

Wind Law Support Document

This Document is intended to provide the Litchfield Town Board with insight into the decisions of the Wind Law Committee, and provide supporting evidence for the provisions put forth in the proposed law.

To avoid confusion, the Committee elected to separate this law into four (4) Articles.

By segregating Wind Measurement Towers and Small Wind Turbines, each into their own Article, we have hopefully eliminated the confusion surrounding SEQRA review, permits, setbacks, fees, etc... which should generally only apply to the large wind systems.

Article I. General Requirements - outlines conditions applying to all Articles within this law.

Article II. Wind Energy Facilities - outlines the requirements for large wind systems; those having a rated output of more than 100Kw.

Article III. Wind Measurement Towers - covers these temporary towers only.

Article IV. Small Wind Turbines - covers those rated at 100Kw or less.

Article I. General Requirements

Section 1.01 Title

Section 1.02 Purpose

Section 1.03 Authority

Section 1.04 Applicability

Section 1.05 Severability

Section 1.06 Effective Date

Section 1.07 Definitions...The committee added several definitions to insure understanding of their use, and modified others to agree with the provisions set forth within the new law.

Modified definitions include:

- Ambient Sound
- Applicant
- Background Sound
- Engineering Report, Engineering Study or Engineering Plan
- Site and/or Site Boundary
- Sound Pressure Level
- Name Plate Rating
- Prominent Tone
- Participating Landowner
- Qualified Independent Acoustical Consultant
- Rotor Diameter

- Small Wind Turbine
- Tower Height

Section 1.08 Fees... After review and discussion, the committee agreed to adopt the language in the template law. Additionally, we have included a Fee Schedule template, which the Board may use as a reference when setting the Fee amounts.

Section 1.09 Tax Exemption

Observing board member Kate Entwistle reviewed the referenced law and reported to the committee with her findings. The committee agreed that this provision was appropriate, particularly since it provides leverage in any negotiations between a developer and the town with respect to payment in lieu of taxes (PILOT) agreements.

Article II. Wind Energy Facilities

Section 2.01 Scope

The committee decided that the more restrictive application, development and security provisions apply to facilities with large wind turbines. These facilities may include Wind Measurement Towers, Accessory Facilities and Equipment or even Small Wind Turbines but if the Name Plate Rating exceeds 100kW singly or in aggregate or a height of 100 feet then the provisions of this Article apply.

Section 2.02 Permits

2.02.A Permit Requirements... Section 2.02-A establishes two distinct permits: one for construction and one for operation. This is further outlined in section 2.16. The committee was unanimous in their belief that these two activities be considered separately.

Wind turbines are covered under the New York State Fire Prevention and Building Code. Though specifically exempt from the provisions of the Building Code, they are covered under Miscellaneous Group U, which includes "Towers" and hence per 19 NYCRR Part 1203, building permits are required.

2.02.B Exemptions... The committee considered mechanical, non-electrical wind turbines as not necessarily having less environmental impact than electrical generation turbines. In making this determination, the committee considered the main impacts that are sited with turbines in general, including visual domination, noise and vibrations, ice throw, risk of mechanical disintegration or collapse, etc. These impacts may be present in a mechanical turbine as well. A general exemption for mechanical turbines is only appropriate if restricted in overall height. The committee selected 50 feet as a logical limit, thereby not unduly restricting turbines used for irrigation, for example.

"Replacement in-kind or modification"...This provision allows the Facility Operator to perform needed maintenance and install system upgrades as needed, without requiring special approval from the Town Board, but does not allow changes that affect the scope of the Construction Permit, Operating Permit, or this law. Further, this provision prohibits replacement of a Wind Turbine, or components thereof, without Board approval if a catastrophic failure has occurred. All Committee members were in agreement.

2.02.C Transfer... The committee was mindful that wind energy facilities are often sold to entities that can take most advantage of the tax credits being offered, as these credits are a significant portion of the return on investment. As such, subsection C was deemed important to protect the Town. Additional liability wording appears in other sections.

2.02.D Construction Permits... The committee considered allowing an operational period as part of an original construction permit, but determined that this was not in keeping with the Town's and landowner's best interests. In particular, the requirement that an operation permit be obtained following construction provided leverage to the Town that would help assure that the project had been constructed as planned and was safe to operate. Two years was considered adequate for the construction phase to be completed and is consistent with other building permits issued by the Town. This would allow adequate time for such activities as road building, foundation construction, tower erection, commissioning, and grid integration. A one-year period was considered, but was rejected due to the fact that approval for grid integration could take longer than planned or weather might delay construction due to safety concerns.

2.02.E Operation Permit... The primary purpose of a separate, renewable Operation Permit is to insure the Town, and its residents, that the provisions in this law are being complied with on an ongoing basis. This has not been the case in many Wind Facilities throughout the country. Frequent ownership changes and bankruptcies dilute the strength of the original agreements, leaving both the Town and the Participating Landowners stranded. By requiring the Facility Operator to renew his Operation Permit every 5 years, and by requiring an engineering inspection and complaint review, the Operator will be forced to maintain his equipment and procedures in a professional manner, resolve open complaints, and be up to date on his financial commitments. This process also provides a stimulus to update the Decommissioning Fund to current standards, check for adequate insurance coverage, etc...

