

County Zoning Ordinances for Commercial Wind Compared to Indiana's Wind Energy Ready Community Standards

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The Indiana General Assembly passed Senate Bill 411 in the spring of 2022, creating voluntary commercial wind regulation standards. Communities that adopt these voluntary standards or have less restrictive standards regulating commercial wind development can qualify as a wind energy ready community. The legislation lays out seven categories of standards, including:

- setbacks and maximum height
- shadow flicker
- signal interference
- sound level limitations
- wind turbine light mitigation technology;
- drainage repair and
- decommissioning

Scope of this study

This study compares Indiana counties' current zoning ordinances to the voluntary standards for commercial wind development outlined in SB 411 and enacted in Indiana Code 8-1-41. The study is limited to use standards or overlay district standards specific to commercial wind within the zoning ordinance governing the county's unincorporated area. It does not look extensively at the permitting process, such as whether it is a permitted use or special exception and in what districts, whether an amendment to the zoning map would be required, or permit fees. Because each county could permit commercial wind projects in many districts, the study also does not consider the zoning district standards which apply to all developments within a district. Finally, this report is not a definitive answer as to whether a county's regulations meet the requirements of this legislation to be considered a wind energy ready community. It should be used for informational purposes only. The information is not intended to provide specific recommendations for policies or decisions.

IC 8-1-41-9 from this legislation reads

Sec. 9. (a) A permit authority for a unit described in section 1(a) of this chapter is responsible for enforcing compliance with any standards set forth in sections 10 through 16 of this chapter that apply in the unit under section 1(a) of this chapter.

(b) A unit may:

(1) adopt and enforce a wind power regulation that includes standards that:

(A) concern the permitting, construction, installation, siting, modification, operation, or decommissioning of wind power devices in the unit; and

(B) are less restrictive than the standards set forth in this chapter;

(2) waive or make less restrictive any standard set forth in this chapter with respect to any particular:

- (A) wind power device; or
- (B) project to install one (1) or more wind power devices in the unit; or
- (3) waive or make less restrictive any standard that is not set forth in this chapter but that is included in a wind power regulation adopted by the unit with respect to any particular:
 - (A) wind power device; or
 - (B) project to install one (1) or more wind power devices in the unit.
- (c) This chapter does not affect a unit's planning and zoning powers under [IC 36-7](#) with respect to the permitting, construction, installation, or siting of one (1) or more wind power devices in the unit.

For this study, section 9 is interpreted as precluding any county with a standard greater than those listed in sections 10-16 or any additional standard required for commercial wind development but not included in sections 10-16 from being considered a wind energy ready community. Some additional standards may be regarded as industry standards or requirements replicated from other agencies, which developers or communities may not interpret as more restrictive. This study highlights some of these nuances and provides an opportunity for discussion among policymakers, planners, land use attorneys, and commercial wind developers.

Methodology

Data from the Indiana Renewable Energy Community Planning Survey and Ordinance Inventory Summary (Ogle & Salazar, 2021) and updated ordinances collected from county planning offices were evaluated using the categories from the legislation. The study did not focus on collecting ordinances, but updated ordinances were incorporated if the researcher was aware of revisions from news articles or colleagues. The analysis does not include counties without planning and zoning or zoning standards specific to commercial wind development. Counties that do not permit commercial wind development in any district were excluded from the detailed analysis but included in the map (Figure 1). The ordinances of the remaining forty-four counties were then analyzed to ascertain whether they met the standards in the seven categories from the legislation: setbacks and height, shadow flicker, interference, sound limit, wind turbine light mitigation technology, drainage repair, and decommissioning. Two additional categories were added to indicate whether the ordinance had setbacks from additional uses and any other additional use standards or requirements. Finally, a score of zero through nine was assigned to each county based on the number of categories where their standards met or were less restrictive than the standards in the legislation.

