

PMC-ND
(1.08.09.13)

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



RECIPIENT: [Spero Renewables, LLC](#)

STATE: [CA](#)

PROJECT TITLE: [Recyclable Thermoset Polymers from Lignin Derived Phenols](#)

Funding Opportunity Announcement Number	Procurement Instrument Number	NEPA Control Number	CID Number
DE-FOA-0002029	DE-EE0008929	GFO-0008929-001	

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 funding to [Spero Renewables LLC \(Spero\)](#) to design, synthesize, and test novel composite materials. These would include lignin-derived thermoset pre-polymers, renewable thermosets, and carbon fiber reinforced polymers (CFRPs). The materials would be developed to have high yield, high purity, and low solvent/energy inputs. Optimal recycling conditions for thermosets and CFRPs would also be researched.

Proposed project activities would include the following:

Task 1: [Spero](#) would establish a baseline verification plan and perform experiments to establish baseline metrics. Results would be submitted to DOE's verification team.

Task 2: Activities under this task would include development of synthesis techniques, composite synthesis/optimization, and material analysis. Coating strategies would also be developed to make thermosets water resistant.

Task 3: This task would consist of the development of a preliminary life-cycle analysis (LCA) for fiber-reinforced plastics (FRPs) made from thermosets. This task would be performed by Argonne National Laboratory (ANL).

Task 4: Activities under this task would include the decomposition of thermosets, characterization of decomposed thermosets, and verification of the thermoset coating strategy developed under Task 2.

Task 5: This task would focus on the development of new thermoset recycling techniques. Work tasks would include analysis of recycling conditions, decomposed thermoset recycling, and characterization of recycled thermosets. New methods for fast healing/recycling of thermosets would also be developed.

Task 6: This task would focus on synthesizing CFRPs from which both carbon fiber and thermoset matrices could be

recycled. CFRP prototypes would be synthesized (< 10 g scale), subjected to mechanical testing, and characterized. Carbon fiber and thermoset matrices would then be recycled from these structures and the structures reformed. The recycled CFRPs would then be characterized.

Task 7: This task would consist of the development of a Techno-Economic Analysis of thermoset/CFRP synthesis and recycling.

Task 8: This task would consist of the development of a final LCA, started under Task 3.

Tasks 1, 3, 7, and 8 would be limited to intellectual, design, and computer modeling activities. These activities would be performed by Spero and ANL at their office spaces in Goleta, CA and Lemont, IL, respectively.

Tasks 2, 4, 5, and 6 would consist of laboratory based experiments focused on composite synthesis, characterization, and testing. All experimental work would be performed at an existing, purpose-based laboratory facility operated by Spero in Goleta, CA.

Project activities would not require any physical modifications to existing facilities, ground disturbing activities, or changes to the use, mission, or operation of existing facilities. No new permits, licenses, or authorizations would be required to perform project activities.

The project would involve the use and handling of hazardous materials, including industrial chemicals and solvents. All such handling would be performed in controlled laboratory environments. Established health and safety policies and procedures would be adhered to, including employee training, the use of personal protective equipment, engineering controls, monitoring, and internal assessments. Experiments utilizing volatile solvents (e.g. ethanol) would be performed under fume hoods in order to manage resulting emissions. Any hazardous waste materials produced as part of the project would be disposed of properly by a qualified waste-disposal service provider. Spero and ANL would adhere to all applicable Federal, state, and local environmental, health, and safety 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:

Bioenergy Technologies Office

This NEPA determination does not require a tailored NEPA provision.

Review completed by Jonathan Hartman, 11/06/2019

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: 11/8/2019

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: _____