



Cooperation Reliability Testing of the Clipper Windpower Liberty 2.5 MW Turbine

Cooperative Research and Development Final Report

CRADA Number: CRD-07-210

NREL Technical Contact: Scott Hughes

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In accordance with Requirements set forth in Article XI.A(3) of the CRADA document, this document is the final CRADA report, including a list of Subject Inventions, to be forwarded to the Office of Science and Technical Information as part of the commitment to the public to demonstrate results of federally funded research.

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CRADA Title: Cooperation Reliability Testing of the Clipper Windpower Liberty 2.5 MW Turbine

Parties to the Agreement: Clipper Windpower, Inc.

Joint Work Statement Funding Table showing DOE commitment:

| Estimated Costs | NREL Shared Resources |
|-----------------|-----------------------|
| Year 1 | \$ 20,430.00 |
| Year 2 | \$ 00.00 |
| Year 3 | \$ 00.00 |
| TOTALS | \$ 20,430.00 |

Abstract of CRADA work:

Clipper Windpower (CWP) has developed the Liberty 2.5 MW wind turbine. The development, manufacturing, and certification process depends heavily on being able to validate the full-scale system design and performance under load in both an accredited structural test facility and through accredited field testing. CWP requested that DOE/ NREL upgrade blade test capabilities to perform a scope of work including structural testing of the C-96 blade used on the CWP Liberty turbine. This funds-in CRADA was developed to upgrade NREL blade test capability, while enabling certification testing of the C-96 blade through the facility and equipment upgrades. NREL shared resource funds were used to develop hardware necessary to structurally attach a large wind turbine to the test stand at the NWTC. Participant funds-in monies were used for developing the test program.

Summary of Research Results:

A test program for structural testing a CWP C-96 wind turbine blade was developed under this CRADA with funds-in monies. Test specifications and plans were developed for multi-directional static load cases, and single-axis flap and edge fatigue tests. The blade was received for testing and instrumented with an array of strain gauges. In parallel to the preparation of the specification and instrumentation of the blade for testing, a remote-enable blade pitch mechanism was developed, using NREL shared resources. This automated pitch mechanism was developed to enable control of rotating the blade on

the test stand. Blades are statically tested in multiple directions; blades are rotated on the stand to position the blade for each of the loadings. The pitch system designed and procured by NREL is suitable for use on test blades up to 70-m in length.

Subject Inventions listing:

No subject inventions were developed under this CRADA.

Report Date: March 15, 2012 Responsible Technical Contact at Alliance/NREL: Scott Hughes

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