Concern was voiced that a separate Operation Permit may inhibit a developer's ability to obtain financing for the initial project, ie: "if an anti-wind Board comes into power". This concern is resolved by including the first Operation Permit in the application fee with the Construction Permit, making it part of the initial application package. The developer/operator must still meet his obligations within this law to qualify for the Operation Permit, but he does not need to apply separately. Further, we believe that industrial wind turbines, particularly if not maintained properly, can result in a substantial potential hazard to the public safety due to risk of collapse, blade throw, ice throw and the like. Operating permits are required per 19 NYCRR Part 1203 "(g) Operating Permits. (1) Operating permits shall be required for conducting the activities or using the categories of buildings listed below: ... (v) buildings whose use or occupancy classification may pose a substantial potential hazard to public safety, as determined by the government or agency charged with or accountable for administration and enforcement of the Uniform Code."

ROI (Return on Investment) for a wind power project is very short, usually less than 3 years, due to the huge subsidies and tax benefits provided by the Federal and State Governments¹. This easily falls within the 5- year time frame of the Operation Permit.

¹ See Schleede, June 12, 2007 and July 30, 2008, available on the NYSERDA website:

In considering the term for an Operation Permit, the committee attempted to balance the interests of the developer with that of participating and adjacent landowners/tenants and the Town. A shorter period would allow for more oversight but would be a drain on the Town's resources. A longer period would not permit adequate oversight and mitigation of financial and environmental issues. The committee considered that an applicant might wish to apply for an Operation permit of a shorter duration if the subject turbines were near the end of their operational life expectancy or if leases or other commercial agreements were set to expire within the five- year period. The committee also considered the possibility that the applicant could be abating a complaint (such as noise or for lack of operation) under a mitigation plan agreed upon with the Town Board during the renewal phase. The committee found that codifying such a contingency was unnecessary and all suggested wordings were found to be unacceptably vague.

Section 2.03 Waivers and Additions... *Per the advice of our Town Attorney, Section 2.03 was altered to allow the Town Board to add restrictions or requirements to the application process, as deemed necessary to suit the unique conditions of a specific site or application. Such conditions might include Quarry blasting near an operating Wind Turbine, poor soil conductivity for adequate electrical grounding, run-off effecting wetlands and nearby wells, etc...*

Section 2.04 Enforcement and Penalties... The committee considered how penalties might be allocated between the developer/operator and the landowner (if not the developer or operator). Several committee members advocated for the landowner to have liability in the event of an enforcement action; others disagreed noting that a landowner, who was not an operator or developer, lacked the ability to mitigate a violation by virtue of the fact that they were likely to lack the necessary technical expertise or resources. Nonetheless, the committee agreed that a landowner, who leases his land to a developer in exchange for consideration, should have some liability under enforcement provisions of the law. Such potential liability would cause a landowner to carefully review his commercial agreements with a developer in advance and assure that he has adequate recourse in the event of an enforcement action. The committee found this reasoning compelling and did not modify section 2.04 except to note that the penalties were not likely to deter a larger wind developer/operator and should be reviewed accordingly.

Section 2.05 Application Requirements

2.05.A Completed Application

The Town will have to create a form for a Wind Energy Facility Permit application, as none currently exists. The details of this application will have to be worked out but should include basic information such as contact information for the Applicant, any Participating Landowners, an enumeration of parcels by tax map reference, a completed checklist for all of the requirements for a valid application under this law, numbers and types of turbines planned, anticipated construction schedule, etc.

2.05.B Site Plan

2.05.B.8 A plan of ingress and egress... Using statutes from other towns as reference, the committee added this section to provide the Town of Litchfield with a map of the proposed connections to Town, County and State highways. This will allow our Highway dept. to inspect the proposed sites and assess the impact on traffic flow, pavement conditions, watershed, snow removal, etc...All committee members were in favor.

2.05.B.9 Landscaping Plan... Again using statutes from other towns as reference, this section was added to give the Town (and the participating landowners) full knowledge of the Developer's plans for the Site. The committee noted the rural character of the town and wanted assurances that this character will not be unduly impacted by the Turbine installation, to the extent possible. One committee member opposed, all others were in agreement.

2.05.B.10 Construction Access Plan... Other statutes were again used as reference. This plan provides the Town with foresight into potential problems arising during the construction phase. Considering that the loaded blade transport vehicle may be up to 150' long, problems such as traffic detours, road damage, interference with power poles and guy wires, sharp corners, etc... and payment for these alterations and repairs, will need to be addressed during the planning stage. All members were in agreement.

2.05.C Vertical Drawing

2.05.D Lighting Plan

2.05.E Erosion Control

2.05.F Construction Schedule... Planning will be critical, so as not to interfere with peak traffic periods, School Bus routes, Mail routes, etc...

