

**BY ELECTRONIC MAIL (David.Wiesner@puc.nh.gov)**

March 23, 2015

New Hampshire Site Evaluation Committee  
c/o David K. Wiesner, Staff Attorney  
N.H. Public Utilities Commission  
21 South Fruit Street, Suite 10  
Concord, NH 03301

**Re: NH Site Evaluation Committee Rulemaking, Docket No. 2014-04**

Dear SEC Chairman Honigberg and Committee Members:

On behalf of our organizations, we are pleased to provide the following comments in compliance with the SEC Rulemaking Notice 2015-12 dated March 5, 2015.

As we worked through the Site Rules, preparing our recommendations, we kept in mind a statement made in one of the many pieces of Legislation governing this effort. From HB1602:

“Accordingly, the general court finds that it is in the public interest for the site evaluation committee to establish criteria or standards governing the siting of wind energy systems in order to ensure that the potential benefits of such systems are appropriately considered and unreasonable adverse effects avoided through a comprehensive, transparent, and predictable process. When establishing any criteria, standard, or rule for a wind energy system or when specifying the type of information that a wind energy applicant shall provide to the committee for its decision-making, the committee shall rely upon the best available evidence”.

Thank you for the opportunity to provide our recommendations. If you have any questions regarding the attached, please do not hesitate to contact either of us.

Respectfully,

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The Windaction Group  
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603-838-6588

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<b>SEC RULEMAKING: REFERENCE MATRIX</b>		
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## DECOMMISSIONING – Wind Energy Systems

### CHAPTER Site 300 CERTIFICATES OF SITE AND FACILITY

#### PART Site 301 REQUIREMENTS FOR APPLICATIONS FOR CERTIFICATES

Site 301.08 Effects on Public Health and Safety. Each application shall include the following information regarding the effects of, and plans for avoiding, minimizing, or mitigating any unreasonable adverse effects of, the proposed facility on public health and safety:

(a) For proposed wind energy systems:

(7) Include a decommissioning plan prepared by an independent, qualified person(s) with appropriate knowledge and experience in wind generation projects and cost estimates. The plan may allow for contributions to the Decommissioning Fund ("Fund") as the construction process proceeds such that the funding level is commensurate with the costs of removing infrastructure in place. The plan will provide ~~providing~~ for removal of all structures and restoration of the facility site with a description of sufficient and secure funding to implement the plan, which shall not account for the anticipated salvage value of facility components or materials, including the provision of financial assurance in the form of an irrevocable standby letter of credit, performance bond, or surety bond; and Decommissioning would consist of the following:

(a) All turbines, including the blades, nacelles and towers, would be disassembled and transported off-site;

(b) All of the transformers would also be transported off-site;

(c) The overhead power collection conductors and the power poles would be removed from the site;

(d) All underground infrastructure at depths less than four feet below grade would be removed from the site and all underground infrastructure at depths greater than four feet below finished grade would be abandoned in place. Areas where subsurface components are removed would be filled, graded to match adjacent contours, and re-seeded, stabilized with an appropriate seed and allowed to re-vegetate naturally.

(e) The decommissioning fund will be managed independently and reviewed every five years to validate adequate funding. The fund will increase over time to account for inflation.

(f) The fund shall be bankruptcy-remote to protect it against creditor claims in the event the Facility encounters financial difficulty.

(g) If the Project fails to produce at least 65% of the output projected by the Applicant during any consecutive 12-month period, then a decommissioning review may be instituted at the discretion of the Committee.

## **STATEMENT OF REASON**

The recommendations pertaining to decommissioning are taken from recent certificates issued by the Vermont Public Service Board in reference to approved wind energy facilities. In all cases, Vermont decommissioning plans were required to be fully funded by the time a project is placed into service. The funds represent the full amount of decommissioning and do not net out the projected salvage value..

The Vermont orders we looked at are as follows:

- a) Certificate of Public Good for Kingdom Community Wind:  
<http://psb.vermont.gov/sites/psb/files/orders/2011/7628FinalOrder%20CPG%20Attachment%20A-2.pdf>
- b) Certificate of Public Good for Georgia Mountain Community Wind:  
<http://psb.vermont.gov/sites/psb/files/orders/2011/7508%20Final%20Order.pdf>
- c) Certificate of Public Good for Deerfield Wind:  
<http://www.state.vt.us/psb/orders/2009/files/7250finalorder.pdf>

The State of Ohio Power Siting Board (OPSB) has required the full value of wind project decommissioning to be maintained in a decommissioning fund if other third parties held liens on the project.

Many wind developers suggest the cost of decommissioning a wind project would be largely covered by the trade-in value of the project's scrap metal and copper. This assertion assumes that market value for scrap metal is relatively high and stable, which is far from the case. The volatility of the scrap copper market is indicative of the difficulty in accurately projecting the actual market value of project components.

Further, scrap value estimates are frequently based on quoted scrap values that assume certain scrap specifications. For example, the scrap value quotes assume turbine towers are broken down into pieces less than three-feet in length and that copper would be stripped from the equipment. These are added costs that are typically not accounted for when determining the value of scrap.

The NH Legislature was very clear that decommissioning plans are important to protect the State, aesthetically and financially, following the end of useful life of industrial wind turbines and related infrastructure. Pursuant to RSA 162-H:10-a (II) "For the adoption of rules, pursuant to RSA 541-A, relative to the siting of wind energy systems, the committee shall address the following: (7) Site decommissioning, including **sufficient and secure** funding, removal of structures, and site restoration."

## IMPACT EASEMENT AGREEMENT - Wind Energy Systems

### CHAPTER Site 100 ORGANIZATIONAL RULES

#### PART Site 102 DEFINITIONS

Site 102.47 "Impact Easement" commonly referred to as a "Good Neighbor Agreement" means an easement which runs with the land, and is granted to the owner of a wind energy conversion system or other use for the period of time that such use shall exist, by the owners of adjoining or neighboring real property in which it is mutually agreed between the grantor and grantee that the grantor shall hold the grantee harmless from odor, smoke, dust, noise, visual or other legal impacts associated with such use on the grantor's property when such use is operated in accordance with the terms of such easement.

### CHAPTER Site 300 CERTIFICATES OF SITE AND FACILITY

#### PART Site 301 REQUIREMENTS FOR APPLICATIONS FOR CERTIFICATES

Site 301.08 Effects on Public Health and Safety. Effects on Public Health and Safety. Each application shall include the following information regarding the effects of, and plans for avoiding, minimizing, or mitigating any unreasonable adverse effects of, the proposed facility on public health and safety:

(a) For proposed wind energy systems:

(9) Identify any Impact Easement entered into with participating landowners, abutters or other persons to include name and address, tax map lot #. Applicant shall notify the SEC of additional Impact Easements entered into after the certificate has been granted. Such notifications shall be made part of the SEC public record.

Site 301.14 Criteria Relative to Findings of Unreasonable Adverse Effects.

(f) In determining whether a proposed energy facility will have an unreasonable adverse effect on public health and safety, the committee shall:

(2) For wind energy systems, apply the following standards:

d. Participating Landowners: The applicant's energy facility may exceed the sound, shadow flicker, and setback requirements set forth in a., b., and c. above with respect to any residence, occupied building, or other property if the owner thereof has agreed in writing to waive those requirements. The waiver of these requirements by participating landowners will be provided to the SEC for posting on the SEC website.

Site 301.17 Criteria Relative to Findings of Serving the Public Interest. In determining whether a proposed energy facility will serve the public interest, the committee shall consider:

(a) the impact of the Impact Easement on host town, abutting towns, impacted towns and the county with consideration for local ordinances and zoning, property tax abatements and orderly development.

### **STATEMENT OF REASON**

These Impact Easement agreements need to be disclosed during the SEC process for many reasons, not the least of which are impacts on community health, safety, and real estate and tax valuations. The long-term effects and unintended consequences of these agreements need to be considered. Easements typically run with the land and may be in effect for more than 30 years. The disclosure of an easement is also important in evaluating post-construction impacts for compliance.

#### **Recent situations where Impact Easements have exacerbated financial and/or health issues:**

- Post-construction compliance monitoring and assessments of impacts could be skewed if there is data pertaining to where impact easements have been put in place.
- Glenmore (Brown County), Wisconsin - Duke Energy's Shirley Wind Farm entered into a number of impact easements with surrounding landowners. When other, non-encumbered residents began to experience negative impacts associated with the project, there was no means by which the governing body could fully assess the degree of impact since those with easement agreements were prohibited from speaking. In October 2014 the Brown County Board of Health ultimately declared the Shirley Wind Farm a "human health hazard" but knowing about the existence of the easement agreements is useful.
- Coos County, New Hampshire - In 2014, there was an issue with property owner tax payments rising significantly due to the county tax assessment of the Granite Reliable wind energy facility. NH's Governor Hassan signed a Bill relieving property owners of a portion of their tax burden, not knowing these property owners had already agreed to a cash settlement with the wind developer protecting them from tax increases. The agreement called for "the strictest confidence". This situation resulted in a multitude consequences for the state and local governments.

