Analysis of Proposed Cohocton Windmill Local Law #2

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Rev. 4

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1.0 Introduction

Megawatt scale industrial wind turbine "farms" are proposed for the town of Cohocton, N.Y. and will permanently alter the town if allowed. Large turbines create strong noise levels not only from wind through the blades but also by the turbine mechanisms themselves. To capture the wind these turbines are generally to be installed on hill tops around the town and thus have significant potential to create a serious and disturbing noise nuisance. Wind turbine noise added to the prevailing ambient background sound is an important environmental consideration when siting wind turbines since they are a permanent installation and may substantially impair a resident's right of enjoyment of neighboring lands, or even personal health. In addition, consideration of noise impacts and mitigation measures are a specific requirement of a NY State Environmental Quality Review procedure, which is required before the enactment of any local windmill law.

2.0 Cohocton Windmill Law #2

The Town of Cohocton is recommending a noise limit in a proposed zoning amendment entitled "A LOCAL LAW #2 FOR THE YEAR 2006 AMENDING THE ZONING LAW OF THE TOWN OF COHOCTON, NEW YORK TO REGULATE WINDMILLS AND WINDMILL FACILITIES" , dated Sept 21, 2006. A comprehensive and detailed environmental impact study is required prior to enactment of this law which is intended to replace Local Law #1 of 2006. Local Law #1 had no environmental review. That is completely contrary to requirements of N.Y.S. Environmental Conservation law. Proposed Local Law #2 is in the midst of an environmental review by the Town Board.

2.1 SEQR Analysis Required

A State Environmental Quality Review (SEQR) analysis is required by NYS ECL Article 8 and NYCRR Part 617 prior to approval of Local Law #2. The Cohocton Town Board, acting as Lead Agency has completed the Full Environmental Assessment Form (FEAF) supplied as a guide by the NYS DEC. The FEAF frequently refers to an Appendix I, "Town of Cohocton Zoning Law Amendment Environmental Assessment Form Supplement" from Bagdon Environmental Company. Badgon provides the only environmental analysis of the potential environmental consequences of the proposed Law and its conclusions are the basis to support the SEQR findings.

Why is the rezoning under "Essential Services"? No wind farm or wind turbine has been established as "essential". NYS has a great excess of electrical capacity most of the year, electrical power is transmitted throughout the region from the many hydro, nuclear and other generating plants. Most power is transmitted downstate where power plants are rarely operated due to the cost. Although electrical energy is an "Essential Service", wind turbines in Cohocton are hardly a necessity now, or in the foreseeable future.

2.2 Critique of the FEAF

Rezoning of land in the entire Town is a Type I action under SEQR Part 617 rules since land use would change for more than 25 acres of the town.

> § 617.4 TYPE I ACTIONS .
>
> (b) The following actions are Type I if they are to be directly undertaken, funded or approved by an agency:
>
> (2) the adoption of changes in the allowable uses within any zoning district, affecting 25 or more acres of the district;

Type I actions are likely to require an Environmental Impact Statement (EIS). According to the Part 617 rules the EIS purpose is to perform in-depth analysis of likely areas of environmental harm and mitigation measures. Only if the FEAF clearly shows that **no** harm will come from **any** environmental effect will an EIS **not** be required. This is not simple, particularly for a complicated and large issue like industrial scale wind farms.

It is not clear what findings the Town Board has reached from the FEAF since it is incomplete though signed by Supervisor J. Zigenfus on Sept 19, 2006. And as of the Oct. 4 issue no notice of findings have been published by the DEC's ENB as required:

> § 617.12 DOCUMENT PREPARATION, FILING, PUBLICATION AND DISTRIBUTION.
>
> (c) Publication of notices.
>
> (1) Notice of a Type I negative declaration, conditioned negative declaration, positive declaration and completion of an EIS must be published in the Environmental Notice Bulletin (ENB) in a manner prescribed by the department

The FEAF form is a guide for agencies when considering an proposed action and does not replace NYCRR Part 617 law. Use of the FEAF for decision making on a proposed Town Law may be misleading and inappropriate since the FEAF is designed primarily for project sponsors. From the FEAF, Part 1(Sponsor) Notice (at the top of the form):

> …Answers to these questions will be considered part of the application for approval and may be subject to further verification and public review.

The following gross errors were found in FEAF, notwithstanding many conclusions that were highly subjective toward "no harm".

Cover

P1. No Determination check box is checked so the form is not complete and invalid.

Part II: Project Impacts and Their Magnitudes

P. 11 Will the Proposed Action result in a physical change to the project site? No is checked but obviously the town law allowing windmills will physically change the landscape.

All environmental impacts that were identified in Part 2 of the FEAF were checked as "small to moderate" impact based on the Bagdon report which claims "Enactment of the zoning amendment… is not expected to have any direct or significant adverse environmental effects." Much of their conclusion is based on the law's requirement that any wind turbine installation must submit an Environmental Impact Statement. But SEQR rules do not allow this "putting off" of accountability to future project proposals. Environmental concerns that are likely to be incurred due to the rights granted in the law must be addressed now. And contrary to the expectations according to a Type I SEQR action, Bagdon has determined that the enabling of wide scale industrial windfarms throughout the town will definitely **not** harm the environment. Apparently the Town Board concurs but the Bagdon analysis is completely insufficient to support this conclusion.

2.3 Noise Definition in Local Law #2

The noise limit provision is given in section 1110, Required Approvals:

> (c) Predicted Windmill Noise Analysis:
>
> iii. Except as otherwise provided herein, windmills shall be located so that predicted windmill only noise at non-project property lines shall not exceed 50 dB(A), and windmill only noise at existing residences located on non-project parcels shall not exceed 45 dB(A).

Where do these noise figures come from and how are they justified for this town law in keeping with SEQR evaluation requirements? How is "windmill only" noise separated from background noise and for what duration is the noise to be measured? Apparently a noise meter reading higher than 50 dB(A) for any instant when the wind turbine noise is heard is sufficient to violate the ordinance.

The only supporting justification for the noise criteria is from the Bagdon report's "Noise and Odor Impact" paragraph:

> "The noise levels prescribed in the law are in keeping with the rural-residential and agricultural character of the Town. The 45 db(A) limit at residences imposed as a siting criterion is consistent with the U.S. EPA guidance on rural nighttime noise standards."

