

PMC-ND

(1.08.09.13)

**U.S. DEPARTMENT OF ENERGY**  
**OFFICE OF ENERGY EFFICIENCY AND RENEWABLE ENERGY**  
**NEPA DETERMINATION**

**RECIPIENT:** [Clemson University](#)**STATE:** SC

**PROJECT TITLE:** [Nacelle Testing for Offshore Wind Turbines with Hardware-In-the-Loop](#)

<b>Funding Opportunity Announcement Number</b>	<b>Procurement Instrument Number</b>	<b>NEPA Control Number</b>	<b>CID Number</b>
<a href="#">DE-FOA-0002071</a>	<a href="#">DE-EE0008962</a>	<a href="#">GFO-0008962-001</a>	

Based on my review of the information concerning the proposed action, as NEPA Compliance Officer (authorized under DOE Policy 451.1), I have made the following determination:

**CX, EA, EIS APPENDIX AND NUMBER:**

Description:

**A9 Information gathering, analysis, and dissemination** Information gathering (including, but not limited to, literature surveys, inventories, site visits, and audits), data analysis (including, but not limited to, computer modeling), document preparation (including, but not limited to, conceptual design, feasibility studies, and analytical energy supply and demand studies), and information dissemination (including, but not limited to, document publication and distribution, and classroom training and informational programs), but not including site characterization or environmental monitoring. (See also B3.1 of appendix B to this subpart.)

**B3.6 Small-scale research and development, laboratory operations, and pilot projects** Siting, construction, modification, operation, and decommissioning of facilities for smallscale research and development projects; conventional laboratory operations (such as preparation of chemical standards and sample analysis); and small-scale pilot projects (generally less than 2 years) frequently conducted to verify a concept before demonstration actions, provided that construction or modification would be within or contiguous to a previously disturbed or developed area (where active utilities and currently used roads are readily accessible). Not included in this category are demonstration actions, meaning actions that are undertaken at a scale to show whether a technology would be viable on a larger scale and suitable for commercial deployment.

**B5.15 Small-scale renewable energy research and development and pilot projects** Small-scale renewable energy research and development projects and small-scale pilot projects, provided that the projects are located within a previously disturbed or developed area. Covered actions would be in accordance with applicable requirements (such as local land use and zoning requirements) in the proposed project area and would incorporate appropriate control technologies and best management practices.

Rationale for determination:

The U.S. Department of Energy (DOE) is proposing to provide federal funding to Clemson University to create, implement, and validate a Hardware-In-the-Loop (HIL) testing platform for the evaluation of electromechanical interactions of system components and controllers, as well as the wind and wave dynamics, as applicable to offshore wind.

As a result of this project, Clemson University would:

- Provide a platform to test and validate advanced techniques for Fault Detection and Isolation (FDI), Fault Tolerant Control (FTC) and/or Fault Ride Through (FRT) to increase overall wind turbine reliability.
- Assess and measure various approaches to creating mechanical and electrical real-time simulation models to represent aerodynamic/hydrodynamic loading and grid conditions, wind turbine structural components, and actuators.
- Validate HIL operation in a virtual test bench environment with benchmark test cases to enable preliminary analysis for applicability and reduce the risk associated with full-scale testing.
- Demonstrate HIL benchmark test cases on the 7.5 megawatt (MW) test bench with a full-scale General Electric (GE) 2020 prototype wind turbine nacelle to measure the efficacy of HIL testing in evaluating electromechanical

dynamics.

This project would consist of reporting, data analysis, modeling, design and laboratory testing of a hardware-in-the-loop testing system for wind turbine nacelles. Project activities would include the design, development and validation of a Hardware-In-the-Loop testing method for wind turbine nacelles. Design and development activities of the project would involve computer simulations and controller development. The validation step would include testing of a full scale wind turbine nacelle on our 7.5 MW dynamometer at the center. All project activities will take place at Clemson's Energy Innovation Center in Charleston, SC. No field testing would occur as part of this project.

DOE does not anticipate any impacts to resources of concern as a result of this project.

**NEPA PROVISION**

DOE has made a final NEPA determination.

Notes:

Wind Energy Technologies Office

This NEPA determination does not require a tailored NEPA provision.

KKerwin 12/26/2019

**FOR CATEGORICAL EXCLUSION DETERMINATIONS**

The proposed action (or the part of the proposal defined in the Rationale above) fits within a class of actions that is listed in Appendix A or B to 10 CFR Part 1021, Subpart D. To fit within the classes of actions listed in 10 CFR Part 1021, Subpart D, Appendix B, a proposal must be one that would not: (1) threaten a violation of applicable statutory, regulatory, or permit requirements for environment, safety, and health, or similar requirements of DOE or Executive Orders; (2) require siting and construction or major expansion of waste storage, disposal, recovery, or treatment facilities (including incinerators), but the proposal may include categorically excluded waste storage, disposal, recovery, or treatment actions or facilities; (3) disturb hazardous substances, pollutants, contaminants, or CERCLA-excluded petroleum and natural gas products that preexist in the environment such that there would be uncontrolled or unpermitted releases; (4) have the potential to cause significant impacts on environmentally sensitive resources, including, but not limited to, those listed in paragraph B(4) of 10 CFR Part 1021, Subpart D, Appendix B; (5) involve genetically engineered organisms, synthetic biology, governmentally designated noxious weeds, or invasive species, unless the proposed activity would be contained or confined in a manner designed and operated to prevent unauthorized release into the environment and conducted in accordance with applicable requirements, such as those listed in paragraph B(5) of 10 CFR Part 1021, Subpart D, Appendix B.

There are no extraordinary circumstances related to the proposed action that may affect the significance of the environmental effects of the proposal.

The proposed action has not been segmented to meet the definition of a categorical exclusion. This proposal is not connected to other actions with potentially significant impacts (40 CFR 1508.25(a)(1)), is not related to other actions with individually insignificant but cumulatively significant impacts (40 CFR 1508.27(b)(7)), and is not precluded by 40 CFR 1506.1 or 10 CFR 1021.211 concerning limitations on actions during preparation of an environmental impact statement.

The proposed action is categorically excluded from further NEPA review.

**SIGNATURE OF THIS MEMORANDUM CONSTITUTES A RECORD OF THIS DECISION.**

NEPA Compliance Officer Signature:

 Electronically Signed By: Kristin Kerwin

NEPA Compliance Officer

Date: 12/26/2019

**FIELD OFFICE MANAGER DETERMINATION**

- Field Office Manager review not required
- Field Office Manager review required

**BASED ON MY REVIEW I CONCUR WITH THE DETERMINATION OF THE NCO :**

Field Office Manager's Signature:

Date:

Field Office Manager