Other unintended consequences to consider, which may result from not disclosing these agreements:

- Abatements – there is nothing to preclude a property owner that has signed an Impact Agreement to request an abatement on their property taxes, as is the case with a landowner in Lempster, due to noise, shadow flicker or property value impact. Unless disclosed, the town officials are unaware of this Impact Easement.
- Building Permits – if the town's zoning ordinance conflicts with the State's setback requirements, property owners may be denied a permit to build a structure on their property, as the Town would be unaware they have an Impact Easement agreement.

By way of example, here is a copy of the Lempster's 'neighbor agreement':

<http://s3.amazonaws.com/windaction/attachments/862/LempsterNHNeighborAgreement.pdf>

## ORDERLY DEVELOPMENT - Wind Energy Systems

### CHAPTER Site 100 ORGANIZATIONAL RULES

#### PART Site 102 DEFINITIONS

Site 102.48 “Impacted Community” means a municipality that is neither the host nor abutting town although will potentially be impacted by aesthetics, financially or due to health/safety concerns.

### CHAPTER Site 300 CERTIFICATES OF SITE AND FACILITY

#### PART Site 301 REQUIREMENTS FOR APPLICATIONS FOR CERTIFICATES

Site 301.09 Effects on Orderly Development of Region. Each application shall include information regarding the effects of the proposed facility on the orderly development of the region, including the views of municipal and regional planning commissions and municipal governing bodies, including but not limited to Master Plans and Zoning Ordinances of the host, abutting or impacted municipalities regarding the proposed facility, ~~if such views have been expressed in writing~~ and the applicant’s estimate of the effects of the construction and operation of the facility on:

(a) Land use in the region, including the following:

- (1) A description of the prevailing land uses in the host communities and communities abutting and impacted by the proposed facility; and
- (2) A description of how the proposed facility is consistent with such land uses and identification of how the proposed facility is inconsistent with such land uses;

(b) The economy of the region, including an assessment of:

- (1) The economic effect of the facility on the host communities and communities abutting and impacted by the proposed facility;
- (2) The economic effect of the proposed facility on in-state economic activity during construction and operation periods;
- (3) The effect of the proposed facility on State, host, abutting and impacted communities’ ~~and local~~ tax revenues;
- (4) The effect of the proposed facility on host, abutting and impacted communities and regional real estate values;
- (5) The effect of the proposed facility on tourism and recreation in the host communities, ~~and~~ communities abutting the facility and other communities in the vicinity of the facility; and
- (6) The effect of the proposed facility on community services and regional infrastructure including, but not limited to emergency services and highway;

Site 301.15 Criteria Relative to a Finding of Undue Interference. In determining whether a proposed energy facility will unduly interfere with the orderly development of the region, the committee shall consider:

(a) The extent to which the siting, construction, and operation of the proposed facility will affect land use, employment, and the economy of the host town, abutting and impacted towns, county or counties in which the facility is proposed to be located;

(c) The views of municipal and regional planning commissions and municipal governing bodies regarding the proposed facility including consideration of the host town's master plan, zoning and ordinances.

### **STATEMENT OF REASON**

We recommend the scope of municipal consideration not be limited to only host and abutting towns, nor simply the views of the governing bodies, given the wide range of impacts industrial wind facilities can have on municipalities.

Municipal governing bodies must be given “due consideration” in the SEC hearing process for siting an energy facility. In addition, their zoning ordinances and Master Plans should also be considered. Planning Boards across the state have assembled area specific Master Plans, for which there is no consideration currently within the Rules.

*NH RSA 674:2 “The purpose of the master plan is to set down as clearly and practically as possible the best and most appropriate future development of the area under the jurisdiction of the planning board, to aid the board in designing ordinances that result in preserving and enhancing the unique quality of life and culture of New Hampshire”*

Town zoning ordinances must also be strongly considered when siting an energy facility, in an effort to avoid unintended consequences. If a town has ordinances that identify specific siting standards and/or setbacks, and the SEC permits a project that using different standards, it's unclear which guideline should prevail, particularly in the event of a turbine failure that damages property on an adjacent parcel. As an example: Building Permits – if the town's zoning ordinance conflicts with the State's setback requirements, property owners may be denied permits to build a structures on their property.

The currently proposed SEC rules do not cover all possible siting guidelines. Ordinances that have been enacted by a municipality should be given “due consideration” by the SEC to assure there will be no impact to the municipality. An example of a few specific municipal siting guidelines represented in Ordinances:

- Steep slopes
- Impacts on public infrastructure
- Communication interference
- Administration and associated costs



## **PUBLIC INTEREST – Wind Energy Systems**

### **CHAPTER Site 100 ORGANIZATIONAL RULES**

#### **PART Site 102 DEFINITIONS**

Site 102.49 “Public interest” means the welfare or well-being of the general public, commonwealth, within the State of New Hampshire. The welfare of the public shall prevail when compared to the welfare of a private company. All of society has a stake in this interest and the government recognizes the promotion of and protection of the general public, as provided for in NH RSA 162-H:16.IV(e)

### **CHAPTER Site 200 PRACTICE AND PROCEDURE RULES**

#### **CHAPTER Site 300 CERTIFICATES OF SITE AND FACILITY**

##### **PART Site 301 REQUIREMENTS FOR APPLICATIONS FOR CERTIFICATES**

Site 301.03 Contents of Application.

(f) If the application is for an electric generating facility, the application shall include the following information:

(3) Type of turbine and generator unit, including:

c. Whether the unit will serve base, intermediate or peaking loads;

de. Unit efficiency;

e. Impact on system stability and reliability

(h) Each application for a certificate for an energy facility shall include the following:

(6) Each application shall include information describing how the proposed facility will be consistent with the public interest, including but not limited to:

; and

(a) Whether the net environmental effects of the facility, considering both beneficial and adverse effects, serve the public interest.

(b) Whether the net economic effects of the facility, including but not limited to costs and benefits to energy consumers, property owners, state and local tax

revenues, employment opportunities, and local and regional economies, serve the public interest.

(c) Whether construction and operation of the facility will be consistent with federal, regional, state, and local policies.

(d) Whether the facility as proposed is consistent with municipal master plans and land use regulations pertaining to (i) natural, historic, scenic, cultural resources and (ii) public health and safety, air quality, economic development, and energy resources.

Site 301.17 Criteria Relative to Findings of Serving the Public Interest. For the committee to find that the proposed facility will not have an unreasonable adverse effect on the public, the record must demonstrate that the proposed facility:

(a) And the use of use of the Impact Easement will not have an unreasonable adverse effect on host town, abutting towns, impacted towns and the county with consideration for local ordinances and zoning, property tax abatements and orderly development.

(b) Would not create a negative net environmental effect, considering both beneficial and adverse effects.

(c) Would not create a negative net economic effect, including but not limited to costs and benefits to energy consumers, property owners, state and local tax revenues, employment opportunities, and local and regional economies, serve the public interest.

(d) Will construct and operate the facility consistent with federal, regional, state, and local policies.

(d) Is consistent with municipal master plans and land use regulations pertaining to (i) natural, historic, scenic, cultural resources and (ii) public health and safety, air quality, economic development, and energy resources.

#### **STATEMENT OF REASON:**

NH RSA 162-H:16.IV(e) requires the committee to make a finding relative to the public interest, and section 301.03(h)(6) of the proposed rules includes a requirement that the application include “information describing how the proposed facility will be consistent with the public interest.” However there are no Findings defined.

The Applicant must be able to demonstrate the facility will serve the public interest prior to any certificate being issued, as recommended above.

