

# Renewable Energy

*Fueling and Feeding America Through Renewable Resources*

## The Wind Energy Ordinance Process for Local Government

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### Introduction

Use of wind energy has become a viable and substantial strategy for expanding renewable electricity production in the Midwest, and more so recently throughout Indiana. The 850 megawatt (MW) utility-scale wind farms currently under development in Benton County are evidence of the wind energy potential in the state and of opportunities for rural economic development from wind power.

Energy concerns related to prices, supply, the environment, and pending carbon-reducing legislation have lead to the emergence of wind energy as a technology of choice to fulfill our country's increasing energy needs. The U.S. Department of Energy's office of Energy Efficiency and Renewable Energy recently proposed producing 20% of our nation's electricity needs through wind power by the year 2030. This will require the expansion of wind energy to a total of 290,000 MW of power in the next 23 years throughout the United States (DOE/EERE, 2008). To put this into perspective, generally speaking, one megawatt of power is enough electricity to meet the needs of 225 to 300 U.S. households (DOE/NREL, 2005).

The development of wind energy in Indiana counties offers an opportunity to diversify economic development in rural areas where wind resources exist. However, preparation for wind energy development requires careful consideration and planning. Rural Indiana landowners in areas with ample wind resource capacity are being approached by wind developers who want to lease their property for utility-scale wind production. Landowners and developers alike look for local ordinances for the implementation of wind energy, approved by a local governing body (typically a planning board, board of commissioners, or other local government entity). Counties equipped with wind energy ordinances and permitting processes offer a proactive approach to development for their residents.



**Figure 1.** Utility-scale wind turbines in Benton County, Indiana.

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A wind energy ordinance will address most of, but is not limited to, the following topics to integrate wind energy developments within a local community: the economic benefits, application for a permit, design and installation guidelines, setback guidelines (or distance from designated property), use of public roads, operations, liability insurance, and decommissioning of wind-energy equipment (Constanti and Beltron, 2006). Several of the wind energy ordinances currently under development in Indiana counties also account for the installation of small-scale wind turbines for residential use, businesses, and other institutions such as schools.

The wind energy development process for local government and landowners to consider follows the seven “Ps” (Source: Constanti, M. and Beltron, P., 2006), which are:

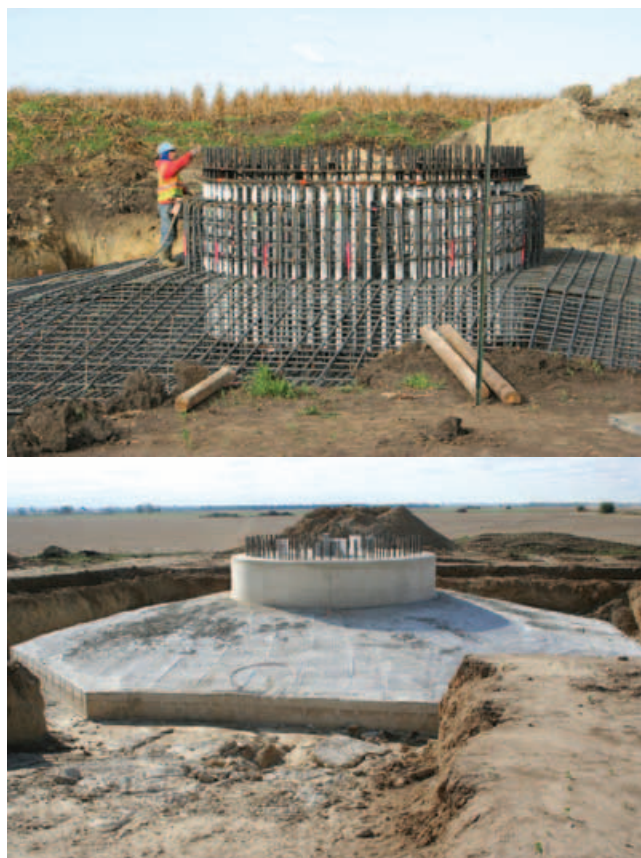
1. **Potential:** Investigating what the wind resource is within the county and learning the basics of wind energy development
2. **Promotion:** Allowing access and active promotion of the county’s wind energy resource potential to local constituents and wind energy developers
3. **Public Outreach:** Providing educational information to the general public about wind energy and its potential benefits and impacts
4. **Planning:** Creating an effective and comprehensive county plan to facilitate the development of wind energy in the county
5. **Permitting:** Creating and implementing effective permitting, zoning, and siting processes for new wind energy developments within the county
6. **Project Construction**
7. **Project Operations and Maintenance (O&M):** Keeping things going once the development has been constructed and the wind company oversees the wind farm

