



U.S. Department of Energy

Categorical Exclusion Determination Form

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

Project Title: 25A4374 - MacroAlgae Butanol

Location: Delaware

Proposed Action or Project Description:

American Recovery and Reinvestment Act:

DuPont and Bio Architecture Lab, Inc. (BAL) propose to develop a commercially viable process for production of biobutanol from macroalgae (seaweed) as a transformational energy-related project that offers significant advantages over fossil fuels and ethanol as currently made from corn and sugarcane and second generation cellulosic biomass. Macroalgae is a low cost, scalable, and environmentally sustainable biomass. Macroalgae is grown in the ocean at a projected cost of \$40 per ton or \$0.04 per pound of sugar, significantly lower than corn or sugar cane. The aquafarming of macroalgae requires no land use change, uses no fresh water, requires no fertilizer, and improves the local ocean environment. As an ocean-based biomass, macroalgae can be grown closely to coastal populations where significant energy infrastructure exists, reducing the cost of transport and the environmental footprint for macroalgae-based biofuels. Macroalgae will also diversify the sources of US biomass, serving as a hedge against failure of terrestrial crop failures. Biobutanol is an advanced biofuel with significant advantages over ethanol, including higher energy density, lower vapor pressure, lower hygroscopicity and less corrosivity. Also, biobutanol can be blended in gasoline at higher levels than ethanol without changes to automobiles or fuels infrastructure. BP and DuPont have recently formed Butamax™ Advanced Biofuels to commercialize biobutanol made from sugar feedstocks as well as advanced feedstocks such as macroalgae. The project makes use of existing developments

Categorical Exclusion(s) Applied:

X - B3.6 Siting/construction/operation/decommissioning of facilities for bench-scale research, conventional laboratory operations, small-scale research and development and pilot projects

*-For the complete DOE National Environmental Policy Act regulations regarding categorical exclusions, see Subpart D of 10 CFR10 21 [Click Here](#)

This action would not: threaten a violation of applicable statutory, regulatory, or permit requirements for environment, safety, and health, including DOE and/or Executive Orders; require siting, construction, or major expansion of waste storage, disposal, recovery, or treatment facilities, but may include such categorically excluded facilities; disturb hazardous substances, pollutants, contaminants, or CERCLA-excluded petroleum and natural gas products that pre-exist in the environment such that there would be uncontrolled or unpermitted releases; or adversely affect environmentally sensitive resources (including but not limited to those listed in paragraph B.(4)) of Appendix B to Subpart D of 10 CFR 1021). Furthermore, there are no extraordinary circumstances related to this action that may affect the significance of the environmental effects of the action; this action is not "connected" to other actions with potentially significant impacts, is not related to other proposed actions with cumulatively significant impacts, and is not precluded by 40 CFR 1506.1 or 10 CFR 1021.211.

Based on my review of information conveyed to me and in my possession (or attached) concerning 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: **Matthew Dunne**

Digitally signed by Matthew Dunne
 DN: cn=Matthew Dunne, o, ou,
 email=matthew.dunne@hq.doe.gov, c=US
 Date: 2010.01.29 17:20:46 -05'00'

Date Determined: 1/29/2010

Comments:

Webmaster:

A NEPA review has been completed by the ARPA-E NEPA Compliance Officer, and the following sections of the Milestones and Deliverables Schedule as set forth in Attachment 3, Statement of Project Objectives have been determined to qualify for a categorical exclusion (B3.6) under DOE NEPA regulations: Program Element/Project I, Phase I and Program Elements/Projects II through IV.

For Program Element/Project I, Phase II (involving the execution of a 5-10 hectare macroalgae pilot aquafarm) of the Milestones and Deliverables Schedule, an additional ARPA-E NEPA determination is required. The determination must be completed by the ARPA-E NEPA Compliance Officer before any work on Program Element/Project I, Phase II can begin. DuPont shall not make any funding commitments for Program Element/Project I, Phase II until the additional ARPA-E NEPA determination is completed. At least six months before any work on Program Element/Project I, Phase II is scheduled to begin, DuPont shall submit a completed ARPA-E Environmental Questionnaire for a determination by the ARPA-E NEPA Compliance Officer. The ARPA-E NEPA Compliance Officer shall determine whether a categorical exclusion applies or whether an Environmental

25A4374 Proposed Action or Project Description (Continued)

biobutanol made from sugar feedstocks as well as advanced feedstocks such as macroalgae. The project makes use of existing developments within both BAL and DuPont. BAL has developed a microorganism capable of consuming carbohydrates (alginate, mannitol and cellulose) in macroalgae to produce ethanol at high yield. DuPont has developed a butanologen that will produce biobutanol from glucose in an efficient manner. The technical challenges of the program include finding and integrating marine genetic material into an industrial relevant butanologen, that allows for alginate and mannitol consumption. The key deliverables of the process are a validation of the cost of sugar from macroalgae, incorporation of a biobutanol pathway into the BAL E. coli, integration of the alginate pathway into DuPont's butanologen, development of an in-situ product removal process, and a techno-economic and life cycle analysis of the sustainability of the overall process.

25A4374 Comments (Continued)

Assessment or Environmental Impact Statement must be prepared by DuPont. If the ARPA-E NEPA Compliance Officer determines that an Environmental Assessment or Environmental Impact Statement is required, DuPont shall prepare the required Environmental Assessment or Environmental Impact Statement and submit it to the ARPA-E NEPA Environmental Compliance Officer for his review. Upon the approval of the ARPA-E NEPA Environmental Compliance Officer, DuPont may begin work on Program Element/Project I, Phase II and make funding commitments for Program Element/Project I, Phase II.