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

**RECIPIENT:** Georgia Institute of Technology **STATE:** GA

**PROJECT TITLE:** Durable, High-Performance Unitized Reversible Fuel Cells Based on Proton Conductors

| Funding Opportunity Announcement Number | Procurement Instrument Number | NEPA Control Number | CID Number |
|---|---|---|---|
| DE-FOA-0001874 | DE-EE0008439 | GFO-0008439-001 | GO8439 |

**Based on my review of the information concerning the proposed action, as NEPA Compliance Officer (authorized under DOE Policy 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.) |
| **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 Georgia Institute of Technology (Georgia Tech) to design, develop, fabricate, and test electrolyte materials, electrode materials, and catalysts for reversible solid oxide fuel cells to be used for conversion of hydrogen to electricity and vice versa. Hydrogen ion conducting membranes based on unitized reversible fuel cell (URFC) technology would be developed for energy storage and power generation, along with a roll-to-roll manufacturing process to produce URFCs and stacks. The project would be completed over two Budget Periods (BPs), with a Go/No-Go Decision Point in between each BP.

Proposed project activities for BP1 would include synthesis of electrode and electrolyte powders, fabrication of electrode supports, electrochemical testing/materials analysis, catalyst optimization (for enhanced durability), assembly of laboratory-scale URFCs (10 mm in diameter), and performance testing. BP2 activities would include development of a conceptual roll-to-roll production process, fabrication of prototype large URFCs (10 cm x 10 cm), performance testing of prototypes, and assembly/demonstration of prototype URFC stack. Development of the conceptual roll-to-roll production process would include high-temperature co-sintering of fuel electrode and electrolyte bilayers, as well as low-temperature firing of air electrodes.

All project activities would be performed at existing, purpose-built research and development facilities on Georgia Tech's primary campus in Atlanta, Georgia. Facilities in which work would be performed are equipped to complete

the proposed research activities and regularly conduct work similar in nature to that included in the scope of this project. No change in the use, mission or operation of existing facilities would be required. Likewise, no new permits, licenses, or authorizations would be required to perform project activities.

The project would involve the use and handling of industrial solvents, powders (e.g. metal oxides, metal nitrates, and metal carbonates), and flammable/oxidizing gases (e.g. hydrogen and argon). Any risks associated with the handling of these materials would be mitigated through adherence to established health and safety policies and procedures. Protocols would include the training of laboratory personnel, proper storage of hazardous materials and gases, and proper disposal of all laboratory waste. Gas would be stored in a designated flammable gas area and the total quantity stored at any one time would be limited to 600 cubic feet. Gases would only be handled in well vented areas. All laboratory personnel would be trained in the proper handling and use of dangerous gases, including hydrogen. Georgia Tech would adhere to all relevant Federal, state, and local health, safety and environmental regulations when completing project work.

Ceramic and metal-based nanoscale materials, including nanocatalyst coatings and nanostructured components, would be used throughout the project. These materials would be bonded to electrode structures. All such handling would occur indoors, in laboratory conditions with adequate ventilation in order to mitigate any inhalation risks.

**NEPA PROVISION**

DOE has made a final NEPA determination.

Notes:

Fuel Cell Technologies Office
This NEPA determination does not require a tailored NEPA Provision.
NEPA review completed by Jonathan Hartman, 11/07/2018

**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: Casey Strickland Date: 11/7/2018

NEPA Compliance Officer

**FIELD OFFICE MANAGER DETERMINATION**

- [x] 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