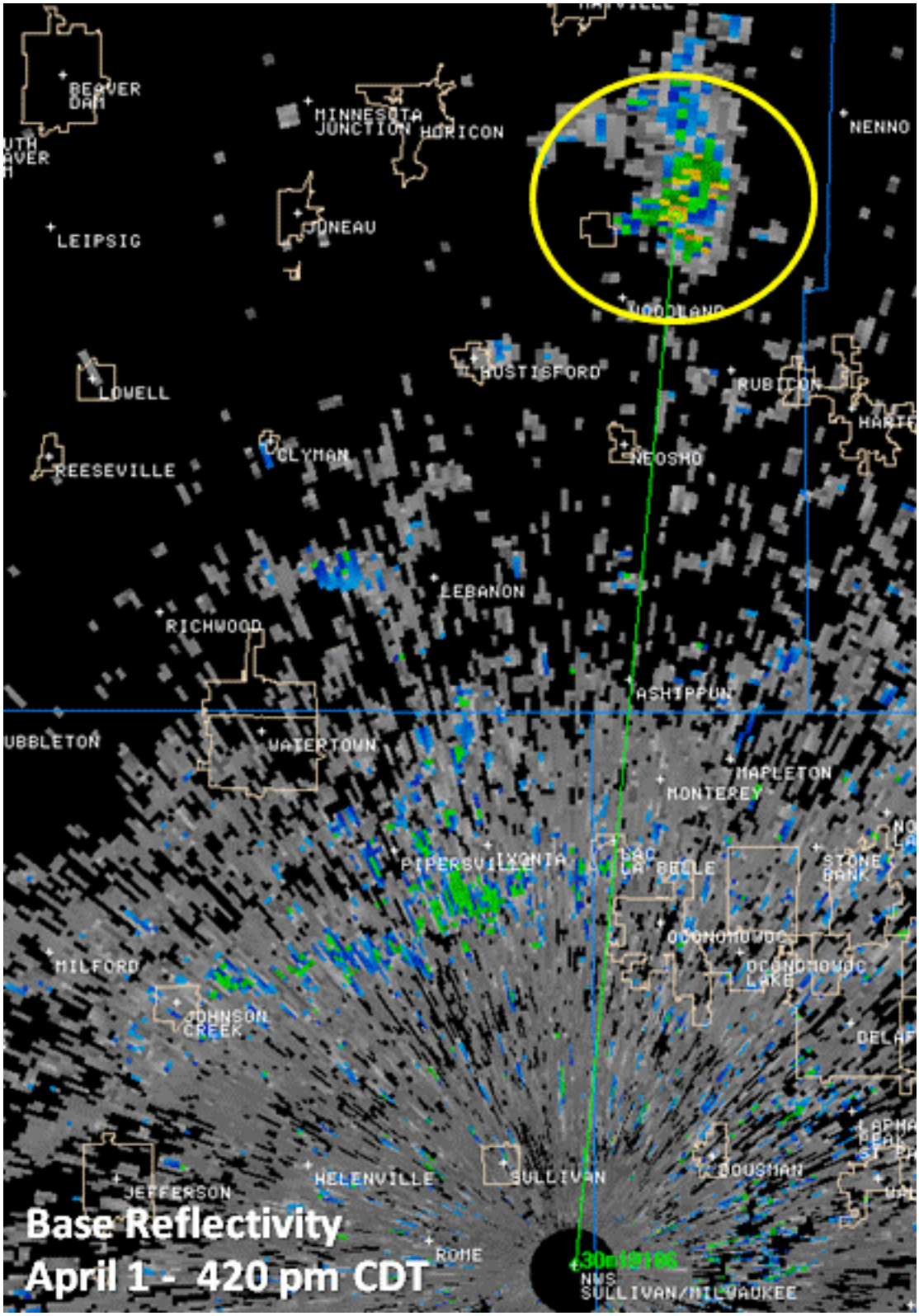
To: The Public Service Commission of Wisconsin
From: Kevin Kawula, Natural Area Restorationist, Owner and Operator of Lone Rock Prairie Nursery, Rock County Parks Volunteer, Town of Spring Valley Zoning Board Secretary, Rock County Conservationists Board Member,Concerned Citizen.
Re: PSCW Draft Wind Siting Rules, Straw Proposal Amendment Ballot, and Addressing the absence of a Wildlife Representative on the Wind Siting Council.

I would like to address the Draft Rules and Straw Proposal at the same time.

What neither the Draft Rules or the Straw Proposal accomplish, is address the inherent trouble with industrial scale wind energy, the size of the machines. Spinning something the size of a 747 or larger will have definite physical impacts. For every action there is a reaction. Please look at the image below. Will the effects of these industrial wind turbines be captured within 1,000 feet?

