**Environmental, Health, and Economic Impacts of the Terra-Gen Proposal for an Industrial Wind Facility in the Town of Prattsburgh, NY**

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 **Commissioned by Prattsburgh Preservation Alliance, Inc.**

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 **Executive Summary**

Early in 2017, the Town Board of Prattsburgh, NY updated their Comprehensive Plan “designed to provide municipal officials and residents with direction and guidance as our community looks to the future.” The stated Goals for the plan included preservation and protection of the rural way of life. In the town-wide survey during the preparation of the Comprehensive Plan, residents said that “peace and quiet” was the most-desired attribute of the area and that “rural atmosphere” was the number one attribute for preservation. Residents also said that the possibility of Industrial Wind Development was the development of their highest concern.

That the current Town Board is working hand in glove and behind the scenes with an industrial wind developer is a resounding rejection of the deeply held values of the residents. The industrial wind turbines being proposed, among the largest ever built with an overall height of 695 feet, will destroy the rural character, peace, and quiet of Prattsburgh for decades to come. Unfortunately, the negative impacts cannot be confined within the borders of the Town. All neighboring Towns will be impacted. These Towns include Italy, Jerusalem, Pulteney, Urbana, Bath, Wheeler, Avoca, Howard, Fremont, Dansville, Cohocton, Wayland, and the Town and Village of Naples.

Industrial wind turbines, unlike most other industrial structures, have very limited useful lives. While a manufacturing and assembly plant may operate for more than a hundred years, industrial wind turbines typically fail in less than twenty years. When the proposed Prattsburgh project fails in 2035 or sooner it must be decommissioned at an estimated cost of $80M. Since the wind developers refuse to pay even one dollar for decommissioning it will be up to the town and/or state taxpayers to cover these costs. For a town like Prattsburgh, with an annual budget of less than $1M, decommissioning may never occur and the 70 story turbines will gradually collapse over another 15 years. It is difficult to predict how many residents would remain in the town by that time, but it is most likely that the only people who stayed did not have the resources to relocate.

In early 2016 the NYS Public Service Commission (PSC) revealed its plans for the implementation of Governor Andrew Cuomo’s Clean Energy Standard (CES). The CES called for 50% of the state’s electricity usage to come from “renewable sources” by 2030. The most important renewal generation in the state currently is hydroelectricity from Niagara Falls and the Eisenhower Locks. Both of these facilities have significant upside capacity and currently provide 19% of our overall electricity consumption. However, the PSC redefined “renewable” to include only wind and solar and they mandated that the 40% of wind would be sited upstate while the 10% of solar would be downstate. Unfortunately the PSC either didn’t know or didn’t care that the electrical grid system cannot absorb or transmit the incremental wind energy from upstate to downstate. In other words, the thousands of turbines planned for upstate will intermittently generate electricity but none of it will be used. It appears that the Governor is counting “nameplate capacity” for his Clean Energy Standard not actual generation. Even if we had more transmission capability, upstate wind turbines only produce at ten to fifteen percent of nameplate capacity on an annual basis. So the CES cannot possibly be achieved by siting turbines in upstate.

For more than twenty years, residents in the vicinity of windfarms have been reporting negative impacts, including a variety of health and quality of life symptoms. These include tinnitus, dizziness, vertigo, nausea, tachycardia, irritability, problems with concentration and memory, panic episodes, and internal pulsing and quivering. The severity of symptoms varied depending on the turbine setback, the total number of turbines, and the nameplate capacities. In general, when residents moved to safer setbacks, (typically more than 2.5 miles from turbines), the symptoms quickly dissipated. However, within the past ten years there have been numerous medical studies focused on longer-term human exposure to low frequency noise (LFN) from turbines. In addition there have been several lab studies using human cells and laboratory animals. The conclusions from all of these studies are that LFN exposure over a number of years produces the same negative outcomes as Vibroacoustic Disease (VAD), which had been found in industrial noise exposure 50 years ago. VAD causes direct and permanent tissue, organ, and system damage. Examples of VAD damage are cognitive impairment, changes on cardiac/arterial structures, malignancies (cancer), cardiovascular-like disease, hearing impairments, adverse birth outcomes, and death.