However the US EPA does not regulate community noise:

> Community noise
>
> EPA does not have any regulatory authority governing noise in local communities. You should consult with your local governmental (e.g., city and county) authorities to see if there are local or state laws that might apply to your situation. In addition, many states run noise pollution programs. To contact your state environmental agency for more information on their programs and regulations, see http://www.epa.gov/epahome/state.htm.

The EPA does have a comprehensive noise report relating to community noise which should raise strong concerns about the Cohocton law. From the EPA's "Community Noise" (Ref. 1)

> 3.1 Variation of Outdoor Noise Environment with Location
>
> The range of daytime outdoor noise levels at the 18 locations is presented in Figure 7. The locations are listed from top to bottom of the figure in descending order of their daytime residual noise levels (Lg0). The noisiest location which is outside of a 3rd floor apartment overlooking an 8-lane freeway is at the top of the list with its daytime residual noise level of 77 dB(A). **The rural farm is next to the bottom of the list with its daytime residual noise level of 33 dB(A)**. This difference of 44 dB in the residual noise levels of these two locations constitutes a large range in noise climate. Its magnitude clearly implies that all citizens do not enjoy the same "quality" in their noise environment. In fact, the owner of the 3rd floor apartment near the freeway has trouble keeping the apartment rented for more than a month to any one tenant. His problem is not surprising since the outdoor noise level is sufficiently high to render normal speech communication difficult indoors even when the windows are closed.

(emphasis added)

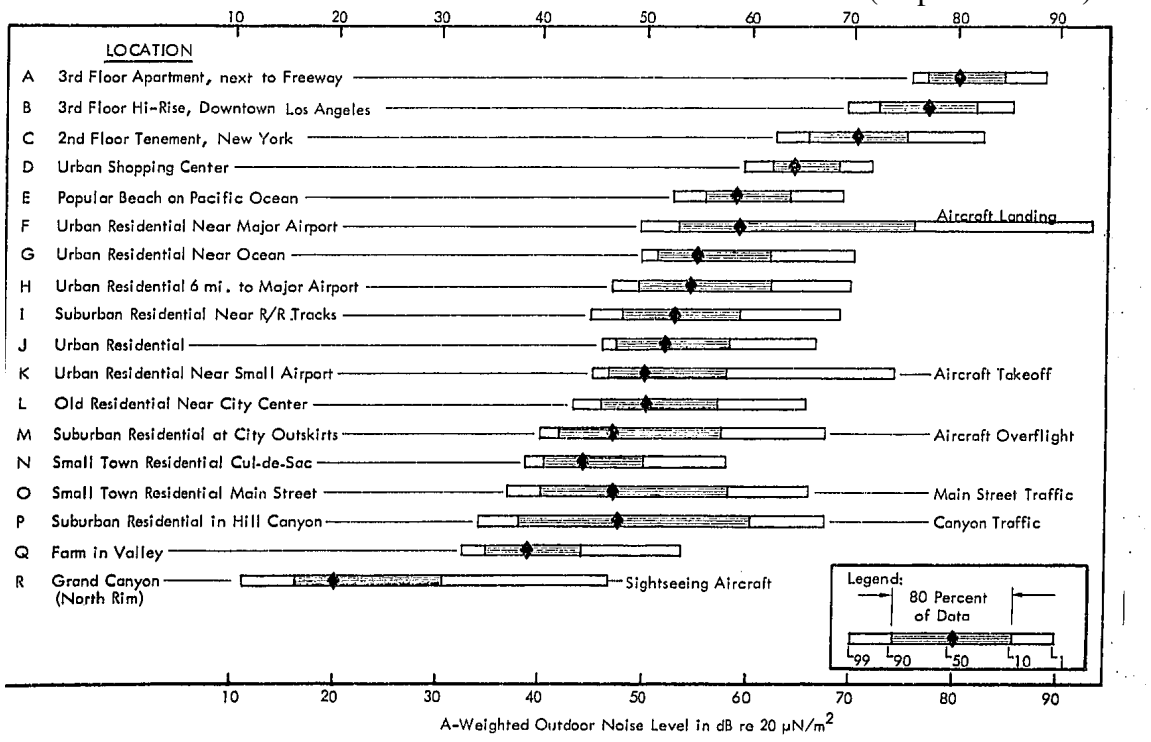


Fig 7 of EPA Report

From the noise table above we see clearly that a daytime 50 dB(A) ambient level is aligned with urban areas near airports, railroad tracks or city centers. The Cohocton law and Bagdon report would allow affected properties to become as noisy as urban settings. Night time levels are considerably lower in rural areas as shown in the EPA Fig 9 table below 37 dB(A) more than 90% of the night and below 30 dB(A) for 10% of the night. The Cochocton law is not at all consistent with any EPA data.

