

# THE WAYWARD WIND

## INTRODUCTION

The United States east of the Mississippi River has about five percent of the nation's onshore wind potential. If industrial wind developers achieve their goals, the region will be saturated with approximately 300,000 wind turbines spread over millions of acres. New York, with .3 of one percent of the nation's onshore wind, could be saturated with about 20,000-400 foot tall machines, spread over more than a thousand miles of terrain. Wyoming County alone could absorb around 400, of which 120 have already been proposed. Although most of the country's wind-rich lands are in the upper Midwest, relatively inexpensive access to existing transmission lines makes eastern states such as New York attractive for wind development. Because it is perceived as non-polluting and renewable, wind energy has become popular with the public. While at some level we wish to reduce our reliance on fossil fuels, with their toxic emissions, demand for electricity has nonetheless increased two percent each year since 1975. At this rate, we will likely double current usage in thirty years. But if all these turbines are constructed, what will it mean to ordinary people, to energy policy and to an improved environment? Nearly four years ago, I set out to investigate these questions. In a number of forums, I examined the claims of wind industry developers, their trade organization, the American Wind Energy Association, and the engineers and technocrats within the National Renewable Energy Lab, an agency of the US Department of Energy. I'll share with you this evening how those claims withstand the evidence of real world experience. Indeed, the documentary you just witnessed, *Life Under A Windplant*, was an effort to communicate some of my findings.

Before I speak, I have a few things to say. I make no money from my work on this issue, and neither I nor members of my family own property within view of a windplant. What I say tonight is focused solely on my desire for enlightened public policy. I've lived in Garrett County, MD for nine years, an area much like Wyoming County, with a residential lake district and small towns surrounded by farmland. At first, I'd hoped to support windpower because, as an environmentalist, I have long been concerned about our society's dependence on fossil fuels and such malignant coal mining practices as mountaintop removal. I'm alarmed at such statistics as the number asthma cases in the nation doubling every five years. High levels of mercury contamination in our rivers and oceans are by-products of fossil fuel consumption. However, I seek *effective* solutions for these and other environmental problems. Although I support efforts to reduce demand by living off the grid with small-scale wind and solar power, I'm mindful of the initial costs of doing so, making this kind of enterprise difficult to apply at industrial scale.

As a student of history and science, I wanted to understand the nature of “renewable” energy, and to provide some context for windpower. The quest for renewable energy has a long history. A few hundred years ago, timber seemed inexhaustible, but our demand made short work of the supply. Coal, too, is renewable, but again, our demand will at

some time overrun supply—and our meager lifespan won't extend the tens of millions of years necessary to replenish it. A few generations ago, hydroelectric dams were all the rage. Although these do produce a lot of electricity from a renewable source, they are so environmentally damaging that many are now being dismantled around the country, at taxpayer expense. Because time seems to be running out on fossil fuels and the lure of non-polluting windpower is so seductive, some people are now promoting windpower initiatives at any cost, without investigating potential negative consequences-- and with no apparent knowledge of even recent environmental history.

Scientists are not just experts; they work in an analytic process characterized by rigorously evaluated *if this, then* that experimental “conditionals.” Analysis of this kind seeks predictive power because it considers many variables individually, then works to understand how they integrate to create “regularities”—patterns with a predictable outcome. The predictions of science—and the processes used to achieve them—are then scrutinized by other scientists for validation in a forum known as independent peer review. A particular experiment, however honestly and intelligently conducted, can yield the “wrong” answer for a variety of reasons. This is why experiments must be checked by other scientists, using other instruments, other conditions, even other ideas. This is the essence of the scientific method. Moreover, good public policy requires those who make claims about the safety of their product to substantiate those claims *before* introducing it into the environment, what Rachel Carson called the precautionary principle. Sponsored research is always suspect. Experts who work for an industry should submit their research and resulting conclusions for independent, peer-reviewed analysis. Science insists upon conclusions accounting for all the evidence, not selective pieces that fit the convenience of anyone's economic or ideological agenda.