## Laying the Groundwork for Wind Energy

A county preparing for wind energy development and creating a wind energy ordinance should contact local government organizations in counties that have already developed wind energy ordinances to learn from them and avoid reinventing the wheel. Benton County in Northwest Indiana, the first county in the state to investigate and adopt a wind energy development plan, began the ordinance process in 2004. In July, 2007, wind farm development began in the county, giving them

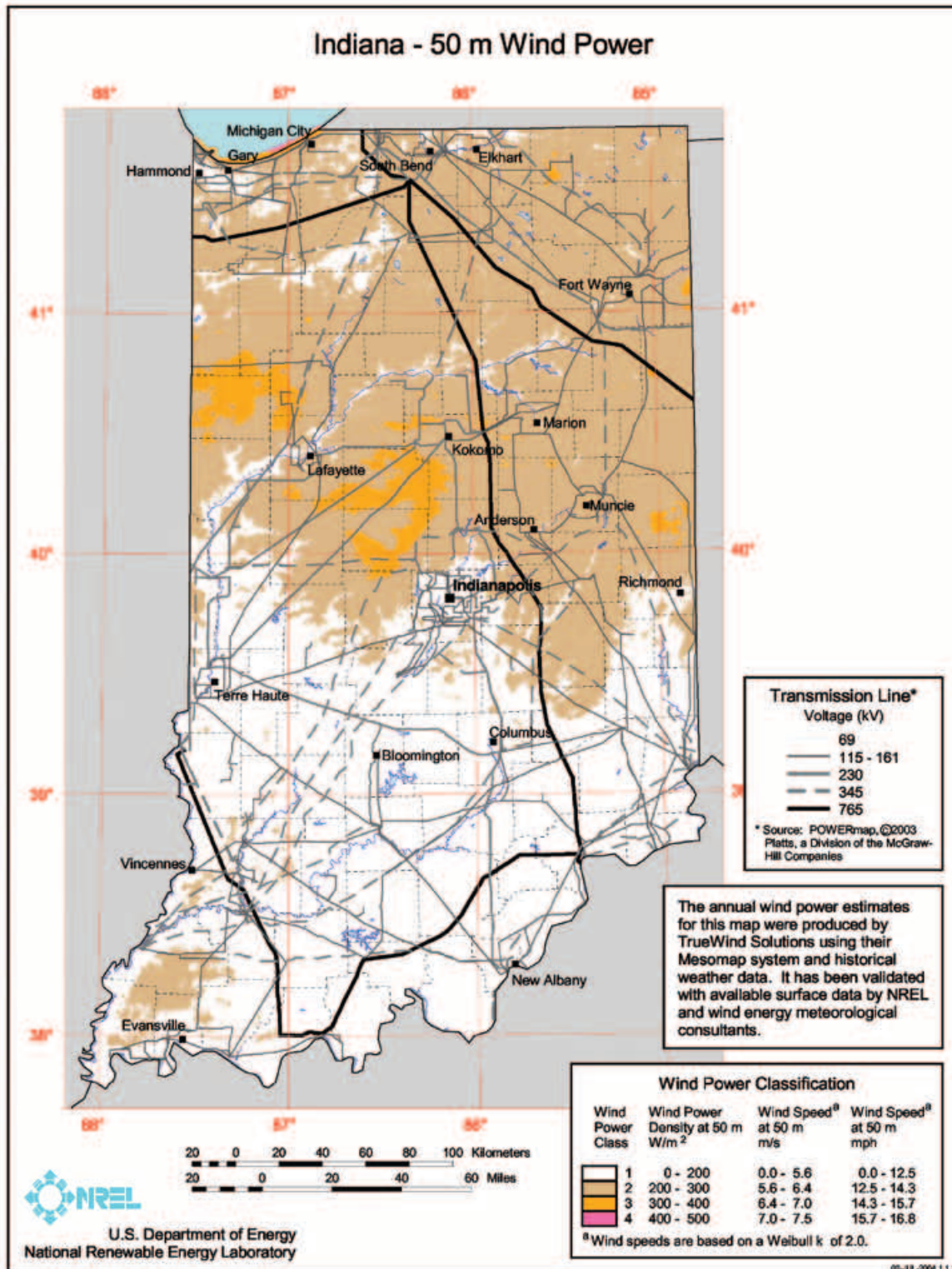
the opportunity to test their comprehensive plan. As a result, the planning commission is actively assisting other counties with wind energy potential as they create their own ordinances and permitting processes. Wind energy ordinances from multiple counties in Indiana are being compiled through Purdue Extension and may be accessed online, through your local Extension office, or through the authors of this publication.