## SAFETY SETBACKS - Wind Energy Systems

### CHAPTER Site 300 CERTIFICATES OF SITE AND FACILITY

#### PART Site 301 REQUIREMENTS FOR APPLICATIONS FOR CERTIFICATES

##### Site 301.03 Contents of Application.

(c) Each application shall contain the following information with respect to the site and other necessary infrastructure of the proposed energy facility and alternative locations the applicant considers available for the proposed facility:

(3) The location of property lines, residences, industrial buildings, and other structures and improvements within or adjacent to the site;

Site 301.08 Effects on Public Health and Safety. Each application shall include the following information regarding the effects of, and plans for avoiding, minimizing, or mitigating any unreasonable adverse effects of, the proposed facility on public health and safety:

(a) For proposed wind energy systems:

(3) Describe planned setbacks that indicate the distance between each wind turbine and the nearest nonparticipating landowner's existing ~~occupied~~ buildings and property lines, and between each wind turbine and the nearest public road and overhead infrastructure and underground utility ~~line~~, and explain why the indicated distances are adequate to protect the public from risks associated with the operation of the proposed wind energy facility;

##### Site 301.14 Criteria Relative to Findings of Unreasonable Adverse Effects.

(f) In determining whether a proposed energy facility will have an unreasonable adverse effect on public health and safety, the committee shall:

(1) For all energy facilities, consider the information submitted pursuant to Site 301.08 and other relevant evidence submitted pursuant to Site 202.24;

**(2) For wind energy systems, apply the following standards:**

c. Safety Setback Standards: The setback distance between a wind turbine tower and a non-participating landowner's ~~existing permanently occupied building shall be no less than 3 times the turbine tower height as measured from the center of the wind turbine base to the nearest point of the foundation of the permanently occupied building, the setback distance between a wind turbine tower and a non-participating landowner's~~ property line shall be no less than ~~1.15~~ 1.5 times the turbine tower height as measured from the center of the wind turbine base, and the setback distance between a wind turbine tower and the nearest public road shall be no less than ~~1.53~~ 1.5 times the turbine tower height as measured from the center of the wind turbine base to the

right-of-way line of the public road, in each case turbine elevation shall be taken into consideration. "with the Greater safety setback distances may be imposed by the Committee if supported by the evidence presented. Turbine tower height" is measured from the base of the turbine foundation to the tip of the blade in the vertical position;

## **STATEMENT OF REASON**

Safety setbacks from turbines are established to minimize the risk of property damage or injury resulting from ice throw or component failure. These sources provide supporting information for the proposed setback recommendations cited above.

1) **C., Bossanyi E., Seifert H.,** *Assessment of Safety Risks Arising From Wind Turbine Icing*. 31 March - 2 April 1998, Hetta, Finland [http://arcticwind.vtt.fi/boreasiv/assessment\\_of\\_safety.pdf](http://arcticwind.vtt.fi/boreasiv/assessment_of_safety.pdf)

- a. Rime icing is elevation dependent;
- b. Under icing conditions, a moving turbine rotor is liable to accrete significantly heavier quantities of ice than stationary components;
- c. Rotor blade ice can be cast some distance from the turbine if it breaks off a rotating blade;
- d. Rime ice can form when the turbine is operating and is not shaken off by blade flexing;
- e. Rime ice formation appears to occur with symmetry on all turbine blades with the result that no imbalance occurs and the turbine continues to operate.

2) **GE Energy,** *Ice Shedding and Ice Throw – Risk and Mitigation*,  
[http://site.ge-energy.com/prod\\_serv/products/tech\\_docs/en/downloads/ger4262.pdf](http://site.ge-energy.com/prod_serv/products/tech_docs/en/downloads/ger4262.pdf)

Rotating turbine blades may propel ice fragments up to several hundred meters if conditions are right depending on turbine dimensions, rotational speed and many other potential factors.

3) **Iberdrola/Groton Wind LLC,** *Environmental Health and Safety Plan*,  
[http://www.nhsec.nh.gov/projects/2010-01/documents/131011safety\\_plan.pdf](http://www.nhsec.nh.gov/projects/2010-01/documents/131011safety_plan.pdf)

Ice that has formed on a wind turbine typically sheds as the air temperatures rises [sic]; however, cases have been documented when ice shedding occurred without a temperature rise. Shedding ice may be thrown a significant distance as a result of the rotor spinning or wind blowing the ice fragments. Icing of blades is a significant issue that during "shedding" poses a risk of injury or property damage. Everyone is reminded that at any time when "icing" may potentially occur there is no replacement for using constant vigilance in assessing your surroundings.

4) **Will Staats, NHF&G,** *Testimony before Vermont Committee*,  
<http://www.windaction.org/posts/36424-testimony-of-will-staats#.VQ3I1BrF98E>

The danger of ice throw cannot be over emphasized. I have often worked near these turbines on our research projects in the winter and witnessed the large divots in the snow where ice has been flung from the turning blades. On one terrifying occasion, my truck was struck by flying ice that, had it hit me or anyone else close by, could have killed or caused serious injury. One operator of a wind installation told me these machines will throw a four hundred pound chunk of ice one thousand feet.

- 5) **Vestas**, *Mechanical operating and maintenance manual V90-3.0MW turbine*,  
<http://www.windaction.org/posts/15632-vestas-mechanical-operating-and-maintenance-manual-v90-3-0mw-turbine#.VQ3KBxrF98E>

Do not stay within a radius of 400m (1300 ft) from the turbine unless it is necessary. If you have to inspect an operating turbine from the ground, do not stay under the rotor plane but observe the rotor from the front. Make sure that children do not stay by or play nearby the turbine. If necessary, fence the foundation.

- 6) **Dr. Terry Matilsky**, *Windmills: Basic Kinematics*,  
<http://xray.rutgers.edu/~matilsky/windmills/throw.html>

Simple math describing motion shows that ice or debris from a 100-foot long blade can be thrown nearly 1700 feet from the base of the turbine. Distance is dependent on the length of the blade, the angle of the blade at the time of the incident, the speed of rotation and the vertical distance from the ground.

- 7) **Nordex Energy GmbH**, *Rules of Conduct on, in and around Wind Turbines Turbine Classes K06, K07, K08 All Types*  
<http://s3.amazonaws.com/windaction/attachments/2351/NordexSafetyManual-c.pdf>

Falling Turbine Parts - In case of a fire in the nacelle or on the rotor, parts may fall off the wind turbine. In case of a fire, nobody is permitted within a radius of 500 m (1640 feet) from the turbine.

- 8) **Volkswind GmbH**, *Planning your Wind Farm*,  
<http://www.volkswind.de/en/wind-farm-development/planning.html>

Volkswind would evaluate whether your land is appropriate for one or more wind turbines. For a fast & reliable evaluation you might refer to the following parameters:

- Setback at least 1000 meters (3281 feet) from occupied houses
- Outside the boundaries of protected or conservation areas
- Required space per turbine and carne approx. 2.000 square meters

## NOTES:

a) Wind turbine safety setback distances that extend onto non-participating properties may risk rendering those properties unsafe for further development. Local building departments could refuse to grant building permits in the setback zone. Homeowner insurance companies may refuse to insure structures within the safety zone.

b) In general, we recommend safety setbacks to be measured up to the property line of non-participating landowners and not to the wall of a *permanently occupied building* as stated in the draft rules. The classification of 'permanently occupied building' fails to recognize part-time residents or other structures including, but not limited to barns, sheds and pool. This distinction could run counter to the Equal Protection Clause of the 14th amendment of the U.S. Constitution which prohibits states from denying any person within its jurisdiction the equal protection of the laws. Upon challenge, the Courts could strictly scrutinize the law or, in this case, its administration, to determine whether the classification is discriminatory.

## SHADOW FLICKER - Wind Energy Systems

### CHAPTER Site 100 ORGANIZATIONAL RULES

#### PART Site 102 DEFINITIONS

Site 102.39 "Shadow flicker" means the alternating changes in light intensity that can occur when the rotating blades of a wind turbine are back-lit by the sun or moon and cast moving shadows on the ground or on structures. The "astronomical maximum" is the theoretical maximum number of hours that shadow flicker will be produced at a location assuming the sun is shining all day from sunrise to sunset, the rotor-plane of the turbine is always perpendicular to the sun and the turbine is always operating.

### CHAPTER Site 300 CERTIFICATES OF SITE AND FACILITY

#### PART Site 301 REQUIREMENTS FOR APPLICATIONS FOR CERTIFICATES

Site 301.08 Effects on Public Health and Safety. Each application shall include the following information regarding the effects of, and plans for avoiding, minimizing, or mitigating any unreasonable adverse effects of, the proposed facility on public health and safety:

(a) For proposed wind energy systems:

(2) Include a assessment that identifies the astronomical maximum as well as the anticipated hours per year of shadow flicker expected to be perceived at schools, day-care centers, health care facilities, private property, residential neighborhoods, places of worship, elderly care facilities, public gathering areas (outdoor and indoor), and roadways that fall within 1.5 miles of any turbine. Shadow flicker modeling will assume an impact distance of 1.5 miles from each of the turbines; report evaluating the shadow flicker expected to be perceived at all buildings occupied or used for another purpose, which report shall be based upon computer modeling programs and input data defining the most conservative case scenario, including the astronomical maximum shading duration;

Site 301.14 Criteria Relative to Findings of Unreasonable Adverse Effects.