2.05.G Maintenance Plan

2.05.H Decommissioning Plan... The committee took note of the limited operational life of wind turbines, most models of which have only been operated for a few years and have a rated life, as yet unproven, of only 15 to 20 years. Additionally, the committee noted that lease agreements also have a finite life and some provision for restoration of the site to its original condition must be made. The committee noted that a wind developer might sell his rights to a third party, might go bankrupt or might otherwise not be situated to fulfill his obligations for decommissioning. As such, the committee found it necessary to add the decommissioning plan to the application. Language from laws of other towns was used as reference. A non-functional turbine is a public hazard due to risk of over speed in the no-load or unregulated condition and subsequent blade throw; collapse due to fatigue failure of its mechanical and structural components (foundation, bolts, shafts...) and ice throws and falls.

2.05.I List of Property owners

2.05.J Complaint Resolution Process... The committee noted that the model language for complaint resolution was vague and discussed various methods for handling this process. We would anticipate that the developer will respond to this section with his internal plan for handling complaints including such provisions as assigning a posting of contact information, assigning a corporate official as the designated individual to receive complaints, a complaint tracking and resolution process, etc.

Complaints are handled through the abatement process; in our town this will require Town Board approval. One practical problem for our town is that specific individuals (codes enforcement officer, supervisor, magistrate) could have conflicts of interest that might require them to recuse themselves from complaints related to any specific project. The town board a large is better situated to evaluate disputes than any specific official but in the end complaints will occur and will likely result in legal action by the parties involved if the town cannot broker a satisfactory solution. The Operating permit provides “teeth” to the complaint resolution process.

2.05.K Transportation Plan....

2.05.L SEQRA Process... Except for distance changes to keep this section compliant with other areas of this law, no other changes were required.

The Committee read the SEQR law and various summary documents published by the State and believes that it adequately understands the provisions of this section to recommend that our Town adopt it.

It is important for the Town Board to understand that while the environmental impact statement may be prepared by the developer for consideration by the Town, the Board is in fact responsible for its content.

Wind turbines are known to impact weather radar².

Wind turbines are known to impact local bat and bird populations but the significance of such impact is likely site dependant.

Wind turbines require very large foundations (610,000 lbs. concrete in the case of Fenner) as ballast against overturning moments caused by the force of the wind on the cantilevered masts. Additionally, buried transmission lines require extensive trenching. For example, the Fenner wind facility is reported to have 6.6 miles of buried lines. These soil disturbances have the potential to cause a significant impact on subsurface water flow.

Litchfield resident Charlie Newell, a retired transmission system designer for National Grid commented to the committee that stray voltage could be problematic unless the facility is properly grounded. This could be challenging in the case of a system that is mounted in an area with thin topsoil. Our native limestone is a very poor electrical conductor. Our discussions with local geotechnical and structural engineers that have experience with subsurface investigations for wind farm developments³ indicate that testing for electrical conductivity of soils is common.

² Utica OD Oct. 13, 2009: <http://www.uticaod.com/archive/x576551720/Upstate-wind-farms-interfering-with-weather-radar>

³ Comments of Atlantic Testing Laboratories during a recent National Society of Professional Engineers meeting.

2.05.M Accuracy Statement

2.05.N Application Signatures... This section was added to insure that all participating property owners are included and fully aware of the scope and detail of the proposal, and as such are in agreement with its content. One committee member opposed, all others were in favor.

Section 2.06 Application Review Process

2.06.A Pre-application Meeting... The committee discussed the need and purpose of a pre-application meeting in depth. This provision was included in the model language without any definition as to its purpose. In the end, the committee agreed that a pre-application meeting could be useful and that an applicant may request such a meeting, but it was not essential to do so.

2.06.B Application... The committee noted that the application might include plans, maps, reports and other material that may be printed on various paper formats. To facilitate dissemination of the application to interested parties, an electronic format such as Adobe Portable Document Format (.pdf) shall be provided by the applicant, along with the hard copy documents.

2.06.C Town Board review

2.06.D Public Hearing

2.06.E Notice to Herkimer County Planning

2.06.F Town Board Decision

Section 2.07 Wind Energy Facility Development Standards

2.07.A Underground Transmission Lines

The committee received several comments from the public requesting that transmission lines be buried.

2.07.B No antennas

Telecommunications facilities have their own unique environmental impacts; unless the SEQR process and application address both telecommunications facilities and wind turbines, this section prohibits a developer from adding the antennas after the fact.

2.07.C No advertising

2.07.D Tower Lighting

Tower lighting is a significant impact on the nighttime view shed. Flashing red lights or strobe lights will be required for towers over 200 feet or within close proximity to aviation facilities. Additional lighting increases visual impact and is prohibited.