Findings

The study found 52 counties with commercial wind energy defined as a use in their zoning ordinance. Eight of these counties do not permit commercial wind in any zoning district. These counties were excluded from the analysis. Of the remaining 44 counties, two (Clark and Warren counties) met all nine categories set forth in the legislation and this study. Both Clark and Warren counties permit commercial wind as a special exception in at least their agricultural zoning district with no additional use standards. Ripley County may also meet the standards in the legislation, as their only additional standard is that the commercial wind energy system must be certified by an engineer. This is likely an industry standard or required by other agencies. Still, because it is in addition to the standards listed in

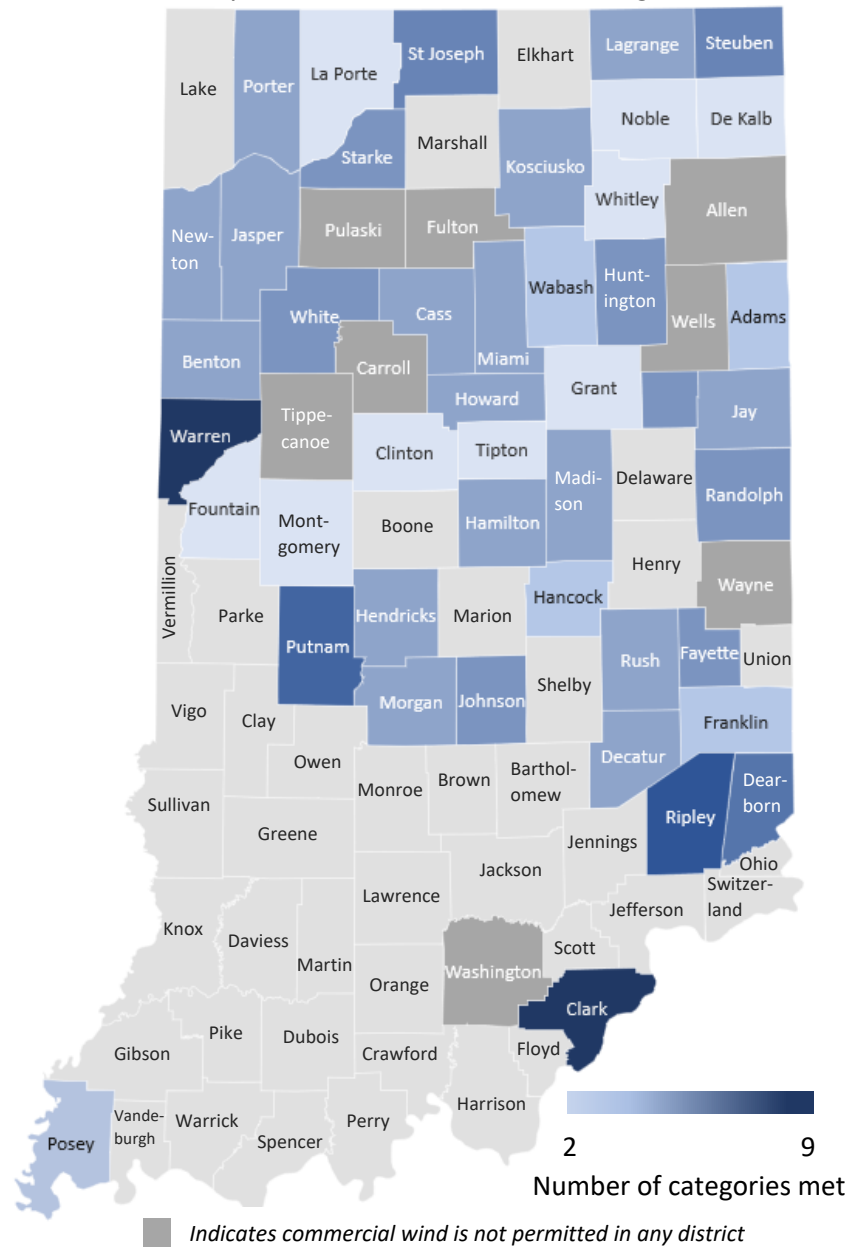
IC 8-1-41, it was considered not to meet the criteria of no additional standards or requirements. Putnam County also met eight of the nine categories. They have adopted much of the language from IC 8-1-41 in 2022 but also include standards for turbine color and require maintenance, transportation, and re-vegetation plans, as well as liability insurance and certification by an engineer. Figure 1 shows how many categories each county met. Appendix A has a detailed table of the categories met by each county. The following sections will highlight some conflicts between current ordinances and the standards in the legislation for each category.