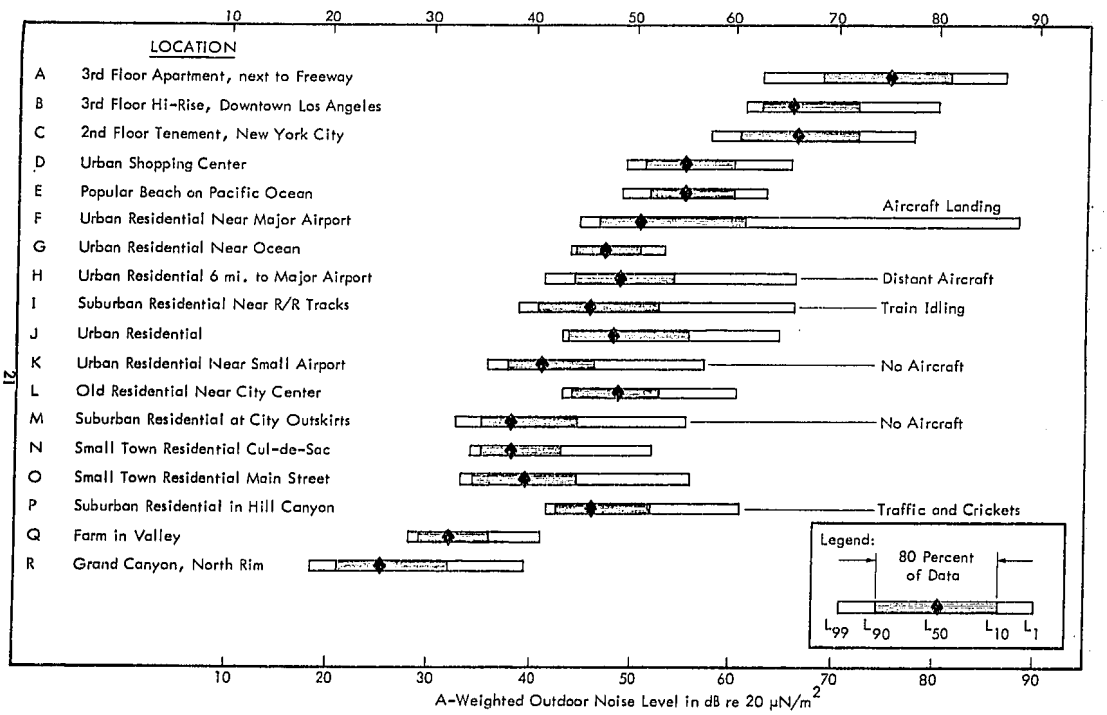


Figure 9. Nighttime Outdoor Noise Levels Found in 18 Locations Ranging Between the Wilderness and the Downtown City, with Significant Intruding Sources Noted. Data are Arithmetic Averages of the 9 Hourly Values in the Nighttime Period (10:00 p.m. – 7:00 a.m.) of the Levels Which are Exceeded 99, 90, 50, 10 and 1 Percent of the Time

2.4 Noise Discussion

There are many well known significant environmental issues customarily associated with large wind turbines: blade impact bird injuries, safety from wind turbine mechanical failures, safety from blade ice throw, safety from lightning induced fires, electrical ground faults, local power grid fluctuation, real estate values, noise, aesthetics, habitat loss and others. Each environmental effect can be a complicated evaluation due to the massive size of wind turbines, the large number of possible sites and the widespread locations throughout the township.

One of the more important environmental aspects is noise pollution. Although improved over past turbines today's megawatt scale industrial wind turbines will produce broadband noises over 100 dB(A) according to all manufacturer's specifications that have been checked (Gamesa, GE, Liberty and others). Noise must be adequately analyzed since turbine setback and siting criteria are highly dependent on noise levels. Although the NYS DEC Noise Policy (Ref. 2) is not a legal policy-adhering requirement for Lead Agencies outside the DEC all agencies must nevertheless adhere to the environmental review requirements of SEQR and demonstrate a thorough evaluation of noise. Many agencies and sponsors choose to follow the Noise Policy because it is already exists, is detailed, comprehensive and approved by the DEC.

The Cohocton Law however specifies a dB(A) noise figure at turbine property lines not a requirement for any adherence to Noise Policy or other comprehensive evaluation plan. Any wind farm allowed through this zoning amendment will refer in its SEQR EIS to

town law noise requirements. And UPC Wind's "Wind Farm Cohocton" has indeed done this in the Draft EIS an attempt to corroborate the "correctness" of its noise analysis to conformance to Town Law. Every other wind farm's EIS proposed in NY has consistently referred to local windmill ordinances for environmental compliance with noise. Yet **none** of those town laws that have been checked, also like Cohocton, have any supporting environmental review to justify the noise criteria.

The correct measurement and assessment of the complex noise potential of a large wind turbine farm project is a vital part of the environmental review and mitigation process and there are specific instructions in the Policy about excessive noise:

> When a sound level evaluation indicates that receptors **may experience sound levels or characteristics that produce significant noise impacts or impairment of property use**, the Department is to require the permittee or applicant to **employ reasonable and necessary measures to either eliminate or mitigate adverse noise effects**.

The DEC Noise Policy suggests a 3 dB(A) increase over ambient for "sensitive receptors" and a generally applicable limit of 6 dB(A) increase as acceptable under most circumstances. Therefore the computer modeling of noise contours around each turbine depends exclusively on obtaining reliable ambient background noise data. Inaccurate noise contours and inaccurate background noise limits will lead to serious errors in delineating setback requirements for turbine siting. The relatively simple mathematics of sound assessment is shown in the graph, Fig. 1 below.

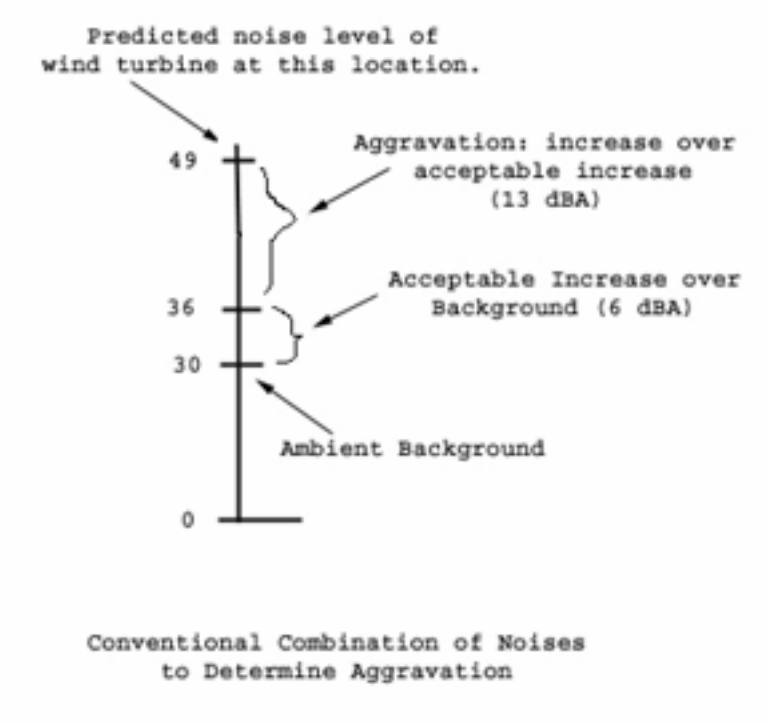


Fig. 1: Noise Aggravation Mathematics

3.0 Associated Noise Studies from other Regions and Agencies

In the study of complex phenomena or in the manufacture of electrically operated equipment it is common for analysts and manufacturers to use information, studies and standards developed in other countries as a guide. The beneficial sharing builds the knowledge base, prevents undesirable effects and enhances public comfort and safety.

