


National Wind Technology Center

NREL
NATIONAL RENEWABLE ENERGY LABORATORY

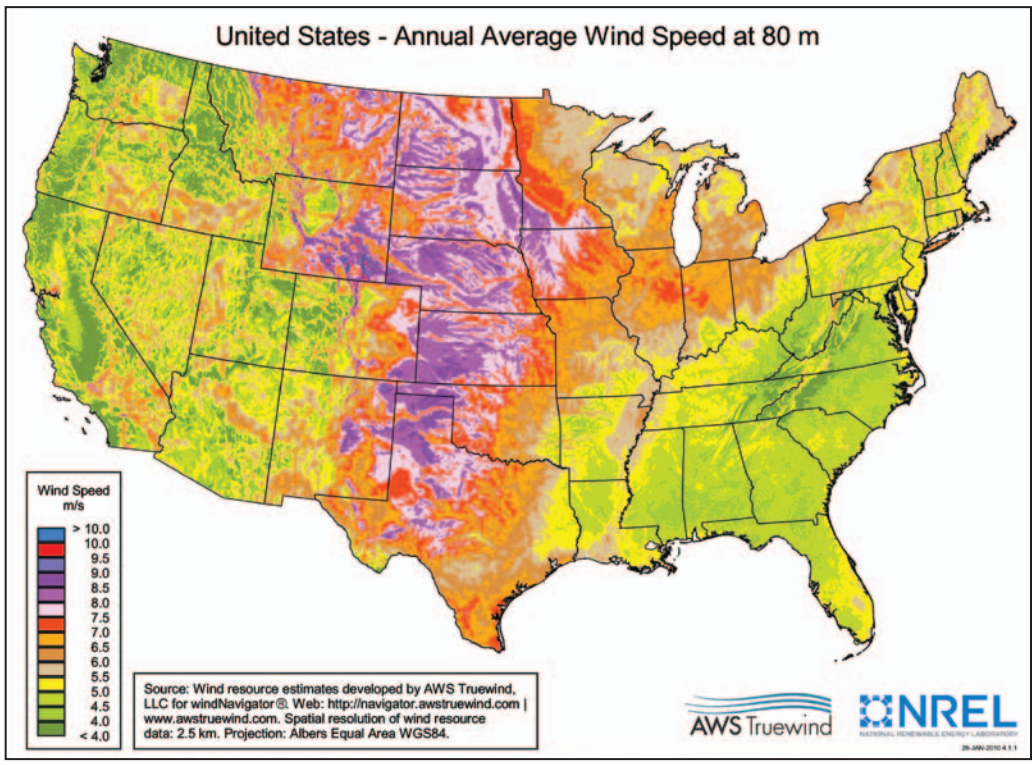
Wind Resource Assessments and Mapping

Knowing and showing where the wind resource can be found

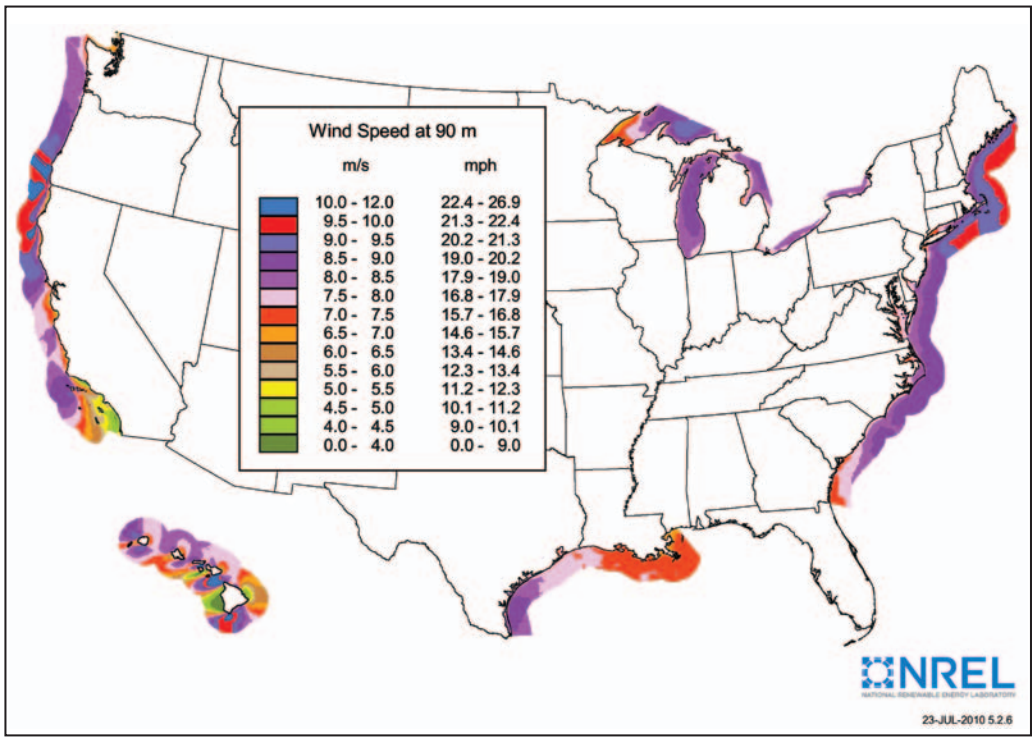
All markets for wind turbines require an estimate of how much wind energy is available at potential development sites. Correct estimation of the energy available in the wind can make or break the economics of wind plant development. Wind maps developed from the late '70s to the early '90s provided reasonable estimates of areas in which good wind resources could be found. Now new computing tools and new meteorological data sets allow researchers to create even more accurate and detailed wind maps of the world.