Setbacks and Height Restrictions

IC 8-1-41-10 sets standards for wind turbine setbacks and height. Most of these setbacks are measured as a factor of the "wind power device's blade tip height, as measured from the ground to the tip of the blade." The study assumed this meant when the tip is positioned at its highest point and not the blade clearance from the ground, as the former is a common definition of total tower height (Oteri, 2008; Hoen et al., 2022). Counties can require wind power devices to adhere to the following setbacks summarized from the legislation (IC 8-1-41-10):

- 1.1 times the total tower height from the centerline of any
 - Runway
 - Public use road
 - Railroad easement or right-of-way
- 1.1 times the total tower height from a nonparticipating property line
- Three times the total tower height from the outer wall of a nonparticipating dwelling
- 1.2 times the total tower height from the right-of-way for any utility transmission or distribution line

Figure 1. Number of categories in IC 8-1-41 analysis met by counties' commercial wind zoning ordinance



- Two times the total tower height from the property line of undeveloped land zoned or platted for residential use
- 1 mile from a state park
- 1 mile from a municipality

This section also states that the setback from a nonparticipating dwelling or property line and municipality may be waived by the affected owner or municipality. The study interpreted this as an option for counties because the term "may" instead of "shall" is used. Counties without these waivers were not excluded from being considered as meeting section 10 of the legislation. Sometimes the setbacks from a property line or dwelling include all property lines or dwellings with a waiver option for all or participating owners. These ordinances were also not excluded from being considered as meeting this category.

The study found five counties that clearly meet these setbacks. Four of these counties have no specific setbacks for commercial wind, and one (Putnam County) has adopted the legislation's language. There are a variety of reasons why counties' setbacks don't meet the standards in the legislation. Some of these include requiring a minimum setback with the height factor, not measuring from the centerline, or using a specified number of feet instead of a factor of height, particularly from dwellings. Nine counties use a setback from a property line of 1.1 times tower height with a minimum of 350'. This would likely not be more restrictive based on industry standards for tower height. Commercial wind turbines in Indiana range from 389 to 591 ft (Hoen et al., 2022). Only two counties measure from the centerline for the setback from a road; sixteen use the edge of the road or right-of-way, and 15 only specify from the road. Setbacks measured from the edge of the road or right-of-way would be slightly larger than if measured from the centerline as specified in IC 8-1-41-10. Fifteen counties require commercial wind turbines to be setback 1,000'-1,520' from a nonparticipating dwelling. With the height of commercial wind towers in Indiana, 1000' would certainly not be more restrictive than the maximum setback for dwellings of 3 times the total turbine height set forth in the legislation, but 1,500' and 1,520' would be in some cases (Hoen et al., 2022). Finally, some counties simply have more restrictive setbacks for one or more of the uses listed in section 10. Seventeen counties have a setback definitively greater than 1.1 times the total tower height from a nonparticipating property line. These range from 1.5x the tower height (4 counties) to 6.5 times the tower height (2 counties).

Section 10 also prohibits including a "blade tip height limitation" that is more restrictive than the Federal Aviation Administration. Ten counties have a restriction on maximum height ranging from 220-600 ft.

Additional Setbacks

The study provided a separate category for setbacks from additional uses. If the ordinance required a setback from any use, zoning district, or right-of-way not listed in section 10, it did not meet this category. Thirty-four of the 44 counties included a setback from a use not listed in section 10. Table 1 shows some common use categories for these additional setbacks. The specific use buffered varies. For example, if a county names a setback from a particular river or reservoir, it is included in the bodies of water category in Table 1. The legislation contains a setback from both undeveloped platted land

Table 1. Common setbacks from uses not listed in IC 8-1-41-10

	No. of Counties
All occupied buildings	12
Public or institutional use, including schools and religious institutions	9
Bodies of water	9
Participating residence	9
Other tower/communications tower	6
Wetlands or floodplains	6
Existing platted community or subdivision	6

and municipalities. The existing platted community or subdivision category in Table 1 counts counties that require a setback from unincorporated communities or have different setbacks for a single dwelling and an existing subdivision.