Successful wind energy development depends upon knowing the assets within a community. First, determine if ample wind resources are available to support a large, utility-scale wind development of 600 kilowatts or larger (Constanti, 2006). Private-sector wind energy developers often collect and study site-specific data, but general wind resource maps are also available online to the general public through the National Renewable Energy Laboratory (Figures 3 and 4). Figures 3 and 4 show wind resource maps illustrating wind speeds at 50 and 100 meter heights above ground level for Indiana. Note that the wind resource



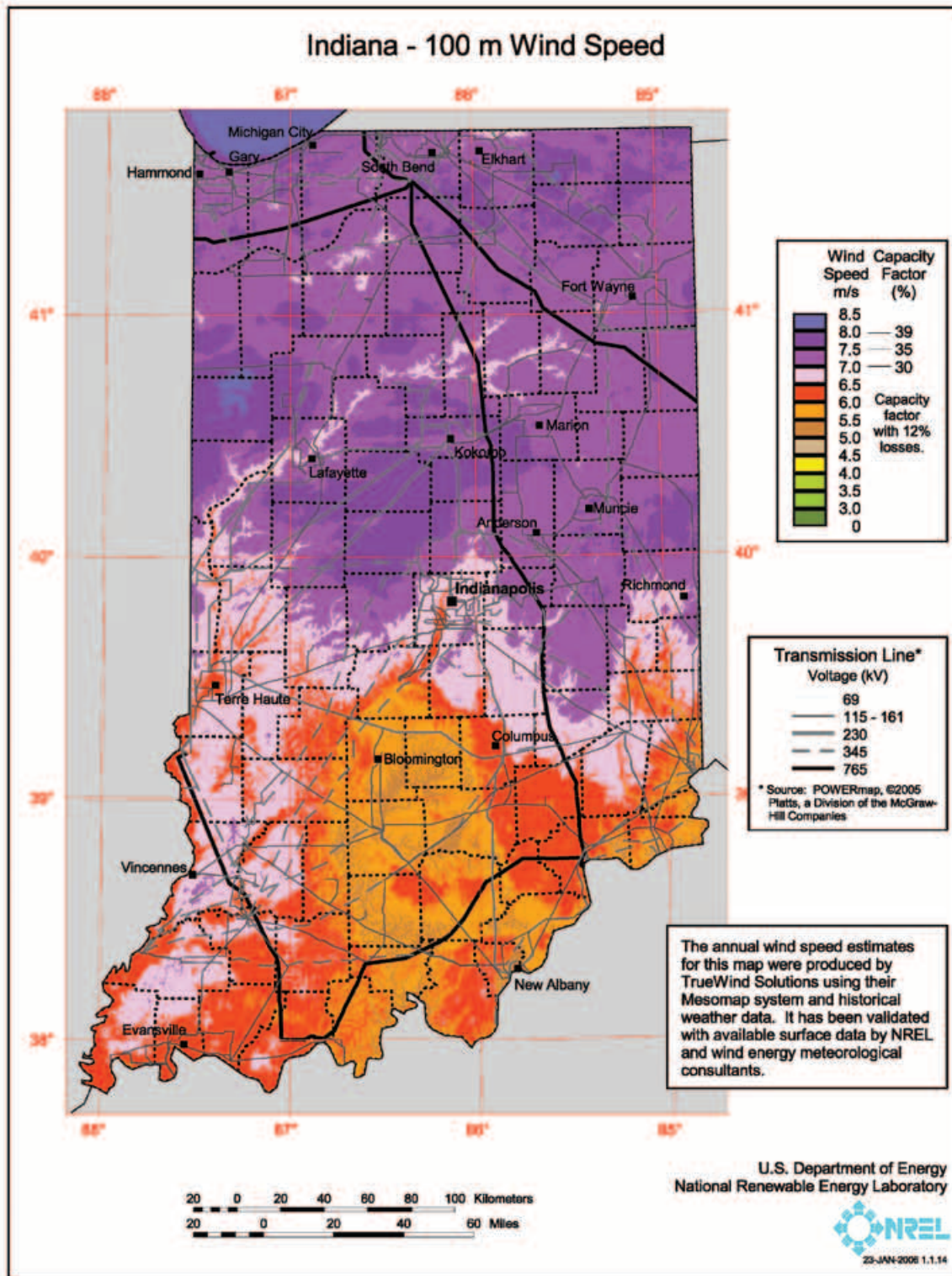
**Figure 2.** The construction of a utility-scale wind turbine foundation in Benton County, Indiana.