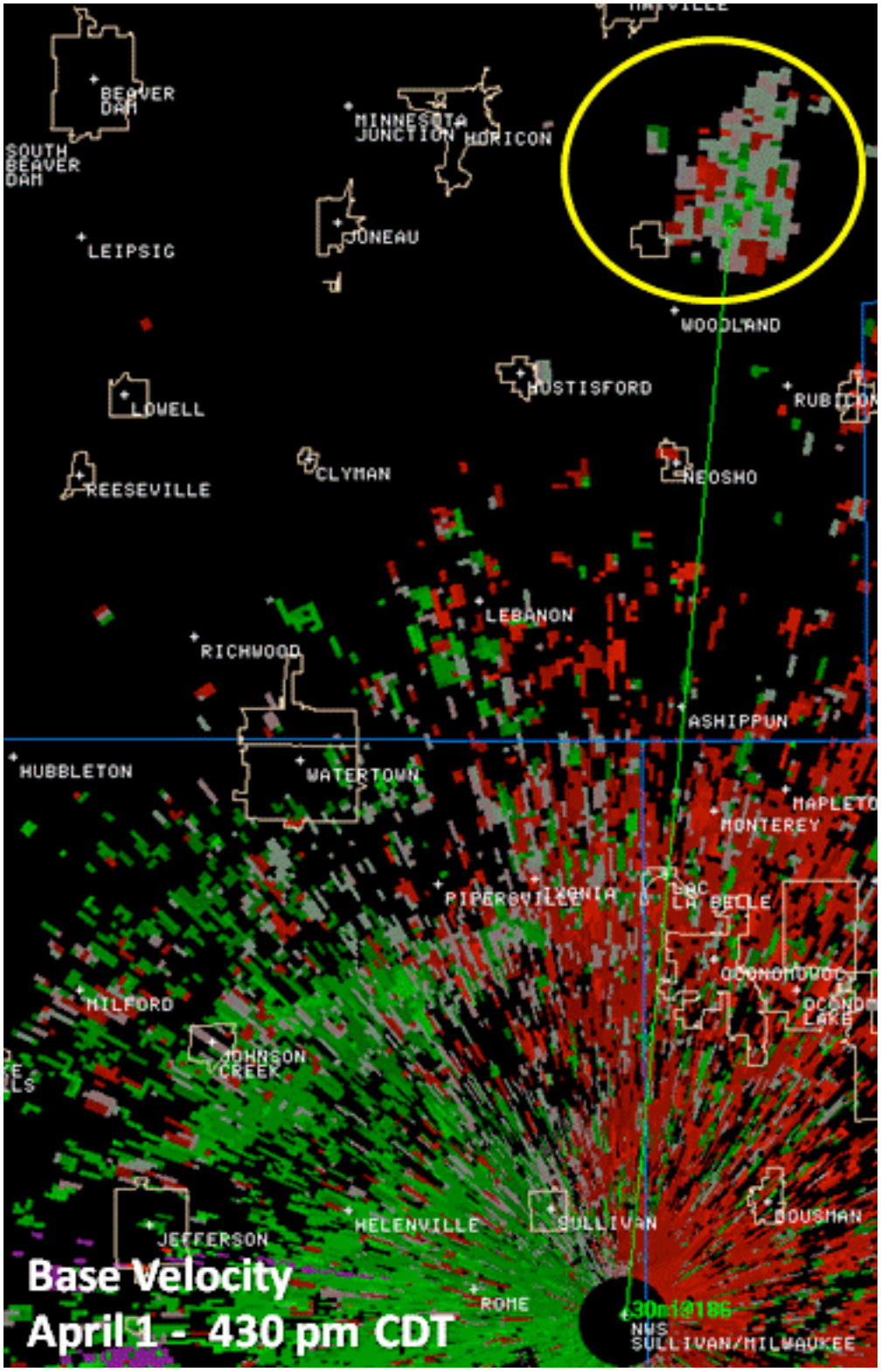
Denmark Wind Project at Sea, Turbulence and Wake expressed in clouds and mist.

These physical effects are also captured by weather radar, but the false reading/interpretation of these radar images as storms or tornados, may be over looking the very real and physical impact areas represented by the images. It would be useful to have these weather radar images reviewed to help assess what wind turbine wakes are exacting on a community.

