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

RECIPIENT: South Dakota School of Mines & Technology **STATE:** SD

PROJECT TITLE : Pilot-Scale Biochemical and Hydrothermal Integrated Biorefinery (IBR) for Cost-Effective Production of Fuels and Value Added Products

Funding Opportunity Announcement Number	Procurement Instrument Number	NEPA Control Number	CID Number
DE-FOA-0001689	DE-EE0008252	GFO-0008252-001	

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.)
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.
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 South Dakota School of Mines and Technology (SDSMT) to design, develop, and demonstrate cost effective production of value-added products originated from the waste streams of biomass processing operations.

The types of activities associated with the proposed project would be data analysis, computer modeling, laboratory scale research and development, equipment installations, and pilot scale demonstration. The proposed project would involve the integration of biochemical and hydrothermal platform technologies to produce biocarbon, carbon nanofibers, polylactic acid (LA) and phenol from corn stover. Rather than a centralized, fully integrated facility, this would be a distributed pilot scale process (with unit operations at different facilities) designed for a 1 ton-per-day (tpd) throughput. Materials would be transferred between locations for further processing. Project subrecipients include Idaho National Laboratory (INL; Idaho Falls, ID), Southwest Research Institute (SwRI; San Antonio, TX), Old Dominion University (ODU; Norfolk, VA), and Virginia Commonwealth University (VCU; Richmond, VA). The scale of the proposed work depends on location: pilot operations would be located at INL, SwRI, and SDSMT (Rapid City, SD). ODU and VCU would perform supplementary laboratory research.

At INL, corn stover would be dried, milled, and undergo alkaline pretreatment followed by enzymatic hydrolysis. It is anticipated that 10 tons of corn stover would be prepared and shipped in different batches as needed to SwRI, ODU, and SDSMT for laboratory experiments and/or pilot scale processing. Any work proposed to be conducted at a DOE laboratory may be subject to additional NEPA review by the cognizant DOE NEPA Compliance Officer for the specific DOE laboratory prior to initiating such work. Further, any work conducted at a DOE laboratory must meet the laboratory's health and safety requirements.

Activities performed at SwRI would include testing of biomass slurry, studies on hydrodeoxygenation for the upgrading of fuels, and conversion of biochar into graphitic biocarbon at the Alternative Fuel Center: a pilot plant facility designed for this type of research. At ODU, laboratory work would involve the optimization of pretreatment and processing methods as well as product characterization. Studies on the graphitization of biochar would occur in-lab at VCU. Activities taking place at SDSMT would include: process design and modeling; hydrothermal experiments with corn stover; characterization of biochar, fuels, LA and phenol; and bench scale conversion of biochar into carbon nanofiber mats via electrospinning. These activities at SDSMT would take place in existing, dedicated university research facilities. In addition, the recipient would procure and test two new pilot facility unit operations at the locations described below. This equipment would be used for hydrothermal liquefaction of biomass residue and wet oxidation of the aqueous waste stream for LA and phenol enrichment - the final steps of the proposed distributed process.

At SDSMT, the undertaking of pilot scale production would require retaining commercial and university resources to fabricate, relocate, and install equipment. The system would consist of a continuous stirred tank reactor with auxiliary equipment for hydrothermal treatment of unhydrolyzed solids, a wet oxidation reactor for lactic acid enrichment from aqueous biocrude, and auxiliary control valves, pumps, water supply and digester tanks. The equipment footprint would be approximately 500 sq. ft. Fabrication would occur at The Shop Rapid City LLC: a previously developed 1800 sq. ft. industrial facility designed to provide workshop space for lease along with necessary equipment, tools and materials. Assembled equipment would be transferred to the Black Hills Business Development Center on the SDSMT campus for installation. Owned by the Rapid City Economic Development foundation, this is a purpose-built 40,000 sq. ft. facility for technology start-ups. The project would occupy 900 sq. ft. of floor space equipped with 28 ft. overhead doors to provide easy access for pilot scale equipment; no structural modifications would be required. The space is currently rented by SDSMT to house other equipment, which would be relocated by the university to accommodate the proposed project. Beyond installation, activities at this location would include short-term and temporary demonstration entailing the storage of feedstocks and chemicals. The recipient does not anticipate the need for additional permits to perform project activities at this facility, which has proper storage space and infrastructure available for such work.

The proposed project does not involve new construction or outdoor activities at any location. Equipment installations or other physical modifications would not be required at INL, SwRI, ODU, and VCU. These institutions are fully permitted, and no change in the use, mission or operation of existing facilities would occur as a result of project activities.

Pilot scale operations would use and produce the following quantities of materials. At INL, pilot scale activities would use approximately 10 tons corn stover throughout the entire project lifecycle, producing approximately 2.4 tons unhydrolyzed solids and 100 tons wastewater. Demonstration at SDSMT would be of limited duration, consuming approximately 0.4 tpd unhydrolyzed solids and 2400 L/day water for a total throughput of 6 tons. SDSMT would produce approximately 0.4 tons biochar, 0.08 tons bio-oil, 18,000 L wastewater (i.e. processed and washing water), and test quantities of lactic acid and phenol. SwRI would produce approximately 130 kg biocarbon per batch of generated biochar (150-200 kg) received for pilot scale conversion.

At all locations, various steps of the project would involve the use of hazardous materials including industrial grade reagents, common solvents, catalytic materials, and gases. Handling and storage would occur in state-of-art facilities equipped with general purpose hoods, engineering controls, and monitoring systems. SDSMT, INL, SwRI, ODU and VCU conduct internal assessments and have stringent protocols in place to ensure compliance with proper procedures and practices for the management of hazardous materials in accordance with federal, state, and local environmental regulations. These institutions provide safety training and personal protective equipment to all employees and conduct regular internal assessments. Routine types and quantities of laboratory chemical waste generated by project activities would be disposed of via appropriate systems following established guidelines at each facility. Non-hazardous waste generated by the proposed project, such as biomass residue and treated water, would be covered by existing permits required to discharge effluent and solid waste. No siting, construction or major expansion of waste storage, disposal, recovery, or treatment actions/facilities would be required.

At the conclusion of the project, equipment would remain in place for future operations. Products generated would be kept in-lab by project partners and would not require any adjustment to or expansion of existing storage space at these sites.

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.

Insert the following language in the award:

You are required to:
Any work proposed to be conducted at a DOE laboratory may be subject to additional NEPA review by the cognizant DOE NEPA Compliance Officer for the specific DOE laboratory prior to initiating such work. Further, any work conducted at a DOE laboratory must meet the laboratory's health and safety requirements.

Note to Specialist :

Bioenergy Technologies Office
This NEPA determination requires a tailored NEPA Provision.
NEPA review completed by Whitney Doss, 3/9/2018

SIGNATURE OF THIS MEMORANDUM CONSTITUTES A RECORD OF THIS DECISION.

NEPA Compliance Officer Signature: Electronically Signed By: Casey Strickland Date: 3/20/2018
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