Shadow Flicker

IC 8-1-41-11 sets a standard for limiting shadow flicker on a nonparticipating dwelling. This section allows a county to require a shadow flicker analysis or study. They also can require towers not to be placed where a dwelling on a nonparticipating property will experience "more than thirty (30) hours per year of shadow flicker under planned operating conditions for the wind

power device" (IC 8-1-41-11). Twenty-three counties meet this category, with 20 having no limitations on shadow flicker. Common reasons for more restrictive shadow flicker standards included a daily limit (i.e., 30 hours per year or 30 minutes per day) or restricting shadow flicker on other uses such as roadways or all nonparticipating uses. Thirteen counties require no shadow flicker on at least nonparticipating dwellings and sometimes other uses.

This section also allows counties to offer a waiver of this standard by the owner of an affected dwelling. This study did not consider the absence of a waiver as being more restrictive.

Signal Interference

IC 8-1-41-12 allows a county to set interference standards to minimize or mitigate impacts on various radar and communication signals. Thirty-six of the 44 counties include language about interference. The language in both the legislation and the ordinances is broad. The study categorized ordinances that used wording such as "eliminated" and "shall resolve or not interfere" in regards to interference as more restrictive than "minimized or mitigated." Eleven counties used language that was considered more restrictive. The study did not consider requiring a communications study as being more restrictive as it may be used to demonstrate compliance with the standard.

Sound level limitations

IC 8-1-41-12 sets the following maximum for noise limiting standards:

"a project owner may not install or locate a wind power device in a unit unless the project owner demonstrates to the permit authority that the wind power device will operate in a manner such that the sound attributable to the wind power device will not exceed an hourly average sound level of fifty (50) A-weighted decibels, as modeled at the outer wall of an affected dwelling."

Several components are necessary for a county ordinance to align with this section. The study looked at the actual sound limit, where and how sound is measured, and if any other uses were included. Nine

counties meet all of these components, with six of those counties not requiring noise limits for commercial wind. The three counties with noise limit standards that meet or are less restrictive are the only counties that use an hourly average to measure the limit. Most counties have a fixed limit or require the limit to be met 90% of each hour. Many counties limit noise at the property line or within 200 ft of the affected dwelling. Some counties use an unweighted decibel scale, making it more difficult to ascertain whether they are more or less restrictive than 50 dBA. Twenty-one counties include another use in the limit besides nonparticipating dwellings.

This section also allows counties to offer a waiver of this standard by the owner of an affected dwelling. This study did not consider the absence of a waiver as being more restrictive. It also does not treat the requirement of a sound study as more stringent.

Light Mitigation Technology and Drainage Repair

IC 8-1-41-14 allows for light mitigation technology to be required after January 1, 2023, unless it is not or has not been approved by appropriate federal agencies, including the Federal Aviation Administration (FAA), or the project owner determines it is not economically feasible. All of the ordinances analyzed meet this standard. Putnam County, which adopted the language from the legislation, is the only county that includes language about light mitigation technology.

IC 8-1-41-15 is applicable for commercial wind projects installed after June 30, 2022. It provides that a county can require a project owner to repair or remedy any damage to drainage infrastructure from construction, installation, or maintenance. All 44 counties meet this section. Thirty-two require a drainage plan or agreement, and 28 have language about drainage repair in their ordinance.

Decommissioning

IC 8-1-41-16 provides for decommissioning and site restoration. The study looked at the following aspects of decommissioning:

- Decommissioning plan
- Surety bond or equivalent security
 - 100% of decommissioning costs net estimated salvage value
 - Allowed to be posted in increments described in IC 8-1-41-16

Nine counties meet this section's specifications, three of which do not require a decommissioning plan in their ordinance. Four require a plan but no surety bond and the last two require a plan and surety bond or equivalent. Putnam County uses the language from the legislation, and Huntington County does not include specifics about the bond. Counties with a more restrictive decommissioning plan did not include provisions for the bond to be posted in increments, may require additional assurance in the bond for unforeseen costs, or don't include salvage value in the calculation for the bond. In addition, many counties require decommissioning to be completed by a specific timeline and that soil is restored to a minimum depth. This study did not treat these as additional restrictions since they would be included in the decommissioning plan, which is allowed in IC 8-1-41-16.