2.07.E Visual Impact... The committee discussed potential colorization schemes to reduce visual impact and was not able to reach any conclusions. The committee noted that a camouflage

scheme for the tower might give the impression that the turbine was “floating in space” which would be disconcerting. It was agreed that it would be useful to encourage the applicant to consider color schemes other than the standard white or grey and to present these options to the Board, however no standard for color was set. The FAA provides guidance on colors for wind turbines noting: “The white paint most often found on wind turbine units is the most effective daytime early warning device. Other colors, such as light gray or blue, appear to be significantly less effective in providing daytime warning. Daytime lighting of wind turbine farms is not required, as long as the turbine structures are painted in a bright white color or light off-white color most often found on wind turbines.”

2.07.F Guy Wires... The committee discussed the use of guy wires and concluded that they were not desired for permanent use but may be useful for repairs or maintenance. The committee took note of the fact that guy wires may be climbed.

2.07.G Electromagnetic Interference... The committee took note that ridgelines are preferred locations for wind turbines due to their elevation and more stable wind conditions. Such ridgelines are also desirable locations for radio transmission towers. Radio interference can include disruption of the transmission path, multi-path reflections and in the case of Doppler radar⁴, false indications of severe weather or masking of actual severe weather in the shadow of turbines or turbine clusters. Turbine blades are typically equipped with conductive features for lightening protection or may be comprised of conductive materials such as aluminum or carbon fiber composites and could be expected to interfere with RF transmissions.

2.07.H Construction Debris

2.07.I Agricultural Mitigation... The committee reviewed the referenced Guidelines for Agricultural Mitigation and found them appropriate for inclusion.

2.07.J Rare Animal Species

2.07.K Storm Water Run-off... The committee took note that if turbines are constructed in areas without well-drained soil, effluent from storm water runoff or spills (such as of petroleum products) could travel long distances and potentially pollute nearby wells. Subsection 2.07-K addresses storm water, and we would anticipate that hazardous material spill response be addressed in the Environmental Impact Statement.

Should the development disturb more than one acre of land, a SPDES General Permit for Storm Water Discharges from Construction Activity is required⁵.

2.07.L Shadow Flicker... *Several committee members experienced shadow flicker during turbine field visits and reported on their experiences. The committee took note of the fact that shadow flicker, as noted on p. 527 of the Wind Energy Handbook, impacts 10% of adults⁶. Additionally, the*

⁴ Utica OD Oct. 13, 2009: <http://www.uticaod.com/archive/x576551720/Upstate-wind-farms-interfering-with-weather-radar>

⁵ <http://www.dec.ny.gov/chemical/43133.html#Permit>

⁶ Wind Energy Handbook, Burton, et. al., ©2001 Wiley ISBN-13: 978-0471489979

committee is aware of a specific case of a child, who is subject to seizures, is living in an area near a proposed wind energy facility.

2.07.M FAA letter...The committee noted that structures, and even cranes, exceeding heights of 200 feet require a permit from the FAA. Additionally, proximity to airports, radar, and navigation aids could result in the FAA determining that a hazard exists. To avoid unnecessary effort on the part of the Town, it was agreed that an Applicant should first seek FAA approval in the form of a “Determination of No Hazard” prior to submission of an application to the board. All members were in agreement.

2.07.N Maximum Height... The committee noted that turbines are becoming increasingly high to reach the best wind resources and avoid ground level turbulence. However, the existing facilities such as the Fenner or Maple Ridge turbines are very significant features on the landscape, even though they are well below 450 feet tall (in fact, 328 feet in the case of Fenner, 390 feet for Maple Ridge). Since a significant part of the impact is visual domination and interruption of natural views, the ordinance should include a limitation on height. In considering a max height, it was noted that if too low a number were prescribed, the developer would then propose greater quantities of shorter turbines to obtain the same power output. This was not viewed as being a lesser impact than fewer numbers of larger turbines (though other impacts such as noise might be higher for larger turbines, this wasn’t addressed directly in comparing turbine height). It was also noted that we have an airport located just beyond our town boundary and that small aircraft use our airspace for approach and take-off routes. As aircraft have an elevation floor of 500 feet, it is important to be below that number, though it was not known if a 50 foot buffer is adequate given the wake and pressure reduction downwind of an operating turbine. Also, since the flashing light is located on the nacelle and not the blades, a greater hazard exists because the blades may not be visible at night. Since the committee is not aware of any project in the Town that proposes a turbine height in excess of 450 feet, this Max Height was chosen as a compromise. As a frame of reference, the tallest building in the Mohawk Valley is the NY State Office Building in downtown Utica. A wind turbine, at 450 feet tall, would stand more than twice as high. There were two dissenters on the committee, who along with observing board member Kate Entwistle, voted for a 500 foot maximum height. The remaining eight members voted for and passed the 450’ limit. We note that the Commonwealth of Massachusetts recommends a 450’ maximum height. There is growing concern among pilots regarding wind turbines in proximity to airports. For example, the Aircraft Owners and Pilots Association⁷ recently issued cautionary letters noting “it is concerned that their tall construction could lead to potential collisions with aircraft and impact the reliability of radar.”

