Wind Power Development

Pro-active and deliberate policies aimed to foster efficient, equitable, harmonious and aggressive use of our wind resources

By Joe Richardson, a North Dakota landowner and wind power advocate.
Note: I receive no compensation from any source for this or any energy related work.

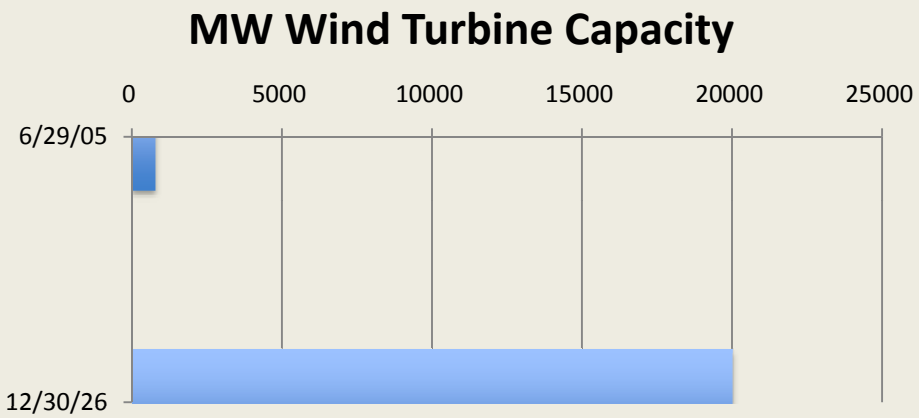
Welcoming Fair & Equitable Development

North Dakota is well-positioned, from a resource strength and economic perspective to lead the nation in defining wind development policies that serve long term interests.

We are not desperate or destitute and can, therefore, participate with developers in ensuring that growth in the use of our resources is sustainable and equitable beyond the initial wind power rush.

Level of Development

Current Development vs. Development 2030?



With ND having 11% of U.S. land-based utility-scale wind power potential and a DOE target of 250,000 MWs of turbine capacity by 2030, ND could, transmission providing, have over 20,000 MWs of capacity by 2030. Perhaps we now have less than 5% of the development we will be receiving? Perhaps we have 10 or even 20%?

Problems now, only magnify later….

Issue: Wind Resource Consumption

Current leasing practices do not value the diminished or eliminated wind resource of downwind neighbors. The elimination or severe depreciation of the wind resource of a neighbor without just compensation for that resource, is a cause for legal action and might even prevail at trial. Should this happen, the court may lack policy guidance for a resolution and might impose a resolution. Litigation, one neighbor against another, could sour public acceptance for wind power development in general.

Presentation Note

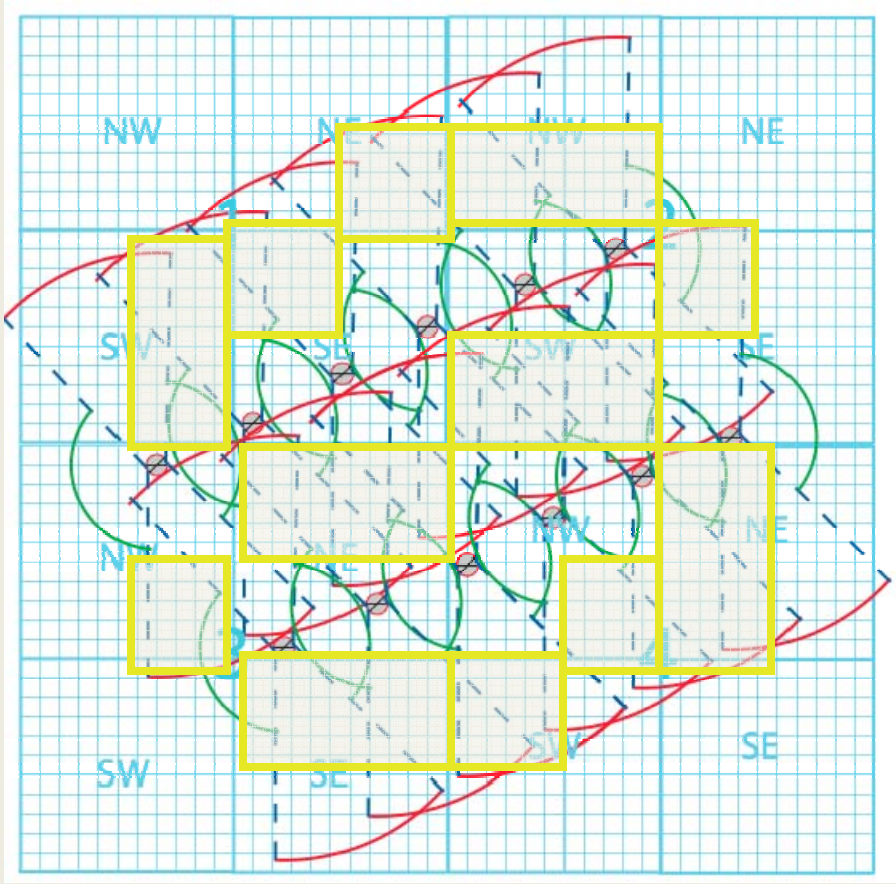
Diagrams used refer to wind turbines that have 80 meter (262.47 foot) rotor diameters.

