U.S. Department of Energy
Categorical Exclusion Determination Form

Proposed Action Title: Georgia Tech Research Corporation -- Tough and Ecological Supercritical Line Breaker for Alternating Current (TESLA)

Program or Field Office: Advanced Research Projects Agency - Energy

Location(s) (City/County/State): Atlanta, Georgia; Lenox, Massachusetts; Chalfont, Pennsylvania; Milwaukee, Wisconsin

Proposed Action Description:

SECOND AMENDED NEPA DETERMINATION: (See attached original and First Amended Determinations, dated January 11, 2022 and May 11, 2022, respectively). This Second Amended Determination follows the addition of project funding, new project milestones, teaming partners, and project locations to support the project team's small-scale research and development activities to create a high-voltage alternating current (AC) circuit breaker using a super critical fluid (SCF) as a dielectric and arc-quenching medium, currently in progress under the Topics Informing New Program Areas (TINA), Targeted Topic U: Sulfur Hexafluoride (SF6)-Free Routes for Electrical Equipment (S-FREE). Specifically, the project team will 1) test and validate the preliminary circuit breaker design and functionality using simulation and physical testing systems; 2) develop, test, and validate scaled system iterations based on preliminary test results; 3) develop and test full system in lab setting; 4) prepare outdoor testing site for system installation; 5) install, test, and validate system operation for 6 months to meet project metrics; and 6) conduct a techno-economic analysis and life cycle assessment for next phase of development. If successful, this project will enable development of a high-voltage AC circuit breaker using a longer-lasting, reliable, and less expensive material, which will improve electrical distribution system reliability and reduce dependence on foreign energy sources, thereby increasing U.S. energy security.

Project activities will be conducted at existing facilities at Georgia Tech Research Corporation (Atlanta, GA), University of Wisconsin-Milwaukee (Milwaukee, WI), WattEDGE Corp. (Atlanta, GA), Electric Power Research Institute, Inc. (Lenox, MA), and KEMA-Powertest LLC (Chalfont, PA) designed for the applicable activities. This project fits within the class of actions identified under the DOE Categorical Exclusions identified below. This assessment was based on a review of the proposed scope of work and the potential environmental impacts of the project. The project team has certified that project tasks will be conducted in accordance with established safety and materials/waste management protocols and pursuant to applicable Federal, State, and local regulatory requirements.

Categorical Exclusion(s) Applied:

B3.6 - Small-scale research and development, laboratory operations, and pilot projects

B3.11 – Outdoor tests and experiments on materials and equipment components

For the DOE procedures regarding categorical exclusions, including the full text of each categorical exclusion, see 10 CFR 1021.102 and Appendix B to 10 CFR Part 1021, and also Section 5.4 (Applying one or more categorical exclusions to a proposal) and Appendices B and C of DOE's National Environmental Policy Act Implementing Procedures (June 30, 2025).

Requirements and guidance in 10 CFR 1021.102 and DOE's NEPA Implementing Procedures: (See full text in regulation and in Implementing Procedures)

✔ The proposal fits within a class of actions that is listed in Appendix B to 10 CFR Part 1021 or Appendix B and C of DOE's NEPA Implementing Procedures (June 30, 2025).

To fit within the classes of actions listed in Appendix B to 10 CFR Part 1021, or Appendix B of DOE's NEPA Implementing Procedures, a proposal must satisfy the conditions that are integral elements of the classes of actions in Appendix B of both 10 CFR Part 1021 and DOE's NEPA Implementing Procedures.

✔ There are no extraordinary circumstances related to the proposal that may affect the significance of the environmental effects of the proposal. DOE or an applicant may modify the proposal to avoid reasonably foreseeable adverse significant effects such that the categorical exclusion would apply.

✔ The proposal has not been segmented to meet the definition of a categorical exclusion.

[Note: For proposals that fit within the categorical exclusions listed in Appendix C of DOE's NEPA Implementing Procedures, see DOE's notice of adoption for the subject Appendix C categorical exclusion for additional considerations. DOE notices of adoption for other agency categorical exclusions may be found on DOE's Section 109 webpage.]

Based on my review of the proposed action, as NEPA Compliance Officer, I have determined that the proposed action fits within the specified class(es) of action, the other requirements and guidance set forth above are met, and the proposed action is hereby categorically excluded from further NEPA review.

NEPA Compliance Officer: GEOFFREY GOODE

Digitally signed by GEOFFREY GOODE
Date: 2026.11.20 12:47:55 -05'00'

Date Determined:

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U.S. Department of Energy
Categorical Exclusion Determination Form

Submit by E-mail

Proposed Action Title: Georgia Institute of Technology -- TESLA: Tough and Ecological Supercritical Line Breaker for Alternating Current

Program or Field Office: Advanced Research Projects Agency - Energy

Location(s) (City/County/State): Atlanta, GA; Forest Park, GA; Starkville, MS; Chalfont, PA

Proposed Action Description:

AMENDED NEPA DETERMINATION: (See attached original Determination, dated January 11, 2022)
This Amended Determination follows the approval of additional funds to support the project team's small-scale research and development of a high-voltage alternating current (AC) circuit breaker using a super critical fluid (SCF) as a dielectric and arc-quenching medium. Specifically, the project team will 1) design and build a "tough and ecological supercritical line breaker for AC" (TESLA) by replacing the common medium of sulfur hexafluoride gas with an SCF medium, 2) validate the design and functionality using a synthetic test circuit, and 3) prepare a full-scale product for future commercial market. If successful, the TESLA will be rated at 245kV, 4kA and will operate without the use of sulfur hexafluoride gas, a compound that has environmental concerns as a global warming contributor.

