U.S. Department of Energy
Categorical Exclusion Determination Form

Proposed Action Title: Jumpstart Opportunities to Unleash Leadership in Energy Storage with 1K Energy Storage Systems -- JOULES-1K Phase 2 and JOULES 1K Phase 2 SBIR-STTR (NOFO Nos. DE-FOA-0003162 and DE-FOA-0003163)

Program or Field Office: Advanced Research Projects Agency - Energy

Location(s) (City/County/State): AZ, CA, CO, CT, GA, IL, MA, MD, MI, TN

Proposed Action Description:

FIRST AMENDED PROGRAMMATIC NEPA DETERMINATION (See attached original Determination, dated February 26, 2026). The Jumpstart Opportunities to Unleash Leadership in Energy Storage with 1K Energy Storage Systems (JOULES-1K) Phase 2 Program (previously Pioneering Railroad, Oceanic and Plane ELectrification with 1K energy storage systems [PROPEL-1K]) consists of projects chosen from Phase 1 of the JOULES-1K program which show the most promise of developing novel energy storage to support drones, robots, Electrical Vertical Take-Off and Landing (eVTOL) aircraft, and other applications that would benefit from ultra-high-density storage systems. Specifically, project teams will develop storage technologies that achieve energy density targets that equal or exceed 1,000 watt-hours per kilogram and 1,000 watt-hours per liter at the end of life and at the net energy storage system level. If successful, JOULES-1K Phase 2 projects would enable energy storage technologies fundamentally distinct from conventional battery approaches which could increase energy density by 4x compared to today's state-of-the-art storage systems, ultimately reducing dependence on foreign energy and mineral sources, thereby increasing U.S. energy security.

The JOULES-1K Phase 2 Program is composed of 6 small-scale research and development projects that will be conducted by universities, large businesses, and small businesses. This First Amended Determination adds 3 projects to the original Determination (see Attachment A for all 6). All 6 projects fit 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 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:

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 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: 2026.05.22 12:02:14 -04'00'

Date Determined:

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Attachment A: Projects in the JOULES 1K Phase 2 (NOFO Nos. DE-FOA-0003162 and DE-FOA-0003163) Program

Prime Recipient (Control No.)	Project Title	Categorical Exclusion
And Battery Aero, Inc. (3162-1523)	**High Energy Renewable AFx eLectroDes (Phase II)**	**B3.6**
Illinois Institute of Technology (3162-1511)	**1K Rechargeable Solid-State Li-Air Battery for Aviation**	**B3.6. B3.15**
Precision Combustion, Inc. (3163-1505)	**Electrochemical Microchip Paired with Energetic Fuels for MWh Electrified Propulsion (EMPoWEr)**	**B3.6**
Johns Hopkins University (3162-1546)	High Density Energy Storage Using Cyclic Hydrogen Carriers	B3.6, B3.15
University of Maryland (3162-1543)	High-energy, Rechargeable, Low-Cost Batteries for Train and Ship Electrification	B3.6
Georgia Institute of Technology (3162-1534)	Alkali Hydroxide Triple Phase Flow Batteries (3PFB)	B3.6

Bold text indicates the three projects included in the Amended CX.

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Program or Field Office: Advanced Research Projects Agency - Energy

Location(s) (City/County/State): CO, GA, MA, MD

Proposed Action Description:

The Jumpstart Opportunities to Unleash Leadership in Energy Storage with 1K Energy Storage Systems (JOULES-1K) Phase 2 Program (previously Pioneering Railroad, Oceanic and Plane ELectrification with 1K energy storage systems [PROPEL-1K]) are projects chosen from Phase 1 of the JOULES-1K program which show the most promise of developing novel energy storage to support drones, robots, Electrical Vertical Take-Off and Landing (eVTOL) aircraft, and other applications that would benefit from ultra-high-density storage systems. Specifically, project teams will develop storage technologies that achieve energy density targets that equal or exceed 1,000 watt-hours per kilogram and 1,000 watt-hours per liter at the end of life and at the net energy storage system level. If successful, JOULES-1K Phase 2 projects would enable energy storage technologies fundamentally distinct from conventional battery approaches which could increase energy density by 4x compared to today's state-of-the-art storage systems, ultimately reducing dependence on foreign energy and mineral sources, thereby increasing U.S. energy security.

The JOULES-1K Phase 2 Program is composed of 6 small-scale research and development projects that will be conducted by universities, large businesses, and small businesses. This Determination covers 3 of the 6 projects (listed in Attachment A). The projects fit 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 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:

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 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.

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[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: 2026.02.26 10:22:15 -05'00'

Date Determined:

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Attachment A: Projects in the JOULES 1K Phase 2 (NOFO Nos. DE-FOA-0003162 and DE-FOA-0003163) Program

Prime Recipient (Control No.)	Project Title	Categorical Exclusion
Johns Hopkins University (3162-1546)	High Density Energy Storage Using Cyclic Hydrogen Carriers	B3.6, B3.15
University of Maryland (3162-1543)	High-energy, Rechargeable, Low-Cost Batteries for Train and Ship Electrification	B3.6
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