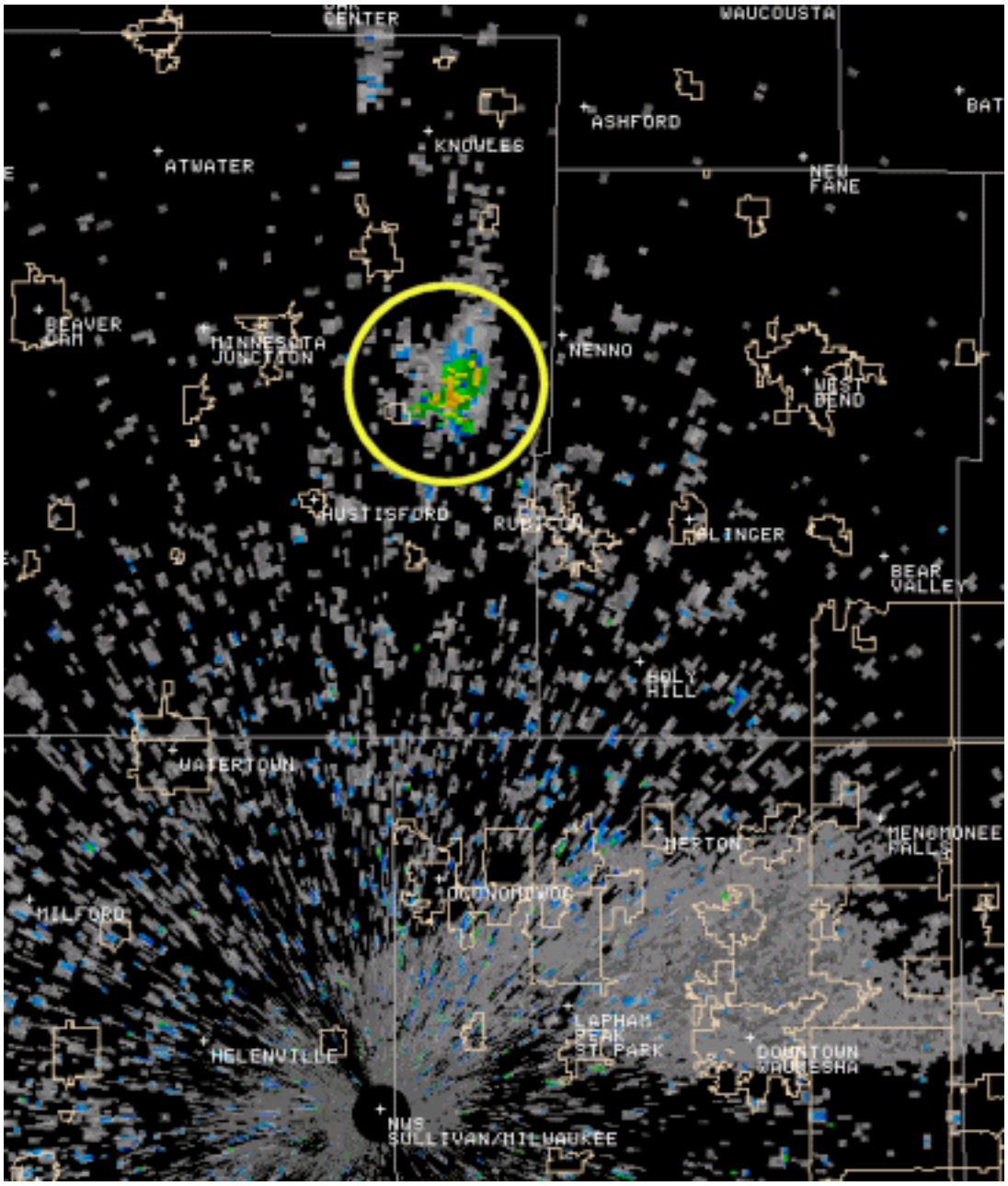


#1 - A small part of the electromagnetic energy radar beam sent from the radar is reflected back by the rotating turbines. The radar processes this "returned energy" as an

area of precipitation and plots it accordingly on the map. This contamination of the base reflectivity image as illustrated in the above image, has an effect on the radar algorithms used to estimate rainfall and to detect certain storm characteristics.