For example with consumer electrical equipment it will often bear a Underwriter's Laboratory (UL) label certification of design and manufacturing safety for U.S. products and also a Canadian Standard's Association (CSA) certification for products sold in Canada since the electrical supply is identical, though the safety measurements and standards are slightly different.

Likewise for wind turbine noise, the noise emanations are similar, turbines are manufactured internationally, and noise measurement methods and reporting units are identical. It is therefore useful to assess other analysis' to survey their conclusions and rationale.

Several other reports identify rural, country ambient sounds as about 30 dB(A), or frequently quieter, and that quieter noise levels in the 30 dB(A) range should be used as opposed to urban environments that frequently allow 50 dB(A) limits. For example, wind turbines in Europe are more widely established and noise studies there indicate that in terrain similar to many areas of Cohocton, low noise backgrounds are to be expected, that the wind turbines noises are therefore much more objectionable, and that setbacks up to 1 mile or more, are needed.

3.1 Canadian Requirements

The Ontario Canada Ministry of the Environment has evaluated noise requirement for siting of wind turbines in Ontario Canada (Ref. 3). They publish a graph for various environments with a weighted increase for increasing winds. See Fig. 6 below. The project sponsor identifies predicted noise emissions at a location and compares it with the values in the graph to flag nonconformance. For rural settings the noise limit is 40 dB(A) over a range of turbine speeds rising to 53 dB(A) in higher winds. Using Cohocton's proposed 50 dB(A) would clearly be well beyond the acceptability of Ontario province except in the highest wind conditions (9.5 m/s or higher).

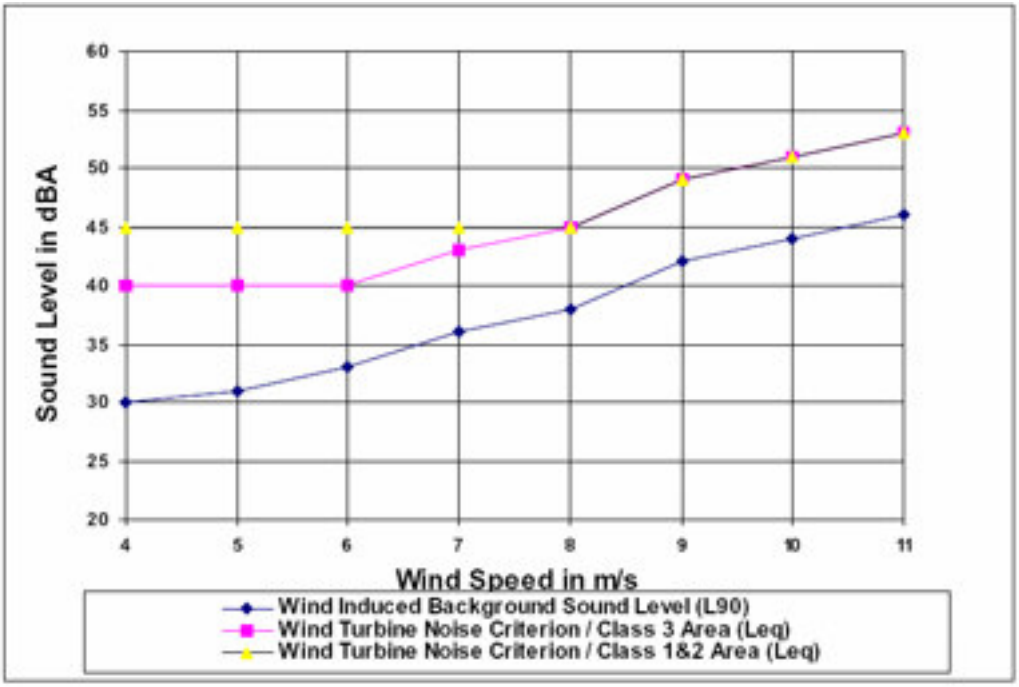
3.2 United Kingdom

The UK Noise Association has extensively studied turbine noise issues. From *Location, Location, Location, An investigation into wind farms and noise by the Noise Association,* by John Stewart (Ref. 4):

> Wind Farm Noise – the impact on areas of low background noise
>
> Mid Wales -a land of hills and valleys. A place where the wind blows frequently and the

population tends to be thinly spread. Ideal for wind farms. And, not surprisingly, many are planned. **The best place very often for the turbines to catch the wind is close to the top of a hill**. It means that the wind turbines can be at their most productive. But it also means that the **noise may cascade down the surrounding valleys**. To makes matters worse, many of the scattered hamlets within the valleys snuggle into corners protected by the hills and the mountains where the background noise level is very low indeed. **You only need to visit these areas to hear the 'swish, swish, swish' of the turbines – particularly downwind – over a mile away from the wind farm.**

(emphasis added)



"Class 3 Area" means a rural area with an acoustical environment that is dominated by natural sounds having little or no road traffic, such as the following:

i. a small community with less than 1000 population;
ii. agricultural area;
iii. a rural recreational area such as a cottage or a resort area; or a wilderness area.

Fig 2: Ontario Canada Turbine Noise Acceptance Chart

The description of Mid Wales above describes much of the scenic Cohocton.. The prevailing (urban) UK national guidelines for noise limits are (from Stewart)

- Daytime noise levels outside the properties nearest the turbines should not exceed 35-40 dB(A) or 5 dB(A) above the prevailing background, whichever is the greater.
- Night noise limits outside the nearest property should not exceed 43 dB(A) or 5 dB(A) above the prevailing background, whichever is the greater.

But in areas like Mid Wales, the guidelines are deemed by the UK Noise Association to give noise levels too high. Likewise, a lower noise threshold in the 35 dB(A) range is to be anticipated. The DEC Noise Policy gives acceptable noise levels about 6 dB(A) higher than the prevailing background. The background must be accurately measured however.