Please keep these ideas in mind throughout this discussion. Wind developers and their supporters make a number of claims for wind facilities, stating they lessen dependence on foreign oil; improve air quality; reduce global warming by replacing fossil-fueled power plants; and improve public health; while providing electrical power for many thousands of homes and adding significant revenues and jobs to local economies. They also promise their technology will not pose great risk to wildlife, nor will it alter the landscape in perceptible ways, nor decrease the value for surrounding properties, nor introduce disturbances that might jeopardize the right of neighbors to quietly enjoy their property. Conversely, they barely mention the extraordinary subsidies that taxpayers and ratepayers provide, subsidies not indexed to reductions in CO2 and other toxic emissions.

Throughout my experience, I could not substantiate a single claim developers made for industrial wind energy, including the one justifying its existence: that massive wind installations would meaningfully reduce our reliance on fossil fuels. When you understand *this*, you realize the wind business is not really that complex. But there are a lot of complicated issues swirling around it that obscure and distract from this main point, issues such as global warming, property values, the nature of wind leases, local revenues and taxes, wildlife, natural views, and a host of others. So how does one know the truth of it all? How does one go about separating the reality from spin?

What we know is often a matter of how we choose to see the world. Consider the story of an active, spry man of 86 who had taken up with a 20-something showgirl. He wined and dined her, then told his friends he wanted to marry her. His friends were concerned. “Henry,” they said, “you’ve had two heart attacks in the last six years. On your wedding night, don’t you think the difference in your ages will be a problem? Think of the physical stress!” The old fellow thought on this a bit, and replied: “Well, I’d be sad, of course. But, if she dies, she dies.”

Perhaps you’ll agree that if something seems too good to be true, it almost always is. You should ask good questions and demand solid proof, not relying upon unsecured promises—and realize that the responsibility of substantiation lies with those making the claim. I could address all the complications surrounding this issue, but that would take far too much time. Consequently, I’ll touch on a few prominent ones, then focus on wind energy effectiveness and economics, showing what we might get, and what we would have to give, for industrial wind energy, examining the two windplant operations presently targeting Wyoming County. Afterward, I’ll respond to questions.

## **PROPERTY VALUES**

Do you believe industrial facilities stretching many miles across your landscape, with 105 spinning sky-scraper sized structures creating a cascade of noise are *not* going to negatively affect property values for those in the neighborhood, as the wind industry maintains a government study proves? One of the most validated real estate precepts is that prominent natural views and historic scenery have premium value, and intrusions restricting those views erode value. However, the Renewable Energy Policy Project, conducted by officials associated with the National Renewable Energy Lab, is often used by wind developers as evidence their projects will not diminish property values. But this 2003 report contains serious methodological flaws. George Sterzinger, the project’s executive director, admitted as much in response to critics who stressed the study contained no proof that windplants were the reason for changes in property values. “We have no idea,” he said, noting that the REPP did not have time or money to answer that question. Sterzinger further agreed that the study’s findings have to be applied carefully to different situations.

There are few windplants in the world, let alone in the United States, with turbines over 400 feet tall placed so prominently near a resort community. Consequently, there is no comparable yardstick by which appraisers can measure the impact in Wyoming County for predictive purposes. And without knowing about the various nuisances this kind of windplant will produce, the problems for credible prediction increase even more.

Independent inquiry in Britain, Denmark, and New England suggest the likelihood of significant property devaluations. In his June 10, 2005 direct testimony before the Wisconsin Public Service Commission, Kevin Zarem, an appraiser, estimated that residential property near a proposed windplant “will likely be in the 17%-20% loss range.” And this based solely upon visual impact. He did not assess potential loss due to

wind turbine noise, motion, or shadows. Russell Bounds, one of Garrett County's leading realtors in large property transactions and the man in the documentary, has already lost sales in the area of proposed windplants. Mr. Bounds testified in a PSC hearing that, over the last several years, he has had at least 25 people who expressed interest in buying land in the area targeted by wind developers. However, when he advised them about the plans for wind facilities, not one of those people expressed further interest.

You've seen the property devaluations described in the documentary. And I have seen contracts which require land owners and encourage neighbors to sign a "memorandum of non-disturbance easement agreement," which absolves the wind company from liability for what the owners might regard as wind turbine-caused nuisances. Realtors will tell you that even transmission lines detract from value. Given the choice between buying a property with exquisite natural views and a comparable property surrounded by industrial development nearby, which one would you pay premium prices for?

