



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

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Proposed Action Title: (25A5144) Arizona State University - Cyanobacteria Designed for Solar-Powered Highly Efficient Production of Biofuels - Phase II

Program or Field Office: Advanced Research Projects Agency - Energy

Location(s) (City/County/State): Tempe, AZ; Mesa, AZ; Gilbert, AZ; St. Paul, MN; Raleigh, NC

Proposed Action Description:

Funding will support (1) engineering and optimization of the cyanobacteria *Synechocystis* to enhance the organism's ability to produce laurate, a fatty acid capable of conversion to biofuel, in a wide variety of environmental conditions, and (2) the design and development of a large-scale, low-flow photobioreactor system that can harvest cyanobacteria for production of laurate.

Proposed work consists of indoor laboratory and greenhouse-based research and development (R&D), including (1) genetically engineering *Synechocystis* to improve laurate productivity over a larger range of environmental conditions, (2) small-scale, laboratory-based cultivation of *Synechocystis* to demonstrate stability of laurate, (3) development of laurate harvest and recovery protocols, (4) development and optimization of small-scale photobioreactors designed for cultivation of photosynthetic *Synechocystis* and recovery of laurate produced by the *Synechocystis*, (5) natural sunlight testing and validation of small-scale photobioreactor units to test efficiency of laurate recovery, (6) design, development, and optimization of a large-scale Smart Flow photobioreactor system designed for cultivation of photosynthetic *Synechocystis* and recovery of laurate produced by the *Synechocystis*, (7) natural sunlight testing and validation of the large-scale photobioreactor system in contained greenhouses to test efficiency of laurate recovery, and (8) laboratory-based conversion of laurate into jet fuel using laurate produced from the large-scale Smart Flow photobioreactor system. R&D tasks will be conducted in dedicated university laboratory and greenhouse facilities located at Arizona State University (Tempe, AZ; Mesa, AZ), University of Minnesota (St. Paul, MN), and North Carolina State University (Raleigh, NC). Supportive engineering and technoeconomic analysis will be performed at Diversified Energy Corp.

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:

Date Determined: 04/17/2012