(f) In determining whether a proposed energy facility will have an unreasonable adverse effect on public health and safety, the committee shall:

(1) For all energy facilities, consider the information submitted pursuant to Site 301.08 and other relevant evidence submitted pursuant to Site 202.24;

(2) For wind energy systems, apply the following standards:

b. Shadow Flicker Standard: Shadow flicker created by the applicant's energy facility during operations shall not occur more than 30 hours astronomical maximum per year and a limit of 30-minutes per day with an actual number of 8 hours per year at schools, day-care centers, health care facilities, private property, residential neighborhoods, playgrounds, places of worship, elderly care facilities, playgrounds, recreational areas, public gathering areas (outdoor and indoor), and roadways that fall within 1.5 miles of any turbine. If Shadow Flicker limits cannot be met via

~~project layout and setback distances, curtailment technology or other mitigation tools may be considered; per year or 30 minutes per day within any occupied permanent residence of a non-participating landowner;~~

## **STATEMENT OF REASON**

- 1) **Mason County, Michigan, USA:** substantial shadow flicker impacts at distances up to 6,000 feet. County ordinance limited shadow flicker to 10 hours per year.

Source: Mary Reilly, Mason County Zoning and Building Director, Scottville, MI,  
mreilly@masoncounty.net, (231) 757-9272

*Observed shadow flicker and results following curtailment mitigation (2013)*  
<http://www.masoncounty.net/userfiles/filemanager/414/>

- 2) **German Standard:** A maximum of 8 hours/year actual amounts of shadow flicker nationwide.  
Astronomical maximum (worse case) of 30 hours per year and 30 minutes per day.

Source: *International Review of Policies and Recommendations for Wind Turbine Setbacks from Residences: Setbacks, Noise, Shadow Flicker, and Other Concerns*  
Minnesota Department of Commerce: Energy Facility Permitting; Kathryn M. B. Haugen; Oct. 2011  
[http://mn.gov/commerce/energyfacilities/documents/International\\_Review\\_of\\_Wind\\_Policies\\_and\\_Recommendations.pdf](http://mn.gov/commerce/energyfacilities/documents/International_Review_of_Wind_Policies_and_Recommendations.pdf)

- 3) **Danish Standard:** Not exceed 10 hours per year on neighboring houses. If the shadow limit is exceeded the wind turbine owner may alternatively be required to shut down the wind turbine in critical periods. Usually, wind turbines can be fitted with meters to detect shadow flicker on a receptor so that the operation can be halted if the sun shines during critical periods.

Source: Danish Law - [http://www.windpower.org/en/policy/planning\\_and\\_regulation.html](http://www.windpower.org/en/policy/planning_and_regulation.html)

Source: *Wind Turbines in Denmark*. Danish Energy Agency. November 2009.  
[http://www.ens.dk/sites/ens.dk/files/dokumenter/publikationer/downloads/wind\\_turbines\\_in\\_denmark.pdf](http://www.ens.dk/sites/ens.dk/files/dokumenter/publikationer/downloads/wind_turbines_in_denmark.pdf)

4. **Various:** Available list of news articles, videos, documents addressing potential impacts of Shadow Flicker.  
<http://www.windaction.org/posts?utf8=%E2%9C%93&topic=Shadow+Flicker&view=list&per=100>

## **NOTES:**

- a) The intensity of the shadow flicker depends on the intensity of the sun and the amount of the (apparent) solar disk which the blade covers as it rotates in front of the disk.

b) Shadow flicker modeling generally assumes a maximum impact distance of 10-rotor diameters which for a 100-meter (328 feet) rotor diameter, shadows would be expected to fully dissipate after 3280 feet. This standard may have been appropriate for shorter blades, however, the longer, wider blades on today's machines and different shadow profiles for different blade shapes (manufacturer dependent) have proven inadequate in estimating flicker impacts. Shadow flicker has been recorded up to 6000 feet from a turbine.



## **SITE CONTROL – Wind Energy Systems**

### **PART Site 301 REQUIREMENTS FOR APPLICATIONS FOR CERTIFICATES**

#### **Site 301.03 Contents of Application.**

(c) Each application shall contain the following information with respect to the site and other necessary infrastructure of the proposed energy facility and alternative locations the applicant considers available for the proposed facility:

(6) Evidence that the applicant has a current right of legal access to and control of ~~or the ability to acquire control of~~ the site(s), in the form of ownership, ground lease, easement, option, or other contractual rights or interests.

## **STATEMENT OF REASON**

For a wind energy facility, the wind turbine site is one of multiple sites impacted. The facility will potentially require a transmission route and a substation. These additional sites should be included and fully considered in the application.

The Applicant should be required to show **legal control** of all site(s) that will be impacted by the energy facility. There is no point in going through the adjudicative process for a project where the Applicant has not fully secured access to the site(s). Using Wild Meadows as an example, the Applicant did NOT have control of the entire site and therefore was unable to complete all required studies. They may not have been able to take control at any point. Unless the Applicant can legally show control of the land, there is no point in moving forward with the adjudicative process

## **TURBINE NOISE - Wind Energy Systems**

### **CHAPTER Site 300 CERTIFICATES OF SITE AND FACILITY**

#### **PART Site 301 REQUIREMENTS FOR APPLICATIONS FOR CERTIFICATES**

Site 301.08 Effects on Public Health and Safety. Each application shall include the following information regarding the effects of, and plans for avoiding, minimizing, or mitigating any unreasonable adverse effects of, the proposed facility on public health and safety:

(a) For proposed wind energy systems:

(1) Include a sound impact assessment prepared in accordance with professional standards by an expert in the field, which assessment shall include the reports of a preconstruction sound background study and a sound modeling study, as follows:

#### **(REPLACE CURRENT DRAFT RULES WITH FOLLOWING SECTION)**

(a) The methodology for conducting a preconstruction sound background study shall include:

(1). Adherence to the ANSI/ASA S12.9-2013 Part 3 standard, a standard that requires short-term attended measurements.

(2) Long-term unattended monitoring may be conducted in accordance with ANSI S12.9-1992/Part 2, provided audio recordings are taken in order to clearly identify and remove transient noises from the data. Frequencies above 1250 Hz 1/3 octave band are to be filtered out of the data.

(3) Measurement locations should be conducted at the nearest properties from proposed wind turbines representative of all non-participating residential properties within 2.0 miles.

(4). Sound measurements shall be omitted when the wind velocity is greater than 4 m/s (~9 mph) at the microphone position, when there is rain, and/or with temperatures below instrumentation minima. Following ANSI 12.9 Part 3 protocol, microphones shall be placed 1 to 2 meters above the ground, and at least 15 feet from any reflective surface. A windscreen of the type recommended by the monitoring instrument's manufacturer must be used for all data collection. Microphones should be field calibrated before and after measurements. An anemometer shall be located within close proximity to each microphone.

(b) Pre-construction sound reports shall include a map and/or diagram clearly showing the following:

(1) layout of project area, including topography, project boundary lines, property lines;

(2) locations of the Measurement Points (MPs);

(3) distance between any MP and the nearest wind turbine(s);

- (4) location of significant local non-turbine sound and vibration sources;
  - (5) distance between all MPs and significant local sound sources;
  - (6) The location of all sensitive receptors including, but not limited to: schools, day-care centers, health care facilities, residences, residential neighborhoods, places of worship, and elderly care facilities.
  - (7) Indicate temperature, weather conditions, sources of ambient sound, and prevailing wind direction and speed for the monitoring period; and
  - (8). Final report will provide A weighted and C weighted sound levels for L10, Leq and L90.
- (c) The predictive sound modeling study shall:
- (1) Be conducted in accordance with ISO 9613-2.
  - (2) An adjustment to the Leq produced by the model shall be applied in order to adjust for turbine manufacturer uncertainty. This adjustment shall be determined in accordance with the most recent release of the IEC 61400 Part 11 standard (Edition 3.0 2012-11). This standard anticipates that the analysis of wind turbine acoustical emissions will also consider sound power level and tonality for a batch of wind turbines as opposed to just one machine (IEC 61400 Part 14).
  - (3) Predictions shall be made at all properties within two (2) miles from the project turbines for the wind speed and operating mode that would result in the worst case wind turbine sound emissions at night.
  - (4) Other corrections for model's algorithm error shall be disclosed and accounted for in the model(s).
- (d) The predictive sound modeling study report shall:
- (1) Include the results of the modeling described in (3) above as well as a map with sound contour lines showing dBA sound emitted from the proposed wind energy system at 5 dBA intervals;
  - (2). Include locations out to 2 miles from any wind turbine included in the proposed facility; and
  - (3) Show proposed wind turbine locations and the location of all sensitive receptors including, but not limited to: schools, day-care centers, health care facilities, residences, residential neighborhoods, places of worship, and elderly care facilities;
- (e) Post-Construction Noise Compliance Monitoring shall include:
- (1) Adherence to the ANSI/ASA S12.9-2013 Part 3. This standard requires short-term attended measurements to ensure transient noises are removed from the data. Measurements will include at least one nighttime hour where

turbines are operating at full sound power with winds less than 3 m/s (~6 mph) at the microphone.