**Figure 3.** Indiana Wind Resource Map – 50-Meter Wind Power

Source: U.S. Department of Energy, National Renewable Energy Laboratory, 2004.



**Figure 4.** Indiana Wind Resource Map – 100-Meter Wind Speed

Source: U.S. Department of Energy, National Renewable Energy Laboratory, 2006.



maps provided by NREL are not based on wind data collected from meteorological towers mounted for wind data collection, but instead are generated using historical weather data and computer modeling tools that were validated by available surface data and meteorological consultants. Thus, these maps should not be depended upon as the sole data for making investment decisions; however, they can be used as a guide to potential wind resources in the region. Developers will need to install meteorological towers to collect site-specific wind data over time to determine the wind resources in the area of interest.

If adequate wind resources are present, effective wind energy development also must have access to suitable power transmission lines. The wind energy developer must consider the lead-time needed to establish interconnection agreements and should consult with an Independent System Operator (ISO) to facilitate this process through an interconnection study and evaluation (Lefeld, 2008).

County staff should also work with the local community to educate the public about potential opportunities that could result from wind energy development. Indiana has successfully welcomed new wind developments because of the open minds and commitment of several local citizens. Once engaged with a selected wind energy developer, a county should give the developer access to relevant information and help the developer form strategic partnerships that will facilitate the process and create a culture for a successful wind energy development.

## Considerations for a Wind Energy Ordinance

There are several components to a comprehensive county wind energy ordinance. They include, but are not limited to:

1. A required distance for setbacks or distance of the wind towers from buildings or residential property. This will depend upon the scale and the speed of the wind turbines within a proposed development.
2. A method for determining compensation to land owners and farmers due to crop or property damage resulting from transportation and/or construction. Transportation of large equipment and turbine components during construction may require the development company to include road expansions.
3. A requirement that developers maintain adequate drainage in farm fields or other land affected by construction. Wind farm developments onto farm property may conflict with drainage infrastructure.
4. A contractual arrangement describing how payments will be allocated to landowners from wind energy developers for use of the land for wind energy development.
5. An evaluation and understanding of infrastructure needs before the development process begins.
6. Noise standards for utility-scale wind turbines that properly integrate turbines with residential property.
7. Decommissioning arrangements for the structures that come into play once the wind turbines are no longer usable.

