

Rationale of Key Aspects Contained in the Commercial Wind Ordinance Proposed by the Zoning Commission

Purpose

The purpose of this document is to provide the reader with a perspective of the rationale behind certain decisions and criteria established in the proposed commercial wind development ordinance produced by the Zoning Commission (Commission). It will specifically address decisions related to setbacks, sound and shadow flicker, as those seem to be areas where a great number of people have questions or concerns.

Guiding Principles

1. Each landowner had rights relative to their own property. Those rights begin and end at their property line.
2. As part of the rights recognized in #1 is the future enjoyment and use of land within the confines of their property, consistent with the rules of a civil society.
3. The effects of commercial wind turbine operations are real. They commonly produce (among other things) sound, shadow flicker and a safety danger from fire, flying ice and other debris. Energy companies recognize this and require 'effects' easements' as part of the agreements with landowners that sell their wind rights to them.
4. Certain landowners may choose to give up or sell their rights for protections against the effects described in #3 and exercise their rights to seek a commercial wind turbine on their property, consistent with #2.
5. Unlike the landowners described in #4, certain landowners choose not to give up their rights of protection from effects described in #3.
6. Instances described in #4 and #5 occur, where the choices of landowners in #4 may result in effects described in #3 to be impacted on landowners described in #5. Since this potential is real and occurs, a means to adjudicate conflicts must be enabled via ordinance.
7. That the categories of sound, shadow and danger are individual aspects that have specific characteristics and can be individually accounted for or controlled.

Rationale

For many years, the effects of sound, shadow and safety have all been lumped into one bucket of 'effects' and the tool of setbacks was used to address them as a collection. The commission chose to leverage the technology and scientific information available today to separate the effects and address each individually. That is not to say we advocate picking one or the other, but rather each have a way to be managed and each should be managed on their own merits as part of a collection.

Property line vs Residence

We determined that in light of the guiding principles that the effects from turbine operation should not be forced upon anyone, or the protective rights from effects taken from them. Limits were placed at the

property line in recognition that future use of land may result in new subdivision or new homes or new animal use. Supporting this concept is the legal doctrine and constitutional clause prohibiting public taking of property by regulation. In other words, we tried to ensure that language in the ordinance did not automatically result in taking of the right of enjoyment to property from landowners choosing not to give up their protections against effects of turbine operations, just because their neighbor gave up or sold their rights of protections from those effects. In short, decisions by one landowner to give up their rights to effects of turbine operation were a relinquishment of their own rights, they should not result in automatic taking of rights from their neighbors.

Sound

Among the most prevalent complaints and predominate impacts vocalized by citizens is that of sound impact. Nearly all complaints that we heard carried a sound impact aspect to it. We also heard from health authorities and saw in peer-reviewed scientific journals that there were physiological health impacts as result of certain types and levels of sound – though debate continues as to the severity. Frequently, as has been done so often in the past, distance had been the suggested tool of choice to address that effect. The Commission instead chose to manage sound as sound, and use the tools of sound levels, modeling, thresholds and measuring as the means to manage that effect. Simply put, the commission established sound level thresholds consistent with scientifically recognized sound levels of quiet rural communities and determined that is the level currently lived in by citizens of the county. We used that as the baseline threshold for landowners choosing not to have a turbine on their property. And, we established threshold for lands hosting a turbine that was based on consideration of physiological health aspects. We also provided provisions for these levels to be waived (discussed below)

There are a myriad of ways for wind turbine operators to manage the amount of sound received at any given location, and the onus is on them to ensure that turbine operations comply. Alternatively, they can work with and convince or purchase the same effects impacts easement from the impacted adjacent landowner just as they did from the turbine hosting landowner. That is why we provided for a waiver of those thresholds if that adjacent landowner agrees to give up those effects' rights.

We also established a requirement for the turbine developer to perform sound modeling analysis in advance, share that modeling during permitting for validation, and included strong complaint resolution and ramifications if violated. In this way, it motivates the developer and hosting landowner to work with the neighbor and protects the neighbor from an automatic taking of their rights by regulation. Those rules are consistent with rulings from the Iowa and U.S. Supreme Courts.

Of note the ordinance does recognize though that sound levels for landowners hosting turbines may be void depending on the specific language of the effect's easements granted by those landowners. In short, they may have given away protections that they might otherwise have, and the ordinance cannot change that.

Why Three Measures for Sound

Readers of the ordinance will note that sound thresholds are expressed in three measures of a number expressed as dBA, dBC, and dBG and wonder why not just dBA since it's the one most often cited. The simple reason is that sound and the measurement of sound is complex, and using a single measurement simply excludes certain sounds and sound levels. Here's a simplistic discussion of it.