Should the project actually be built there are some benefits that will accrue to the Town. Over 15 years of operation the sum of all leases, Host Agreement, Scholarships, and miscellaneous payments will total **$7,965,000**.

Over that same time period, the loss of property values in Prattsburgh and the surrounding towns, the increased morbidity and mortality rates, and the cost of decommissioning and remediation reach a grand total of **$426,500,000.** For every $1,000 of benefit there is $53,400 of cost. We are hopeful that at some point the Board will conduct the legally required “hard look and due diligence” and conclude that the negative project impacts far outweigh the rather paltry benefits offered by the wind developer.

**Section A – Town of Prattsburgh Comprehensive Plan – Excerpts (pages 5, 6)/Comments**

“The Town Comprehensive Plan is designed to provide municipal officials with direction and guidance as our community looks to the future. It will ensure that **Prattsburgh retains its rural atmosphere**, and enable that:

* Development happens in a planned and orderly manner without sprawl.
* Landowners are encouraged to maintain open space and farmland.
* Environment-friendly business and industry are assisted.
* Historic assets are restored and preserved.
* Our agricultural base is supported and encouraged.
* The air, water, and land are not despoiled.”

 **“Our Vision: A Rural Way of Life”**

 According to the results of a community survey, Prattsburgh residents and property owners want to hold on to “a rural way of life”.

 **Goals of the** **Comprehensive Plan:**

* Protect the rural way of life for Prattsburgh residents and their families.
* Provide a safe and healthy environment in which to live, work, and raise a family.
* Protect the right to use and enjoy property while respecting the rights of neighbors.
* Encourage the preservation and/or restoration of historical assets.
* Encourage landowners to retain open space and farmland, and discourage sprawl.
* Encourage the development of clean industry that benefits our community, both economically and environmentally.

 Additional pertinent comments (page 13)

* “Peace and quiet” was ranked the #1 most-liked attribute of the area.
* “Rural atmosphere” was ranked the #1 thing people would like to stay the same.

 Additional concerns, Industrial Development ((page 24)

* Industrial Wind Development was the #1 industry of immediate concern by survey respondents.

Town of Prattsburgh, Current Landscape

The only section of the Town with a concentration of buildings is the business district on Main St. near the Town Park with a post office, grocery, gas station, and a number of other retail outlets. Virtually all of the rest of the Town is decidedly rural in nature. This area contains hundreds of single and two story residences and a wide variety of out buildings such as garages, sheds, and storage buildings. There are also a large number of older barns and silos which reflect the Town’s agricultural heritage. All of the structures currently in the Town, including the business district, are quite consistent with the wishes of the residents to protect and preserve the existing rural character and natural quiet. In addition there are no existing buildings in the Town more than 45 feet in height.

In stark contrast to the current quiet and natural beauty, Terra Gen has proposed that they place 28 to 36 immense wind turbines on the highest hills and destroy the natural features and majestic views that residents want to preserve. The turbines Terra Gen has chosen are among the largest in the world and, to date, have never been placed on land, much less in a rural residential area. At 695 feet these turbines would be more than 17 times higher than our existing structures. They would dominate the Finger Lakes view sheds for more than 10 miles from Prattsburgh. It is clearly incumbent upon the Town Board to respect the wishes of the residents and modify town law to establish setbacks from turbines to property lines that reflect the latest medical studies on turbines and human health. As discussed in Section D, safe setbacks for industrial wind turbines are measured in miles, not feet.