Further corroboration pertaining to Scotland siting comes from Dick Bowdler, "a noise and acoustic consultant for more than 30 years and most of my current work is dealing with the assessment of environmental noise as it affects residential properties. I work equally for those potentially creating noise and those affected by it. I have been a supporter of wind energy and other forms of renewable energy for some 35 years. " (Ref. 5) Continuing, he says:

> In practice, in most rural areas, my rule of thumb is that the nearest turbine needs to be at least 1¼ miles from any house. However, these are areas where the background noise level can be 20dBA at night. You suggest that your background noise level could be 30-32dB. This seems a likely figure if you have 350 houses in the area, though I suspect it could be a bit lower than this. On this basis, noise from the wind farm should not exceed 35dBA. **If the developers are suggesting that 55 decibels is acceptable, this is quite outrageous. 55dBA is more than four times as loud as your background noise.**
>
> Most of the Scottish wind farms that have recently been approved have no housing closer than about 1 mile, except where the house belongs to the landowner of the wind farm site. There are a few applications with houses as close as about 2000 feet but these have all either been turned down or withdrawn by the developer.
>
> I am not familiar with the GE turbines, but I suspect that they have a sound power level of about 105dBA. In this case, the noise level would be between 45 and 50dBA at 1400 feet in neutral weather conditions and if the nearest turbines were in full view. (emphasis added)

3.3 Sweden

The Swedish Environmental Protection Agency (SEPA) published a report "Noise Annoyance from Wind Turbines – a review" (Ref. 6). This report "reviews the present knowledge on perception and annoyance of noise from wind turbines in residential areas as well as in recreational areas."

The study relates information useful for two criteria: perception and objection. Each receptor location, turbine location, vegetation and terrain may have a marked impact on turbine noise perception. This is particularly important in geographies having many undulating hills. From the study:

> Topographical conditions at site have importance for the degrees to which the noises from wind turbines are masked by the wind. **Dwellings that are positioned within deep valleys or are sheltered from the wind in other ways may be exposed to low levels of background noise, even though the wind is strong at the position of the wind turbine** [Hayes 1996]. The noise from the turbine may on these conditions be perceived at lower sound pressure levels than expected. Current recommendation state that measures and sound propagation calculations should be based on a wind speed of 8 m/s at 10 meter above the ground, down wind conditions, creating a "worst case" scenario. This recommendation does not consider the case described above.
>
> (emphasis added)

Also the objection to noise was categorized by a well composed, statistically valid survey of a variety of residents near a moderate-power (600 KW/unit) wind turbine installation. The study setup parameters are given below, followed by Fig. 3, a "chart of annoyance" from the report summarizing the results.

The Swedish study was performed in Laholm during May-June 2000. The areas chosen comprised in total 16 wind turbines thereof 14 had a power of 600 kW. The study base comprised one randomly selected subject between the ages of 18 and 75 in each household living within a calculated wind turbine sound pressure level of 25 to 40 dBA (n=518).
The annoyance was measured using a questionnaire. The purpose of the study was masked and among questions on living conditions in the countryside, questions directly related to wind turbines were included. Annoyance from several outdoor sources was asked for regarding the degree of annoyance both outdoor and indoor. Annoyance was measured with a 5-graded verbal scale ranging from "do not notice" to "very annoyed". The same scale was used for measuring annoyance from wind turbines specifically (noise, shadows, reflections, changed view and psycho-acoustical characters). The respondents' attitude of the impact of wind turbines on the landscape scenery and the attitude to wind power in general were also measured with a 5-graded verbal scale, ranging from "very positive" to "very negative". Questions regarding living conditions, health, sensitivity to noise and employment were also included. A total of 356 respondents answered the questionnaire, which gave a total response-rate of 69%.
For each respondent calculated A-weighted sound pressure level as well as distance and direction to the nearest wind turbine were obtained. Sound pressure levels (dBA) were calculated at 2.5-decibel intervals for each household. The calculations were done in accordance with [Naturvårdsveket 2001] and reflect downwind conditions. Data of distance between the dwelling of the respondent and the nearest wind turbine, as well as the direction, was obtained from maps.
The correlation between noise annoyance from wind turbines and sound pressure level was statistically significant (r_s=0.399; n=341; $p<0.001$). **The annoyance increased with increasing sound pressure level at sound pressure levels exceeding 35 dBA**. No respondent stated them selves very annoyed at sound pressure levels below 32.5 dBA (Fig. 1). **At sound pressure levels in the range of 37.5 to 40.0 dBA, 20% were very annoyed and above 40 dBA 36%.** The confidence intervals were though wide; see Figure 1.

(emphasis added)

Note that about 40% of the participants find turbine sounds above 40 dBA "very objectionable". Even 32.5-35 dBA are "very objectionable" to 10 % of respondents. This study should serve as a direct warning that residents will strongly object to wind farms sited according to the Local Law #2. After turbine farms are operational, with finality and permanence, resident "receptors" will have no recourse for any mitigation other than to physically move away. What price will they receive for their real estate when prospective buyers find that the seller is moving because they can't stand the noise?

Also of interest from the Swedish EPA study are comments relating to wilderness areas, pertaining to much of Cohocton..

"3.3 Perception of noise from wind turbines in wilderness recreational areas

The special soundscape of wilderness recreational areas has been described by a number of authors, e.g. [Miller 2001, Dickinson 2002]. **The soundscape differs from site to site and can be very quiet in remote areas, especially when vegetation is sparse** (as in the Swedish bare mountain region). In a comparison between different outdoor settings in USA, it was found that the sound pressure level in a suburban area at nighttime was above 40 **dBA**, along a river in Grand Canyon 30-40 dBA and **at a remote trail in the same park 10-20 dBA** [Miller, 2002]. **The effect of intruding sound should be judged in relation to the natural ambient soundscape. The sound pressure level of the intruding sound must be compared to the sound pressure levels of the background noise**. The durability of audibility is another variable of importance for understanding visitors' reactions to noise [Miller 2001].