Diagrams are to scale.

Prevailing winds suggested by diagrams are out of the NNW in winter and SSE in summer.

The use of $5,000 per turbine in annual lease is neither suggestive of what leases should pay nor reflective of what is being paid. The amount is only used as an illustration.

Current Real Estate Only Compensation Practices Make Many Losers



Owners of the shaded yellow-box 40 and 80 acre plots are likely to entirely lose their wind resource without compensation, under the existing real estate-based compensation practice, unless they happen to own an adjoining property with a turbine on it.

Wind Consumption – The Science

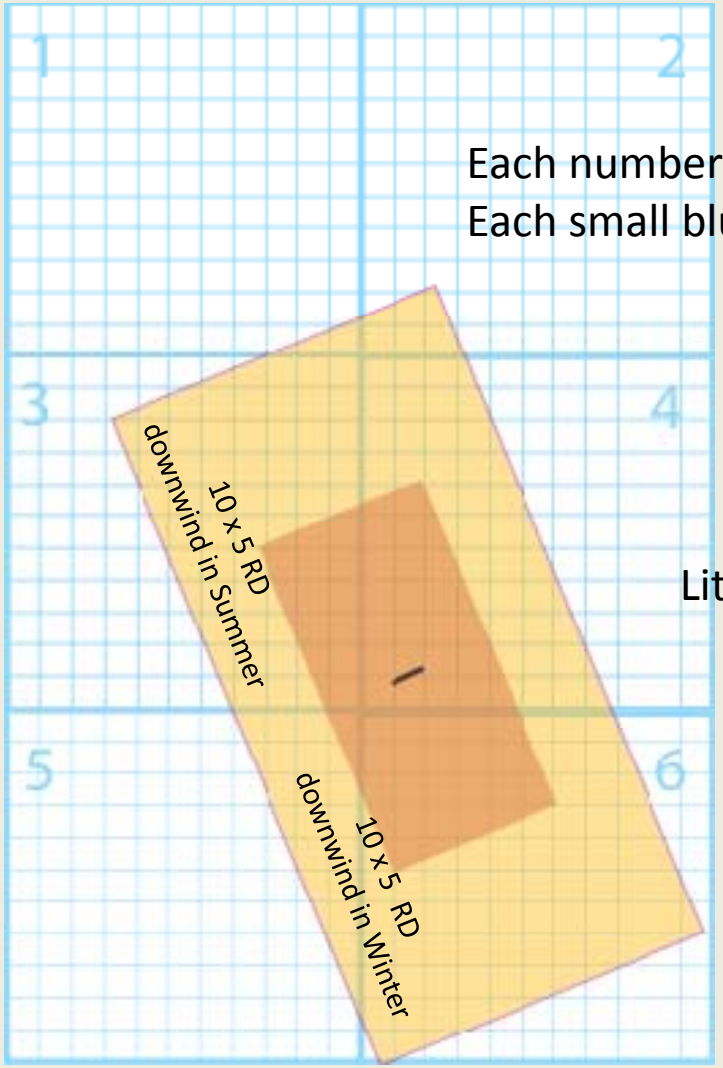
"If the wind strikes a second turbine before the wind speed has been restored from striking an earlier turbine, the energy production from the second turbine will be decreased relative to the unshielded production. The amount of the decrease is a function of the wind shear, the turbulence in the the wind, the turbulence added by the turbines, and the terrain. This can easily be in the range of five to ten percent for downwind spacings of around ten rotor diameters."

