PMC-ND

(1.08.09.13)

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

RECIPIENT: Texas Tech University **STATE:** TX

PROJECT TITLE : Intensified Solar Reactor for Green Ammonia Manufacture and Gen3 Thermochemical Energy Storage

Funding Opportunity Announcement Number	Procurement Instrument Number	NEPA Control Number	CID Number
DE-FOA-0002378	DE-EE0009802	GFO-0009802-001	

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 Texas Tech University for the design, development, fabrication, and demonstration of an intensified reaction-absorption process for enhanced ammonia-based thermochemical energy storage (TCES), in order to reduce the cost for manufacturing green ammonia for energy. This project would be carried out over 30 months and three Budget Periods (BPs).

The proposed project activities would take place at Texas Tech University (TTU) in Lubbock, TX, University of Minnesota (UMN) in Minneapolis, MN, and RTI International (RTI) in Research Triangle Park, NC. TTU would design, develop, and fabricate reaction-absorption (RXN-ABS) ammonia storage and an experimental rig for testing energy storage and ammonia production, in addition to equipment testing. UMN would design and fabricate an absorber heat exchanger, which would subsequently be sent to TTU for demonstration. UMN would also synthesize conductive absorbents, and conduct several technoeconomic analyses (TEA). RTI would carry out equipment testing and process engineering analysis.

The proposed project activities would include the optimization of a heat recovery reactor (HRR) for ammonia synthesis, including the creation of an experimental system in lab to accommodate it.

First in BP1, a heat recovery reactor (HRR) would be optimized for ammonia synthesis, including the experimental system and lab needed to accommodate it. A baseline conductive absorbent for ammonia separation and storage would be designed. Brayton Energy would contribute two months of two engineering researchers to assist with the absorber exchanger. At the end of BP1, a TEA of absorptive-enhanced ammonia synthesis would be carried out. In BP2, the activities from BP1 would be continued, in addition to finalizing the design of the HRR and absorber recuperator. A second TEA would be carried out incorporating catalyst screening data. Lastly in BP2, risk retirement, tech transition, and supply chain development analyses would be performed. In BP3, the HRR and absorber heat exchanger would be integrated, ammonia-based heat recovery cycle for storage using RXN-ABS would be demonstrated, and absorber and conductive absorbents would be finalized. A TEA of absorptive-enhanced

ammonia synthesis would be carried out, in addition to a final risk retirement and technology transition plan.

The proposed project activities would involve the use and handling of various hazardous materials, including <5kg of metal halide salts, <20L of industrial solvents, active materials, 50L of ammonia and flammable gases, and operating the experimental rig at high temperature and pressure. All such handling would occur in-lab and would pose no risk to the public. All experimental laboratories are properly ventilated. Disposal of the product gas would be burning the gas product and exhaust to the fume hood. All hazardous materials would be managed in accordance with federal, state, and local environmental regulations. Existing health and safety policies and procedures in the institutions would be followed, including employee training, proper protective equipment, engineering controls, monitoring, and internal assessments.

There would be no ground disturbing activities or deployment of outdoor equipment. However, there would be minor changes to an existing laboratory at TTU. A materials research room would be modified to serve as the lab that houses the experimental rig. This would require the installation of electrical outlets, water, and house air lines. There would be no need for any new permits or licenses.

NEPA PROVISION

DOE has made a final NEPA determination.

Notes:

Solar Energy Technologies Office (SETO)
Review completed by Alex Colling on 03/18/2022.

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: Electronically Signed By: Kristin Kerwin Date: 3/24/2022

NEPA Compliance Officer

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: _____ Date: _____

Field Office Manager