No studies on noise from wind turbines in wilderness areas have to my knowledge been carried out, but the effect of noise from other sources has been discussed in a few articles. A larger study on noise

annoyance from aircraft over-flights on wilderness recreationists was performed in three wilderness areas in USA [Fidell et al 1996]. (emphasis added)

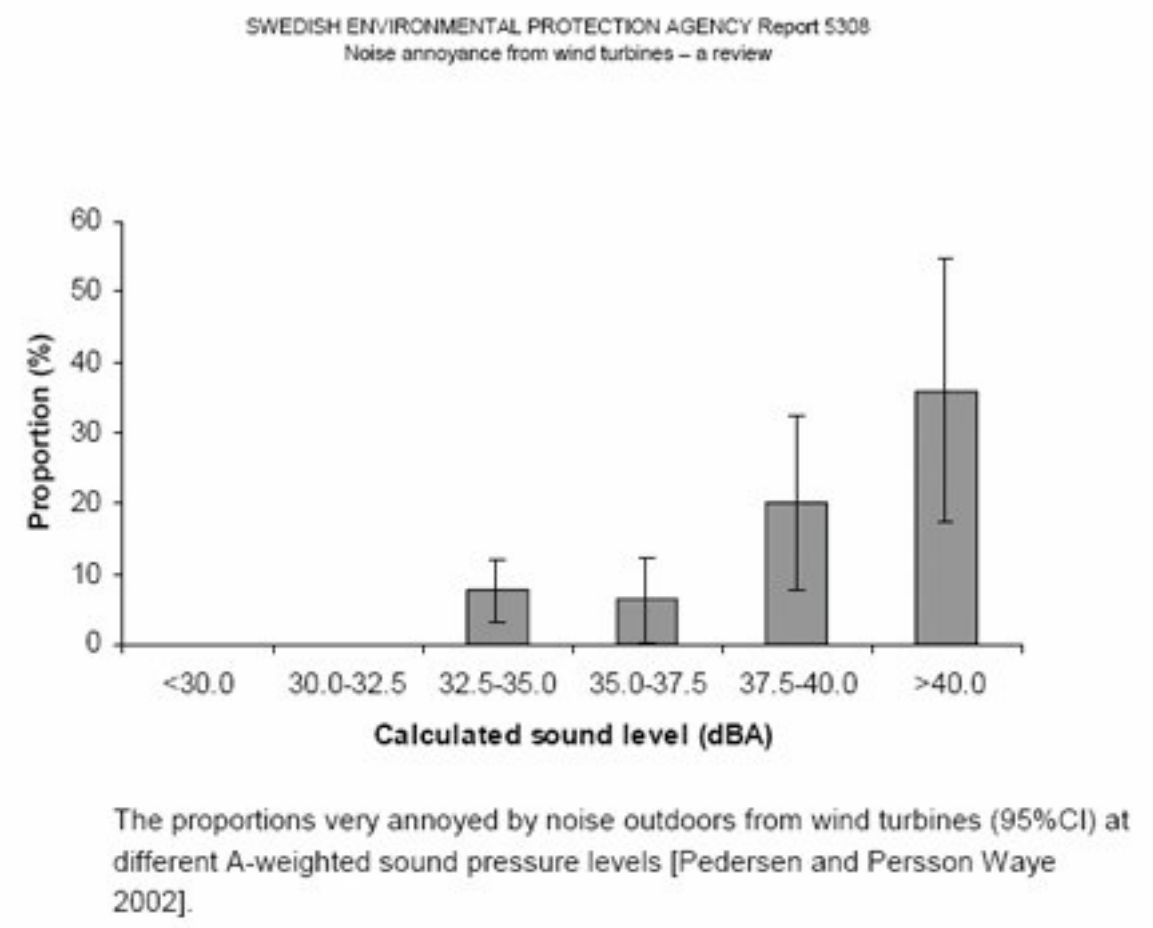


Fig.3: Chart of Very Annoyed Respondents

3.4 NASA

Noises carry greater distances from elevated noise sources like wind turbines and this has been reported by NASA in a study *Wind Turbine Acoustics* by Hubbard and Shepherd (Ref. 7) From the Introduction:

> Wind turbine generators… are producing electricity both singly and in wind power stations that encompass hundreds of machines. Many installations are in uninhabited areas far from established residences, and therefore there are no apparent environmental impacts in terms of noise. There is, however, **the potential for situations in which the radiated noise can be heard by residents of adjacent neighborhoods, particularly those neighborhoods with low ambient noise levels**. … (emphasis added)

This report contains detailed noise analyses of various wind turbine styles – upwind rotors vs. downwind rotors, blade shape, rotational speed etc. And it includes a detailed sound propagation analysis. Sound "bends" (refracts) in the atmosphere much like light refracts in striking a lens. A graph of the effect, from the report, is shown in Fig. 4 below.

The "Shadow" zone in the figure may explain the observed "quietness" experienced by observers when taken to stand near wind farm turbines such as the Fenner wind farm. The noises are masked unless the observer is 4x the tower height distance. And it underscores the necessity of comprehensive and accurate engineering studies of complex phenomena. Merely relying on anecdotal "I don't hear anything" knee jerk responses to a turbine visit is misleading and hardly equivalent to living year round as a "receptor".

Recall from the Mid Wales description above that turbine sounds carry one mile. This is shown in the NASA study as well, Fig. 5 below, for a single "point source" turbine. The sounds carry further for a "line" of turbines and many wind farms do have linear clusters of turbines along a hill ridge making the situation 6 dB worse.

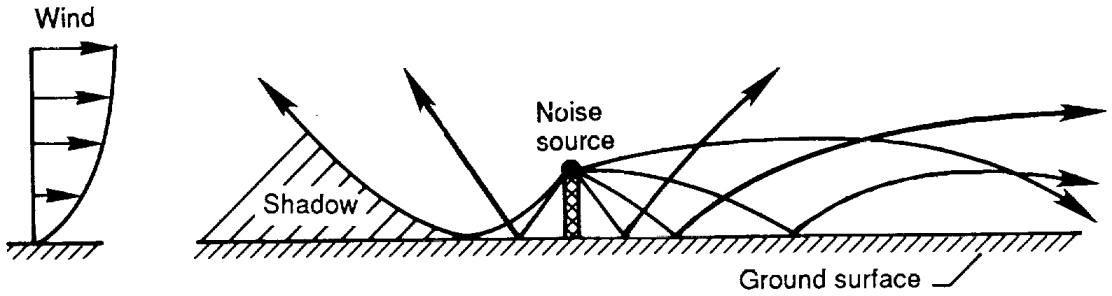


Figure 7-20. Effects of wind-induced refraction on acoustic rays radiating from an elevated point source [Shepherd and Hubbard 1985]

Fig 4: Sound Refraction Effects (NASA Fig 7-20)

From Fig. 5 it can be seen that the sound drops about 30 dB (for 1000 Hz, the most sensitive to human hearing) at 1,000 meters (about 3,000 ft). For example the Gamesa wind turbine spec sheet lists about a 100 dBA noise level at the turbine (Ref. 8) and therefore at 3,000 ft the noise is 100 - 30 = 70 dB. At one mile (5280 ft = 1609 meter) the chart, which has a logarithmic scale, gives about a 60 dB drop, or 40 dB remaining (100 - 60 = 40). The 40 dB figure is about what the Europeans use for their noise boundary, with a 1 mile setback too. Notice that for low-frequency sounds, such as the blade-support tower induced "whosh" (250 Hz on the graph), that the sound carries much further, out to 2 miles.

