

PMC-ND

(1.08.09.13)

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

**RECIPIENT:** Colorado State University**STATE:** CO

PROJECT TITLE: Application Additive Manufacture of Fiber Reinforced Composites for Novel Internal Wind Blade Structure with Radically Reduced Tooling Requirements

Funding Opportunity Announcement Number	Procurement Instrument Number	NEPA Control Number	CID Number
DE-FOA-0002252	DE-EE0009404	GFO-0009404-001	

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.

Rationale for determination:

The U.S. Department of Energy (DOE) is proposing to provide federal funding to Colorado State University (CSU) to develop novel additive manufacturing (AM) processes for use in the fabrication of wind turbine blades. Research would focus on fabrication processes for the internal blade structure. Material samples and sub-scale representative blade components would be fabricated and tested as part of the project. The project would be completed over three Budget Periods (BPs), with a Go/No-Go Decision Point in between each BP. This NEPA Determination is applicable to all three BPs.

Proposed project activities would include conceptual design work, computer modeling, material synthesis, material characterization, component fabrication, and mechanical testing. Conceptual design work would include component specifications development and AM process development. Computer modeling would consist of both performance modeling and techno-economic modeling. Material synthesis would consist of the synthesis and testing of polymer materials for incorporation into internal blade structure components. Component fabrication would be performed at laboratory (i.e., materials in 100s of mm lengths) and pilot scales (i.e., components with lengths < 20 m). At laboratory-scale, test panels composed of commercially available polymer feedstocks would be produced using AM processes and tested. At pilot-scale, representative components would be fabricated utilizing AM processes, including core kits, grid stiffeners, and truss cores. All components would be representative of wind blade internal structures. Once fabricated, the components would then be integrated into a section of a wind blade to demonstrate compatibility of the manufacturing processes developed with existing manufacturing processes and blade designs.

CSU would coordinate all project activities between project partners and perform process development, laboratory-scale fabrication, and characterization at laboratory facilities at its campus in Fort Collins, CO. Vestas Wind Systems (Vestas) would perform pilot-scale fabrication of representative components testing at its wind blade manufacturing facility in Brighton, CO. Arkema would perform material characterization and AM process development at its laboratory facility in King of Prussia, PA. The National Renewable Energy Laboratory (NREL) would perform computer modeling and data analysis. Additionally, the pilot-scale components fabricated by Vestas would be incorporated into an existing section of a wind blade at NREL's Flatirons Campus in Arvada, CO. A visual inspection of the integrated section would be performed. The wind blade section would not be incorporated into a turbine or used for turbine testing. No physical modifications to existing facilities, ground disturbance, or changes to the use, mission, or operation of existing facilities would be required. No additional permits or authorizations would be required.

Project work would involve the use and handling of chemicals, solvents, feedstock materials for synthesis activities (e.g., resins, carbon fibers, etc.), and powered equipment. Nanoscale materials may also be utilized in fabrication processes. All such handling would be performed in controlled laboratory environments that work with these materials as part of their regular course of business. Potential hazards would be mitigated through adherence to established institutional health and safety policies and procedures. Protocols would include employee training, the use of personal protective equipment, monitoring, engineering controls and internal assessments. If nanoscale materials are used, they would be incorporated into other compounds to encapsulate the nanomaterials for safer handling and use. Potential inhalation risks would be mitigated through the use of fume hoods. CSU and its project partners would observe all applicable Federal, state, and local health, safety, and environmental regulations.

Any work proposed to be conducted at a federal facility may be subject to additional NEPA review by the cognizant federal official and must meet the applicable health and safety requirements of the facility.

NEPA PROVISION

DOE has made a final NEPA determination.

Notes:

Advanced Manufacturing Office

This NEPA determination does not require a tailored NEPA provision.

Review completed by Jonathan Hartman, 07/14/2021

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: _____



Casey Strickland

NEPA Compliance Officer

Date: 7/14/2021

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: _____

Field Office Manager

Date: _____