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Wind Energy Program Technology Portfolio

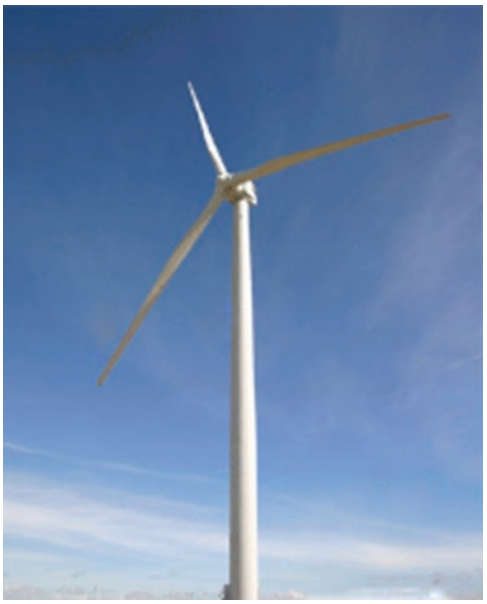
Low Wind Speed Technology Phase I: Clipper Turbine Development Project

Clipper Windpower Technology, Inc.

Project Description: Design studies conducted by the U.S. Department of Energy, its subcontractors, and others have indicated that several new design configurations offer significant opportunities for reducing cost over current wind turbine configurations. These technologies include reduction in the cost of and improvements in the efficiency of the drivetrain; increases in energy capture by increasing rotor diameter; and improved active wind turbine controls. Several techniques can be used to achieve these results. Many, such as decreasing drivetrain weight to make taller towers more cost effective, or advanced rotor designs that decrease loads and allow greater rotor diameter, are interrelated.

This project is developing a new turbine design that incorporates a number of advanced elements. This new design, designated the Clipper C-93 Liberty turbine, uses a highly innovative multiple-drive path gearbox feeding four advanced permanent magnet generators. The multiple-drive path design radically decreases individual gearbox component loads, which reduces gearbox weight and size. The new generators significantly reduce component mass by eliminating much of the copper that would be required for windings in the rotor. The machine will also take advantage of advanced feedback controls to reduce load excursions in turbulent wind conditions and optimize pitch schedules to reduce drivetrain loads and improve energy capture. The new machine, with its 93-meter rotor, 75-meter hub height, and 2.5-MW rating promises to be significantly lighter, less costly, and easier to maintain than other machines in this rating.

This Clipper 2.5-MW drivetrain underwent dynamometer testing at the National Wind Technology Center.



Clipper 2.5-MW Liberty Turbine installed in Medicine, Wyoming.

Project Type: Prototype Development
Total Project Budget: $18,955,065
Industry Cost Share: $9,359,147
DOE Cost Share: $9,595,918
Planned Project Duration: October 2002–December 2006

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Current Status: NREL began field tests on the prototype in 2005.

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