To confirm the reasonableness of the NASA report one can look again at the DEC Noise Policy (Table C, "Projected Noise Levels") and find for example a Hitachi earth moving shovel starting at 92 dBA then falling to 56.5 dBA at 3,000 ft, a decline of 35 dBA. Looking at Fig. 5 again we find a 35 dB drop at 1,000 m (3,000 ft), in good agreement. Therefore we can easily conclude that reasonable setbacks for wind turbines should be in the neighborhood of 1 mile, far greater than the setbacks that will result from adherence to Town Law #2.

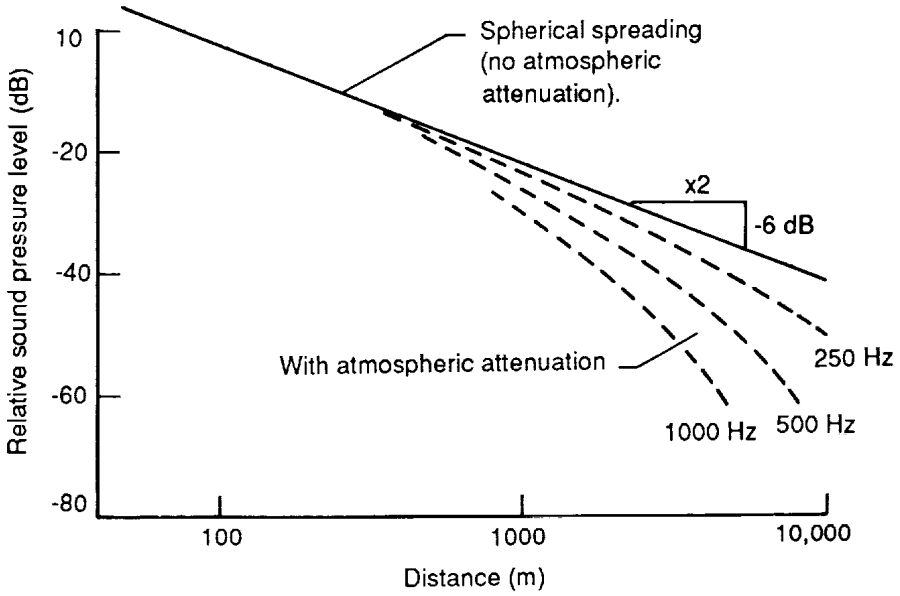


Figure 7-18. Decrease in sound pressure levels of pure tones as a function of distance from a point source [ANSI 1978]

Fig. 5: From NASA "Wind Turbine Acoustics" (Ref 7)

3.5 W.H.O. Sound Levels for Night Sleeping

The World Health Organization (Ref. 9) has begun conducting comprehensive analysis of the health impairment due to night time noises and disturbance to sleep. Though targeting the effects from aircraft and highway noises the conclusions can be associated with wind turbines since those studies are as yet not started.

The W.H.O. conclusions to date should serve as a guide and warning. Sleep disturbances may occur with 42 dB(A) night time noise levels and if high enough chronic sleep disturbance is known to cause health changes.

Conclusions:

8. **There was unanimous agreement that disturbed sleep had serious health** effects – solid evidence existed in sleep medicine, the insomnia model would be used as a proxy and its causes and effects described on the final document.

9. The analysis of the evidence suggested **that Lnight outdoor>42 dB(A) induced sleep disturbances.**

18. The NOAEL for Myocardial Infarction was Lday = 60–65 dB outdoors **and Lnight**

outdoors = 50 – 55 dB for road traffic**.** (see footnote 1)[1]

(emphasis added)

4.0 Conclusion

A graph summarizing the results is in Fig 6 below and clearly shows the need for changing the noise criteria for Town Law #2 to prevent noise pollution. As can be seen Law #2 is well above the W.H.O. minimum guidelines, and the DEC's recommended "ambient + 6 dBA" for most of Cohocton. Notice on the graph too that sources of noise (NASA and DEC) will propagate to over 1 mile before attenuating sufficiently, in stark contrast to the highly erroneous computer prediction given with by Wind Farm Cohocton in their DEIS.

All industrial scale wind turbines "farms" may cause significant noise and megawatt scale turbines are large, heavy, and have noise emissions approaching a jet engine. These projects easily have the potential of creating a large "noise footprint" on the entire Town. An accurate and comprehensive noise analysis is essential but clearly there is no supporting analysis showing how the Local Law #2 noise figure was derived nor that it has any bearing whatsoever on a realistic numerical definition, nor that a numerical definition should be adopted. From the DEC's Noise Policy:

> In circumstances where noise effects cannot readily be reduced to a level of no significance by project design or operational features in the application, the applicant **must evaluate alternatives and mitigation measures in an environmental impact statement to avoid or reduce impacts to the maximum extent practicable** per the requirements of the State Environmental Quality Review Act.

Rather, it is clear from reviewing noise requirements and analysis of a variety of other sources that the noise limit criterion in Law #2 is far too high for a town like Cohocton and should not be specific. How does an affected resident enforce this law? Once turbines are sited and operational the noise can not be mitigated. Is anyone to believe that a violation of this town law, due to noise measurement, will force the permanent closure of the wind turbine? No mitigation is possible after turbines are operational.

