

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



RECIPIENT: Autumn Energy Corp.

STATE: GA

PROJECT TITLE : Enabling Low-Heat Industrial Decarbonization through Optimizing Electromagnetic Material-Wave Interactions

Funding Opportunity Announcement Number	Procurement Instrument Number	NEPA Control Number	CID Number
DE-FOA-0002997	DE-EE0011198	GFO-0011198-001	GO11198

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.

B3.15 Small-scale indoor research and development projects using nanoscale materials

Siting, construction, modification, operation, and decommissioning of facilities for indoor small-scale research and development projects and small-scale pilot projects using nanoscale materials in accordance with applicable requirements (such as engineering, worker safety, procedural, and administrative regulations) necessary to ensure the containment of any hazardous materials. Construction and modification activities would be within or contiguous to a previously disturbed or developed area (where active utilities and currently used roads are readily accessible).

Rationale for determination:

The U.S. Department of Energy (DOE) is proposing to provide funding to Autumn Energy Corporation (Autumn Energy) for the optimization of electromagnetic material-wave interactions for enabling low-heat industrial decarbonization.

Research and development for electromagnetic (EM) catalysis, EM reactor design and optimization, demonstration of continuous flow process chemistry and analytical characterization would be carried out at Autumn Energy's facility in Aiken, South Carolina. Microwave-enhanced catalytic experiment, converting plastics to olefins, catalyst synthesis, testing and data analysis, microwave reaction process simulation would occur at West Virginia University (WVU) in Morgantown, West Virginia. Catalysts synthesis and characterization as well as traditional heating, microwave, and radio-frequency induction chemical conversions of waste plastic to light olefins would occur at Horizon I Engineering Center and the Swearing Engineering Center at the University of South Carolina (USC). Wash coating of monolith substrates and catalyst impregnations would occur at Applied Catalysts in Laurens, South Carolina. Literature searches, information gathering, data analysis, computer modeling, training, report preparation and project meetings would occur at Benedict College in Columbia South Carolina and AIChE – RAPID Manufacturing Institute in New York, New York. General office work associated with the award would occur at Shell Technology Center in Houston, Texas.

Nanosized metal particles would be created as part of the project at the Applied Catalyst, Autumn Energy and USC sites and may introduce respiratory and skin exposure risks. Award efforts associated with the creation of nanoparticles would occur in accordance with local, state and federal guidelines, to include the use of appropriate personal protective equipment (PPE).

Chemical exposure to employees would also be a potential hazard at the Applied Catalysts site. Standard laboratory practices would be used to prevent any exposure to chemicals for employees, including the use of appropriate PPE and any chemical disposals necessary would be completed in accordance with local, state and federal regulations.

Pinch points or sharp features from grinding or engineering skids are award risks associated with the Autumn Energy site. Other hazards at this site include chemical exposure from oxidizers or catalyst preparation activities, hot surfaces, noxious gases from chemical conversions and microwave radiation leakage. All workers would wear the appropriate PPE to minimize injury from all sharp objects and pinch points or areas where extremities would be harmed are protected by plexiglass shields and/or automatic shutoffs. Any impact from noxious gases that might be generated due to various feedstocks would be minimized using portable fume hoods. Microwave radiation would be contained within the reactor unless couplings allow leakage and/or reactor material changes occur. A handheld and wall mounted microwave survey meter would be used to detect any leakages before the start of any runs and at shift changes to ensure any exposure that occurs would be less than federal standard 21 CFR 1030.10.

Project efforts at the two USC facilities would involve the development and synthesis of catalysts with high selectivity towards ethane to ethylene and high adsorption of microwave or radio-frequency induction energy. These activities would occur at USC in accordance with local, state and federal guidelines. Existing USC health and safety policies and procedures would be followed, including employee training, proper protective equipment, monitoring, control and internal assessments. Additional policies and procedures would be implemented as necessary as new health and safety risks are identified.

Laboratory scale emissions would occur at the Applied Catalyst, Autumn Energy, WVU and USC, which would be considered negligible. All emission sites occur within USEPA Attainment Areas.

No permits would be needed in association with the proposed project and no physical modification of existing facilities or ground disturbing activities would occur as a result of award activities.

DOE has considered the scale, duration, and nature of proposed activities to determine potential impacts on resources, including those of an ecological, historical, cultural, and socioeconomic nature. DOE does not anticipate impacts on these resources which would be considered significant.

NEPA PROVISION

DOE has made a final NEPA determination.

Notes:

Industrial Efficiency & Decarbonization Office
NEPA review completed by Chris Akios, 06/20/2024

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: _____



[Andrew Montano](#)

NEPA Compliance Officer

Date: 6/21/2024

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: _____