## **WIND TURBINE NOISE**

Developers claim modern wind turbines make little noise beyond the sound of "wind rustling through the leaves," pointing to their own studies showing low decibel levels and the experience of observers who've been taken directly under a wind turbine. However, the reality for people living near a windplant does not substantiate this claim. In the documentary, the noise recording was not modified. Turbine noise is so irritating and disconcerting that it can cause people to seek medical attention, as Rodger Hutzell had to do. The problem is so acute in Europe that the world's first International Wind Turbine Noise conference was convened in Berlin last fall. A Malone, New York physician, Nina Pierpont, who has studied the symptoms of several families, especially the d'Entremont family of Nova Scotia, has called for systematic medical study of what she has termed Wind Turbine Noise Syndrome.

An explanation for turbine noise was published earlier this year by a Dutch researcher, G.P. van den Berg of the University of Groningen in the Netherlands. Van den Berg demonstrates that loud aerodynamic sounds are generated when the moving propeller blade passes the turbine's tower mast, creating sound pressure fluctuations. Such fluctuations may not be great from an individual turbine, but when several turbines operate together, the pulses amplify each other, greatly magnifying the sound. Van den Berg also notes a "distinct audible difference between the night and daytime sound at some distance [more than one mile] from the turbines"—a finding consistent with the experiences of Meyersdale residents. I've sent Ruth Lavin a copy of van den Berg's dissertation on this subject, which she'll share with you upon request.

Who will compensate people if wind projects devalue their property or create relentless noise? Don't accept glib statements and unsecured promises. Wind developers seek to externalize costs to others. You might check Horizon Wind's Tug Hill Neighbor Agreement, which might shed some light on this. Note that it indemnifies the wind company for liability from the very nuisances it claims won't happen. Note further the

non-disclosure clause. Look for these or similar documents circulating soon in Wyoming County.

There are a range of windplant-generated nuisances that have been verified across three continents. The failure of many local governments to provide appropriate leadership on this issue is appalling. After-the-fact law suits brought because of predictable nuisances are difficult, expensive, and time consuming. These massive windplants precipitate incivility, pitting neighbor against neighbor. A major reason for government to exist is to anticipate and mitigate this incivility. Recent changes to the Perry Township Wind Ordinance strongly suggest they were incorporated under the guidance, if not the dictation, of the wind industry, without consulting any comprehensive plan that honors the rural integrity of this region. This is a prescription for discord.

### **SAFETY FOR BIRDS, BATS AND OTHER WILDLIFE**

The wind industry asserts its technology is safe for migrating wildlife, using avian experts and industry-sponsored studies to bolster its claims. None of these have withstood the scrutiny of evidence. Tall structures—buildings, cell and communication towers-- are responsible for killing millions of migrating species annually. Huge 350-465 feet tall continuously lit wind turbines—with propeller blades moving at nearly 160 miles per hour at their tips and placed atop prominent ridges where large numbers of birds concentrate in migration-- kill birds of prey, songbirds, and especially bats. Despite industry insistence this won't happen, it already has. When confronted with this reality, the industry argument morphs into a ten wrongs make a right scenario: "Cats and communication towers kill millions of birds annually, and we won't kill that many." When challenged about the appropriateness of this defense, the industry shifts gears once more: "The need for clean energy justifies the loss of wildlife," inferring that wind energy will displace significant fossil fuel production. Some here tonight might recall this same ends justifies the means rationale promoted use of DDT.

Three recent radar studies--one in Vermont, one in Virginia--each documented significant potential problems for migratory wildlife. Last week, I also talked with graduate students from Frostburg University in Maryland who recently used radar to chart numbers of birds and bats flying overhead along the mountains of Western Maryland. The preliminary data shows that wind turbines may pose a high risk to bird and bat populations. On many nights during the season, for example, as many as 300,000 birds and bats fly low enough to collide with huge wind turbines. Last year, Ed Arnett, a biologist with Bat Conservation International, released his study of two Florida Power and Light windplants in Pennsylvania and West Virginia. His research reaffirmed earlier studies showing major bat mortality. [Faced with the news that its wind turbines were killing thousands of bats](#) Florida Power and Light, reacted quickly. It barred scientists from pursuing follow-up work, removed its \$75,000 contribution from the research cooperative studying bat mortality and ended the doctoral work of a graduate student who had produced two years of data showing unusually high rates of bat death at the Pennsylvania and West Virginia sites. Although Florida Power and Light has pulled the

plug on further research into avian and bat mortality on any of its properties, the company plans to construct hundreds more turbines in the mountainous areas of the region.