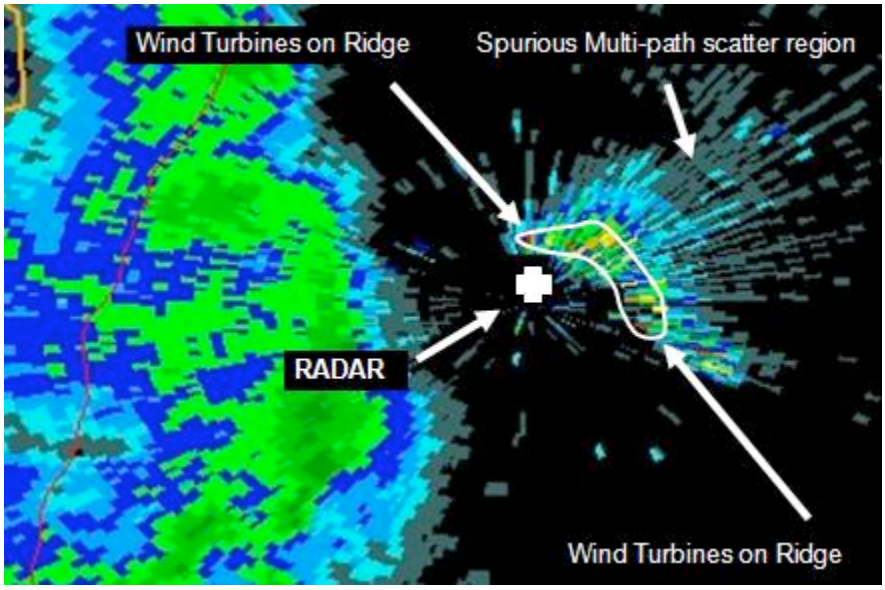


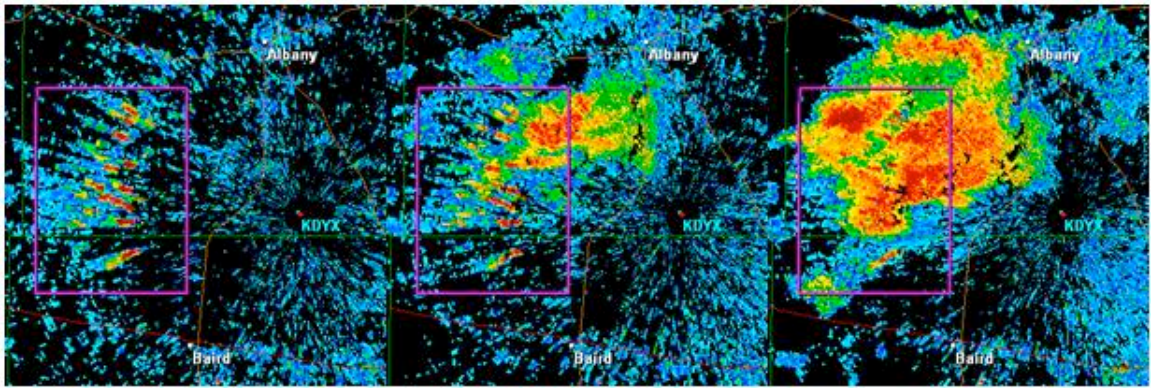
#2 - The rotating turbines also impact the velocity base data as you can see from the above image. This velocity data is used by radar operators and by a variety of algorithms in the radar's data processors to detect certain storm characteristics such as mesocyclones, tornado vortex signatures, and relative storm motion.



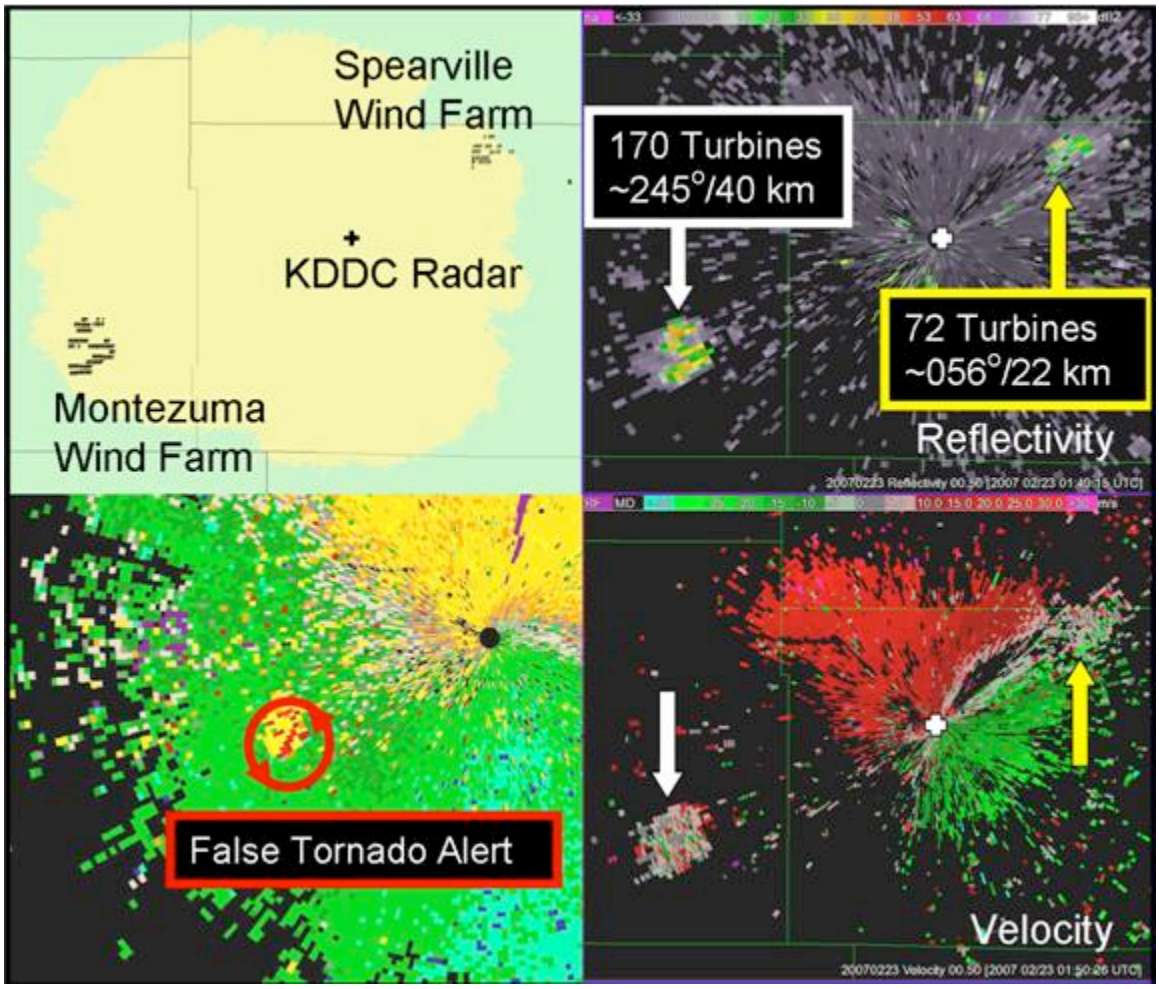
#3 - The above two hour animation (not animated here) from the evening of April 1, between 915 pm and 11 pm CDT shows the persistent interference from the Butler Ridge wind turbine farm on the KMKX base reflectivity radar image. (animated version available at www.wind-watch.org/documents/wind-farm-interference-showing-up-on-doppler-radar/)