Other Additional Standards and Requirements

Forty-two of the 44 counties require additional standards, plans, or requirements beyond what is listed in sections 10-16 of IC 8-1-41. Counties were considered more restrictive than the legislation's definition of a wind energy ready community if they had an additional requirement from what is listed in sections 10 through 16. Table 2 lists common additional standards and requirements. Some additional requirements might not be considered more restrictive by project owners as they may currently be required by other governmental agencies or utility companies or are industry standards. Other less common additional standards include construction standards such as dust control and waste management, tower design, and required minimum acreage per tower. Property value guarantees, environmental analysis, and construction bonds are some less frequently incorporated additional requirements.

Table 2. Common additional standards or requirements

	No. of Counties
<i>Standards</i>	
Color/Finish	41
Minimum blade clearance	38
Climb prevention	37
Warning signs	34
Braking system	32
Underground collection cables	32
<i>Other requirements</i>	
Transportation/road use plan or agreement	38
Certificate of design compliance or certified by an engineer	36
Proof of liability insurance	35
Maintenance Plan	25
Emergency/safety plan	22
Erosion control plan	22
Economic development agreement	19

Permitting process, zoning districts, and other potential conflicts

This legislation does not limit the process requirements or restrictions of zoning districts in which commercial wind must be permitted to be considered a wind energy ready community. Zoning districts are a primary tool for regulating the siting of any use. The eight counties that do not allow commercial zoning in any district meet many and sometimes all of the standards set forth in IC 8-1-41. The tool used to restrict commercial wind development is to not list it as a permitted use or special exception in any zoning district.

Additionally, the board of zoning appeals may apply additional standards or restrictions for a project during the special exception process for counties that permit wind by special exception. This tool allows communities the flexibility to work with project owners and neighbors for specific projects or locations. The trade-off is that it can make it more difficult for community members and project owners to understand the requirements of developing commercial wind from the onset. A final consideration is whether the ordinance exempts commercial wind from specific district standards that would create a conflict, such as height restrictions. A county may not have a height restriction on commercial wind. Still, if the county overlooked including an exemption from district height restrictions for commercial wind, it would require the project owner to apply for a variance from developmental

standards. Because commercial wind may be permitted in several districts with different district standards and a different permitting process (i.e., permitted use, special exception) may apply in various districts, it can be challenging to gather and synthesize all of these requirements across the state. It may be more pertinent to focus on how commercial wind is regulated in a specific type of zoning district where projects are most likely to be located.

Additionally, this study did not look at definitions in each county's ordinance. Definitions for nonparticipating land owners or dwellings may differ from the legislation, potentially changing the number of categories met for some counties.

Conclusion

Because of the specificity of language in IC 8-1-41 and the variance of local ordinances' standards and how they are organized and enforced, it is complicated to ascertain which counties' pre-existing ordinances meet the definition of a wind energy ready communities. This study finds that counties that don't have any additional use standards or adopt the language directly from the legislation are the most likely to meet standards outlined in IC 8-1-41. There are likely other counties that have worked or are currently working with commercial wind developers with more restrictive or additional standards than those in the legislation.

For additional information on renewable energy ordinances in Indiana, including land use definitions, see Indiana Renewable Energy Community Planning Survey and Ordinance Inventory Summary at www.cdext.purdue.edu/land-use.

Acknowledgments

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Appendix A. Categories met for each county

	Setbacks & Height	Shadow flicker	Signal Interference	Sound Level Limit	Light Mitigation Technology	Drainage Repair	Decommissioning	No Additional Setbacks	No Additional standards/plans	Number of categories met
Adams										3
Benton										4
Blackford										5
Cass										4
Clark										9
Clinton										2
Dearborn										7
Decatur										3
DeKalb										2
Fayette										5
Fountain										2
Franklin										3
Grant										3
Hamilton										4
Hancock										3
Hendricks										4
Howard										4
Huntington										5
Jasper										4
Jay										4
Johnson										5
Kosciusko										4
LaGrange										4
LaPorte										2
Madison										4
Miami										4
Montgomery										3
Morgan										4
Newton										4
Noble										2
Porter										4
Posey										2
Putnam										8
Randolph										5
Ripley										8
Rush										4
St. Joseph										6
Starke										5
Steuben										6
Tipton										3
Wabash										3
Warren										9
White										5
Whitley										2