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[1] As the report discusses there is an association between long term noise exposure and heart attack (myocardial infrarction or MI):

> **Sufficient evidence existed for an association between community noise and ischaemic heart diseases;** limited/sufficient evidence existed for an association between community noise and hypertension. Most information came from road traffic noise studies but there was normally little information regarding night noise in particular. But **night time values could be extrapolated from day time results.**
> Below 60 dB(A) for Lday there was no noticeable increase in MI risk to be detected. Therefore for the time-being, Lday = 60 dB(A) could be set as the NOAEL ("no observed adverse effect level") for road traffic noise and myocardial infarction (Babisch, 2002). For noise levels greater than 60 dB(A), the MI risk increased continuously, and was greater than 1.2 for noise levels of 70 dB(A).
> *Discussion*
> **Normally CVD effects manifested themselves after 10 years living in a noisy area**.
>
> (emphasis added)

Prior to enacting this law the Town Board must seek an impartial and justifiable noise analysis to establish any noise criterion and include reasonable recourse to affected residents if violations are expected **prior** to construction.

Richard H. Bolton , CV in Appendix 1

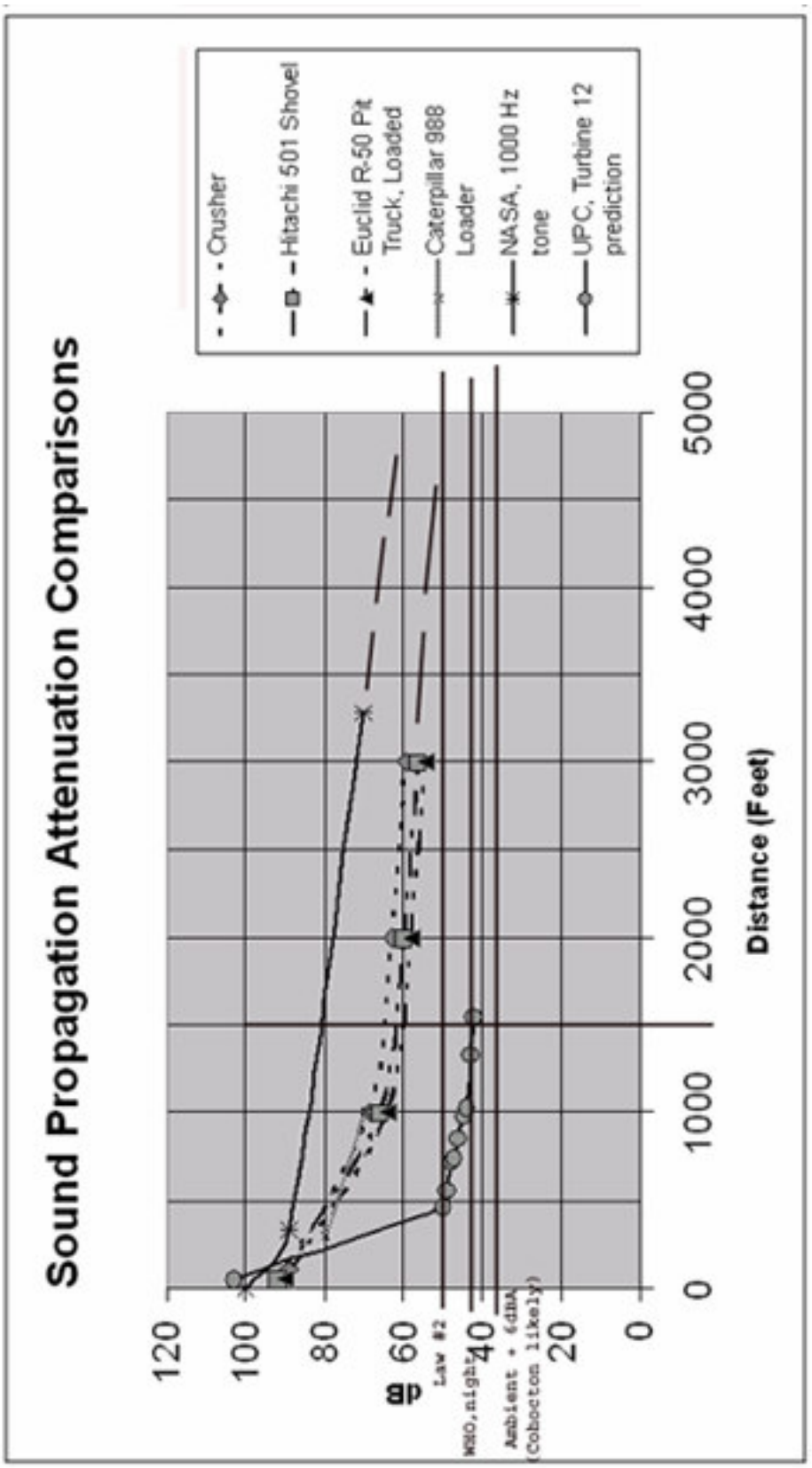

Fig 6: Graph of Sound Propagation Comparisons

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Appendix 1

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I graduated from the University of Rochester in 1975 with a B.S. in Physics and subsequently took graduate courses in optics there.

From 1975 to my retirement in 1998 I was a Project Engineer at Eastman Kodak and receive 5 US Patents. Always working in new product research, engineering and development I was often involved in "due diligence" engineering analysis for new product proposals throughout the corporation. This involved considerations of manufacturability, reliability, ergonomics, customer acceptance, and design methodology. My work was cross-disciplinary because of my physics background and my exposure within Kodak to many other scientists and engineers. I often worked in engineering disciplines of optical design, mechanical design, systems design, and product software.

From 1976 to 1986 I had the position of Adjunct Faculty, Rochester Institute of Technology, Physics Laboratory.

From 2005 to present I have been a Technician at Hobart and William Smith Colleges' Physics Department, where I am responsible for laboratory setup, physics equipment parts manufacture, and devising new demonstrations.

I am President of Bare Hill Software Company that develops engineering software for Macintosh and Microsoft personal computers. In that capacity I served as consultant engineer to Eastman Kodak, Corning Glass, and Xerox on various equipment projects.

I am President of the Environmental Compliance Alliance founded to promote public and government agency awareness of New York State and Federal environmental regulations, and promoting agency compliance with those regulations.

In my professional experience I have learned to examine and analyze technical reports, especially with regard to methodological, technical and statistical errors. I recently consulted on a wind turbine project slated for Clinton County in upstate NY. My noise analysis is being used in a proceeding there.

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