(2) Unattended long-term monitoring can also be conducted.

(3) Sound measurements shall be omitted when there is rain, and/or with temperatures below instrumentation minima. Microphones shall be placed 1 to 2 meters above the ground and at least 15 feet from any reflective surface following ANSI 12.9 Part 3 protocol. Proper microphone screens are required. Microphones should be field calibrated before and after measurements. An anemometer shall be located within close proximity to each microphone.

(4) Monitoring will involve measurements being made with the turbines in both operating and non-operating modes. SCADA data will be used to record hub height wind speed and turbine power output.

(5) Locations to be pre-selected where noise measurements will be taken. Measurements will be performed at night with winds above 4.5 m/s (~10 mph) at hub height and less than 3 m/s (~6 mph) on the ground.

(6) All sound measurements during post-construction monitoring will be taken at 0.125-second intervals measuring both “fast” response and Leq metrics.

(7) Post-construction monitoring surveys will be conducted once within three months of commissioning, and once each season thereafter for the first year. Additional surveys may be conducted at the request of the SEC. Adjustments to this schedule will be permitted subject to SEC review.

(f) Post-construction sound reports shall include a map and/or diagram clearly showing the following:

(1) layout of project area, including topography, project boundary lines, property lines;

(2) locations of the Measurement Points (MPs);

(3) distance between any MP and the nearest wind turbine(s);

(4) For each measurement period during the post-construction monitoring, reports will include each of the following measurements:

(a) LAeq, LA10, and LA90;

(b) LCeq, LC10, and LC90.

(5) Noise emissions shall be free of audible tones. If the presence of a pure tone frequency is detected, a 5 dB penalty shall be added to the measured dBA sound level;

(6) The SEC shall adopt a complaint resolution program. Validation of noise complaints shall require field sound surveys conducted under the same meteorological conditions as occurred at the time of the complaint.

Site 301.14 Criteria Relative to Findings of Unreasonable Adverse Effects.

(f) In determining whether a proposed energy facility will have an unreasonable adverse effect on public health and safety, the committee shall:

(1) For all energy facilities, consider the information submitted pursuant to Site 301.08 and other relevant evidence submitted pursuant to Site 202.24;

(2) **For wind energy systems, apply the following standards:**

a. Sound Standards: A-weighted equivalent sound levels produced by the applicant's energy facility during operations shall not exceed ~~the greater of 45 or 5 dBA above ambient levels between the hours of 8:00 a.m. and 8:00 p.m. each day, and the greater of 40 dBA or 5 dBA above ambient levels at all other times during each day,~~ as measured at the ~~property line of a non-participating landowner; exterior wall of any existing permanently occupied building on a non-participating landowner's property, or at the nonparticipating landowner's property line if it is less than 300 feet from an existing occupied building, and these sound levels shall not be exceeded for more than 3 minutes within any 60-minute period;~~ 38 dBA at the property line of a non-participating landowner, exterior wall of any existing permanently occupied building on a non-participating landowner's property, or at the nonparticipating landowner's property line if it is less than 300 feet from an existing occupied building, and these sound levels shall not be exceeded for more than 3 minutes within any 60-minute period;

**STATEMENT OF REASON**

**1) SB99 Consensus:** The SB99 stakeholder group researching energy siting related to health and safety achieved consensus on the proposed Site 301.08(a)(1)(a) on pre-construction noise surveys, predictive modeling and post-construction noise monitoring. The stakeholder group consisted of wind developers, members of the public, and four acousticians with expertise on turbine noise. The attached emails from EDPR, acoustician Ken Kaliski, and others demonstrate the support for the final document specific to the methodologies for conducting studies.

**2) Noise Standard:** Consensus was not achieved on wind turbine sound standard cited in Site 301.14 (f)(2)(a) that recommends a 39 dB(A) not to exceed standard at the property line of a non-participating landowner. Supporting documentation follows:

(a) Limits in Denmark for Wind Turbine Noise:

44 dBA (at 8 m/s) in open areas with few residences (At this level, turbine noise from larger capacity machines will produce significant annoyance at residences due to a low frequency component.)

39 dBA (at 8 m/s) for residential areas

(b) Pedersen and Waye 35 dBA:

E. Pedersen, K. P. Waye, "Perception and annoyance due to wind turbine noise – a dose response relationship", J. Acoust. Soc. Am., 116 (6), 3460-3470, 2004.  
<http://www.proj6.turbo.pl/upload/file/263.pdf>

Wind turbine noise was perceived by about 85% of the respondents even at A-weighted sound pressure levels (SPL) at 35.0–37.5 dB. This could be due to the presence of amplitude modulation in the noise, making it easy to detect and difficult to mask by ambient noise.

(c) Pedersen and Nielsen below 33-38 dBA:

E. Pedersen, F. van den Berg, R. Bakker, J. Bouma, "Response to noise from modern windfarms in The Netherlands", J. Acoust. Soc. Am., 126 (2), 634-643, 2009.  
<http://umcg.wewi.eldoc.ub.rug.nl/FILES/root/pubs/2009/JAS0006341/JAS0006341.pdf>

(d) Swedish Limit on turbine noise: 35 dBA is used for wind turbines in Sweden for quiet areas.

#### **NOTES:**

a) There is substantial peer-reviewed research and scientific articles (several cited above) documenting community annoyance from wind turbine noise. Turbine noise is prominent at a-weighted levels above 38 dB.

As turbines get larger, there is a shift to low-frequency noise which travels further and is better able to penetrate walls and enter the indoors. The effects of wind turbine noise on human health is believed to be indirect from noise annoyance and sleep disturbance. There is little research on the impact of turbine noise on wildlife. Since wind turbine noise can contain both tonal components, amplitude modulation, impulsiveness and LF-noise it is perceived as more annoying than other typical noises.

## **VISUAL IMPACT – Wind Energy Systems**

### **CHAPTER Site 100 ORGANIZATIONAL RULES**

#### **PART Site 102 DEFINITIONS**

Site 102.10 “Combined observation” means a ~~personviewer~~ sees multiple energy facilities from a stationary point within a typical cone of vision.

Site 102.18 “Key observation point” means a viewpoint that receives regular public use and from which the facility would be prominently visible, ~~a point from a scenic resource that has the greatest number of proposed facility structures or components potentially visible, where the greatest amount of public use is anticipated, and at which access to the scenic resource is most easily or likely achieved.~~

Site 102.37 “Sequential observation” means a ~~personviewer~~ sees or hears multiple energy facilities from different viewpoints as the ~~personviewer~~ travels along a particular route such as a hiking trail, snowmobile trail, river, scenic byway, or on a lake.

Site 102.43 “Successive observation” means a ~~personviewer~~ sees multiple energy facilities from a particular viewpoint, but not within the same viewing arc, by changing the ~~personviewer~~’s cone of vision.

### **CHAPTER Site 200 PRACTICE AND PROCEDURE RULES**

#### **Site 202.13 Site Inspections.**

(a) The committee or subcommittee, as applicable, and public counsel shall conduct a site visit of any property and/or any area of potential visual impact which is the subject of a hearing if requested by a party, or on its own motion, if the committee or subcommittee determines that the site visit will assist the committee or subcommittee in reaching a determination in the hearing.

(d) Intervenor and/or abutters may request their property be subject to a site visit.

