



The National Wind Technology Center

A Proven and Valued Wind Industry Partner

NREL's National Wind Technology Center (NWTC) is the nation's premier wind energy technology research facility. Research at the NWTC encompasses wind and water devices. The NWTC's specialized facilities and personnel provide technical support critical to the development of advanced wind and water energy systems. From the base of a system's tower to the tips of its blades, NREL researchers work side-by-side with wind industry partners to increase system reliability and reduce wind energy costs so that wind energy can increase its contribution to our nation's energy portfolio. The NWTC's research and test facilities are unique to the nation. Its location at the foot of the Colorado Rockies provides diverse and robust wind patterns ideal for testing. The NWTC's unique and highly versatile facilities can test wind turbine components and prototypes from 400 watts to multi-megawatts in power rating.

The NWTC — A National Asset

Since the NWTC was dedicated as the nation's premier wind energy research facility in 1993, wind energy has become one of the fastest growing electricity generation sources in the world. During the past decade, our nation's wind energy capacity has grown from less than 2,000 megawatts (MW) to more than 35,000 MW. But at just over 35,000 MW, wind energy still comprises only about 2% of the nation's electricity generating capacity. With appropriate research and development, NREL scientists believe that wind power can grow substantially, and the research conducted at the NWTC is leading the way to helping foster a wind energy market in which both large and small companies can compete.

NWTC Facilities and Capabilities

The wind industry and community members have learned they can depend on the experience, capabilities, and specialized equipment housed at the NWTC to advance technology, increase performance, and improve reliability. NREL's Wind Center provides its industry partners with every aspect of the technical support they need to take a wind turbine from the design table to the marketplace and to answer the many questions about wind energy development.



The NWTC is located at the foot of the Colorado Rockies, an ideal location for wind energy research because of its highly variable winds and reliable winter storms. PIX01618.

Facilities

The NWTC is a 305-acre (approximately 1 mile by ½ mile) area comprised of field test sites, test laboratory facilities, industrial high-bay work areas, machine shops, electronics and instrumentation laboratories, and office areas. Although continuously changing, there are hundreds of test articles and supporting components such as turbines, meteorological towers, custom test apparatus, test sheds, storage areas, calibration and measurement instruments, data acquisition systems, load frames, computers and electronics, machine tools, supporting heavy equipment, and associated required infrastructure including electrical power, water, fire protection, and fiber optic communications. All NWTC testing facilities and capabilities are specific to developing wind energy technology.

Capabilities

The NWTC has the capability in place to readily support the installation and testing of multiple MW-scale and distributed wind turbines. NREL's NWTC conducts research across the complete spectrum of engineering disciplines that are applicable to wind energy, including: atmospheric fluid mechanics and aerodynamics;

dynamics, structures, and fatigue; power systems and electronics; and wind turbine engineering applications.

The NWTC's specific wind energy research capabilities include:

- Design review and analysis
- Software development, modeling, and analysis
- Systems and controls analysis
- Technical support
- Transmission and grid integration
- Wind resource assessment

The W's of Energy: Wind and Water

What do wind and water have in common? Marine hydrokinetic (MHK) energy devices are high-force, low-speed machines, similar to wind turbines that convert the kinetic energy of a moving fluid into electrical energy. The U.S. Department of Energy awarded the NWTC \$7.5 million (over three years) for continued research on marine hydrokinetic energy devices. Development of energy through the Earth's largest, most predictable, and renewable water resources – its oceans and rivers – require increasingly efficient, high capacity devices designed and deployed to maximize performance and reduce capital costs. NWTC has begun research and development efforts that test and validate machine performance and lesson inefficiencies. These, in turn, are expected to increase investor and regulator confidence and lead to the creation of a U.S. marine energy industry.



Wind power is the fastest growing new source of power generation in the world. PIX12087.



A 44.5-meter blade static test performed at the NWTC. PIX14708

Accreditation

As a facility accredited through the American Association of Laboratory Accreditation (A2LA) to perform several critical tests, the NWTC provides the high quality testing required by wind turbine certification agencies, financial institutions, and other organizations throughout the world. A2LA is an independent organization that audits and monitors all NWTC testing activities to ensure that sufficient quality control processes are followed to produce reliable test results. The NWTC is accredited to perform the following tests in accordance with international standards:

- Acoustic Noise to IEC 61400-11 and MEASNET
- Power Performance to IEC 61400-12-1 and MEASNET
- Mechanical Loads to IEC 61400-13
- Power Quality to IEC 61400-21 and MEASNET
- Duration Testing to IEC 61400-2
- Safety and Function to IEC 61400-2

Contact the National Wind Technology Center at 303-384-6900.

Helpful Web Sites

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

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

National Renewable Energy Laboratory

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

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