Section 2.08 Required Site Safety Measures...The committee noted that the template law offered very few safety or security provisions, and felt these additions were important to both the Town and the property owners. This Section was adopted from various reference laws and added by unanimous agreement.

2.08.A Automatic Braking

2.08.B Grounding... While this provision is written for the Town in general, it should be noted that some areas within the Town may require special grounding consideration due to poor conductivity of the base soils.

2.08.C Unauthorized Access

⁷ http://www.aopa.org/advocacy/articles/2009/090326wind_wa.html

- 2.08.D Lockable Doors and Gates
- 2.08.E Warning signs
- 2.08.F Not Climbable
- 2.08.G Minimum Height to Blade

Section 2.09 Traffic Routes and Road Maintenance This section required no changes

- 2.09.A Designated Traffic Routes
- 2.09.B Remediation of Damaged Roads
- 2.09.C Photographic Evidence

Public comments included concern for the condition of roads for access for construction equipment and materials and delivery of the turbines and towers. Additionally, ongoing maintenance will likely require large cranes and other heavy equipment. These activities could cause road damage. The committee recommends that the County be consulted as to the need for unique protection for county roads.

Section 2.10 Setbacks and Noise

The setback issue proved to be the most time consuming section for this committee. Individually, our Members did extensive investigation into scientific studies relating to tower collapse, ice throw, blade projectile travel distances, shadow flicker problems, visual domination and noise issues. Using the data we found, these topics seem to fall within three distance zones from each tower center:

- ~ tower collapse and ice throw cover the smallest area.
- ~ shadow flicker problems and blade projectile travel range cover a considerably larger area.
- ~ noise problems and visual domination extend over the widest range.

From this, the committee then chose to define these concentric zones and quantify the areas for each.

Zone 1 is defined as a **Danger Zone**. This zone covers the immediate area surrounding the Turbine Tower and presents the greatest risk of personal injury. Ice throw and blade fragmentation are high probability dangers, while tower collapse, as in Fenner, is always a possibility. Zone 1 is off-limits to all but operational employees and landowners.

While determining the size of Zone 1, the committee looked at data and recommendations provided by the Turbine manufacturers. Vesta, one of Europe's largest turbine builders, advises operators and Vesta employees to stay 1300' from their operating turbines. GE Energy, in a technical note entitled "Ice Shedding and Ice Throw, Mitigating Risk", advises a safe working distance to be a function of the Turbine size and provides a formula for calculating that distance [$1.5 \times (\text{tower height} + \text{rotor diameter})$]. The committee felt the GE approach would better fit a variety of circumstances and we adopted their formula as our standard for the Zone 1 perimeter.

Zone 2 is defined as a **Hazard Zone**. This zone extends to cover the blade fragmentation throw range⁸ and the critical range of shadow flicker. Zone 2 allows for short-stay public access, such as roads, trails, and non-residential buildings. If they so choose, a Participating Land-owner may reside within Zone 2. The committee determined that while blade fragmentation is relatively frequent and presents a considerable personal injury hazard, such events will most likely occur during high-wind storms conditions, when public traffic will be at a minimum. In establishing the limits for Zone 2, the committee took note of recommendations for shadow flicker as outlined in the Wind Energy Handbook (p.527): “ a minimum spacing from the nearest turbines to a dwelling of 10 rotor diameters”. This distance also coincides with a California Department of Energy report, predicting the distance a blade fragment can be thrown from a damaged turbine. The committee chose to use this formula as our standard for Zone 2 and establish this perimeter as the Site Boundary. All landowners within this perimeter must be Participating Landowners and Zone 2 (the Site Boundary) must fall completely within the Town Of Litchfield borders.

Areas identified as Zone 1 and Zone 2 were adopted without dissention. The area designated as Zone 3 was the main topic of discussion for several meetings and was passed by a vote of six (6) to two (2) with two members absent.

Zone 3 is defined as a **Risk Zone**. This zone extends to cover the area affected by the noise emanating from the rotating blades and also addresses the problem of visual domination. Zone 3 allows for residences if the developer obtains an easement from the current property owner.

Noise studies of wind turbine systems are relatively new and expanding, brought about by frequent complaints from neighboring property owners. As wind farms expand throughout the USA, they are growing in both height and diameter, while being sited closer and closer to existing residential structures. These larger industrial machines emit low frequency, long wavelength sound waves that are found to be a cause of health problems. Scientists in several countries are studying this phenomena and have issued setback guidelines to counteract these problems. One of the best-known studies was published here in the USA by Dr. Pierpont and included data from our nearby Fenner wind project.