Braddock Bay near Rochester along Lake Ontario is a major destination point for many thousands of birds of prey, many of which use the ridges along Silver Lake to help guide their spring migration. The July issue of *Wildbird* contains an excellent article about Braddock Bay and raptor migration. When I told Donald Heintzleman, one of this country's leading bird of prey specialists, about plans to construct several large windplants in this part of New York, he expressed concern. Avian migration is an extremely complex phenomenon, with many influencing factors, including the changing conditions of weather and climate over many years. Adequate preconstruction study for wind projects does not mean that, because such study is made, therefore windplants should be built. Rather, risk studies should be made to determine whether or not they should be built at all. Wind developers plan thousands of turbines along the major avian migration flyways from Georgia through New Hampshire, creating a gauntlet of risk for birds and bats, some species of which having extremely vulnerable populations. We should take great care to avoid the unintended consequence wrought by uninformed decisions.

Before discussing wind energy and economics, let me briefly address **AESTHETIC AND HERITAGE CONCERNS**. I believe the landscape, and particularly the natural vistas that showcase our rural history, is one of our most valuable assets, one that we should preserve and pass along to our children and their children. Although clustered development and appropriate technological scale are necessary in any modern society, I assure you that huge wind machines will discordantly transform the way people see your area for generations to come. Wind developers retort that “beauty is in the eye of the beholder.” While some people may find these turbines attractive, most have no concept of the size and scope involved. Imagine, by way of comparison, that someone was loudly and continuously playing rap music throughout the countryside. Most people, even politicians, understand the need to restrain such an exuberant expression of one's personal aesthetics, even though some people might well enjoy it. Such civic restraint should also apply in the visual arena. These proposed turbines are not like a new tie or suit or even an automobile. They will be an in-your-face presence to thousands of people, many of whom will find them repellent. Those contemplating leasing their property for a wind turbine easement should ask themselves whether a small financial compensation should override their desire not to harm a neighbor's way of life, since most of those neighbors have chosen to live quietly and peacefully away from industrial development, preferring a more organic relationship with nature.

**JUST HOW GREEN, FUNCTIONAL AND EFFECTIVE IS WIND ENERGY? IS IT WORTH THE HIGH LEVEL OF PUBLIC SUBSIDY SUSTAINING IT. ON A PER KILOWATT HOUR BASIS, WIND IS THE MOST HEAVILY SUBSIDIZED SOURCE OF INDUSTRIAL POWER IN THE NATION**, according to John Sherwell, Director of Maryland's Power Plant Research Program. Other major power producers enjoy a high level of public subsidy, but they also provide significant electricity.

Presently, Horizon Wind seeks to place 65 turbines around the county. Orion has stated it wants to put 40 turbines here—for a total of 105. The rated capacity of each Horizon turbine is 2MWs; Orion's turbines may be rated at 1.5 MWs. These 105 turbines would have a combined rated capacity of 190 MWs. **Rated Capacity** means the amount of electricity a wind turbine could put into the electricity grid over a year's time if it were working at full strength all the time.

However, because of the nature of the wind and the limits of technology, engineers use the term **Capacity Factor** to assess what percentage of its rated capacity a power plant will actually deliver. Wind turbines don't begin generating electricity until wind speeds hit around 8 mph and they shut off at wind speeds exceeding 55 mph to avoid damage. They achieve rated capacity typically at wind speeds of 32-37 mph. Because of wind's unpredictable intermittency and power fluctuations, along with the downtime for maintenance, no windplants located in the eastern United States have achieved a capacity factor of more than 30 percent. Consequently, Horizon/Orion's combined windplants might contribute on average 57 MWs annually to the electricity grid, which is 30 percent of their rated capacity. Although no power plants work at peak capacity all the time, the capacity factor for wind is so low it has no rivals as an industrial power source. And in summer months, when demand for electricity is highest, the likely capacity factor for wind in this region will only be about 10 percent because of summer's light winds.

An **Electricity Grid** is a complex network of regional power sources working to supply demand for a variety of customers—residential, commercial, industrial, along with public and quasi-public operations like police, schools, hospitals, traffic control. Your grid is known as the New York Independent System Operator, and it serves over 19 million people with a required annual installed capacity of 37, 534 MWs. Coal generates around 15 percent of its power; nuclear--27 percent; hydro--19 percent; natural gas--20 percent; and petroleum--15 percent. All of these provide steady, reliable power, and are managed very carefully by controllers to closely match demand with supply.