* Thunderstorm or winter storm characteristics could be masked or misinterpreted, reducing warning effectiveness in the vicinity of, and downrange of the wind farm.
* False signatures contaminating Doppler velocity data in the vicinity and downrange of the wind energy facility could reduce forecaster's situational awareness, particularly during hazardous/severe weather events.
* Data masking or contamination if thunderstorms develop over the wind farm may negatively impact warning effectiveness.
  False precipitation estimates could negatively impact flash-flood warning effectiveness.





#5 - Sequence (left to right) of 0.5 deg reflectivity images showing thunderstorms developing over a wind farm (purple rectangle) 10-16 nm (18–30 km) west of Dyess AFB, TX WSR-88D. Left: thunderstorms have not yet developed, high reflectivity values due to wind turbines alone. Middle and Right: storm has developed to where in right image a distinct notch structure, indicative of severe weather, formed – note: turbine and weather echoes indistinguishable



These physical impacts cannot be captured with a safety/noise/shadow flicker setback of 1,000 feet. 1,000 feet is an industrial turbine spacing distance used to mitigate turbine wake impacts on each other. In the PSCW's Glacier Hills EIS, chapter 2, p.13, 2.1.2 Turbine Spacing – it states that the wind turbines selected for the Glacier Hills project would require a spacing of 1,200 to 2,000 feet between each other to minimize the effect of wake and turbulence caused by the wind turbines operating. Homes and non-participating residences receive less respect and consideration than do other industrial wind turbines.

The proper compromise setback to allow industrial wind development is 2,640 feet.

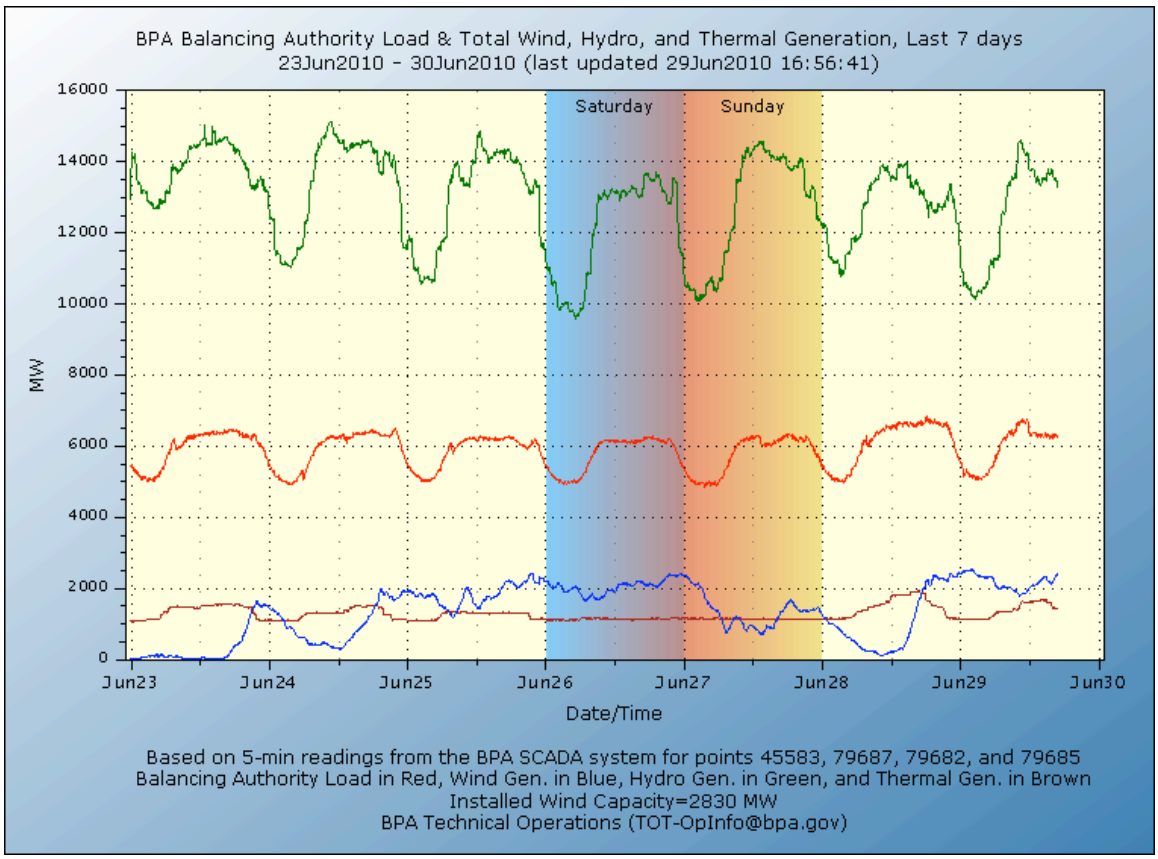
Hosting or easement properties can sign to have the turbines as close as 1,000 feet. A person who signs an easement contract to allow a turbine 1,000 feet from their residence (Good Neighbor Easement) should expect to receive $8,760 per year ($1.00 for each hour of the year) for living with the turbine's impact.

