



NREL's Wind Powering America Team Helps Indiana Develop Wind Resources

How does a state advance, in just five years, from having no wind power to having more than 1000 megawatts (MW) of installed capacity? The Wind Powering America (WPA) initiative, based at the National Renewable Energy Laboratory (NREL), employs a state-focused approach that has helped accelerate wind energy deployment in many states. One such state is Indiana, which is now home to the largest wind plant east of the Mississippi.

Since 1999, WPA has helped advance technology acceptance and wind energy deployment across the United States through the formation of state wind working groups (WWGs). The WWGs facilitate workshops, manage anemometer loan programs, conduct outreach, and facilitate landowner and community meetings. The WWGs also provide effective networking and are instrumental in overcoming initial market barriers to wind energy. Perhaps most important, WWG projects offer lessons learned that can greatly assist other states with wind energy technology outreach and acceptance.

Mapping Wind Resource Potential

Wind resource maps are among the most valuable tools used by NREL's WPA team to initiate state-based communication efforts about wind energy development. Since 1999, NREL researchers have produced and validated high-resolution wind resource maps for 39 states,



Through deep technical expertise and an unmatched breadth of capabilities, NREL leads an integrated approach across the spectrum of renewable energy innovation. From scientific discovery to accelerating market deployment, NREL works in partnership with private industry to drive the transformation of our nation's energy systems.

This case study illustrates NREL's innovations in Deployment.



The 130-MW Goodland I Wind Plant was the first utility-scale wind project in the state. Courtesy of Turner Hunt, Vision Energy



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Puerto Rico, and the U.S. Virgin Islands. Stakeholders, including government officials and wind developers, use the maps to determine whether and how wind energy can benefit their states and territories and to identify promising project locations.

In Indiana, an updated wind resource map played a significant role in fostering wind energy development. During the compilation of the U.S. Department of Energy's (DOE's) 20% Wind Energy by 2030 report, NREL researchers were tasked with updating wind resource maps, including one for Indiana. The new Indiana map showed considerably more wind resource potential (especially at 70 meters and 100 meters above ground) than indicated by the previous 1980s map, which detailed the resource at a height of 50 meters. In January 2006, Dennis Elliott, NREL's principal wind resource assessment scientist, testified before Indiana's House Utilities Commission that Indiana has at least 40,000 MW of wind energy potential, challenging the notion that Indiana is a "coal state" that lacks sufficient wind resources for electricity generation. Elliott stated that Indiana's wind potential may double in the coming years as new wind turbine technology and taller towers (100 meters and higher) hit the marketplace.

Before Elliott testified, the WPA team began working with the Indiana Office of Energy and Defense Development to launch a WWG in Indiana. The Indiana Wind Working Group (IWWG) held its first meeting in November 2005, at Purdue University. Nearly 60 attendees came to learn about Indiana's plan for developing wind energy.

Wind Power Becomes a Reality in Indiana

Fast-forward five years and wind energy development in Indiana is in full swing.

Indiana is now home to four large utility-scale wind projects: the 106-MW Hoosier Wind Project and the 130-MW Goodland I Wind Plant, both in Benton County, as well as the 200-MW Meadow Lake Wind Farm in White and Benton Counties and the giant 600-MW Fowler Ridge Wind Farm (Phases I and II) in Benton and Tippecanoe Counties. A second phase of the Meadow Lake Wind Farm will add another 91.5 MW.

Wind energy development has yielded the following benefits for the state:

- Four wind farms employed more than 2,000 people during peak construction and will create approximately 85 full-time jobs for wind farm operation and maintenance.
- More than 500 landowners participate in the projects; land lease payments range from \$5,000 to \$9,000 per turbine per year.
- Indiana is home to 11 wind manufacturing facilities, providing economic development benefits for the state.
- Wind energy investment for the four projects is estimated to be more than \$2 billion.

The IWWG now boasts 300 members who deal with a variety of topics, including transmission, siting, and distributed wind. All Indiana electric utilities have been active members of the IWWG since its inception.

As part of the IWWG facilitation, IWWG members and the Indiana Office of Energy and Defense Development created a strategic plan for wind energy in Indiana. They also conducted public outreach activities, including the state's first wind energy conference, the "Windiana" conference, which has been held annually since 2008.

The Role of an RPS in Future Indiana Wind Development

A Renewable Portfolio Standard (RPS), also known as a Renewable Energy Standard, can be a primary driver for wind development in a state. A state RPS requires utilities to source a specified percentage of electricity from renewable resources, ensuring that a certain minimum amount of renewable energy development occurs within a set time period. According to a recent report published by DOE's Lawrence Berkeley National Laboratory, nearly half of all wind power capacity installed from 2001 to 2005 can be attributed to state RPSs.

Although Indiana achieved its project development without a state RPS, a recent study shows that the state could reap huge benefits from efforts to meet a national RPS of 15% by 2020, including:

- If Indiana developed wind capacity to meet half of the state's needs for a national RPS, the additional capacity would result in \$5 million to \$10 million in additional revenue to rural landowners per year and more than \$5 billion invested in the state.
- Indiana would gain manufacturing jobs to support a growing U.S. renewable energy industry. An additional 50,000 MW of wind in the United States could require more than 8,000 manufacturing jobs in Indiana.

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