Studies by Dr. Pierpont and others conclude that the low frequency, long wavelength noise generated by today's wind turbines causes the following symptoms in many residents (taken from Dr. Pierpont's Legislative Testimony):

- “Sleep problems – noise or physical sensations of pulsation or pressure making it hard to go to sleep and cause frequent awakening”
- “Headaches which are increased in frequency or severity”
- “Dizziness, unsteadiness, and nausea”
- “Exhaustion, anxiety, anger, irritability, and depression”
- “Problems with concentration and learning”
- “Tinnitus (ringing in the ears)”

⁸ Larwood, Scott and Van Dam, C.P. (California Wind Energy Collaborative), 2006 *Permitting Setback Requirements for Wind Turbines in California*. California Energy Commission, PIER Renewable Technologies. CEC-500-2005-184

Dr. Pierpont's study recommends a minimum residential Setback of 2Km for flat terrain and greater setbacks for hilly or mountainous areas. Other studies and recommendations include:

- George Kamperman, Noise engineer, USA – no less than 2 Km
- Christopher Hanning, MD, sleep specialist, UK – no less than 1.5Km
- National Academy of Medicine, France (equivalent to our AMA)–1.5Km minimum⁹
- Several Sound Consultants are recommending setbacks of from 3 to 5 Km, if elevation changes are substantial (usually greater than 500').

As the world learns more about wind turbines and as their size increases, setback requirements are being reviewed and altered. For example:

- France is considering a national setback requirement based on the National Academy of Medicine recommendation.
- Australia is considering a 2Km setback requirement based on a study done there.
- The State of Vermont is now considering bill #H.677 (dated 2010) that will set state wide setbacks of 1.25 miles to an occupied building, or 2 miles to that building if the elevation change is greater than 500 feet.
- Riverside County, Ca. – Planning board is recommending a 2-mile residential setback.
- Trempealeau County, WI – enacted a 1 mile residential setback
- Manitowoc County, Wi – enacted a 1-mile residential setback.
- Three townships in Maine; Dixmont, Montville, and Thorndike, have each enacted one mile or greater setbacks within the last few months. A fourth township, Jackson, enacted a residential setback of 13 times the Turbine Height (about 1.12 miles for a 450' turbine)
- The Richmondville, NY (Tug Hill wind farm) Town board has asked its Setback Committee to investigate the noise problems at this site and revisit the current setback law.
- Many of Europe's wind developers are now standardizing on the 2 Km setback, Including Retexo RISP, Germany's largest.

Based upon a review of all of this data, the committee chose to use the Pierpont recommendation, rounded down to 6500 feet, as a parameter for Zone 3. Residential units may exist within this area if the owner is in agreement and if the developer obtains an easement. Given the significance of the potential impacts, zone 3 codifies a "good neighbor" policy whereby a developer would need to seek the agreement from nearby residents prior to proceeding with a project. The committee anticipates that in the real world, waivers would be granted if a developer was unable to obtain easements from all affected residents despite a good faith effort to do so. However, if many residents were unwilling to agree to easements, the Town Board should consider this fact in granting waivers and project approvals. Zone 3 assures that this conversation will take place.

The committee also discussed applying Zone 3 restrictions to any property line, rather than an existing residence, thereby protecting that landowner's right to future development of his property. While this argument has strong merit, the committee chose to use the less restrictive provision.

Wording was added to include homeowners living just beyond our Town Boundaries, thus protecting our neighbors as our own residents. Hopefully, our neighboring townships will be equally thoughtful when writing their laws. While easements outside of the town limits are not subject to the Board's jurisdiction,

⁹ Dr. Chantal Gueniot in [Panorama du Médecin](#), 20 March 2006

a developer would need to provide evidence that any required easements exist, in much the same manner that evidence of FAA approval is required.

Several committee members argued that the zone 3 distance should be based on a multiple of turbine size (height or rotor diameter), but the referenced studies did not provide any guidance on this subject. Since the studies generally refer to 1.5MW class machines, a multiple of turbine size would likely result in even greater setbacks for larger turbines and was therefore rejected as being overly restrictive. An argument was made that if noise is the main concern then noise should be regulated rather than distance. For example, could a turbine be “turned down” to meet noise requirements at shorter distances and therefore eliminate the need for specific setbacks? While this is a possibility, it was not considered likely, as reduction in operational speed would result in reduced revenues.

2.10.B *Many research papers, governmental guidelines and texts provide useful guidance on establishing sound standards. A detailed discussion of this subject is beyond the scope of this report however the referenced documents provide an excellent primer on the subject. We recommend for example the NYSDEC guidelines document for a basic primer on sound and Kamperman and James as a more detailed reference.*

The committee considered numerous documents on the subject of sound including those made by or for the industry and those made independently. We found several references to be most useful and authoritative, most notably the World Health Organization guidelines for nighttime sound. The WHO¹⁰ provides guideline values for community noise that are instructive and were used in subsection B3 as maximum sound pressure levels. The WHO notes that sound pressure level as low as 30 dB(A) can cause sleep disturbance whereas 35dB(A) can cause “Speech intelligibility & moderate annoyance”. These are indoor levels and walls or even open windows will attenuate the sound such that we do not anticipate sleep disturbance at outdoor sound pressure levels of 35dB(A) during the nighttime hours. The WHO also notes that an outdoor sound pressure level of 45dB(A) will likely cause sleep disturbance with a window open. We have also included maximum sound pressure limits based on the C-weighted scale based on Kamperman’s¹¹ recommendations, which was endorsed by researchers at Michigan State University¹².