### **CHAPTER Site 300 CERTIFICATES OF SITE AND FACILITY**

#### **PART Site 301 REQUIREMENTS FOR APPLICATIONS FOR CERTIFICATES**

#### **Site 301.03 Contents of Application.**

(c) Each application shall contain the following information with respect to the site and other necessary infrastructure of the proposed energy facility and alternative locations the applicant considers available for the proposed facility:

(3) The location of property lines, residences, industrial buildings, and other structures and improvements within or adjacent to the site;

Site 301.05 Effects on Aesthetics. Each application shall include the following information regarding the effects of, and plans for avoiding, minimizing, or mitigating any unreasonable adverse effects of, the proposed facility on aesthetics:

(b) The visual impact assessment shall contain the following components:

(2) A description of how the applicant identified and evaluated the scenic quality of the landscape and potential daytime and nighttime visual impacts;

(4) A computer-based visibility analysis to determine the area of potential effect, which, for proposed wind energy systems, shall extend to at least a 10-mile radius from each wind turbine in the proposed facility, and, for electric transmission lines longer than 1 mile, shall be ½ mile in urban areas, 2 miles in suburban, rural residential, and village areas, 3 miles in lightly developed or undeveloped landscapes where the line follows an existing transmission corridor, and 5 miles in lightly developed or undeveloped landscapes where the line would be located in a new transmission corridor;

(6) Characterization of the potential visual impacts of the proposed facility on identified scenic resources as high, medium, or low, based on consideration of the following factors:

(a) The expectations of the typical personviewer;

(7) Photosimulations from representative key observation points, visually impacted private property and/or residential neighborhoods and from other scenic resources for which the potential visual impacts are characterized as “high” pursuant to (6) above, to illustrate the potential change in the landscape that would result from construction of the proposed facility and associated infrastructure, including land clearing and grading and road construction; using standard as follows:

(a) Simulation shall be taken at an equivalent focal length of 50 mm (i.e., “normal view”).

(b) Simulations should represent the equivalent of what would be taken with a 75mm focal length lens on a full-frame 35mm camera and printed at 15.3"x10.2" (390x260mm) for hand-holding.

#### Site 301.14 Criteria Relative to Findings of Unreasonable Adverse Effects.

(a) In determining whether a proposed energy facility will have an unreasonable adverse effect on aesthetics, the committee shall consider:

(4) The scope and scale of the change in the landscape visible from affected scenic resources and private properties;

Site 301.16 Additional Criteria Relative to Wind Energy Systems. In addition to the criteria set forth in Site 301.07 through 301.15, in determining whether to grant a certificate of site and facility for a proposed wind energy system, the committee shall consider:

(a) Cumulative impacts to natural, scenic, recreational, and cultural resources, including with respect to aesthetics the potential impacts of combined observation, successive observation, and sequential observation of energy facilities by the viewer-person; and



## **STATEMENT OF REASON**

Visual Impact is an extremely important consideration in the siting of an energy facility, particularly those that will be visible for long distances, such as wind energy facilities (may be visible for more than 20 miles) and transmission lines.

The areas with wind energy facilities and/or the potential for additional wind development are located in rural areas which are typically high snowmobile use areas. During the winter months, people travel from all over New England to enjoy the vistas offered by snowmobiling into areas that are otherwise undeveloped and therefore snowmobile trails should be considered as its own criteria. Likewise, the nighttime visual impact of these energy facilities should be considered in addition to the daytime visual impact, as the strobing red lights are highly visible for very long distances at night.

The SEC Committee should not be limited to viewing only the project 'site'. The more visually impacted areas are likely to be areas around the site within a 10-20+ mile radius. A site visit to these areas will provide an opportunity to personally visualize the impact the site will have on surrounding areas. Also, there are people who may be significantly impacted by the energy facility and therefore, should have the opportunity to request the SEC visit their property to see firsthand how they will be impacted. Additionally, photosimulations of impacted private property should also be required with the Application. This will allow the SEC committee to more fully understand and consider the impact on private property, as recently introduced to the Purpose statement of this Chapter.

For purposes of determining visual impact, health and safety setback and noise, the property line of the site(s) should be identified within the application. Additional details and justification are provided in those specific topic areas of this document.

The photosimulation standard identified in Site 301.05(b)(7) was referenced from “*Visualization Standards for Wind Energy Developments*” by The Highland Council (UK).  
[http://www.highland.gov.uk/download/downloads/id/1026/the\\_highland\\_council\\_visualisation\\_standards](http://www.highland.gov.uk/download/downloads/id/1026/the_highland_council_visualisation_standards).

### ***NOTE:***

*“Viewer” has been replaced by ‘Person’ throughout the document, as there is no definition for ‘viewer’. ‘Person’ is defined and readily understood.*

|

## GENERAL COMMENTS – Wind Energy

### CHAPTER Site 200 PRACTICE AND PROCEDURE RULES

#### PART Site 202 ADJUDICATIVE PROCEEDINGS

##### Site 202.15 Waiver of Rules.

(d) The committee or subcommittee, as applicable, shall accept for consideration any waiver request made orally during a hearing or prehearing conference. In general, interested parties will be discouraged from requesting waivers orally.

(e) A request for a waiver shall specify the basis for the waiver and the proposed alternative, if any. Other Parties will be granted the opportunity to present their support or objection to any waiver requests before the Committee.

*Statement of Reason: Self-explanatory.*

### CHAPTER Site 300 CERTIFICATES OF SITE AND FACILITY

#### PART Site 301 REQUIREMENTS FOR APPLICATIONS FOR CERTIFICATES

##### Site 301.03 Contents of Application.

(e) If the application is for an energy facility that is ~~not an electric generating facility~~, an electric transmission line, or an energy transmission pipeline, the application shall include:

*Statement of Reason: No exception should be made for electric generating facilities as the listed in this section is relevant to the process. Applicants can ask for waivers if they are unwilling or unable to provide the information.*

(f) If the application is for an electric generating facility, the application shall include the following information:

(2) Capacity in megawatts including nameplate and capacity factor, as designed and as intended for operation;

*Statement of Reason: For intermittent resources such as a wind energy facility, the use of 'megawatts' is ambiguous, as there is likely to be a significant difference between nameplate capacity and generating capacity. The Application should require to both pieces of information.*

This is an excellent summary Lisa. Thank you so much!

---

**Lisa Frantzis** | Managing Director | Energy | Navigant

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**From:** Lisa Linowes [mailto:lisa@linowes.com]

**Sent:** Friday, June 06, 2014 1:27 PM

**To:** Rieman, Derek; Mike Novello

**Cc:** Donald Pfundstein; Tripp Blair; Stephen Ambrose; Fred Ward; Ric Werme; Schibanoff, Susan; tntmullen@gmail.com; jrsmw@aol.com; Ken Kaliski; Eddie Duncan; Rick James (E-CS); llerner01@comcast.net; larrygoodman4@gmail.com; STUART SMITH; Francis Pullaro; Campbell McLaren; Ken Sullivan; Edward Dekker; Elizabeth Freeman; Jack Kenworthy; Lisa Frantzis; brandy.chambers@nh.gov

**Subject:** Re: SB99 Health and Safety -- NEW DRAFT (with appendices)

Derek - thank you very much for your feedback. I've incorporated all of your recommendations into the text as well as Mike's from last night and earlier today.

Please see my quick notes below in brackets.

ALL: I am attaching the final document for one last review before sending to OEP and Navigant. If anyone has any final thoughts, please let me know by 2:30p. Thx!

Best,

--Lisa

----- Original Message -----

**From:** [Rieman, Derek](#)

**To:** [Mike Novello](#) ; [Lisa Linowes](#)

**Cc:** [Donald Pfundstein](#) ; [Tripp Blair](#) ; [Stephen Ambrose](#) ; [Fred Ward](#) ; [Ric Werme](#) ; [Schibanoff, Susan](#) ; [tntmullen@gmail.com](#) ; [jrsmw@aol.com](#) ; [Ken Kaliski](#) ; [Eddie Duncan](#) ; [Rick James \(E-CS\)](#) ; [llerner01@comcast.net](#) ; [larrygoodman4@gmail.com](#) ; [STUART SMITH](#) ; [Francis Pullaro](#) ; [Campbell McLaren](#) ; [Ken Sullivan](#) ; [Edward Dekker](#) ; [Elizabeth Freeman](#) ; [Jack Kenworthy](#) ; [Lisa Frantzis](#) ; [brandy.chambers@nh.gov](#)

**Sent:** Friday, June 06, 2014 12:19 PM

**Subject:** RE: SB99 Health and Safety -- NEW DRAFT (with appendices)

Lisa,

Thank you for your hard work and dedication to heading up this group. I recognize that this was a herculean task and extremely difficult to capture all of the information that was discussed. With that in mind, it would be greatly appreciated if you would incorporate the following comments in the latest draft. Please feel free to give me a call on my cell phone if you would like to discuss further.