**Section B – Turbine Decommissioning and Remediation Fund**

Industrial Wind Turbines have a typical useful lifetime of up to 20 years provided that they are properly maintained. In the case of the Prattsburgh project it is unlikely that they will operate for more than 10 or 15 years as new, cheaper, and less invasive renewables will become available. Therefore a Decommissioning and Remediation Fund must be established prior to the start of construction. There are several existing wind projects scheduled for decommissioning that give us access to cost estimates for turbine decommissioning-:

* Two 1.65 MW units in Falmouth, MA have been idled for a number of years due to unacceptable noise emissions. Each unit will cost $1.25M for removal, recycling, and remediation. Since the cost would be proportional to nameplate capacity, the Falmouth experience tells us that the decommissioning costs for the Prattsburgh units would be: 5.4/1.65 X $1.25M = = $4.0M X 36 units = $144M. This means that a Fund with a balance of $144,000,000 might be sufficient to decommission the Prattsburgh project.
* Palmer’s Creek in MN has 18 2.5 MW units with a projected removal cost of $410,000 per unit. Converting that cost to the 5.4 MW: 5.4/2.5 X $410k = $885,600 per unit. $885,600k X 36 units = $31,881,600 or about $32M.

If we assume that Falmouth has over-estimated the cost and that Palmer’s Creek has under-estimated, it may be appropriate to choose a middle ground and recommend that Prattsburgh require Terra Gen to contribute $88M to an escrow account overseen by SCIDA for future decommissioning and remediation. As more information about actual decommissioning costs for 5.4 MW units becomes available the funds in escrow must be adjusted appropriately.

**Section C – Variable Generation, Electrical Grid Issues, and Transmission Capacity**

In the spring of 2016 The NYS Public Service Commission (PSC) issued a proposal regarding its implementation of a Large-Scale Renewable Program and a Clean Energy Standard (CES). The CES called for 50% of New York’s energy to be supplied by renewable sources by 2030, 40% from wind, and 10% from solar; and that the wind turbines were to be sited upstate while the solar panels would be downstate. (This was in violation of the legislative intent of Article 10 which was to site all new generation close to the load center (metropolitan New York City.)

On July 8, 2016 James H. Sweeney, Attorney, New York Independent System Operator, Inc. sent a 14 page letter to the PSC. This letter outlined two significant problems with the PSC proposal to site thousands of industrial wind turbines in Upstate.

* The first issue involves the necessity to maintain the stability of the electrical grid by assuring that electricity generation will always equal electricity usage or “demand”. With thousands of wind turbines across hundreds of miles of Upstate it is not possible to maintain grid stability and therefore wind energy production would need to be curtailed or grounded.
* The second issue is that there is zero available transmission capacity. “Curtailment of renewable generation to maintain transmission system reliability would quickly jeopardize achievement of 50% by ‘30 because energy would not be deliverable from upstate renewable sources to downstate load centers.”

Simple logic and sound science tell us that the only practical solution to New York City’s increasing electricity demand is to site new generation in or near New York City. Siting thousands of industrial turbines in Upstate rural recreational areas and destroying the quality of life for tens of thousands of upstate residents will do nothing to achieve the Clean Energy Standard.

**Section D – Low Frequency Noise (LFN) and Health Impacts**

For the last thirty years, across the globe, residents living near industrial windfarms have been raising concerns about the intrusiveness of the turbines in their daily lives. The typical response from wind developers was to blame the complainers as paranoid, super sensitive, or just plain wacky. In 2008, this began to change as the Ontario, Canada Department of Health (ODOH) received hundreds of complaints from residents living near some of the new wind projects north of Lake Erie. ODOL convened a working group of university engineering faculty members from across Ontario and charged them with completing a worldwide medical literature review of the potential linkage between wind turbine operations and human health. This review found extensive and consistent evidence of human health impacts from wind turbines. They named this collection of negative impacts **Wind Turbine Syndrome** or WTS. There were eleven different symptoms of WTS: tinnitus, ear pressure, dizziness, vertigo, nausea, visual blurring, tachycardia, irritability, problems with concentration and memory, panic episodes, and sensations of internal pulsing or quivering.

This cluster of symptoms was well understood by the ODOH as they had seen the same presentations in studies of workers exposed to unsafe levels of industrial noise. They also concluded that WTS would cause sleep deprivation which added significantly greater health risks.

