role of sleep in learning, memory, disease, immunity and aging. There is already lots of evidence of a feedback cycle between not sleeping well or enough and poor health.

For many of us sleep is a frustrating issue. We have so many tasks and distractions that we can't get our kids or ourselves to bed on time. When we do get to bed we lie awake with racing minds or restless legs. Our partners snore so loudly it makes us crazy. We wake up in the wee hours and can't fall back asleep. By day we're so drowsy we can't think straight. We nod off in meetings and at stoplights--or worse, while actually driving.

Our basic problem is too little sleep. But about 64 million Americans a year also have insomnia, often for long periods. Insomnia is trouble falling asleep, waking up often, waking up early and being unable to fall back asleep, or waking up not feeling rested. Another 18 million or so have sleep apnea, where part of the throat relaxes and repeatedly closes the airway until they snort or gasp and breathe again. As many as 12 million have restless leg syndrome. And another quarter million has narcolepsy, causing "sleep attacks" where they may suddenly lose all muscle tone and collapse.

There's help for nearly all of these problems. This week we'll start with the basics of sleep needs and insomnia. Next week we'll discuss some of the other sleep disorders that trouble our days and nights, like restless legs syndrome and narcolepsy. To learn about the serious health condition sleep apnea, search the Cover Story Archives for our article *More Than Snoring: Obstructive Sleep Apnea (OSA)*.

How much sleep do we really need?

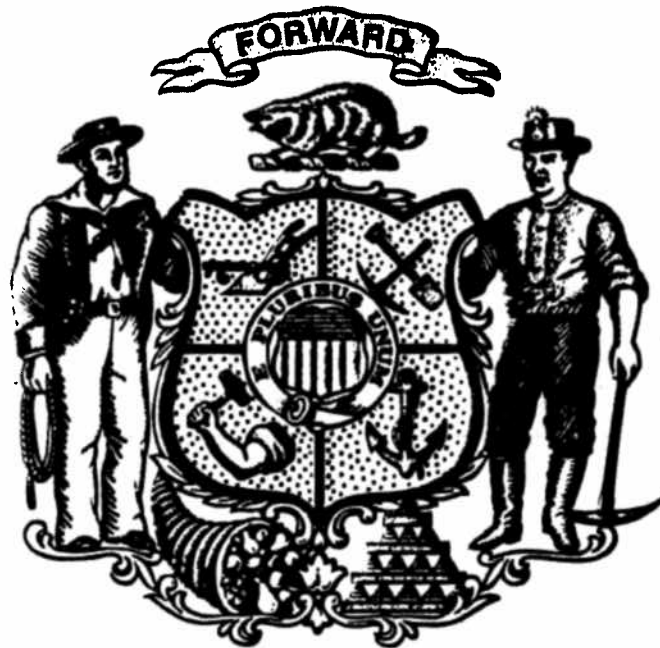
- **Infants:** 11-18 hours per night
- **Toddlers:** 12-15 hours
- **Preschool kids ages 3-5:** 11-13 hours
- **Kids 5-12:** 9-11 hours
- **Teens:** at least 8.5-9.5 hours
- **Adults:** 7-9 hours (women in the first 3 months of pregnancy often need several more)

Many of us feel like we're doing fine even though we get less sleep than that. Part of the problem is that people who are short enough on sleep to do poorly on reflex and coordination tests don't know it. So they keep on

getting less sleep than they need. They don't realize that they're making mistakes and getting into arguments and accidents because they're tired. If you haven't been getting enough sleep, you develop a "sleep debt" and will need more sleep to catch up.

What happens when I don't get enough sleep?

