

PMC-ND
(1.08.09.13)

U.S. DEPARTMENT OF ENERGY

OFFICE OF ENERGY EFFICIENCY AND RENEWABLE ENERGY

NEPA DETERMINATION



RECIPIENT: University of Michigan

STATE: MI

PROJECT TITLE : Optimized Hydrogen Adsorbents via Machine Learning and Crystal Engineering

Funding Opportunity Announcement Number	Procurement Instrument Number	NEPA Control Number	CID Number
DE-FOA-0001647	DE-EE0008093	GFO-0008093-001	GO8093

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.)
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 the Regents of the University of Michigan to use machine learning techniques to predict and reverse engineer new metal organic frameworks (MOFs) that show promise for high hydrogen storage capacity. Only Budget Period 1 (BP1) is being negotiated at this time so this NEPA review is for BP1 activities only. Additional NEPA review will be required if DOE proposes to continue funding the project into subsequent budget periods.

The University of Michigan (UM) located in Ann Arbor, Michigan would apply machine learning methods to analyze the database of 476,007 real and hypothetical MOFs. This analysis would guide the discovery of new compounds that could break through the so-called Hydrogen (H₂) volumetric storage ceiling. UM would search for those MOF properties that correlate with high H₂ storage capacities. The UM would also use machine learning techniques in an attempt to predict the needed MOF properties to achieve the desired H₂ storage capacity. The UM would then attempt to synthesize unique MOFs with specific morphology through the addition of additives during crystal growth. Finally, Ford Motor Company (Dearborn, MI) would conduct materials characterization.

The project would involve the use and handling of various hazardous materials, including metals, organic solvents, hydrogen, and high-pressure CO₂ and H₂. All such handling would occur in-lab. All hazardous materials would be managed in accordance with federal, state, and local environmental regulations. Existing UM health and safety policies and procedures would be followed including employee training, proper protective equipment, engineering controls, monitoring, and internal assessments. At Ford Motor Company the project would require adsorption measurements involving high-pressure H₂ gas, at pressures up to 200 bar. The mitigations for these measurements would involve limiting the quantity of H₂ used during experiments, ensuring hazard mitigation at the point of use within ventilated enclosures, and clear standard operating procedures for each instrument and process being used.

Based on the review of the proposal, DOE has determined the tasks within BP1 of the proposal fit within the class of action(s) and the integral elements of Appendix B to Subpart D of 10 CFR 1021 outlined in the DOE categorical exclusion(s) selected above. DOE has also determined that: (1) there are no extraordinary circumstances (as defined by 10 CFR 1021.410(2)) related to the proposal that may affect the significance of the environmental effects of the proposal; (2) the proposal has not been segmented to meet the definition of a categorical exclusion; and (3) the proposal is not connected to other actions with potentially significant impacts, related to other proposals with

cumulatively significant actions, or an improper interim action. Tasks and subtasks within BP1 of the proposal are categorically excluded from further NEPA review.

NEPA PROVISION

DOE has made a conditional NEPA determination for this award, and funding for certain tasks under this award is contingent upon the final NEPA determination.

Insert the following language in the award:

You are restricted from taking any action using federal funds, which would have an adverse affect on the environment or limit the choice of reasonable alternatives prior to DOE/NNSA providing either a NEPA clearance or a final NEPA decision regarding the project.

Prohibited actions include:

Budget Periods 2 and 3

This restriction does not preclude you from:

All tasks and subtasks associated with Budget Period 1

If you move forward with activities that are not authorized for federal funding by the DOE Contracting Officer in advance of the final NEPA decision, you are doing so at risk of not receiving federal funding and such costs may not be recognized as allowable cost share.

Note to Specialist :

Fuel Cell Technologies Office

This NEPA determination requires a tailored NEPA provision.

Review completed by Chris Rowe on 7/20/2017

SIGNATURE OF THIS MEMORANDUM CONSTITUTES A RECORD OF THIS DECISION.

NEPA Compliance Officer Signature:



Casey Strickland

Casey Strickland

Date:

7/20/2017

NEPA Compliance Officer

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.

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

Field Office Manager's Signature:

Field Office Manager

Date: