



# U.S. Department of Energy

## Categorical Exclusion Determination Form

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Proposed Action Title: Antora Energy - Solid State Thermal Battery

Program or Field Office: Advanced Research Projects Agency - Energy

Location(s) (City/County/State): Sunnyvale, California

Proposed Action Description:

AMENDED NEPA DETERMINATION: (See attached original Determination, dated January 7, 2019). This Amended Determination follows the approval of additional funds to support the project team's small-scale, research and development activities to develop a novel low-cost thermal storage system for dispatching both electricity and industrial process heat via a Direct Thermal Discharge System (DTDS). Specifically, the project team will (1) conduct techno-economic, regulatory and pricing analyses; (2) design the DTDS and experiment at small scale; (3) create steady-state and dynamic simulation model and controls for the integrated system; and (4) test the system and demonstrate extended cycling operation. If successful, the team will prove out the design for a innovative combined heat and power storage technology capable of flexibly discharging electricity and heat, creating significant energy efficiency opportunities for industrial heat and CHP facilities/customers. Project activities will be conducted at existing facilities at Antora Energy (Sunnyvale, CA) designed for the applicable activities. Project tasks continue to 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 project. This assessment was based on a review of the scope and the potential environmental impact of the project. 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. The team has not yet obtained all necessary permits and is prohibited from commencing applicable work before obtaining such permits and providing written assurance to ARPA-E of the same. ~~The only physical modifications of existing facilities will be extensions of internal electrical and plumbing~~

Categorical Exclusion(s) Applied:

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

A9 - Information gathering, analysis, and dissemination

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: 2022.01.21 12:11:45 -05'00'

Date Determined:



# U.S. Department of Energy Categorical Exclusion Determination Form

Submit by E-mail

Proposed Action Title: Duration Addition to Electricity Storage (DAYS) Program (FOA No. DE-FOA-0001906)

Program or Field Office: Advanced Research Projects Agency - Energy (ARPA-E)

Location(s) (City/County/State): AZ, CA, CO, CT, IN, MA, MI, MO, NH, NJ, NY, OH, PA, SC, TN, TX, VA, WA

Proposed Action Description:

AMENDED NEPA DETERMINATION (the original Determination, dated November 30, 2018, is attached as Attachment B) This Amended Determination follows ARPA-E's receipt of required information and certifications from the two remaining Prime Recipients -- University of Tennessee-Knoxville and Quidnet Energy, Inc. -- that were not covered under the original Determination. All 10 projects in the DAYS Program are covered by the original Determination and this Amended Determination (see Attachment A). One Prime Recipient (Quidnet Energy, Inc.) has not yet obtained all necessary permits or approvals and is prohibited from commencing applicable project work before (1) obtaining the necessary permits and approvals and (2) providing written assurances to ARPA-E of the same.

With the new Prime Recipients, All 10 projects continue to fit within the class of actions identified under the DOE Categorical Exclusion(s) identified below and does not involve any extraordinary circumstances that may affect the significance of the environmental effects of the project. This assessment was based on a review of the proposed scope of work and the potential environmental impact of the project. 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
- B3.1 - Site characterization and environmental monitoring
- 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:

Date Determined: 01/07/2019



**Attachment A: Projects in the DAYS (FOA No. DE-FOA-0001906) Program**

Prime Recipient (Control No.)	Project Title	Categorical Exclusion
United Technologies Research Center (1906-1620)	High-Performance Flow Battery with Inexpensive Inorganic Reactants	B3.6
Antora Energy (1906-1621)	Solid State Thermal Battery	A9; B3.6; B3.15
Echogen (1906-1618)	Low-cost, Long Duration Electrical Energy Storage Using A CO2-based Pumped Thermal Energy Storage (PTES) System	B3.6
Form Energy (1906-1551)	Aqueous Sulfur Systems for Long-duration Grid Storage	B3.6
National Renewable Energy Laboratory (1906-1508)	Economic Long-Duration Electricity Storage by Using Low-Cost Thermal Energy Storage and High-efficiency Power Cycle (ENDURING)	A9; B3.6
Michigan State University (1906-1534)	Scalable Thermochemical Option for Renewable Energy Storage (STORES)	A9; B3.6
Brayton Energy, LLC (1906-1535)	Reversible Counter-Rotating Turbomachine to Enable Brayton-Laughlin Cycle	A9; B3.6
Primus Power (1906-1604)	Minimal Overhead Storage Technology for Duration Addition to Electricity Storage	A9; B3.6
Quidnet Energy Inc. (1906-1581)	Geomechanical Pumped Storage	A9; B3.1; B3.6
University of Tennessee-Knoxville (1906-1613)	Reversible Fuel Cells for Long Duration Storage	A9; B3.6

Attachment B



U.S. Department of Energy
Categorical Exclusion Determination Form

Submit by E-mail

Proposed Action Title: Duration Addition to Electricity Storage (DAYS) Program (FOA No. DE-FOA-0001906)

Program or Field Office: Advanced Research Projects Agency - Energy (ARPA-E)

Location(s) (City/County/State): AZ, CA, CO, CT, IN, MA, MI, MO, NH, NJ, NY, OH, PA, SC, TX, VA, WA

Proposed Action Description:

The DAYS Program (hereinafter "Program") seeks to fund the development of energy storage systems that provide power to the electric grid for durations between 10 and 100 hours. Specifically, the teams funded under this Program will develop storage systems that are deployable in almost any location and charge and discharge electricity at a specific fixed cost per cycle. If successful, the projects will provide new forms of long-duration stationary electricity storage systems that enhance grid resiliency, provide low-cost energy capacity, support grid infrastructure, and enable a greater share of intermittent renewable resources in the generation mix.

The Program is composed of 10 small-scale research and development projects that will be conducted by universities, non-profit entities, for-profit entities, and federal laboratories. 8 of the 10 projects (listed in Attachment A) are covered by this Determination and 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)

[X] 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.

[X] There are no extraordinary circumstances related to the proposal that may affect the significance of the environmental effects of the proposal.

[X] 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:

[Handwritten signature]

Date Determined: 11/30/2018

**Attachment B (cont.)**

**Attachment A: Projects in the DAYS (FOA No. DE-FOA-0001906) Program**

Prime Recipient (Control No.)	Project Title	Categorical Exclusion
United Technologies Research Center (1906-1620)	High-Performance Flow Battery with Inexpensive Inorganic Reactants	B3.6
Antora Energy (1906-1621)	Solid State Thermal Battery	A9; B3.6; B3.15
Echogen (1906-1618)	Low-cost, Long Duration Electrical Energy Storage Using A CO2-based Pumped Thermal Energy Storage (PTES) System	B3.6
Form Energy (1906-1551)	Aqueous Sulfur Systems for Long-duration Grid Storage	B3.6
National Renewable Energy Laboratory (1906-1508)	Economic Long-Duration Electricity Storage by Using Low-Cost Thermal Energy Storage and High-efficiency Power Cycle (ENDURING)	A9; B3.6
Michigan State University (1906-1534)	Scalable Thermochemical Option for Renewable Energy Storage (STORES)	A9; B3.6
Brayton Energy, LLC (1906-1535)	Reversible Counter-Rotating Turbomachine to Enable Brayton-Laughlin Cycle	A9; B3.6
Primus Power (1906-1604)	Minimal Overhead Storage Technology for Duration Addition to Electricity Storage	A9; B3.6