

PMC-ND
(1.08.09.13)

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

RECIPIENT: [University of Massachusetts Lowell](#)STATE: [MA](#)

PROJECT TITLE: [Bioconversion of Heterogeneous Polyester Wastes to High-Value Chemical Products](#)

Funding Opportunity Announcement Number	Procurement Instrument Number	NEPA Control Number	CID Number
DE-FOA-0002029	DE-EE0008930	GFO-0008930-001	GO8930

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 funding to University of Massachusetts Lowell (UMass) to develop a biochemical conversion process for recycling poly(ethylene terephthalate) (PET) film and fibers commonly found in post-consumer and industrial waste streams. UMass proposes a three-step recycling process which would involve mechanical pretreatment, enzymatic polymer deconstruction with integrated ball-milling, and microbial bioconversion. Step one and two of this process would be completed by UMass. Step three would be completed at the National Renewable Energy Lab (NREL) in Golden, Colorado.

After an initial verification of baseline data UMass would identify, analyze and select prevalent forms of PET waste for study. UMass would then identify strains of microorganisms (*E. coli*) which would produce enzymes, or groups of enzymes, that could lead to PET degradation. All microorganisms would be limited to those requiring biosafety level 1 (BSL-1) protocols. UMass would also explore pre-treatment strategies to prepare the PET for the biodegradation. This would include developing PET samples in the format of powder, pellets and films.

Once enzymes and formats were established UMass would evaluate the degradation through experiments utilizing a laboratory scale ball-milling reactor. Scale would be less than one liter. The goal of these experiments would be to increase the efficiency of terephthalic acid (TPA) production.

Laboratory scale bioconversion of TPA to adipic acid would then be undertaken at NREL.

After an evaluation and verification of the initial series of experiments UMass would complete the enzymatic biodegradation at a pilot scale. Scale would be five liters.

NREL would also complete a techno economic analysis (TEA) and perform life cycle assessment (LCA) of the process.

All project activities at UMass would occur in a dedicated university laboratory facility at the UMass engineering lab. Work would utilize up to 100 kg of plastic (PET) feedstocks, E. coli strains, and various organic solvents, acids, bases and salts. Project work at UMass would involve the handling of microorganisms requiring biosafety level 1 (BSL-1) protocols. UMass would follow established protocols and SOPs for handling and disposal of these materials. This would include appropriate training and registration of all researchers handling these materials. No physical modification to existing facilities, construction of new facilities, ground disturbing activities, or changes to the use, mission, or operation of existing facilities would be required. Likewise, no additional permits or authorizations would be needed for the completion of project activities. All local, state and federal regulations would be adhered to.

The TEA and LCA performed by NREL would be limited to data analysis. All other project activities at NREL would be laboratory scale and would occur in pre-existing dedicated NREL lab facilities.

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:

Bioenergy Technologies Office

This NEPA determination does not require a tailored NEPA provision.

Review completed by Roak Parker, 01/27/2020

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: 1/27/2020

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: _____