

PMC-ND
(1.08.09.13)

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



RECIPIENT: University of Colorado

STATE: CO

PROJECT TITLE : NWTC - University of Colorado Unmanned Aerial Systems Wind Turbine Wakes and Radar Tracking Demonstration; NREL Tracking No. 14-024

Funding Opportunity Announcement Number	Procurement Instrument Number	NEPA Control Number	CID Number
	DE-AC36-08GO28308	NREL-14-024	GO28308

Based on my review of the information concerning the proposed action, as NEPA Compliance Officer (authorized under DOE Order 451.1A), 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.)
A11 Technical advice and assistance to organizations	Technical advice and planning assistance to international, national, state, and local organizations.
B3.2 Aviation activities	Aviation activities for survey, monitoring, or security purposes that comply with Federal Aviation Administration regulations.
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:

This proposed project would consist of studying wake flow characteristics and collecting wake flow data, as well as, radar system data with an Unmanned Aircraft System (UAS) at the National Renewable Energy Laboratory's (NREL's) National Wind Technology Center (NWTC), located southeast of the intersection of Colorado Highway (CO) 93 and CO-128 in Jefferson County, Colorado. The NWTC is a federally-owned facility that consists of 305 acres and is primarily utilized for wind energy research, development, and testing.

The University of Colorado (CU) would operate the UAS. CU would fly circular orbit paths at a safe distance from the instrumented meteorological towers to compare wind measurements. CU would operate in the wake of the large wind turbines at the NWTC at a safe distance to study the flow characteristics. Both types of flights will be tracked by the existing radar onsite operated by Laufer Wind Group.

The project would test the feasibility of using UASs to study the flow characteristics of the wake of a wind turbine. The relative ease of deployment and mobility of UASs make them well suited for short duration studies of the wakes, where construction of a permanent or even a temporary meteorological tower is cost prohibitive. Improving the understanding of wind turbine wakes would be critical for allowing improved design of large multi-turbine wind farms, where upstream turbines impact the efficiency of downwind turbines. This portion of the project would have two phases. The first phase would be a logistical and engineering feasibility study wherein the process, flight paths, and operational procedures are refined through initial autonomous flights in a wind turbine wake. During this time, the aircraft would carry instruments for flow characterization. The focus would be on qualitative data gathering as CU continues to develop this instrumentation and reduce uncertainty to acceptable scientific levels. The second phase would include collection of scientific flow data in the wake of the turbine once onboard instrumentation has been refined to acceptable levels.

The second purpose of unmanned aircraft flights under this project would be studies conducted on the UAS itself to quantify its radar cross section and develop tracking algorithms within the radar systems. The end goal of this project objective would be to better identify birds flying in the area using the radar, which would inform wind turbine operators

about activity in the area to help reduce bird strikes.

The 3.5 kilogram, 2.1 meter wingspan Skywalker UAS would be flown semiautonomously with a SwiftPilot autopilot, operated from a remote ground control station (see NWTC Skywalker Operational Plan, uploaded to PMC). Launch and recovery of the aircraft would occur in an open area with sufficient room to orbit near the ground station away from structures. Flights would occur at the NWTC and above the adjacent Rocky Flats National Wildlife Refuge, managed by the U.S. Fish and Wildlife Service, to the east at altitudes up to 700 feet above ground. CU personnel, with NREL Subject Matter Expert (SME) oversight, would be responsible for designing, implementing, and analyzing the atmospheric observation portions of this project using LIDAR, a microwave radiometer, and M4 and M5 tower data, as well as overseeing the Skywalker UAS operation and measurements for this project.

No cultural resources, threatened or endangered species, wetlands, floodplains, or prime farmlands would be impacted by this proposed project. No construction or ground disturbing activities are proposed. This work would be conducted under the authorization of several documents (attached in the PMC) and is proposed for Fall 2014 and Spring 2015. If data collection is extended beyond these dates, all permits and authorizations need to be updated.

- A safe work permit, SWP-14-01-20-JDR, was issued by the NREL Safety Manager and was approved by NWTC management. NREL staff trained in outdoor safety precautions in the vicinity of onsite turbines would host personnel from CU. NREL's EHS department has prepared and is updating the safe work permit with the conditions that CU must follow while onsite. Finally, the drone package would require approval by the NREL SMEs prior to deployment at the NWTC.

- NREL and DOE have coordinated with the USFWS for access to the Rocky Flats Wildlife Refuge to the east of the NWTC under permit 1018-0102.

- CU has obtained permission from the Federal Aviation Administration (FAA) to fly in the airspace above the NWTC and adjacent USFWS property, up to 700 feet above ground level under Certificates of Authorization (COAs) 2013-WSA-100 and 2013-WSA-101.

DOE has determined that this proposed action would be consistent with the actions contained in DOE categorical exclusions:

- A9 "Information Gathering, Analysis and Dissemination;"
- A11 "Technical Advice and Assistance to Organizations;"
- B3.2 "Aviation Activities;" and,
- B3.6 "Small-Scale Research and Development, Laboratory Operations, and Pilot Projects."

NEPA PROVISION

DOE has made a final NEPA determination for this award

Insert the following language in the award:

If you intend to make changes to the scope or objective of your project you are required to contact the Project Officer identified in Block 11 of the Notice of Financial Assistance Award before proceeding. You must receive notification of approval from the DOE Contracting Officer prior to commencing with work beyond that currently approved.

Note to Specialist :

National Renewable Energy Laboratory

Prepared by Amy L. Van Dercook, P.G., NEPA Specialist

SIGNATURE OF THIS MEMORANDUM CONSTITUTES A RECORD OF THIS DECISION.

NEPA Compliance Officer Signature: _____

Electronically
Signed By: Lori Gray

NEPA Compliance Officer

Date: 10/7/2014

FIELD OFFICE MANAGER DETERMINATION

☐ Field Office Manager review required

NCO REQUESTS THE FIELD OFFICE MANAGER REVIEW FOR THE FOLLOWING REASON:

- ☐ Proposed action fits within a categorical exclusion but involves a high profile or controversial issue that warrants Field Office Manager's attention.
- ☐ Proposed action falls within an EA or EIS category and therefore requires Field Office Manager's review and determination.