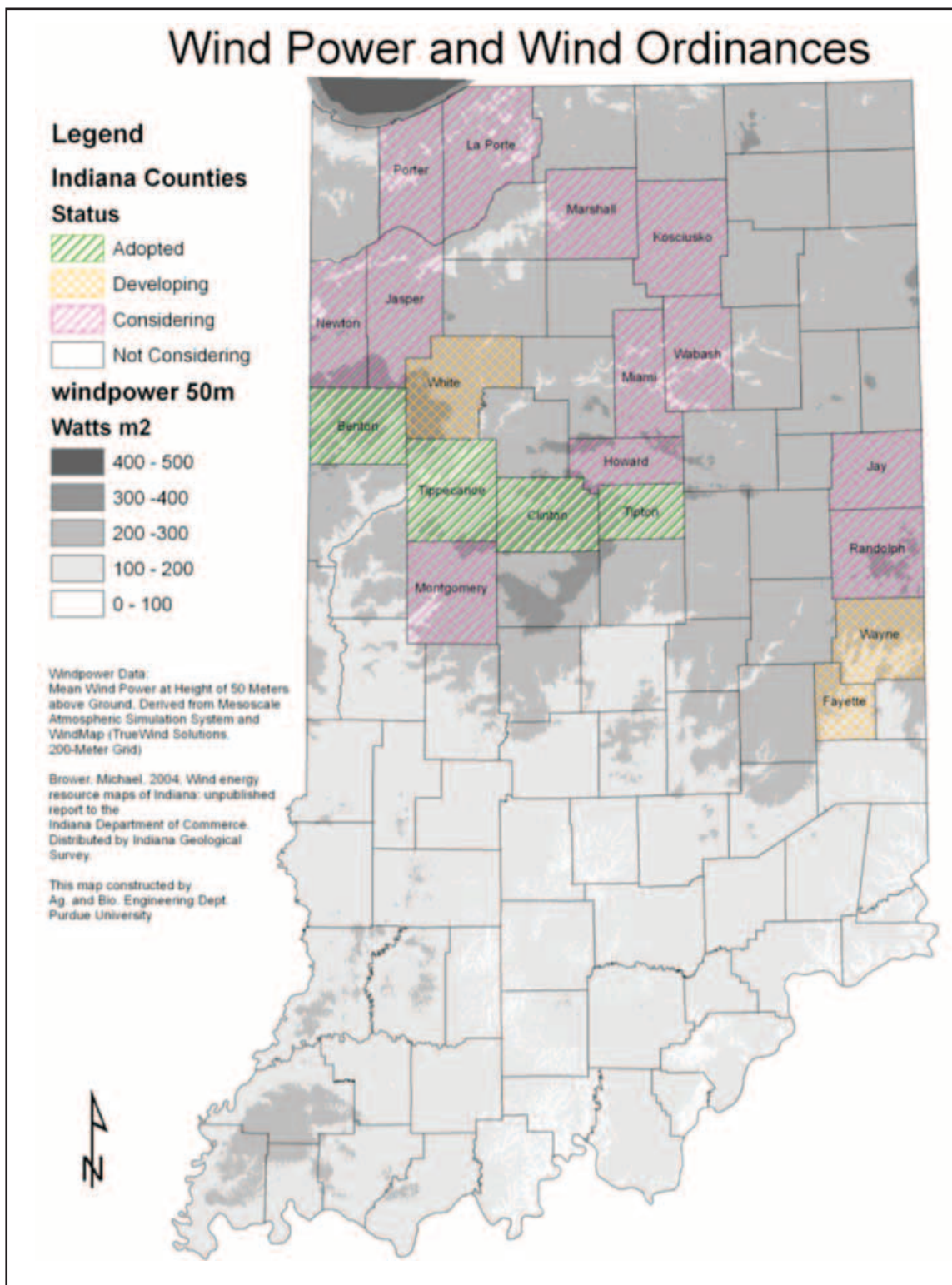
For a comprehensive resource for county planning commissions and other agencies to utilize in developing a local ordinance for wind energy development, the U.S. Department of Energy's National Renewable Energy Laboratory has created a resource guidebook titled "Wind Energy Guide for County Commissioners," which can be accessed online at: <http://www.nrel.gov/docs/fy07osti/40403.pdf>.

Figure 5 shows the status of the development of wind energy ordinances in Indiana as of August 2008, including those counties that had adopted, were developing, or were considering the creation of an ordinance at that time. Figure 6 shows that status as of June 2010 and reflects the changes that have taken place in the interim. Each map also indicates (in grayscale) the areas of the state with wind resources available for wind energy development.