- 1) I don't believe that there was consensus that curtailment technology **shall** be installed. As I mentioned on the call, this is a relatively new technology and there are certain challenges in adopting it as a requirement. Also, the Michigan Shadow Flicker study that you circulated notes that other mitigation tools are available. **[LISA: You're correct. I changed the wording in the table to indicate that curtailment or other mitigation options may be considered]**
- 2) Similar to the sound section in which you provided a chart detailing the SEC's requirements/findings in the NH wind dockets, it may be appropriate to include a chart on the flicker issue citing the thresholds in the body of the document. **[LISA: I added Table 2.c showing the results of the shadow flicker modeling submitted with the four wind energy applications reviewed by the SEC. The SEC has never imposed a SF threshold.]**
- 3) In addition to the comments suggesting that the 30 hour threshold is appropriate because no complaints have been registered in NH, more importantly, the 30 hour threshold has been almost uniformly adopted as the proper threshold across the U.S. **[LISA: Agreed. I added a sentence making the point that the 30-hour threshold is commonly seen in ordinances throughout the US.]**
- 4) Also, I believe that earlier drafts of your document included 10x turbine height as an appropriate study distance for shadow flicker which was previously accepted by the SEC. It should be noted as proposed or alternative study benchmark. **[LISA: You're right. I added the 10x to the table as an option.]**
- 5) In the Setback section, it is appropriate to note and include 1.1x turbine height as a suggested setback as it has been adopted by the SEC. I note it in the appendix, but it should also be included in the document. Moreover, the document does not clearly state the basis for a 5x tip height setback standard. **[LISA: I added a few words explaining the multiplier and also included the alternation proposal that covers the SEC setback distances on prior projects. ]**
- 6) I also disagree that visual inspections should be required associated with ice accretion as technology can mitigate these events. I would request that this issue be moved to 3.3. **[LISA: Understood. I moved this statement into the area of disagreement.]**

Thanks again for your leadership in leading this group.

Respectfully,

Derek

---

***Note—my address and phone number have changed.***

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**From:** Mike Novello [<mailto:mnovello@wagnerforest.com>]

**Sent:** Friday, June 06, 2014 11:53 AM

**To:** Lisa Linowes

**Cc:** Donald Pfundstein; Tripp Blair; Stephen Ambrose; Fred Ward; Ric Werme; Schibanoff, Susan; [tntmullen@gmail.com](mailto:tntmullen@gmail.com); [jrsmw@aol.com](mailto:jrsmw@aol.com); Ken Kaliski; Eddie Duncan; Rick James (E-CS); [llerner01@comcast.net](mailto:llerner01@comcast.net); [larrygoodman4@gmail.com](mailto:larrygoodman4@gmail.com); STUART SMITH; Francis Pullaro; Campbell McLaren; Ken Sullivan; Rieman, Derek; Edward Dekker; Elizabeth Freeman; Jack Kenworthy; Lisa Frantzis; [brandy.chambers@nh.gov](mailto:brandy.chambers@nh.gov)

**Subject:** Re: SB99 Health and Safety -- NEW DRAFT (with appendices)

Thank you the clarifications

On 3.a.2 I still disagree with requiring visual inspections. I am unsure of the practices in Groton, but on the wind farms I am aware of, I would argue that such a requirement is an inappropriate limitation on operations. I would appreciate if you reflected this as a point without consensus

3.3 I agree that there was no consistency. However, not including any of those standards might suggest to anyone reading the report that those options were not considered as potential standards - and only the 5x and 1800 ft standard remain as potential rules for the rule makers to start with. I can't type on my phone and review the PDF to remind myself of what the history has been, but I suggest the Lempster standard be included as one of the potential options the group proposes

Again, thank you for your hard work

Typos and brevity courtesy of my mobile phone

On Jun 6, 2014, at 12:07 AM, "Lisa Linowes" <[lisa@linowes.com](mailto:lisa@linowes.com)> wrote:

Mike, thank you very much for your thorough review. Please see my responses below in blue. I've incorporate most of your recommended changes.

ALL: Attached please the final draft document with Mike's suggestions incorporated AND the appendices included.

Thanks again!

--Lisa

----- Original Message -----

**From:** [Mike Novello](#)

**To:** [Lisa Linowes](#)

**Cc:** [Donald Pfundstein](#) ; [Tripp Blair](#) ; [Stephen Ambrose](#) ; [Fred Ward](#) ; [Ric Werme](#) ; [Schibanoff, Susan](#) ; [tntmullen@gmail.com](#) ; [jrsmw@aol.com](#) ; [Ken Kaliski](#) ; [Eddie Duncan](#) ; [Rick James \(E-CS\)](#) ; [llerner01@comcast.net](#) ; [larrygoodman4@gmail.com](#) ; [STUART SMITH](#) ; [Francis Pullaro](#) ; [Campbell McLaren](#) ; [Ken Sullivan](#) ; [Rieman, Derek](#) ; [Edward Dekker](#) ; [Elizabeth Freeman](#) ; [Jack Kenworthy](#) ; [Lisa Frantzis](#) ; [brandy.chambers@nh.gov](#)

**Sent:** Thursday, June 05, 2014 10:35 PM

**Subject:** Re: SB99 Health and Safety -- NEW DRAFT

Lisa,

It certainly appears that you have spent considerable work on the reformatting and summaries. I think this document correctly shows that although we were not likely to have 100% agreement on all topics, we did reach agreement in some areas, and appeared to be on a good path towards consensus on others.

I have a few additional suggestions/thoughts:

1.1 Second bullet: I suggest rephrasing to "Three primary studies may be necessary to evaluate wind turbine noise emissions"

This suggestion is based on my belief that pre-construction surveys may not be necessary depending on what is decided regarding post construction standards, and also that in some cases noise studies may not be necessary (for example is a project is sited sufficiently far from houses):  
[CHANGE MADE](#)

Table 1.1a

4 - I recall agreement about L10, Leq, and L90, but I believe including C weighting was not settled, and should be moved to Table 1.b - [The question of C weighted was suggested by Rick on Jun 3. Kaliski/Duncan were asked if it would be a problem providing both A and C weighted data and they said it was not a problem. We can relisten to the recording, but it was not an area of disagreement.](#)

6 - There was agreement that turbine manufacturer uncertainty should be added. The +2 dB is based on the historical uncertainty factor included in a manufacturer's sound warranty (for example, 105 dB, +2 dB uncertainty). To the extent the manufacturer warrants a different uncertainty, this factor should be adjusted accordingly. I suggest as replacement text: An adjustment to account for turbine manufacturer uncertainty (historically manufacturers have set this uncertainty around +2 dB) - [No problem with that. It may be best to simply cite the professional standard for this section. Change made.](#)

14 - I agree in concept, though I recall one of the experts, possibly Rick, stating that there was not a substantial difference between winter and early spring. I also recall that the equipment has temperature limitations, possibly 15 degrees F? Should there be a feasibility threshold, if the experts agree that certain periods may not be practical for measurement or are likely to add to the compliance determination, but other periods are expected to provide substantially the same results? [Sure. I also repeated the rule under pre-construction to cite that there are temps below which the monitoring equipment will not properly operate.](#)

15. I am not sure what is meant by inaudible tones? I may be incorrect, but I am not certain the 5 db penalty was agreed to, rather than an evaluation of what was done in Maine? Should this be moved to Table 1.c? [I will remove reference to inaudible and incorporate the Maine standard.](#) Ken Kaliski raised this point in the meeting on Jun 3 in reference to Maine. While Rick did not comment one way or the other on Jun 3, he told me earlier today that he agree with the standard.

8-15 I am a little concerned at the real-world limitations of conducting these stringent tests (acoustician present, winds above X in one place but below Y in another, turbines shutting on and off) particularly since I would imagine cellular communication to be non-existent in some locations. These fears may be overblown, but to the extent we discussed these topics individually rather than in a system, I grow worried that the sum may be much more complicated than the parts? [Each of these items are standard and conducted as part of the post construction survey.](#) The only area of disagreement is whether unattended surveys are adequate on their own without validation via attended. The wording incorporates all of the amendments that Ken Kaliski provided from the first few versions. If the experts agree, I am not inclined to make changes.