"For the mid United States from Texas to North Dakota, it appears that a reasonable spacing is four rotor diameters between the turbines in a row and ten rotor diameters between rows. The rows would be aligned across the prevailing wind direction, usually in a east-west direction in this part of the world where strong winds are usually from the north or south."

----Dr. Gary L. Johnson, "Wind Energy Systems," Chapter 9-1, Electronic Version, December 10, 2001

Dr. Gary L. Johnson taught electrical engineering at Kansas State University for 28 years before taking early retirement in 1994. **He wrote a textbook "Wind Energy Systems"** which was used in a senior elective course for many years. Prentice-Hall let the book go out of print and gave the copyright back to Dr. Johnson. The revised and expanded version was then used for several more years.

80m Rotor Wake/Shadow



NW Winter Prevailing & SE Summer Prevailing

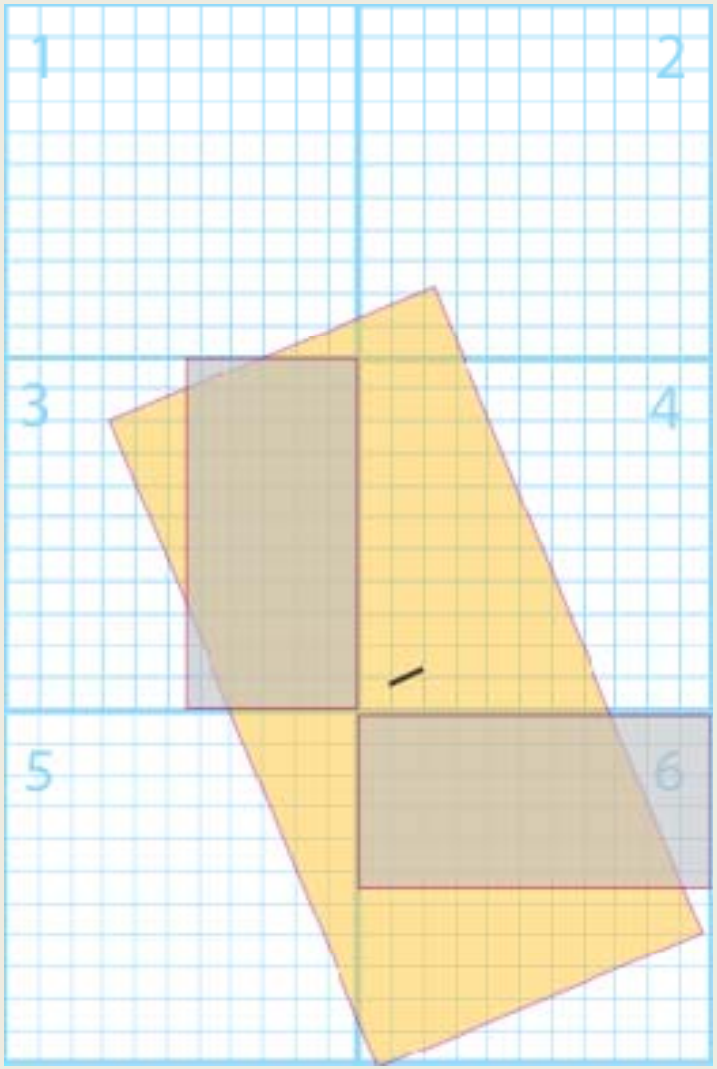
Each numbered block = 1 Quarter Section
Each small blue square = 240 ft. sq.

Little black line in center of boxes = Rotor

Light gold box = complete resource consumed.

Dark gold box = half the resource consumed.