Over the last ten years there have been numerous additional studies on IWT emissions of Low Frequency Noise (LFN) and the negative health issues in nearby residents. And the conclusions are now well past the understanding that the 11 components of Wind Turbine Syndrome are the full story. It is now known that Wind Turbine Syndrome, while a potent source of harm to residents, is only the first level in understanding the hazards from wind turbines. Over the last 10 years additional studies have been completed on residents with much longer exposures (five to fifteen years) to LFN. What the researchers are finding is not merely Wind Turbine Syndrome where the symptoms quickly subside when the resident moves away from the exposure. Rather they are reporting widespread cases of Vibroacoustic Disease (VAD), an illness identified decades ago in industrial settings with significant levels of low frequency noise. It is now understood that the Low Frequency Noise from industrial wind turbines can and will cause VAD in humans after significant long term exposure.

**“Vibroacoustic Disease** is a whole-body, systemic pathology, characterized by the abnormal proliferation of extra-cellular matrices, and caused by excessive exposure to low frequency noise. In both human and animal models, LFN exposure causes thickening of cardiovascular structures, pericardial thickening with no inflammatory process, and in the absence of diastolic dysfunction, is the hallmark of VAD. Depression, increased irritability and aggressiveness, a tendency for isolation, and decreased cognitive skills are all part of the clinical picture of VAD. LFN is a demonstrated genotoxic agent, inducing an increased frequency of sister chromatids in both human and animal models. The occurrence of malignancies among LFN-exposed humans, and of metaplastic and dysplastic appearances in LFN-exposed animals, clearly corroborates the mutagenic outcome of LFN exposure. The inadequacy of currently established legislation regarding noise assessments is a powerful hindrance to scientific advancement. VAD can never be fully recognized as an occupational and environmental pathology unless the agent of the disease – LFN – is acknowledged and properly evaluated**. “**The worldwide suffering of LFN-exposed individuals is staggering and it is unethical to maintain the status quo.”

Low frequency noise from 36 5.4MW Industrial turbines, among the largest ever sited on land, will radiate extremely dangerous low frequency noise across the entire Town of Prattsburgh and also send this deadly radiation into each of the surrounding towns. All of Wheeler will be hit. Nearly all of Cohocton will be hit; more than 50% of Naples Town, 100% of Naples Village, and large portions of Italy, Pulteney, and Urbana will be hit. Also impacted will be Jerusalem, Wayland, Dansville, Fremont, Bath, Avoca, and Howard. Because of prevailing winds some towns will be hit harder than others. Towns situated northwest, west, and southwest of the project will receive the most radiation.

The only way to prevent Wind Turbine Syndrome and Vibroacoustic Disease, short of prohibiting all wind projects in NYS, is to establish setbacks that are beyond the LFN radiation. In the U. S., there are currently 11 municipalities with setbacks of 5,280 ft. to 7,920 ft. 4 other towns are from 4,000 ft. to 5 000 ft. 6 towns are 3,000 ft. or greater. And 13 others are 2,500 ft. to 3,000 ft. In the U.K. the standard is 5,280 ft. and in France it is 4,921 ft. All of these setbacks were for turbines up to 2.5 MW capacity. Since the level of LFN is directly proportional to nameplate capacity, the multiplier to go from a 2.5 MW unit to a 5.4 MW unit is 5.4/2.5 = 2.16. The average of the U.K. and France standards is 5,100 ft. The final step to determine the safe setback for a 5.4 MW unit is 2.16 X 5,100 = 11,016 ft. or 2.09 miles. It is incumbent upon the Town Board to establish a setback that will protect the health and safety of the people of the Town and this setback must carefully consider the 11,000 ft. standard. What the developer wants or needs must not be part of this discussion. Terra – Gen has no standing in Prattsburgh, and it cannot be allowed to void the Town Comprehensive Plan and industrialize this beautiful region of the Finger Lakes..

Prattsburgh Town Board, as a NYS municipal entity, is legally required to safeguard the health, safety, and general welfare of the residents. Given the serious long-term health, environmental, and economic impacts of a 5.4MW project, the Town Board must reject the Terra-Gen proposal in its entirety.

**Section E – Property Values, Assessments, and Tax Rates**

The people of Prattsburgh were very clear and consistent in their survey responses for the 2017 Comprehensive Plan. They said they valued safe and healthy environments for families, preservation and restoration, open space for farms, natural peace and quiet, and a beautiful rural experience. They also said that their number one concern was an industrial wind project. Having seen the failed wind project remaining in Cohocton, they continue to say “no” to industrial wind.

