

PMC-ND

(1.08.09.13)

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

**RECIPIENT:** Research Triangle Institute**STATE:** NC

PROJECT TITLE: Integrated Reactive Catalytic Fast Pyrolysis System for Advanced Hydrocarbon Biofuels

Funding Opportunity Announcement Number	Procurement Instrument Number	NEPA Control Number	CID Number
DE-FOA-0002029	DE-EE0008918	GFO-0008918-001	GO8918

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.

B1.31 Installation or relocation of machinery and equipment Installation or relocation and operation of machinery and equipment (including, but not limited to, laboratory equipment, electronic hardware, manufacturing machinery, maintenance equipment, and health and safety equipment), provided that uses of the installed or relocated items are consistent with the general missions of the receiving structure. Covered actions include modifications to an existing building, within or contiguous to a previously disturbed or developed area, that are necessary for equipment installation and relocation. Such modifications would not appreciably increase the footprint or height of the existing building or have the potential to cause significant changes to the type and magnitude of environmental impacts.

Rationale for determination:

The U.S. Department of Energy (DOE) is proposing to provide funding to Research Triangle Institute (RTI) to develop, fabricate, and test a novel reactive catalytic fast pyrolysis (RCFP) reactor system for biofuels production. A pilot scale unit would be produced for the project. The project would also include development of a catalyst formulation for use in the RCFP, as well as a strategy for upgrading bio-crude produced using the RCFP reactor to a biofuel blend stock that meets ASTM International specifications for gasoline and diesel.

The project would be completed over three Budget Periods (BPs), with a Go/No-Go Decision Point in between each BP. BP1 activities would consist of initial verification of project goals and benchmark data. BP2 activities would focus on design development of the RCFP reactor system and catalyst development. BP3 work would entail the fabrication/installation of the RCFP reactor system, bio-crude production, and biofuel processing.

All project activities would be coordinated by RTI and performed at existing, purpose-built laboratories that regularly perform work activities similar in nature to those included in the scope of this project. RTI would develop the RCFP reactor system and perform reactor testing at its campus in Durham, NC. Haldor Topsoe would perform catalyst optimization at its facilities in Lyngby, Denmark. Project work would require the installation of a pilot scale RCFP reactor system into an existing lab building (discussed below – Tasks 6 & 7). The unit would be fabricated by a third-party vendor that would be selected after the project has commenced. No 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.

Specific project activities are as follows:

BP1

Task 1: Initial Verification – Baseline data and project targets would be verified in-lab. Verification efforts would be coordinated with DOE.

BP2

Task 2: Preliminary Design of Engineering Scale RCFP Unit – This task would consist of the development of engineering design plans for the pilot-scale RCFP unit. This would include the development of a process flow diagram, equipment specifications, layout design, and an initial techno-economic analysis.

Task 3: Detailed Engineering Design – Engineering design work would be completed as part of this task. A final design pack would be developed, which would include finalized process models, system layout, and component specifications.

Task 4: RCFP Catalyst Scaleup – This task would consist of the development of RCFP catalyst formulations by project partner Haldor Topsoe (Lyngby, Denmark). Haldor Topsoe would assess different approaches for catalyst production. The techniques developed by Haldor Topsoe would then be used to produce small batches (<1kg) of catalysts utilizing a fluidized bed reactor at RTI's laboratory facility. Any transportation of catalyst materials between Haldor Topsoe and RTI would be performed in accordance with all federal, state, and local shipping regulations.

Task 5: BP2 Project Management – This task would be ongoing throughout all of BP2 and would consist of all activities relating to project management/administration (e.g. planning, meetings, reporting, etc.).

BP3

Task 6: RCFP Unit Fabrication – RTI would coordinate the fabrication of the pilot RCFP unit with a qualified, third-party manufacturing company. Fabrication of the device would be based on the previously developed engineering designs. Once fabricated, the device would undergo component verification/testing prior to being transported to RTI's facilities.

Task 7: RCFP Unit Installation and Commissioning – The pilot RCFP unit would be installed at RTI's laboratory space within the Johnson Science and Engineering Building, commissioned, and operationally tested. The unit would have a throughput of 1-5 Kg of biomass/hour. The unit would consist of several components, including a biomass feeder, a fluidized bed reactor, a secondary catalyst regeneration reactor, a catalyst reduction reactor, a solids-filter, condensation components, and a blower. The unit would be enclosed in plexi-glass housing and connected to an existing ventilation system and power supply. The entire unit would fit within a designated area within the laboratory space measuring approximately 10 ft. by 20 ft.

Task 8: RCFP Catalyst Production – The best performing material from the previous catalyst screening activities (Task 4) would be scaled up to a level for testing with the pilot RCFP unit (approximately 200 kg). Material characterization of the catalysts produced would also be performed. Catalyst production and characterization would be performed by RTI and Haldor Topsoe at their respective facilities.

Task 9: RCFP Bio-crude Production – The pilot RCFP unit would be used to produce approximately 100 gallons of bio-crude, using a softwood feedstock (e.g. loblolly pine or southern yellow pine) and the catalyst selected in Task 8. Operations would also be assessed at this time, and used to optimize the RCFP system.

Task 10: RCFP Bio-crude Upgrading to Biofuel Blendstock – The RCFP bio-crude produced as part of Task 9 would be processed into drop-in renewable biofuel blendstock. Material characterization would also be performed (e.g. characterization of catalysts and biofuels) by both RTI and Haldor Topsoe at their respective facilities.

Task 11: Process Modeling – Computational analysis would be performed throughout the project to model various processes and inform design specifications. Technoeconomic and life cycle analysis would also be performed based on data acquired.

Task 12: BP3 Project Management – This task would be ongoing throughout all of BP3 and would consist of all activities relating to project management/administration (e.g. planning, meetings, reporting, etc.).

Project work would involve the use and handling of hazardous materials, including gases, catalysts, and organic solvents. All such handling would be performed in controlled, laboratory/manufacturing environments that are equipped with relevant safety equipment (e.g. chemical fume hoods, gas monitors, fire alarms systems). Potential risks associated with the performance of project activities would be mitigated through adherence to established corporate health and safety policies and procedures. Protocols would include personnel training, the use of personal protective equipment, monitoring, and engineering controls. Any hazardous waste produced as part of the project would be handled and disposed of by a qualified hazardous waste management company. RTI would observe all applicable Federal, state, and local health, safety, and environmental regulations.

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, 04/15/2020

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.

DOE has determined that work to be carried out outside of the United States, its territories and possessions is exempt from further review pursuant to Section 5.1.1 of the DOE Final Guidelines for Implementation of Executive Order 12114; "Environmental Effects Abroad of Major Federal Actions."

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: 4/16/2020

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: _____