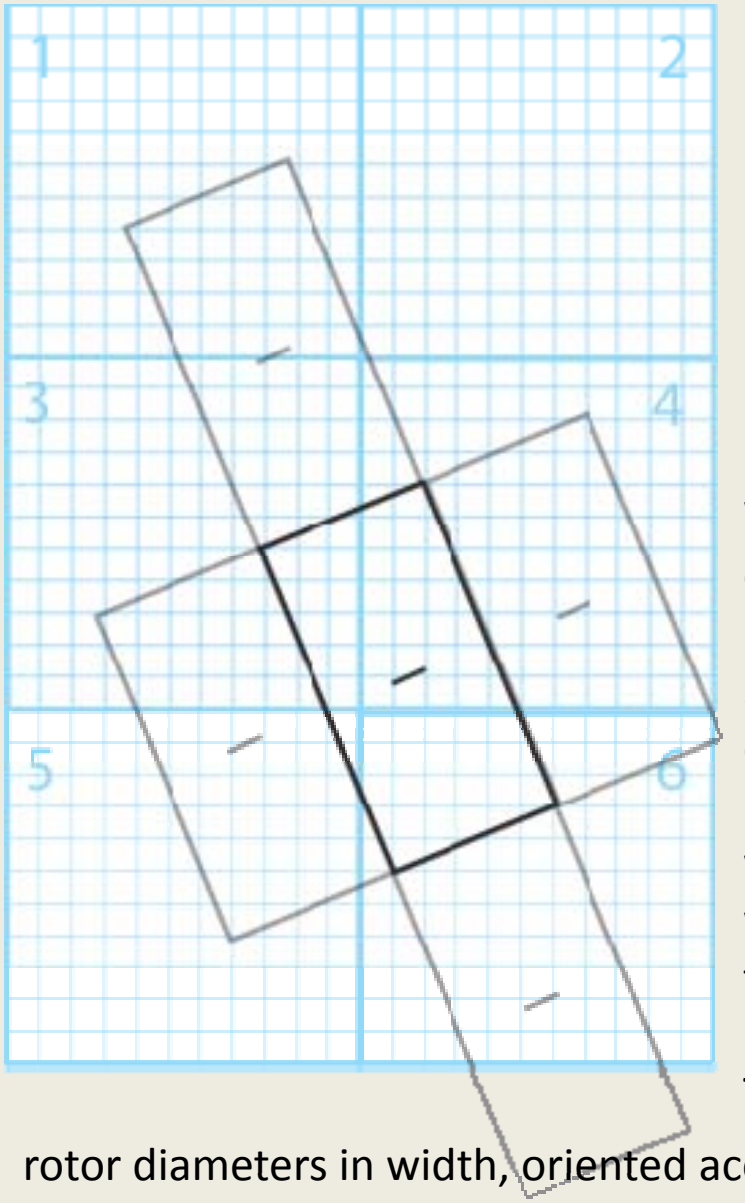
Turbine Real Estate Takes All



A turbine and access road will, on average, take about 2 or 3 acres out of agricultural production. If that turbine deploys an 80 meter rotor, and there are two opposing directions for seasonal prevailing winds, the turbulence from the turbine will involve 284.67 acres.

The owners of the 80 acre rectangular plots have their wind resource consumed without compensation, potentially for generations.

Note: some developers offer a non-negotiable token buffer payment to neighboring property owners.



New Rule: Pay for the Resource Used

Pay for both the real estate and the wind resource.