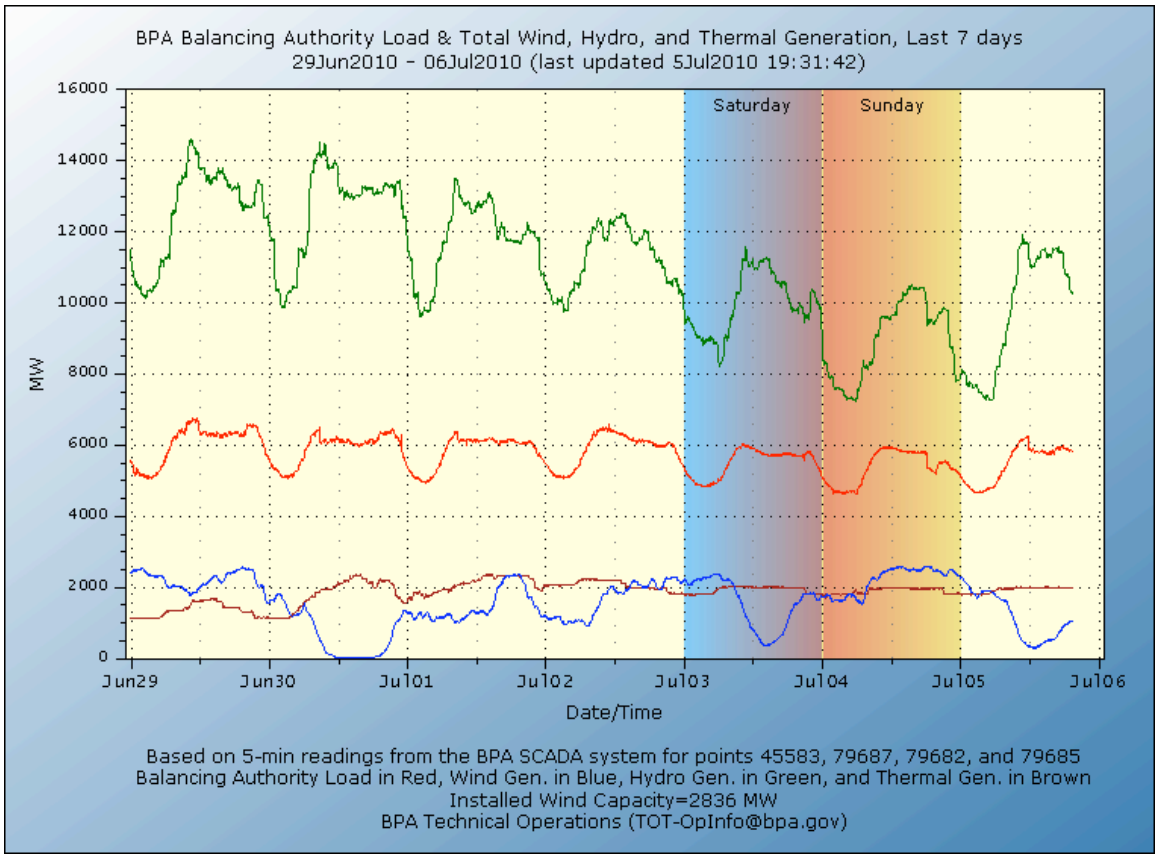
Wind turbine project properties which lease land to the wind developer should expect to receive 10% of the generation income for each - (1.5MW wind turbine operating at 25%

capacity for an average yearly production of 3,750,000 KWh, [via public meetings with Wes Slaymaker, EcoEnergy LLC/EcoMagnolia LLC/EcoAvalon LLC working with, WPPI-Evansville Water and Light, Evansville Wisconsin] valued at 10 cents per KWh with Green Credits [via Focus on Energy Program, Implementation of Community Based Wind Power Businesses in Wisconsin, Page 47, Under 'Revenues' "PPA Rate (Inc. Green Tag) | $0.10000"]) turbine hosted less nighttime generation (up to 50% of annual wind turbine generation, see below), or approximately $18,750 per turbine per year. No turbine should be sited 1.1 times the height of the machine from any residence or non-contracted property line. That is cruelty.

Due to the trouble with industrial wind turbine nighttime noise, and a lack of clear evidence that nighttime wind generation has an impact on curbing baseload thermal generation CO2 emissions, nighttime curtailment of industrial wind turbines must become mandatory, unless a utility can prove a real time social benefit to the reduction of a coal burning facility operation. Any nighttime wind generation, or operation of the turbines, must be approved ahead of time by the hosting Counties, Towns, and residents.