The NYSDEC also offers guidance for developing sound guidelines¹³ noting: “The goal for any permitted operation should be to minimize increases in sound pressure level above ambient levels at the chosen point of sound reception. ...Increases from 3-6dB may have potential for adverse noise impact only in cases where the most sensitive receptors are present.” And “In non-industrial settings the SPL should probably not exceed ambient noise by more than 6dB(A) at the receptor. An increase of 6 dB(A) may cause complaints.” The committee is recommending that Sound Pressure Level not exceed 5dB(A) and 5dB(C) above ambient sound.

A prominent tone penalty is established, this is based on an industry guideline - IEC 61400-11 . We reviewed summaries of the IEC document and concluded that since it has a low-end spectral cut-off of 50Hz it is unsuitable as a general reference. We note that the frequency produced by pressing the first key on a piano keyboard is 27.5Hz; sounds lower than 50Hz are clearly audible and in fact many of the

¹⁰ World Health Organization “Guidelines for Community Noise”, April 1999

¹¹ Kamperman and James, “The How-To Guide to Siting Wind Turbines to Prevent Health Risks from Sound”, October 28, 2008; “Guidelines for Selecting Wind Turbine Sites” Sound & Vibration Magazine, July 2009

¹² Punch, James and Pabst, “Wind Turbines: What You Can’t Hear Can Hurt You”, ASHA Convention, Nov. 2009

¹³ Jeffrey Sama, NYSDEC, “Assessing and Mitigating Noise Impacts”, document DEP-00-1

studies outlined in Section 2.10.A, confirm that the problematic long-wave noise is being generated at frequencies well below this 50Hz threshold. The committee noted this discrepancy and selected the Kamperman recommended spectral range and procedures for testing, which are quickly becoming the recognized standard.

B5 is a screen for infrasound based on the imbalance between the C and A weighted sound pressure levels.

2.10.C.1 *The following section allows for re-establishing a baseline for background sound if ambient conditions change over time.*

Section 2.11 Noise and Setback Easements

Section 2.12 Issuance of Wind Energy Facility Permits

Section 2.13 Decommissioning and Abatement

Section 2.14 Limitations of Approvals

The purpose of this section is to assert that a Wind Energy Facility permit does not of itself give the permit holder the right to cut trees or take other action to improve the wind flow to the facility. This provision does not prohibit the cutting of trees if such rights are lawfully obtained independent of the WEF permit.

Section 2.15 Permit Suspension and Revocation

Section A requires periodic noise testing and a time period for cure of any deficiency.

Section B requires that turbines be maintained in an operational condition. In the event of catastrophic failure (such as the Fenner collapse), this section requires that the operator report to the Town Board the results of the failure analysis and remedial/preventative measures taken.

Section C provides an enforcement means for permit non-compliance to include revocation of a permit and decommissioning, including potential use of the posted decommissioning security.

Section 2.16 Operation Permit Renewals

2.16.A Renewal Application

2.16.B Notification

2.16.C Application Requirements... As stated, the committee developed the Operation Permit, and its renewal requirement, as a means to insure the Town, and its residents, that the provisions of this law are being complied with on an ongoing basis.

2.16.C1 Noise Testing should be performed at regular intervals and reviewed.

2.16.C2 Deficiency Corrections should be complete and timely.

2.16.C.3 Complaint Review will be required at Permit renewal, with full reporting of all registered complaints and the manner in which they were resolved.

2.16.C.4 Operation Condition... all turbines should be either fully operational or in the process of becoming so, as proven by generation output logs.

2.16.C.5 Engineering inspection...All turbines to be inspected by an Engineer and subject to non-destructive examination at the time of operational permit renewal. The committee endeavored to craft a provision that provided the Engineer broad leeway in how this inspection was to be performed to avoid presenting an artificial barrier to permit issuance.

2.16.C.6 The committee believes that it is important to update the decommissioning cost estimates, considering changes in labor rates, demolition methods, scrap value, disposal costs, etc...

2.16.C.7 The committee believes it is important that the Renewal process include verification that all financial obligations are being met.

2.16.C.8 The committee notes that the Environmental Impact Statement issued by the board is a forward looking document and that it should be compared to actual field experience when considering operational permit renewal. Should discrepancies exist, these can be remedied.

Section 2.17 Application Expenses

This section was initially in the Fees section of Article I but was cut from that section and placed here so that it only apply to the Wind Energy Facilities and exclude Small Wind Turbines or Wind Measurement Towers erected independently of Wind Energy Facilities. These are not application fees; any unused portion will be refunded to the applicant. It is important to note that per 6 NYCRR Part 617.13, the Town cannot collect fees from an applicant for *both* the Environmental Impact Statement preparation *and* its review. However, our reading of Section 617.13 indicates that the Town may require that the applicant prepare the draft EIS and then collect fees for its review. In effect, the applicant is paying for both however the Town is not contracting for preparation of the draft, just for the review. 617.13 (c) also places a maximum value of such collected expenses (for SEQR purposes) at one half of one percent of the total project value. For an example \$40 million project, this would be \$200,000. The Town is advised to keep track of such costs; the application form should include an estimated total value of the project for purposes of establishing maximum application expenses.