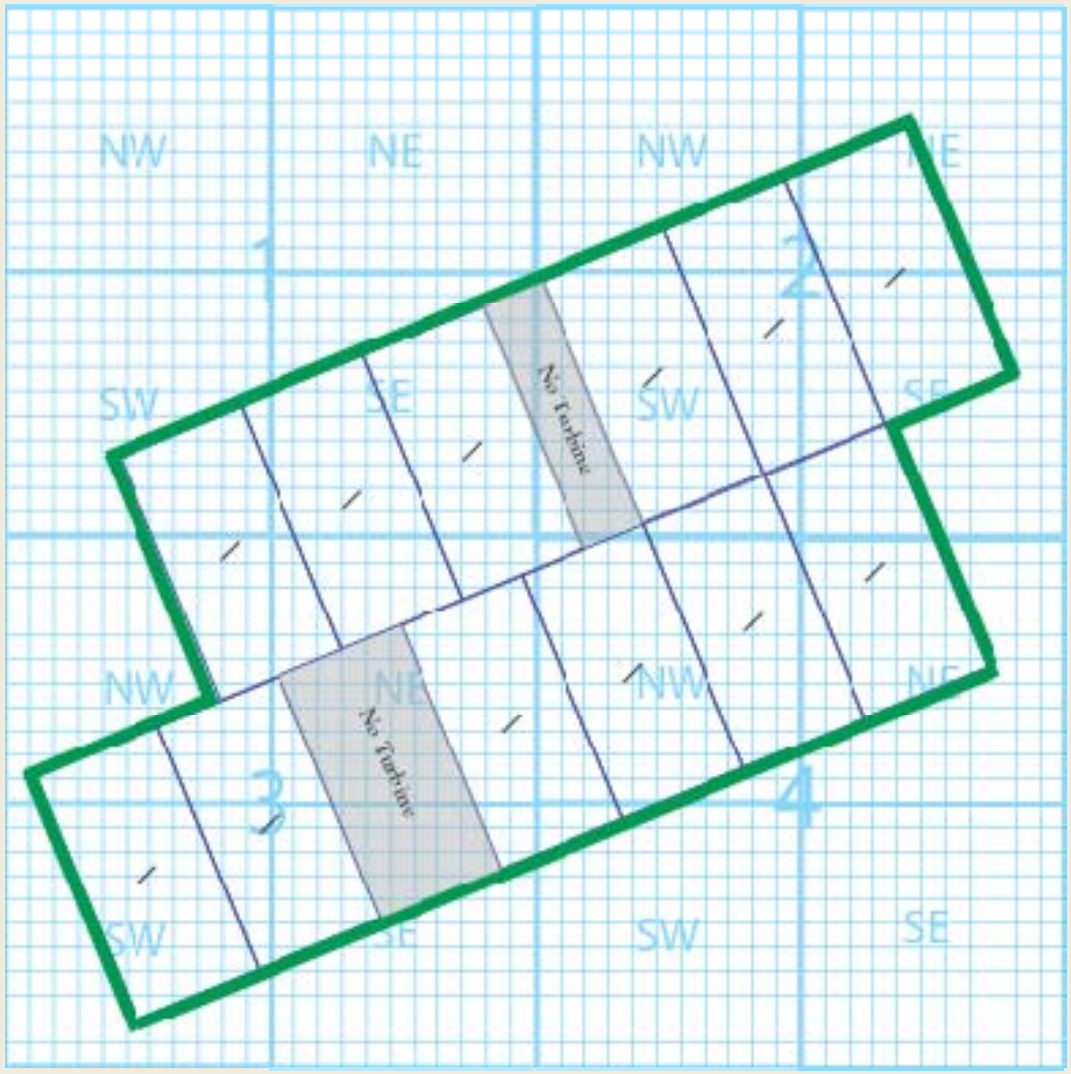
Real estate payments are for ground taken out of production.

Wind resource payment pools are for wind consumed.

$5,000 per turbine could be divided $1,250 for real estate and $3,750 for the wind pool with each landowner paid by acres within the pool. Real estate would pay $416.66 - $625 per acre per annum. Pool would pay $47.47 per wind acre per annum. Note that the owner of real estate also gets wind payment.

To the left, each turbine is placed in the center of a rectangle that is 10 rotor diameters in length and 5 rotor diameters in width, oriented according relative prevailing winds. Each turbine is 10 RD downwind and 4 RD laterally from each other.

Wind Pools in Wind Farms



The 10 x 5 RD rectangles are used to define the outer boundaries of a wind farm. All acres within the wind farm become part of the wind resource pool.

This wind farm has 1,068 acres. It has 12 turbines. At $5,000 per turbine, it has an annual lease revenue of $60,000. Of that $15,000 goes for real estate @ $1,250 per turbine. $45,000 goes to the wind resource pool @ $42.13 per acre.

Disadvantages with Current Practice

- Pits neighbor against neighbor.
- Animosity will fester for generations as lease periods extend up to 99 years in the case of FPL.
- Pits developer against developer.
- Could result in very disruptive litigation.
- Isn’t fair.
- Contrary to established principle and precedent in compensation of resource owners in ND oil and gas development.

Advantages of Wind-Resource Based Compensation

- When payments are balanced right between real estate and wind pools, landowners will not care if they get a turbine, so long as they are in the pool.
- Developers can place turbines freely based on the wind resource to maximize their financial return.
- Clear signals to all.
- Fair
- Doable as shown by decades of experience in the oil and gas fields.
- Harmony

Considerations to New Rules

- All land within the parameter of the wind farm shares in the wind pool.
- Any landowner can prevent a turbine from being placed on their property; however, when they have less than (3%?) of a wind farm's wind resource pool, the wind resource lease can be compelled. No lease may be compelled where more than 15% of the land is owned by those refusing to lease.
- Developers not wishing to compensate for wind resource rights must set their turbines back 5 RD from any neighboring property owner.