Project activities will be conducted at existing facilities at Georgia Institute of Technology (Atlanta, GA), National Electric Energy Testing, Research, and Applications Center at Georgia Institute of Technology (Forest Park, GA), Mississippi State University (Starkville, MS), and KEMA Laboratories (Chalfont, PA) designed for the applicable activities. Project tasks will be conducted in accordance with established safety and materials/waste management protocols and pursuant to applicable Federal, State, and local regulatory requirements. No modifications will be made to existing facilities to accommodate the proposed work.

Categorical Exclusion(s) Applied:

B3.6 - Small-scale research and development, laboratory operations, and pilot projects

A9 - Information gathering, analysis, and dissemination

For the complete DOE National Environmental Policy Act regulations regarding categorical exclusions, including the full text of each categorical exclusion, see Subpart D of 10 CFR Part 1021.

Regulatory Requirements in 10 CFR 1021.410(b): (See full text in regulation)

☑ The proposal 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 proposal that may affect the significance of the environmental effects of the proposal.

☑ The proposal 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.

Based on my review of the proposed action, as NEPA Compliance Officer (as authorized under DOE Order 451.1B), I have determined that the proposed action fits within the specified class(es) of action, the other regulatory requirements set forth above are met, and the proposed action is hereby categorically excluded from further NEPA review.

NEPA Compliance Officer: GEOFFREY GOODE Digitally signed by GEOFFREY GOODE Date: 2022.05.11 14:10:34 -04'00' Date Determined:

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U.S. Department of Energy
Categorical Exclusion Determination Form

Submit by E-mail

Proposed Action Title: Solicitation on Topics Informing New Program Areas Targeted Topic U: SF6-Free Routes for Electrical Equipment (S-FREE) (FOA No. DE-FOA-0001953)

Program or Field Office: Advanced Research Projects Agency - Energy

Location(s) (City/County/State): CT, GA, MS, NY, PA

Proposed Action Description:

The S-FREE Program seeks to develop technologies aimed at reducing Sulfur Hexafluoride (SF6) emissions from the electric transmission and distribution sector. S-FREE teams will (1) identify new alternative gases or gas mixtures with comparable performance to SF6 but with much lower global warming potential (GWP); (2) accelerate development and testing of vacuum-dry air or vacuum-solid dielectric technologies for high voltage (at or above 245kV) applications; (3) design cost-effective sensors enabling early and continuous SF6 and alternative gas leak detection; and (4) design new pathways for the permanent fixation or destruction of SF6 for end-of-life disposal. If successful, S-FREE technologies may reduce, regulate, or eliminate SF6 emissions from electrical grids.

The S-FREE Program is composed of 4 small-scale research and development projects that will be conducted by universities, a non-profit entity, for-profit entities, and federal laboratories. This Determination covers 3 of the 4 projects (listed in Attachment A). These 3 projects fit within the class of actions identified under the DOE Categorical Exclusion identified below and do not involve any extraordinary circumstances that may affect the significance of the environmental effects of the projects. This assessment was based on a review of the proposed scope of work and the potential environmental impacts of each project. All project tasks will be conducted in accordance with established safety and materials/waste management protocols and pursuant to applicable Federal, State, and Local regulatory requirements.

Categorical Exclusion(s) Applied:

A9 - Information gathering, analysis, and dissemination

B3.6 - Small-scale research and development, laboratory operations, and pilot projects

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

For the complete DOE National Environmental Policy Act regulations regarding categorical exclusions, including the full text of each categorical exclusion, see Subpart D of 10 CFR Part 1021.

Regulatory Requirements in 10 CFR 1021.410(b): (See full text in regulation)

☑ The proposal 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 proposal that may affect the significance of the environmental effects of the proposal.

☑ The proposal 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.

Based on my review of the proposed action, as NEPA Compliance Officer (as authorized under DOE Order 451.1B), I have determined that the proposed action fits within the specified class(es) of action, the other regulatory requirements set forth above are met, and the proposed action is hereby categorically excluded from further NEPA review.

NEPA Compliance Officer: GEOFFREY GOODE Digitally signed by GEOFFREY GOODE Date: 2022.01.11 17:38:32 -05'00' Date Determined:

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Attachment A: Projects in the Solicitation on Topics Informing New Program Areas Targeted Topic U: SF6-FREE Routes for Electrical Equipment, S-FREE (FOA No. DE-FOA-0001953)

Full Application Control Number	Lead Organization	Project Title	Categorical Exclusion
1953-1923	University of Connecticut	Detection and Fixation- A lifecycle-management Framework Towards an SF6-Free Green Power Network	A9; B3.6; B3.15
1953-1924	Georgia Institute of Technology	TESLA—Tough and Ecological Supercritical Line Breaker for AC	A9; B3.6
1953-1926	GE Grid Solutions, LLC	Development of an eco-friendly outdoor HV AC power circuit breaker to reduce dependence on SF6 technology in the U.S. electrical grid	A9; B3.6