- You're likely to be drowsy and unfocused. If you are unrushed you may function okay. But if you're under any pressure, you'll make more mistakes than you would if you were well rested. You're apt to forget things, get confused and take more risks. You can't solve problems as well. Your brain starts to take tiny naps of 1-10 seconds called microsleeps, when you're not processing information.
- Learning suffers. You won't remember what you learned yesterday as well as if you were rested. Important short-term memories are downloaded into long-term memory while you sleep. If you don't get enough sleep those memories may not make it.
- You're likely to get cranky and feel depressed. And if you're already depressed, you're less likely to recover.
- Your coordination drops to the level of a drunken person, or worse. If you average 6 to 7 hours of sleep a night, your risk of a car crash doubles compared to sleeping 8 hours. If you sleep less than 5 hours, your risk is 4 to 5 times greater. Falling asleep at the wheel causes over 100,000 car crashes and 1,550 deaths a year.
- You're more likely to gain weight and to develop diabetes. Your body will probably produce more of a hormone that makes you feel hungry (gherlin), and less of one that suppresses appetite (leptin). And you'll crave the most fattening kinds of food--high-calorie carbohydrates. Many studies have found that the less sleep you get the more likely you are to be overweight or obese. That applies to toddlers and kids, too. Insufficient sleep is also linked to higher blood sugar levels and greater risk of diabetes.
- Your risk of heart disease is increased. People who are sleep deprived have higher rates of inflammation (a marker of heart disease risk), high blood pressure, heart disease and heart attacks.
- You may have more pain. This can be a vicious circle. Nearly half of people with chronic pain have insomnia. And several studies have found that people report more pain after nights of less than 6 hours of sleep than on nights when they slept more. There's some data that poor or interrupted sleep lowers the brain's inhibition of pain.
- Your immune system doesn't work as well, so you'll have less resistance to disease. In one study, volunteers who slept well the night after getting a vaccine had almost twice the immunity a month later than others who were kept awake the night after the shot. In another, participants were exposed to a cold virus and then quarantined for 5 days. Those who normally slept less than 7 hours a night were 3 times more likely to come down with colds than those who slept at least 8 hours.



6 hours of sleep? It's not enough

By Elizabeth Weise, USA TODAY

SAN FRANCISCO — Scientists have good and bad news for hard-driving people who boast they need only six hours of sleep a night.

The good news is a few may be right: Researchers at the University of California-San Francisco have identified a family with a genetic mutation that causes members to require only six hours sleep a night. The bad news? The gene is vanishingly rare in humans, found in less than 3% of people.

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So almost everyone who says he needs only six hours' sleep is kidding himself. And the consequences of chronic sleep deprivation are serious, says Clete Kushida, president of the American Academy of Sleep Medicine and director of Stanford University's Sleep Medicine Center. Sleep deprivation has been linked to an increase in motor vehicle accidents, deficiencies in short-term memory, focus and attention. It's also tied to depressed mood and a decrease in the ability to control appetite.

The family members — a mother and daughter with the gene mutation — were discovered by researchers at UCSF studying circadian rhythms, the waxing and waning biochemical cycles that govern sleep, hunger and activity. Neither woman needed more than six to 6½ hours of sleep a night, and yet both were well-rested, healthy and energetic.

"One of them is over 70, always traveling internationally and extremely active. She dances three or four nights a week," says Ying-Hui Fu, a professor of neurology at UCSF.

When scientists examined the pair's DNA, they found a mutation in a gene called DEC2, which governs cell production and circadian rhythm.

The mutation seems to result in people who need much less than the normal eight to 8½ hours that most humans require for well-rested functioning, according to the paper, which is published in today's edition of the journal *Science*. The research by Fu and her colleagues determined that humans and mice that carry the mutation get more intense sleep, as measured by slow-wave electrical activity in the brain, and so they need less of it.

But Fu estimates that only about 3% of the population is likely to have this gene and cautions that most people who habitually get less than eight hours sleep a night are only building up a large, and dangerous, sleep debt.

Fu says her lab is investigating whether it might be possible to mimic the effects of the gene with therapeutic compounds, but she cautions the research is only at the very beginning. For now, the only real answer to true productivity is to sleep as much as your body needs, she says.

READERS: How much sleep do you need per night? How much do you usually get?

http://www.usatoday.com/tech/science/2009-08-13-sleep-gene_N.htm