The Town Attorney suggested that the Committee include legal fees in this section however did not follow up with any model wording. We believe that the use of the term “consultant and/or expert” is broad enough to include legal counsel if necessary to review and evaluate the application.

Section 2.18 Insurance

The committee believed that it was important to include an insurance provision to protect the Town in the event of damage caused by construction or operation of a WEF. This section was adapted from NYSERDA’s Standard Terms and Conditions for Agreements based on the reasoning that NYSERDA grants

from the System Benefit Charge/Renewable Portfolio Standard funds will likely require that the applicant maintain this coverage anyways. It is a simple matter to include the Town as an additional named insured.

Article III. Wind Measurement Towers

The Committee agreed that the Wind Measurement Tower Permit should be separate from the more restrictive Wind Turbine requirements, but that sufficient safeguards should be established to protect the Town and residents. To this end, Article III was established, allowing for a Wind Measurement Tower to be permitted and erected for the purpose of determining Site feasibility as a future wind farm. Further, under SEQR, towers higher than 100' are classed as Type I and require an environmental impact statement. To inform the public of its purpose and eliminate confusion, a public hearing is required prior to issuing a permit. All committee members were in agreement.

Section 3.01 Scope

Section 3.02 Permits

As this process typically requires about two (2) years of data collection, a two (2) year Wind Measurement Tower Permit was established. Should this Site evolve into a future wind farm, a second five (5) year Wind Measurement Tower Permit was established to coincide with the Wind Energy Facility Operation Permit.

Section 3.03 Standards

The committee also noted that while not limiting height, this Article does require a safety setback of 1.5 times tower height.

Based on a history of collapses of wind measurement towers during icing and/or high wind conditions, safety standards were required. Further site decommissioning was considered necessary. One committee member noted that a friend sent her pictures of a hole that was drilled for a wind measurement tower and left unfilled. Mitigation of the site is necessary for safety reasons.

Section 3.04 Application Requirements

An application must include plans stamped by a competent design professional and/or land surveyor. [There are pending bills at in the State Legislature that would require all non-boundary surveys be prepared and stamped by a Licensed Land Surveyor. Under current practice, site plans are typically produced by Professional Engineers or Architects. Since law in this area is likely to change, we included the wording of 3.04 C.]

FAA approval is required for any structure of 200' or higher or within close proximity to airports. Since the guidelines change from time to time and vary based on proximity to airports, it is not appropriate to list all conditions whereby FAA approval is needed. We refer the applicant to the appropriate section of federal law.

Article IV. Small Wind Turbines

The committee was in full agreement that the Small Wind Turbines section should be relatively free of restrictions, study requirements, engineering reports, etc... With this as our goal, we included only those provisions that are required to insure a safe and neighbor friendly system, and cited provisions required by state and federal agencies for which the applicant may not be aware.

With the exception of needing a Licensed Design Professional for the site plan (a New York State requirement), all other data and design certifications should be readily available from the turbine/tower manufacture, National Grid, and the FAA.

Since small wind turbines are often experimental, engineering review is required if the turbine exceeds certain parameters. This provision can be met with a statement from the manufacturer.

It is unlikely that FAA approval will be required but it is important for the applicant to verify this.

The committee reviewed the standard turbine tower heights for many turbines with a nameplate rating from 1kW to 100kW and concluded that typical heights were from 80 to 100 feet. If the height exceeds 100 feet, a SEQR process is required so to avoid this possibility we restricted overall height at 100 feet. 100kW at a 20% capacity should generate enough energy on average for a typical farm based on net metering. Larger turbines are approaching industrial scale so we limited the small turbine section to 100kW. If multiple turbines are proposed exceeding 100kW in aggregate nameplate rating, the provisions of Article II apply.

Small wind turbines don't require background sound testing or predictive acoustical analysis. If there are sound complaints, these standards will apply.

A small wind turbine should not be the vehicle for mounting of antennas or placement of advertising.

The committee considered restricting lighting on small turbines but this was rejected based on the notion that a resident shouldn't be restricted from placing seasonal decorations on his property.

The committee considered a decommissioning provision for small wind turbines but this was rejected. A majority of the committee didn't think that the Town should have the right to come on someone's property and take down their windmill if it wasn't a hazard to anyone. In practice the Uniform Code gives municipalities the right to condemn structures including turbines and A (13) provides the means to revoke a permit which could trigger the Town's existing authority of condemnation.

Schedule of Fees

This document is provided only as reminder to the Town Board to establish a fee requirement for each of the proposed permits.