We benefit as a society from timely and accurate weather forecasts and storm alerts, and the same timeliness and forecasting should be expected of the technologically advanced wind industry when it comes to nighttime generation requests. The following charts are from the Bonneville Power Authority, available on line at:
www.transmission.bpa.gov/Business/Operations/Wind/baltwg.aspx





BPA Thermal generation (in Brown) never goes below 1,200MW, has a daily rise in output, and then returns to baseload output. The Wind Generation (in Blue) does not appear to have that much impact at all on thermal generation except when it does not generate during the daytime load cycle. It is the non-impact of Wind at night on Thermal Generation that the Commission needs to address with nighttime curtailment unless proven to reduce emissions.

Wind generation numbers from the Midwest Independent Transmission Systems Operator (MISO) also raise CO2 reduction questions. Mainly how effective is the wind generation at reducing the needthermal generation? The MISO generation cycle begins at 4am. Load demand and generation rise at a steady rate until peak demand at 2pm-4pm, and then taper off until then end of the evening (8pm-10pm) to baseload operating levels until 4am the following morning.

From April 15th 2010 through July 6th 2010, 19 days (23.2%) gained wind generation from their 4am starting levels through 2pm-4pm, while 40 days (48.8%) lost wind generation from 4am through the 2pm-4pm peak load time. 18 days (21.95%) saw an initial loss of wind generation and then a gain, while 3 days (3.65%) saw an initial gain and then a loss of wind generation. One day was positive, negative, and then positive again, and one day information for the morning was missed. It is the wind generation loss, initial loss days, initial gains and then loss days (the majority 61 vs. 19 or 74.4% of

the days vs. 23.2%), which the Commission needs to evaluate, in order to verify CO2 reduction claims by the wind project operators. How is a MISO system's operator to respond to falling wind generation just when the daily generation load needs to be filled? Would it be more effective to ramp up the coal facilities, or the natural gas? And, should the wind return which would be ramped down?

Safe setbacks, nighttime curtailment, and reviewing CO2 reduction claims of industrial wind turbines will begin to address a missing element on the Wind Siting Council, an Environmental and Wildlife Representative. Renew Wisconsin is not an environmental operation. Clean Wisconsin tries to do better, but lacks any real environmental impact assessment capability past clinging to the hope that the retirement of coal plants will be tied to the siting of additional wind farms, and a 'community wind' loophole can be used to sidestep real siting problems with the same size machines.

Renew and Clean want to site over ten thousand industrial wind turbines in our state, and that is just wrong. They as part of the industrial wind lobby would like to see 200 to 300 industrial wind turbines built per year until 2025. That is 4,500 turbines, running at name plate capacity, but given efficiency issues, Wisconsin will really need to site 12,000 to 15,000 industrial wind turbines, to reach a 2025 RPS wind generation goal of 5,562GWh. (While 5,562 GWh of wind generation represents only 6% of forecast total electrical generation, it would represent 24% renewable wind energy by installed nameplate capacity. This gap, shortfall, nameplate loophole, will need to be addressed before the damage is done to our state and wildlife populations.)

The acreage needed to site this many wind turbines would be over one million acres. The Commission and Governor Doyle are discussing the largest land fragmentation in this state since the introduction of the steel plow, and the development of paved roads. Does the Commission and Governor Doyle Really want Wisconsin to end up looking like this Elk River wind project in the Flint Hills of Kansas?

This is unplowed prairie habitat used to raise grass fed beef, before construction, be sure to notice the three-branched creek in the foreground.

The three-branched creek is in the bottom right corner of this post construction photo. This photo is the definition of wildlife habitat fragmentation.

Problems with bird and bat mortalities, surrounding the inappropriate siting and operation of industrial wind turbines, have been acknowledged. Problems will continue so long as wind turbine operators seek their corporate profits at the expense of environmentally ethical and responsible standards. There is a misunderstanding, on the part of industrialists and policy makers, of how Wisconsin wildlife populations work and survive.

Wildlife populations live and survive on a very narrow margin, especially during migration. This margin is much narrower than that of any utility or shareholder. Migrating birds, bats, and insects need enough potential refugia enroute to nesting and brooding habitats. Fragmentation of these refugia along migration greenways by industrial wind turbine complexes, will lead to migrating population dislocations and additional wildlife deaths. Migrating animals do not have the energy reserves or time to detour the multiple manmade obstacles they encounter. These obstacles provide some of the bird and bat deaths the wind proponents hide behind. But, building 12,000 industrial wind turbines would exacerbate migration corridor obstacles and habitat losses, by removing additional migration opportunities and habitat over vast swaths of Wisconsin.

Agricultural land offers little nesting opportunity, but acts as defacto greenways, feeding, commuting to feeding, and nest protection habitat. The associated edge habitat of agricultural land is vital for the watch of predators, especially aerial predators. Filling

Wisconsin with 410 foot tall spinning industrial wind turbines will impact/remove the remaining wildlife nesting, feeding, and rearing habitats. In the PSCW's Glacier Hills EIS, chapter 2, p.13, 2.1.2 Turbine Spacing – it states that the wind turbines selected for the Glacier Hills project would require a spacing of 1,200 to 2,000 feet between each other to minimize the effect of wake and turbulence caused by the wind turbines operating. This means that Glacier Hills would impact, or remove, nearly all of the project area's 17,300 acres plus an additional 200-1000 feet beyond the project area's perimeter from existing wildlife habitats.