Wind mapping and validation techniques developed by the U.S. Department of Energy's National Renewable Energy Laboratory (NREL) and U.S. companies are being used to produce high-resolution maps of the

The cup anemometer shown here provides accurate measurements of wind speed.



This map shows the wind resource at 80 meters above the ground for the contiguous United States.



United States offshore wind resource at 90 m above the surface.

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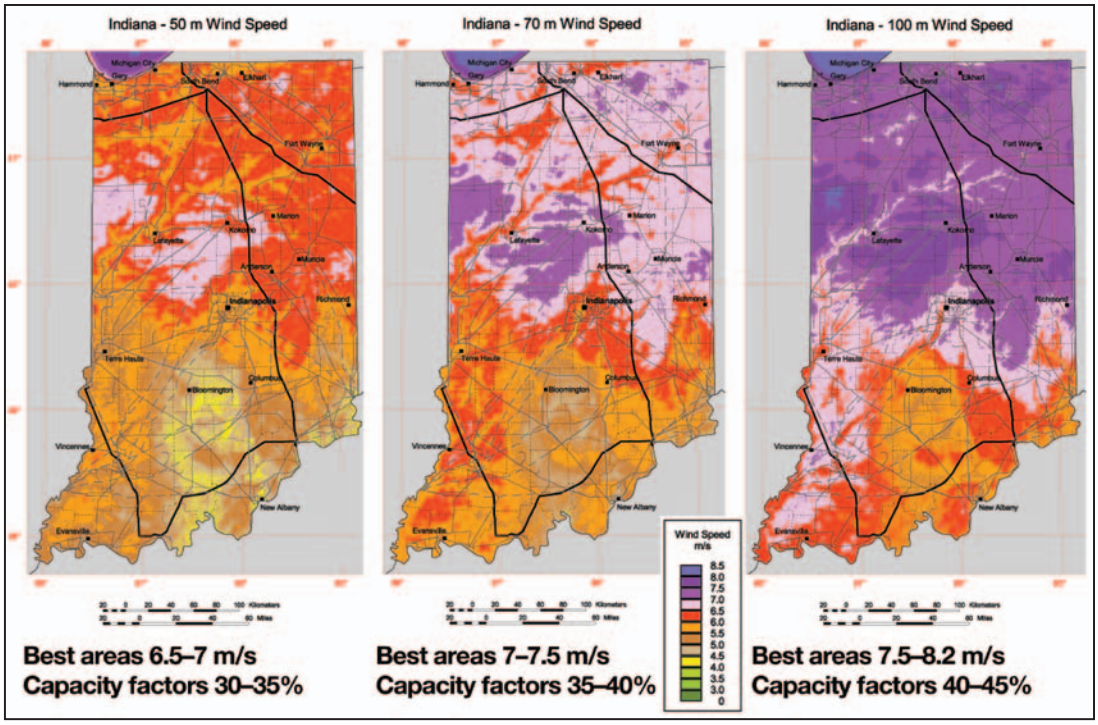
United States and foreign countries and regions that are painting a whole new picture of the wind resource potential. These maps are created using highly accurate Geographic Information System mapping tools and an array of satellite, weather balloon, and meteorological tower data, combined with much-improved numerical computer models. The higher horizontal resolution of these maps allows for more accurate depiction of the overall wind resource and has also led to the identification of new wind development areas where the wind resource was previously considered unsuitable.



These three maps show the promise of wind resources as the wind turbine hub height from the ground increases.

Removing Development Barriers

NREL researchers work with federal, state, and private organizations to validate estimates of the nation's wind resources and support advances in wind forecasting techniques and dissemination. The ability to accurately predict when the wind will blow will help remove barriers to wind energy development by allowing the smooth integration of wind-generated energy onto the nation's electricity grid system. Development of short-term (1 to 4 hours) forecasting tools will help energy producers proceed with new wind farm projects and minimize costs associated with wind generation.

NREL provides technical assistance in wind resource assessment, including the development and validation of high-resolution wind maps, and responds to special inquiries. Since 2002, new high-resolution wind maps have been developed and validated for much of the United States through a public/private partnership with funding cost-shared among the U.S. Department of Energy, state, and stakeholders in the mapping areas of interest.

Shown here is a close-up of sonic detection and ranging (SODAR) system enclosure and associated electronics equipment at the NWTC.

NREL's focus is to provide the wind industry, policy makers, and other stakeholders with applied wind resource data, information, products (e.g., maps), and technical assistance with increasing emphasis on wind resources at increased heights to effectively evaluate the wind resource and development potential. For example, NREL's most recent project resulted in the development of new wind resource maps at heights of 80 and 100 meters for the contiguous United States and estimates of the wind energy potential that would be possible from development of the available windy land areas. For more information on this project, see: www.windpoweringamerica.gov/wind_maps.asp.

Contact the NWTC at 303-384-6900.

Helpful Web Sites

The National Wind Technology Center
www.nrel.gov/wind

Wind Powering America
www.windpoweringamerica.gov

Department of Energy Wind and Hydropower Technologies Program
www1.eere.energy.gov/windandhydro

National Renewable Energy Laboratory

1617 Cole Boulevard, Golden, Colorado 80401-3305 • 303-275-3000 • www.nrel.gov

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