NREL
NATIONAL RENEWABLE ENERGY LABORATORY

Boulder Wind Power Advanced Gearless Drivetrain

Cooperative Research and Development Final Report

CRADA Number: CRD-12-00463

NREL Technical Contact: Jason Cotrell

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CRADA Report
NREL/TP-7A10-57183
April 2013

Contract No. DE-AC36-08GO28308

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Cooperative Research and Development Final Report

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.

CRADA Number: CRD-12-00463

CRADA Title: Boulder Wind Power Advanced Gearless Drivetrain

Parties to the Agreement: Boulder Wind Power

Joint Work Statement Funding Table showing DOE commitment:

Estimated Costs	NREL Shared Resources
Year 1	$ 253,000.00
Year 2	$ 00.00
Year 3	$ 00.00
TOTALS	$ 253,000.00

Abstract of CRADA work:

The Boulder Wind Power (BWP) Advanced Gearless Drivetrain Project explored the application of BWP's innovative, axial-gap, air-core, permanent-magnet direct-drive generator in offshore wind turbines. The objective of this CRADA is to assess the benefits that result from reduced towerhead mass of BWP's technology when used in 6 MW offshore turbines installed on a monopile or a floating spar foundation.

Summary of Research Results:

In general, the reduced tower-top mass contributed to a reduction of extreme loads on the substructure, which is estimated in potential mass savings of 5-15% (for both monopile and spar-buoy cases). This result assumes a fixed design philosophy (based on modal approach) and the adopted geometrical constraints. Results may vary if these assumptions change. In particular for the spar, for a given heel angle equal to that of the baseline case, the BWP system draft could potentially be reduced up to 10%, with additional savings in material and cost, but only if a larger heave displacement can be accepted, or mitigated via a new mooring design.

Extreme Loads on the rotor and blades are slightly lower for the floating cases compared to the monpile, possibly due to the reduced stiffness of the platform in pitch; however, the towers are significantly 'overloaded' in bending due to the additional gravity effect associated with platform heel when compared to the monopile conditions.

Subject Inventions Listing: None

Report Date: 04/06/12 **Responsible Technical Contact at Alliance/NREL**: Jason Cotrell

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