No one really knows what hours in a day the wind will blow sufficiently to produce electricity; or when the wind will blow at speeds providing only a fraction of a plant's rated capacity; or when wind will stop suddenly or change direction--leaving a big hole in the supply of electricity that the grid must compensate for. But since electricity produced at industrial scales cannot be stored and must be used immediately to satisfy instant, continuous demand, the grid must have a backup in the form of excess capacity for wind's unpredictable volatility. Excess grid capacity is currently maintained for all power sources, not just wind, as wind developers are quick to say. The number and variety of power sources on the grid and the fluctuations of demand provide a real challenge for grid operators, even without wind energy. Consequently, power plants such as hydro, which can be throttled forward and back very quickly, are often used to achieved this reserve function, giving grid operators the kind of rapid response they must have to provide reliability. But wind's wide fluctuations even at low levels puts a severe strain on the system, creating management problems and added costs for grid operation. Paradoxically, because industrial wind energy produces only a fraction of a grid's electricity supply, it is

now treated as grid operators treat sudden shifts caused by people turning on and off their lights unexpectedly. *It is treated as a function of fluctuating demand, and not as a source of supply that can be relied upon to satisfy demand.*

As energy expert Tom Hewson has shown, wind can only generate energy, not capacity; it can't penetrate beyond the grid's buffer of "reserve" supply to provide dispatchable electricity in response to demand. *As wind penetration approaches the threshold of the grid's excess capacity, it threatens the security of the system and more excess capacity has to be built, primarily from polluting power sources, thereby diminishing any capacity credit for wind to zero.* Currently, the Judith Gap windplant in Montana, producing in one hour 80 MWs of electricity, often falling to 20 MWs the next, is causing major headaches to the grid, even though the amount of energy relative to the grid's total supply is relatively minute. The Montana utility was forced to buy more short-term power than expected from other energy sources to balance the grid's supply, driving costs upward. To the extent that wind power's electricity approaches, say, ten percent of the grid's online supply, it would threaten the grid's ability to function. What would happen, for example, if the grid had insufficient supply to compensate for a sudden loss of wind power at this level of production? The same kind of blackout that occurred recently in Spain. What would happen if a sudden burst of high energy hit the grid because the wind increased unexpectedly? Such a power surge at ten percent of the grid's total would shut the grid down.

Imagine a skilled juggler, who, with practiced rhythm, balances a variety of things continuously fed to him by an assistant--oranges, bowling balls, shoe boxes, each of different shapes and weight, corresponding to the big three power sources, coal, nuclear, natural gas. After a while, his assistant throws him a flea, which flits around unpredictably. However, because of its size, it can safely be ignored. And no one notices the flea is not really being juggled. This is how the windplants proposed for Wyoming County will affect the New York grid. A bit later, the assistant throws the juggler a swarm of mosquitoes, which also flits around unpredictably and then begins to bite. The disruption in the juggler's rhythm is noticeable, and the whole juggling routine is placed at risk. The mosquitoes represent windpower at five percent of a grid's basic level of supply, a situation similar to that which now exists in Denmark and Germany.

Two sobering observations emerge from all this. First, any CO<sub>2</sub> emission savings that wind production creates are offset by the need for backup generation, much of it from "dirty" power sources. It is not clear whether wind energy creates even more CO<sub>2</sub> emissions because of this factor, given the need to continuously ramp the various reserve power sources up and down, using more fuel much in the way a car engine does in stop-and-go traffic. *No independent, peer reviewed analysis has been done to show how--or whether--wind-produced electricity actually reduces CO<sub>2</sub> emissions.* Second, it is also unclear whether the energy produced by wind facilities, because it cannot penetrate beyond the level of the grid's reserve system, can really be considered to provide power for *any* "users." A million hamsters spinning around in their cages will also generate electricity—but what's the point?