Should this project move forward, all the aspects of life in Prattsburgh that attracted new residents will die away. Prattsburgh and neighboring towns will shift from rural residential to rural industrial. Based on studies at other industrial wind farms we can expect to see property values decrease by 25% to 50%. But because these turbines are more than twice the capacity of any windfarm ever built on land, the decrease here will be significantly more. In fact, some properties may sink to zero. A structure where no one can sleep (when the turbines are running) cannot be called a residence, and will have zero market value.

The 2018 tax roll for Prattsburgh was a grand total of $122,878,970. It may take a few years for the assessments to drop but actual market values will sink immediately. With a 50% loss, the new tax roll is only $61,439,485. Actual tax rates will need to double to make up the difference. This will likely lead to further property value declines as the downward spiral continues until Prattsburgh is a ghost town. It is essential that the Board understands that the loss of property value is a loss in owner equity. The paid off home now worth $150,000 in equity, an important component in retirement planning, could be only $75,000 or less. How can individual homeowners recoup these losses? And who should be held accountable?

**Section F – Quantitative Assessment of 15 Year Project Benefits and Costs**

**Total Project Benefits**

1. Leases: $6,600 X 30 IWTs X 15 years = **$3,015,000**
2. Host Agreement: $250,000 X 15 years = **$3,750,000**
3. Scholarships: $5,000 X 15 years = **$75,000**
4. Miscellaneous: $75,000 X 15 years = **$1,125,000**

 **Total Project Benefits = $7,965,000**

**Total Project Costs**

1. Loss of Prattsburgh Property Values:

 30% X $122,878,970 = **$36,863,691**

1. Loss of Property Values – 14 adjacent towns:

 5% X $1,722,000,000 = **$86,100,000**

1. Cost of Increased Morbidity and Mortality Rates. The first step in quantifying the cost of increased illness and death rates is to determine how many residents live within 4 miles of the project footprint. Using the Terra-Gen “study area” map we estimated the percentage of each town within 4 miles of the project. These were then multiplied by the municipal census populations. The final result was that approximately 13,260 people live within 4 miles of the Prattsburgh industrial wind project. Rates of morbidity (Wind Turbine Syndrome) range from 30% to 70% and vary significantly with distance, nameplate capacity, number of turbines, and prevailing winds. With a highly conservative rate of 25% X (13,260 people) gives us a total of 3,315 people suffering from Wind Turbine Syndrome. With a conservative rate of $50,000 per victim the total cost for increased morbidity is $165,750,000.Our next assumption is that one in ten of the WTS victims will go on to acquire Vibroacoustic Disease (1,326 victims) and that 15% of these will die from the disease (199 fatalities). So the final question is what is the value of a human life? We frequently see in wrongful death cases, particularly when the death was preventable, that a human life is worth millions of dollars (as in the recent Boeing 737 MAX settlements). The wind developer may argue that most of the newly dead people were old, or frail, or very young and that they would be of minimal value, maybe a few thousand dollars at most. Board members should perhaps ask themselves what value they would place on the lives of children, grandchildren, friends, and neighbors. To ensure a very conservative outcome we will assume that a human life in and near Prattsburgh is worth $250,000 for the victims’ survivors. The total cost for 199 additional deaths is therefore, $49,750,000.

**Summary Of Costs and Benefits for Prattsburgh Wind Project**

 **Total Costs = $338,500,000 (plus $88,000,000 decommissioning) = $426,500,000**

 **Total Benefits = $7,965,000**

This **Quantitative Assessment of 15 Year Project Benefits and Costs** used very conservative assumptions throughout and yet concluded that for every $1,000 of benefits there will be $53,400 of costs or losses. Another way to think about this project is that there will be a very small number of people (less than 40) who may benefit and many thousands who will experience staggering losses.

Should Board members have any questions about any portion of this **Report** or the **Reference Materials,** please feel free to contact me.

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