What does this fragmentation mean for the potentially negative impacts on bat populations? The Glacier Hills EIS states…

4.3 BATS
"Bat mortality has exceeded bird mortality at most wind farms where post-construction monitoring of both animal groups has been conducted. Many species of bats are long-lived and have low reproductive rates. This is particularly worrisome because even if the mortality rates for birds and bats from wind turbines were similar, wind turbines can have a more significant impact on bat populations than bird populations,
with the exception of rare bird species. Bat Conservation International estimates that more than 50 percent of American bat species are in decline. As the number of wind projects continues to increase, the cumulative impact on bat populations could be serious. Wind turbines may be more deadly for bats than other structures, such as towers or buildings, on a per structure basis."

Chapter 4, p. 39, "Post-construction mortality studies are being conducted at three recently completed wind projects in Wisconsin. These projects have land cover (i.e., wooded areas, wetlands, and fallow fields within an agricultural matrix) similar to that present within or adjacent to the Glacier Hills project boundary. In addition, the projected bat activity levels based on pre-construction surveys at one of WEPCO's recently constructed wind farm projects (Blue Sky Green Field) were similar to the pre-construction estimates for the Glacier Hills project. The initial post-construction field data from the Blue Sky Green Field project show a high level of bat mortality.14 Thus, it is possible that bat mortality at Glacier Hills could also be high."

There is a simple reason for this. The Wisconsin Wind Resource Assessment Program Final Report (WRAP Final Report), states in the report's figures, p.2 " …wind speeds are highest at midday and again late at night to early morning" (10pm to 6am). Industrial wind turbine average yearly generation numbers and income depend on this " late at night to early morning" (10pm to 6am) wind resource. This is prime bat feeding time, and low electricity usage time (no baseload CO2 emission reductions). Cut in speeds on turbines are not the issue. The issue is a devaluing of wildlife to profit an industry. Nighttime winds partly explain Wisconsin's higher than average bat mortalities. The Glacier Hills site map is an excellent tool for forecasting that Glacier Hills will also be a bat killer. Bats prefer to feed within a ¼ mile of roosting and brooding. Roosting for bats in Randolph and Scott will mostly likely be trees or woodlands, and feeding takes place largely over wetlands and streams where insects are plentiful. The Glacier Hills project area is wedged into a river, stream and wetland complex. Nighttime operation of Glacier Hills wind turbines during the bat breeding and migration seasons will cause bat deaths.

It is the alarmingly high number of bats that are dieing and will be killed if nighttime curtailment, and greater sensitivity to wildlife land usage needs are not addressed by the Wind Siting Council, The Commission, and ultimately Governor Doyle.

The number of bats being killed is 40.54 per wind turbine per year. This is the post construction mortality number for Blue Sky Green Field 88 turbine project. Which Means that Blue Sky Green Field project is killing between 3,500 and 3,600 bats per year. This number is consistent with bat mortality levels Cedar Ridge and Forward Wind. This means that if Renew and Clean Wisconsin achieve their lobbying goals of siting an additional 200 to 300 wind turbines each year until 2025 the bat deaths would reach a staggering 131,200 to 192,700 bats killed per year for the 4,753 wind turbines in the state. To reach the RPS goal of 5,562 GWh with 12,000 to 15,000 wind turbines the bat deaths would climb to 486,400 to 608,000 per year.

These kill rates are unsustainable, and it is unlikely that we would see the higher bat kill numbers as the surviving populations would crash, or be driven from the million plus acres occupied by wind turbines. We could see periodic migration season death spikes as bats, which do not know of the wind turbine areas (the young), enter Wisconsin wind project sites. It would devastate Wisconsin's balance of nature for decades to lose our bats to a greedy few.

It is the size of the industrial wind turbine that is causing the bat deaths. Bats are not being struck by the blades, but are suffering catastrophic damage to their lungs as they fly into the low-pressure zone that is created by the spinning blades. This drop in pressure causes the bats' lungs to expand rapidly, rupture, fill with fluid and blood, and they drown. It is called – Barotrauma – deep-sea divers get a version of it called "the bends", when raised to quickly from the depths. Birds have different lung structures, so they are not as readily affected, but bats are mammals with lungs similar to ours, so take a deep breath, imagine you can stop inhaling until your lungs burst, and you are drowning to death. Could this pressure flux be what wind project residents are suffering from, along with the noise, disturbed sleep, and shadow flicker?

Perhaps now with physical evidence of the dead bats, the images of physical impacts from photos and radar, and the absence of clear proof that coal burning is reduced in our electrical generation mix by adding wind turbines, the PSCW will consider adding a true voice(s) for our wildlife and environmental concerns.

I would like to recommend Shari Koslowsky, Conservationist with the DNR, at sharikoslowsky@wisconsin.gov (608) 261-4382, to consult with the Wind Siting Council before their final recommendations are presented to the Commission.

The Commission should not rush to a judgment for a September 1st decision. This Commission and Governor Doyle won't want to be remembered as the people who turned Wisconsin into the 'Gulf Coast' of midwest industrial wind development.

Respectfully submitted, Kevin Kawula, 13133 W. Dorner Rd., Broadhead, Wi, 53520

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