

PMC-ND  
(1.08.09.13)

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



**RECIPIENT:** Bio2Electric, LLC d.b.a. EcoCatalytic Technologies

**STATE:** NJ

**PROJECT TITLE :** Integrated Hydrogen Combustion with Energy-Efficient Ethylene Production

<b>Funding Opportunity Announcement Number</b>	<b>Procurement Instrument Number</b>	<b>NEPA Control Number</b>	<b>CID Number</b>
DE-FOA-0001465	DE-EE0008315	GFO-0008315-001	GO8315

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:

<b>A9 Information gathering, analysis, and dissemination</b>	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.)
<b>B3.6 Small-scale research and development, laboratory operations, and pilot projects</b>	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 funding to Bio2Electric, LLC d.b.a. EcoCatalytic Technologies (hereafter 'Bio2Electric') to develop a process for the conversion of ethane to ethylene, known as Integrated Fluidized Bed Hydrogen Combustion (IFBHC). If successful, the IFBHC process would result in reduced costs and energy consumption, when compared to traditional steam cracking processes.

The IFBHC process would make use of fluidized metal oxide particles (oxygen transfer agent) to serve as the catalyst for the chemical reaction needed to produce ethylene. Proposed project activities would include catalyst materials characterization and optimization, life studies analyses on the selected catalyst(s), catalyst scale-up synthesis, development and testing of a prototype circulating fluidized bed (CFB) reactor, cold-flow model assessments (analysis of solid transport in the CFB), techno-economic analyses (cost and energy savings analysis), and business plan/commercialization pathway development.

The proposed project activities would be carried out at existing, purpose-built laboratory facilities operated by Bio2Electric (Monmouth Junction, NJ), Dow Chemical Co. (Freeport, Texas), and Southwest Research Institute ('SwRI' - San Antonio, TX). Equipment at SwRI's facilities would be upgraded in order to process hot solids continuously. These upgrades would be limited to existing equipment and would not require any structural modifications to SwRI's facilities. No physical modifications to existing facilities or ground disturbing activities at any of the other project stakeholders' facilities would be required as part of this activity, nor would any new permits, licenses or authorizations be required.

Catalyst synthesis and testing would occur at high temperatures using industry standard equipment, including muffle furnaces and tube furnaces. Personnel at all three institutions have been trained in proper safety and handling precautions for using all equipment associated with this project. Fluidized metal oxide particles would be tested to identify the materials most suitable for use as a catalyst. Ethane would also be fed to laboratory test units as part of testing. Wastes from testing would be composed primarily of magnesium oxide and ores of manganese, both of which are non-toxic in nature.

SwRI maintains permits for gas releases. Any such gas release would be kept within permitted limits. EcoCatalytic maintains fire permits for its operations. No direct experimental work would be conducted at Dow Chemical's facilities.

No additional permits would be required for any of the facilities in order to carry out the activities included as part of this project. All three facilities would comply with relevant Federal, State and local health, safety and environmental regulations.

Based on the review of the proposal, DOE has determined the proposal fits 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. This proposal is categorically excluded from further NEPA review.

**NEPA PROVISION**

DOE has made a final NEPA determination for this award

Insert the following language in the award:

If the Recipient intends to make changes to the scope or objective of this project, the Recipient is required to contact the Project Officer, identified in Block 15 of the Assistance Agreement before proceeding. The Recipient must receive notification of approval from the DOE Contracting Officer prior to commencing with work beyond that currently approved. If the Recipient moves forward with activities that are not authorized for Federal funding by the DOE Contracting Officer in advance of a final NEPA decision, the Recipient is doing so at risk of not receiving Federal funding and such costs may not be recognized as allowable cost share.

Note to Specialist :

Advanced Manufacturing Office  
The NEPA Determination does not require a tailored NEPA Provision  
NEPA review completed by Jonathan Hartman, 6/20/2018

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

NEPA Compliance Officer Signature:  Casey Strickland Date: 6/22/2018  
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: \_\_\_\_\_ Date: \_\_\_\_\_  
Field Office Manager