Sound is a wave and the wave can be considered a cycle of a low and high. These are expressed as frequencies and the more cycles in a second of time the higher the frequency. The intensity level of sound is measured in decibels (dB). Sound measuring devices then take those measured decibels and apply a mathematical formula or 'filter' to display a final number. There are a number of common filters, A, B, C, G, and others. These are known as weighting filters and each used for a specific purpose. The A filter filters out sound intensity at lower frequencies. To accomplish that it subtracts a specified amount of dB for each frequency. The idea behind the A filter is to emphasize the higher frequencies that are presumably more sensitive to the human ear, but it is doing so by penalizing the intensity level of the lower frequencies which are still heard or detected by humans. The C filter does not subtract or penalize the lower frequencies like the A filter does, and it presents the dB level at some of those lower frequencies in a manner closer to what is actually measured. Likewise, the G filter is used for measurements of frequencies (i.e. noise) at even lower frequencies. For example, if you measured the sound level of the noon whistle (a higher frequency) you may get a similar reading from the measuring device using the A and C filters. But if you measured the sound of a train rumbling on a railroad track (lower frequency) with the A and C filters you would get two dramatically different numbers, with the dBA showing a number that could be up to 40 decibels lower than dBC. Again, that's because each filter is designed for a different purpose – one for use at higher frequencies and one for use for lower frequencies. The dBG is for use at frequencies even lower than what dBC is commonly used for. That's why we have three measures and each with their own number. The numbers are based on ranges the commission selected after review of the peer-reviewed scientific literature, recommendations by health officials and professional acousticians. One should also be aware that decibel measurements are exponential, which means that a 5dB change from 40 to 45 is actually a doubling of the sound intensity.

Shadow

It is a fact that the rotating blades between the sun and the ground, or objects on the ground, cause a shadow and the rotation causes a repeating shadow or 'shadow flicker'. There is no denying that. There is also no denying that it can be extremely annoying to people, and pulling the curtains or shades does not stop the shadows from inside the house. Without entering the debate of health aspects to people or impacts to animals it is enough that we know the complaints of impacts are real. They are also not isolated to a few but are recognized and complained of world-wide. For this reason, we determined that it was deserving to be managed in the ordinance, and with its limits at the property line, for reasons already stated.

The measurement of shadow is easy to measure – it is there, or it is not. Since the pre-turbine state is no shadow flicker, then obviously the protective threshold should be no shadow flicker for those that have chosen not to give up those rights. This is easily managed by the turbine operator by use of geometry and known travel of the sun relative to any position on earth on any given day. This is one of the simplest and most predictable effects for them to manage, and with very minimal impact to operation – if any. Shadow flicker may also be waived by the adjacent landowner as we've described in the discussion for Sound.

Also like the discussion in Sound, the commission also established a threshold (albeit higher) for landowners hosting a turbine in light of potential physiological health concerns. It was felt that even though those effects rights may also have been given up or sold by those landowners, the health concerns dictated limits. Those thresholds were established in line with the overwhelming evidence of those measures being commonly accepted and used. However, as described in the discussion for Sound, those limits may not apply depending on the details of the effects easements those landowners may have signed legally away.

Setbacks

If one accepts that sound and shadow is effectively managed based on the ordinance language specific to those aspects, then Setbacks are isolated for use to address safety. Once again, the determination was that it should apply to the property at-large as opposed to a current specific building or type of building on one's property. In research, the commission for no such thing as a "standard" setback a multitude of setbacks are used anywhere from 600 feet to 1.5 miles in Iowa, and zero to 2.5 miles elsewhere. Nor was there much information on the rationale behind the wide range of setbacks used other than in an attempt to manage sound impacts. Most of the safety related literature addressed the throwing of ice or debris from fire or blade breakage but included complex calculations dependent on a variety of variables that would result in a significant challenge for the ordinance and permitting process that precluded developing a single safety setback. While we recognized that safety was a situation dependent circumstance and we wanted to ensure the ordinance recognized that, but we also felt it was necessary to establish minimum safety distance.

We found guidance in turbine manufacture literature of a fire safety zone of 1,640 feet for turbines of the class recently installed in Worth county. Knowing that Worth county has seen at least 3 turbine fires, our belief was that 1) turbine fires were not uncommon, and 2) if a manufacture established a 1640' safety zone, that a 1600' safety zone would be a good minimum. However, we also recognized that as turbines got larger the safety zone should also increase so we developed a multiplier to accommodate that. We also recognized that there are any number of other safety factors unknown to us but known to manufactures and turbine operators and specific to various turbine designs, so we included language that required they share that turbine manufacture safety information with the county, and if those safety cautions created ranges in excess of safety minimum, that the setback would automatically be increased accordingly.