1.1c - On the heading, I think there is a typo - you may have meant "but" not "by" [Typo fixed. thx.](#)

Predictable modeling - I think the distance limitation should be from turbines, not the project boundary (for example, an access road might be part of the project boundary, but the post construction noise concerns are not stemming from the access road). [I think you might be misunderstanding what this bullet is saying. It is referring to the receptor points where the predictive modeling will show the expected noise levels of the operating turbine.](#)

I would ask that you add to Table 1.d :

Preconstruction Monitoring - *Mike Novello felt that pre-construction baseline studies should be focused on informing the SEC about the applicant's ability to meet post-construction compliance criteria. As those criteria were not established by our working group, it is not yet clear that pre-construction baseline studies are necessary* [Comment added](#)

The working on Ken Kaliski's Location of Monitors comments is a little confusing. Is the intended standard to be the property line only if the residence is within 200 of the property line, otherwise approximately 200 ft from a residence or is it 200 ft from a residence or 200 ft from a property line, whichever is closest [He is referring to the former - i.e. if the home is within 200 feet of the property line, the measurement will be taken at the property line otherwise it will be taken at the 200 foot location from the home.](#)

1.4

We relied on a fairly small number of experts to provide information on very technically detailed subjects, such as which ANSI standards apply. To the extent new experts provide additional information, these topics may need to be revisited. [We had FOUR different acousticians in the](#)

meetings. I do not think it's a good idea to get into a discussion of musical standards. It was pretty clear what the standards are designed to address. If we have any doubt, I would be happy to get a formal letter from a member of the ANSI standards committee defining the standards and their proper application.

3.a

2. I disagree with visual inspections being required. In my experience this is not necessary with the proper control software, and in any event, if there is sufficient setback there is a presumption of no one being at heightened risk. I do not recall visual inspections coming up in our discussions, but if they were I suggest they be moved to 3.3 [The discussion came up in three areas. One where Cary Shineldecker from Michigan stated the turbines regularly operate with ice on the blades; Second, there was reference to Iberdrola's Environmental, health and safety plan for Groton Wind. While this document is designed for project employees it would still apply to any member of the public that might wander into the safety zone of an operating wind turbine when the conditions are right for ice accretion. Finally, the recommendations for visual inspection are right out of Seifert's paper -](#)

[http://arcticwind.vtt.fi/boreasiv/assessment\\_of\\_safety.pdf](http://arcticwind.vtt.fi/boreasiv/assessment_of_safety.pdf) (footnoted in the appendices)

4. Same comment on visual inspections

3.3 - I believe one of the alternatives that should be considered is the setbacks used to date by the SEC. I believe one of your earlier drafts had a suitable graphic The table of prior setback distances is now in the appendices. I am sending the version of the draft out with the appendices right now. [Unfortunately, there is no consistency in the decisions. They range from 1.1x turbine height, to no setback to 1300 feet.](#)

4.a This is not necessarily my opinion, but to accurately reflect the voices in the debate, I believe one of the alternative proposals should be along the lines of "No application requirements are necessary with regards to EMF". Since I am again committing the mistake of trying to speak for others, feel free to disregard this suggestion if it is an erroneous summary of some of the opinions [I added a sentence to section 4.3 that reads "An alternative is to take no action relative to EMF."](#)

**Mike Novello**

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Lyme, NH 03768

**Direct: (603) 208-2003**

Cell: (603) 667-0775

Central Office: (603) 795-2002



On Jun 5, 2014, at 6:34 PM, Lisa Linowes <[lisa@linowes.com](mailto:lisa@linowes.com)> wrote:

Dear colleagues -

Attached please find the final draft of the document WITHOUT the appendices.

You will note that the document has undergone significant restructuring to fit the template provided by Navigant.

The bulk of the text that appeared in each of the prior versions still exists and has been placed in the appendices as references. I am formatting the appendices now but I wanted to get you this document asap to make sure you had time to review before tomorrow.

For Lisa Frantzis - I will be pulling the footnotes out where it makes sense and making them references in Appendix C.

Thanks everyone for all of your contributions. I look forward to your comments.

--Lisa

----- Original Message -----

**From:** [Lisa Linowes](#)

**To:** [Lisa Linowes](#) ; [Donald Pfundstein](#) ; [Tripp Blair](#) ; [Stephen Ambrose](#) ; [Fred Ward](#) ; [Ric Werme](#) ; [Schibanoff, Susan](#) ; [tntmullen@gmail.com](mailto:tntmullen@gmail.com) ; [jrsmw@aol.com](mailto:jrsmw@aol.com) ; [Ken Kaliski](#) ; [Eddie Duncan](#) ; [Rick James \(E-CS\)](#) ; [llerner01@comcast.net](mailto:llerner01@comcast.net) ; [larrygoodman4@gmail.com](mailto:larrygoodman4@gmail.com) ; [STUART SMITH](#) ; [Mike Novello](#) ; [fpullaro@renew-ne.org](mailto:fpullaro@renew-ne.org) ; [Campbell McLaren](#) ; [Ken Sullivan](#) ; [Rieman, Derek](#) ; [Edward Dekker](#) ; [Elizabeth Freeman](#) ; [Jack Kenworthy](#)

**Cc:** [Lisa Frantzis](#) ; [brandy.chambers@nh.gov](mailto:brandy.chambers@nh.gov)

**Sent:** Wednesday, June 04, 2014 12:54 PM

**Subject:** SB99 Health and Safety summary of rules

Hi everyone. Attached please find a document containing tables of the proposed rules we've developed from our meetings. Hopefully this format is easier to review. Please get back to me with your feedback.

Also, if you would like to listen to any of the recorded sessions, you can do so by following these steps:

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**Meeting ID: 660-242-248**

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**Conference call Date and Reference #**

June 3, 2014 - Reference # 5

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May 5, 2014 - Reference # 3

Apr 25, 2014 - Reference # 2

Best,

--Lisa

<SummaryReport-SB99-Health-SafetyFINAL.pdf><SummaryReport-SB99-Health-SafetyFINAL.docx>

<SummaryReport-SB99-Health-SafetyFINALw-Appendix.pdf>

<SummaryReport-SB99-Health-SafetyFINALw-Appendix.docx>

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Registered Office Address: 30 South Wacker Drive, Suite 3400, Chicago, Illinois 60606

Yes, both standards have non-relevant items or choices.

**From:** Lisa Linowes [<mailto:lisa@linowes.com>]  
**Sent:** Friday, June 06, 2014 10:05 AM  
**To:** Ken Kaliski; Eddie Duncan  
**Subject:** Re: SB99 Health and Safety -- NEW DRAFT

Ken, Eddie - thank you very much!

I will incorporate the changes. The one issue pertains to selecting 'relevant' parts of the standards.

I know that this is an area where you and Rick disagree so I'll cite it as such.

--Lisa

----- Original Message -----

**From:** [Ken Kaliski](#)  
**To:** [Lisa Linowes](#) ; [Donald Pfundstein](#) ; [Tripp Blair](#) ; [Stephen Ambrose](#) ; [Fred Ward](#) ; [Ric Werme](#) ; [Schibanoff, Susan](#) ; [tntmullen@gmail.com](mailto:tntmullen@gmail.com) ; [jrsmw@aol.com](mailto:jrsmw@aol.com) ; [Eddie Duncan](#) ; [Rick James \(E-CS\)](#) ; [llerner01@comcast.net](mailto:llerner01@comcast.net) ; [larrygoodman4@gmail.com](mailto:larrygoodman4@gmail.com) ; [STUART SMITH](#) ; [Mike Novello](#) ; [fpullaro@renew-ne.org](mailto:fpullaro@renew-ne.org) ; [Campbell McLaren](#) ; [Ken Sullivan](#) ; [Rieman, Derek](#) ; [Edward Dekker](#) ; [Elizabeth Freeman](#) ; [Jack Kenworthy](#)  
**Cc:** [Lisa Frantzis](#) ; [brandy.chambers@nh.gov](mailto:brandy.chambers@nh.gov)  
**Sent:** Friday, June 06, 2014 9:44 AM  
**Subject:** RE: SB99 Health and Safety -- NEW DRAFT

Thanks Lisa for pulling this together. Your efforts are greatly appreciated.

Attached are Eddie's and my comments on the noise section for your consideration.

Ken

**From:** Lisa Linowes [<mailto:lisa@linowes.com>]  
**Sent:** Thursday, June 05, 2014 6:34 PM  
**To:** Lisa Linowes; Donald Pfundstein; Tripp Blair; Stephen Ambrose; Fred Ward; Ric Werme; Schibanoff, Susan; [tntmullen@gmail.com](mailto:tntmullen@gmail.com); [jrsmw@aol.com](mailto:jrsmw@aol.com); Ken Kaliski; Eddie Duncan; Rick James (E-CS); [llerner01@comcast.net](mailto:llerner01@comcast.net); [larrygoodman4@gmail.com](mailto:larrygoodman4@gmail.com); STUART SMITH; Mike Novello; [fpullaro@renew-ne.org](mailto:fpullaro@renew-ne.org); Campbell McLaren; Ken Sullivan; Rieman, Derek; Edward Dekker; Elizabeth Freeman; Jack Kenworthy  
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--Lisa

## SEC Rulemaking Matrix

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## SEC Rulemaking Matrix

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