



# U.S. Department of Energy

## Categorical Exclusion Determination Form

Submit by E-mail

Proposed Action Title: Bio Architecture Lab, Inc. (BAL) - Macroalgae Butanol

Program or Field Office: Advanced Research Projects Agency - Energy

Location(s) (City/County/State): Seattle, WA; Santa Cruz, CA

Proposed Action Description:

This award is a continuation and expansion of research performed by BAL under DE-AR0000006 to develop macroalgae as a sustainable feedstock for biofuel production.

Project work will consist of the following: Harris Group, Inc. and EcoShift Consulting will conduct an independent engineering analysis of a seaweed biorefinery process and provide a summary report to BAL. Project work will take place at Harris Group, Inc.'s office complex in Seattle, WA and EcoShift Consulting's office complex in Santa Cruz, CA.

Categorical Exclusion(s) Applied:

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: 09/19/2012



# U.S. Department of Energy

## Categorical Exclusion Determination Form

Submit by E-mail

Proposed Action Title: (25A4374) Bio Architecture Labs, Inc. - Advanced Biofuels from Microalgae

Program or Field Office: Advanced Research Projects Agency - Energy

Location(s) (City/County/State): Portland, ME; Blue Hill, ME

Proposed Action Description:

Funding will support the testing, installation, monitoring, and analysis of two small-scale aquaculture kelp farms off the coast of Portland and Blue Hill, Maine. Project will focus on the in-lab cultivation of the giant kelp species *Saccharina latissima* and transplant of immature kelp to ocean test sites. A permit for the Blue Hill site has already been secured, and a permit for the Portland site will be secured before any in-ocean project activities occur.

The project does not contemplate any work in or near a governmentally-proposed marine sanctuary or wildlife refuge or a governmentally recognized area of high sensitivity. Likewise, the in-ocean activities will not occur within areas of hazardous natural bottom conditions.

All equipment used for in-ocean cultivation will be disassembled and removed shortly after the end of the project. No emissions into the surrounding environment will occur. No use of radioactive, toxic, or otherwise hazardous materials will occur.

Categorical Exclusion(s) Applied:

B5.25 - Small-scale renewable energy research and development and pilot projects in aquatic environments

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: 12/12/2011



# 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.