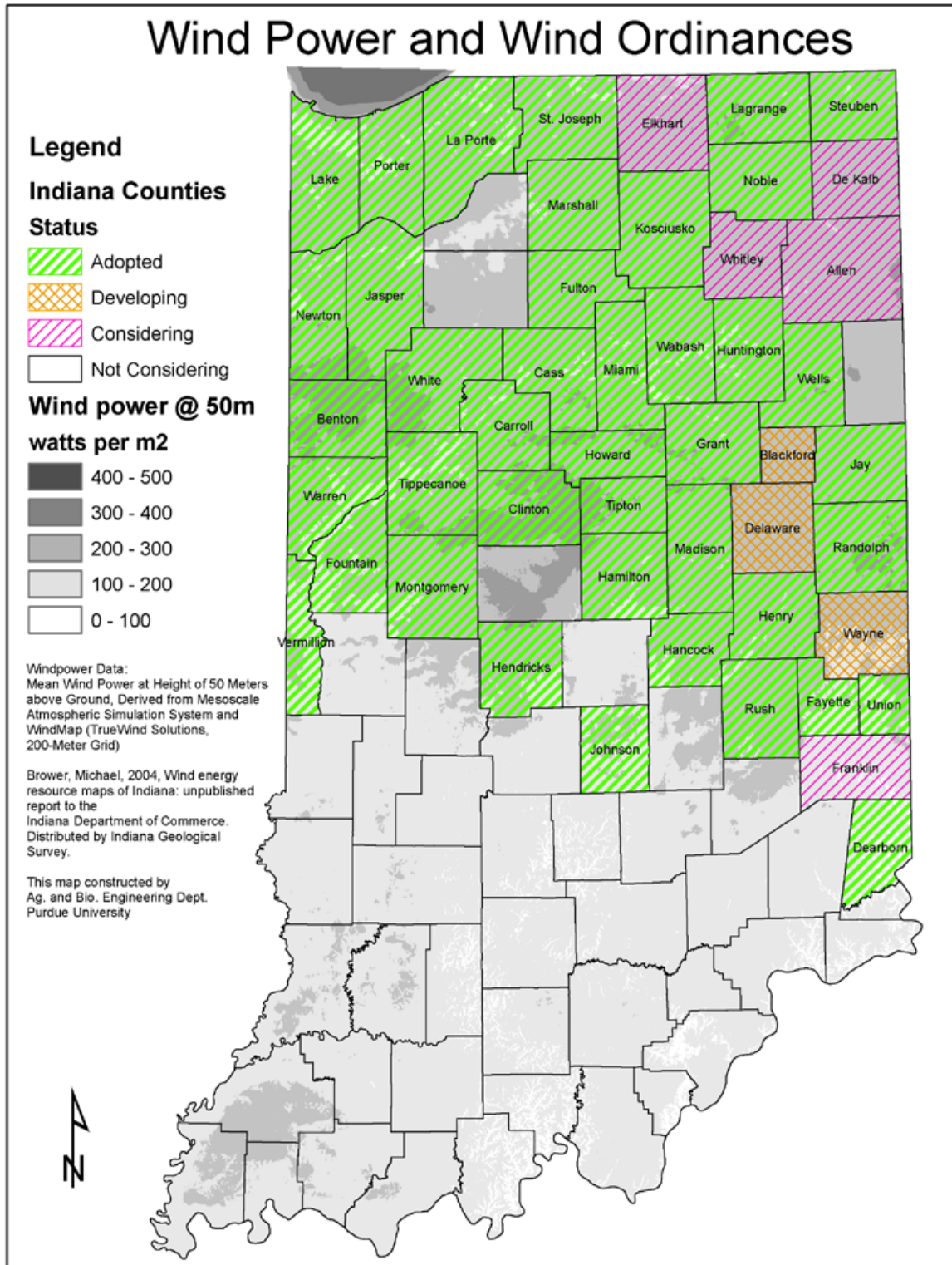
It is always good for counties to be proactive in having a wind energy ordinance in place before developers approach them to propose wind development projects. This gets the community ready, and thus primed to work towards a successful project.

## Acknowledgments

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**Figure 5.** Status of Indiana Wind Energy County Ordinances as of August 2008



**Figure 6.** Status of Indiana Wind Energy County Ordinances as of June 2010





**Figure 7.** Turbine blades awaiting installation in Benton County, Indiana.

## References

- Constanti, M. and Beltron, P. (2006). "Wind Energy Guide for County Commissioners," U.S. Department of Energy - National Renewable Energy Laboratory, Wind Powering America.
- Lefeld, J. (2008). Duke Energy, "Benton County Wind Farm – Utility Perspective," Indiana Wind Working Group, WIndiana Conference, Indianapolis, IN, June, 2008.
- U.S. Department of Energy, Energy Efficiency and Renewable Energy, "20% Wind Energy by 2030: Increasing Wind Energy's Contribution to U.S. Electricity Supply," DOE/GO-102008-2567, May, 2008.
- U.S. Department of Energy, National Renewable Energy Laboratory, Wind Powering America Program, "Indiana – 50 m Wind Power." Map created July, 2004.
- U.S. Department of Energy, National Renewable Energy Laboratory, Wind Powering America Program, "Indiana – 100 m Wind Speed." Map created January, 2006.
- U.S. Department of Energy, National Renewable Energy Laboratory, "Wind Energy Myths, Wind Powering America Fact Sheet Series," DOE/GO-102005-2137, May, 2005.
- Brower, M. (2004). "Wind Energy Resource Maps of Indiana: unpublished report to the Indiana Department of Commerce." Distributed by Indiana Geological Survey.
- TrueWind Solutions, "Mean Wind Power at Height of 50 Meters above Ground, Derived from Mesoscale Atmospheric Simulation System and WindMap." Online at: <[http://129.79.145.7/arcims/statewide\\_mxd/metadata/FGDC/WINDPWR50\\_IN.html](http://129.79.145.7/arcims/statewide_mxd/metadata/FGDC/WINDPWR50_IN.html)> (last accessed July, 2008).

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