Wyoming County's two proposed wind facilities might contribute an annual average of 57 MWs to the NYISO's annual installed capacity of more than 37,000 MWs, which would be little more than one tenth of one percent of the grid's current total. Since we increase our demand for electricity at two percent a year (and New York is presently doing so at more than three percent), these 57 MWs would be swallowed up within the first three weeks of the new demand year. And this is if everything works the way the wind industry hopes it will. If this amount of power were generated by coal or nuclear, with capacity factors approaching 90 percent and with a predictable and constant stream of energy, it would service about 50,000 homes. However, because of the intermittent, unpredictable nature of wind, no homes would be powered by this source. How will such energy meaningfully stabilize natural gas prices or, in any functional sense, serve to diversify the mix of power sources, as wind developers claim?

An electricity grid generally accepts wind energy not because it works very well, but because it has to, the result of political decisions to legislate Renewable Portfolio Standards that now exist in over 20 states, requiring utilities to purchase a certain percentage of renewable energy. The only two renewables capable of achieving industrial levels of electricity are hydro and wind—and no one outside third world countries is constructing new hydro facilities.

I'd also like to dispel a myth that wind developers spread to generate support among environmental groups: that wind energy will contravene the forces contributing to global warming and reduce dependence on foreign oil. Wind only generates electricity. Electricity generation is only part of our energy production. Sixty percent of the nation's energy use does not involve the making of electricity. Coal and gas-fired electricity power plants do pollute the air with toxic hydro-carbons. But the sheer volume of automobile exhaust combined with demand for heat are the major contributors to the problem. It is folly to suggest that thousands of wind turbines blanketing the eastern US would do anything to significantly mitigate these other energy forces. Nationally, oil contributes only three percent of our electricity production. Even if industrial wind generated ten percent of the nation's electricity, it would not staunch the fossil fuel emissions thought to be involved in accelerating global warming, given our nation's increasing energy consumption and given that wind can only intermittently address the electricity portion of our energy production problem—the minor portion. Since wind energy only produces electricity and we use so little oil for the production of electricity, even if large numbers of wind turbines displaced the three percent of our electricity now powered by oil, we would still be heavily dependent on coal and gas—and we would still be mightily dependent on foreign oil.

These realities doom wind power as anything other than a Rube Goldberg operation. To eliminate fossil-fueled back-up power generation for wind energy, we would have to build three windplants for every one with a given rated capacity, each in a separate geographical area to provide statistical redundancy for the intermittent flux of wind--and even then, we would have to spend billions for new grid equipment to integrate that power into dispatchable electricity. By this reckoning, about 6000-2.5 MW turbines

would be needed to displace one 1600 MW coalplant--and perhaps as many as 8000 to compensate for the low wind capacity factors during the summer months, when, of course, demand is highest. This far-fetched scenario would virtually eliminate CO2 emissions at the operational level. However, energy expert Tom Tanton has calculated that, to compensate for the CO2 emissions required to construct a large windplant, the facility would have to operate CO2 free for at least seven years. There is no free lunch with the laws of thermodynamics.

To me, this is the smoking gun that challenges notions that wind power may be a splendid idea. For wind rich areas in the East, industrial wind is a non-starter anywhere in the region because, although the industry will have reasonably easy access to transmission lines, it's not going to produce enough reliable power to dent a grape in the scheme of things. Contrary to a wind developer's claim that our choice is between the belching smokestacks of coal and the twirling blades of huge wind turbines, we'll have both. Even if these turbines were fully deployed in the uplands of the East, coal plants would still be puffing away, their numbers actually increasing, while many thousands of gigantic wind machines would glut the landscape—killing wildlife, destroying culturally significant viewsheds, devaluing property, and creating major disturbances for those who live nearby. And, because the air would be getting dirtier, people everywhere would be getting sicker while paying more in rates and taxes.

In the Midwest, however, and certainly in the deep oceans, there *is* enough wind resource to make a big difference. European nations such as Denmark, Germany, Spain, and the Netherlands, each of which has encountered a political uproar about onshore windplants, are now seriously examining this potential. The problem is that, because of the need for redundancy and our ever increasing demand for electricity, millions of turbines must be constructed and linked to new transmission systems, as well as retooled grid systems--at a cost of trillions of dollars. The ecological implications would be enormous, not to mention the impacts on people.

A discussion of the wind industry's vast array of public subsidies would take another hour. In a nutshell, they were cultivated by Kenneth Lay's Enron, the "energy" company that, before its demise, owned and operated the nation's largest collection of wind facilities; it pioneered the tax shelter as a commodity. Publicly funded tax avoidance schemes reimburse wind energy developers as much as two-thirds of the capital cost of each \$2 million turbine, with many states creating incentives to cover on average an additional ten percent of these costs. A recent Beacon Hill Institute study showed that such incentive programs would allow the Cape Wind project to be reimbursed up to 78 percent of its capital costs over the life of the facility. Windplant owners can use these tax shelters themselves, or sell them, or enter into "equity partnerships" with other companies—all to reduce their corporate tax obligations by tens of millions each year, as the Marriott Corporation did a few years ago with a similar clean energy scheme, within a year reducing its corporate tax obligations from 36 to 6 percent—generating tax credits worth \$159 million and a return of 246% on its investment in just one year.

The Florida Power and Light Group, the parent of FPL Energy, paid no income tax in 2002 and 2003, according to Citizens for Tax Justice, despite having revenues of \$2.2 billion during those years. The FPL Group made large investments in wind energy during those years, and now claims to be one of the nation's leading wind energy producers. It is now the parent company of Meyersdale Wind and Mountaineer Wind in West Virginia, both of which have delivered only a fraction of promised local taxes to date.

These costs to the federal treasury, which are actually transfers of wealth from average tax and ratepayers to a few corporate investors, aren't worth the benefits accruing to a handful of full time employees and to undisclosed annual lease payments to a very few property owners. The Horizon windplant proposed for your area, for example, with an estimated capital cost approaching \$150 million, may employ four or five permanent workers, who may or may not reside in Wyoming County. Most of the construction crew will be non-local, completing the bulk of their work within a year. In my area, wind contracts with property owners offer unsecured promises of a few thousand dollars per year. Promises about adding to local revenues typically have been public relations gestures. Wind companies can deploy specialized depreciation schedules and other offsets to reduce tax obligations, as has happened with windplants in West Virginia and Pennsylvania. Are there penalties in Wyoming County for making promises about local taxes or jobs that aren't made good? When I asked a wind developer at a recent PSC hearing in Baltimore whether he would stand behind the \$750,000 in first year taxes his company had pledged to Garrett County in its written application, he stated only that he would "do what the law requires."

He is of course correct in this. We have arrived at a point in our legal culture where no negative consequences seem to exist for making propaganda claims that are not realized in order to sell a product. Perhaps there are laws and regulatory measures which would penalize wind developers for making claims they did not deliver once their facility was built. If so, I don't know about them. It should be incumbent on a wind developer to substantiate and validate all claims—and it is the duty of government, through its regulatory agencies, not to approve a wind facility until it is *certain* the developer can deliver on all promises and has determined an enforceable set of sanctions, prepared to shut the plant down and order its decommissioning if major problems ensue.

Carl Sagan once said that "Extraordinary claims require extraordinary proof." I have never seen an independent peer-reviewed analysis in a reputable scientific publication substantiating any of the claims made for windpower. Reports from wind developers, their trade association, and from the Renewable Energy Lab, all of which stand to gain from the "enhancement" of wind technology, do not stem from the rigorous "science" enabling good public policy. As I prepared for this talk, the melody of that old 1950's song, The Wayward Wind, came to mind. Wayward is something prompted by the unpredictable that resists guidance or discipline--a perverse deviation from what is expected in order to gratify personal desires. Seemed to fit.

I have worked to understand this issue from a citizen's perspective, reasoning from basic principles, knowing when answers I've been given are unresponsive, and saying, like the boy in the story about the emperor's new clothes, that I don't see the evidence when it was not provided. As citizens interested in more effective energy solutions, this is what I trust you will do also. One can be concerned about how our fossil fuel combustion practices may help accelerate the process of global warming and injure public health without agreeing that the intrusive and ineffectual nature of windpower technology is even a partial solution to the problem. For me, the harsh reality is that massive wind turbines are much more functional (and lucrative) as corporate tax avoidance generators than they are as environmentally friendly producers of energy, symbolic not of a more enlightened energy future but rather of our continuing attraction to the forces of ignorance and greed. They represent at best a placebo for our energy dilemma, distracting from the level of discourse—and political action-- necessary for achieving genuinely effective responses. There are no magic bullets, unfortunately. The only environmentally responsible short-range solution to the problem of our dependence upon fossil fuels must combine effective conservation with much higher efficiency standards—heavy lifting indeed for the most wasteful culture in the history of the planet.

The Wayward Wind, June 19, 2006/Silver Lake, New York

Jon Boone