

High Yields through Productivity and Integration Research (HYPIR) Request for Information

DATE: September 18, 2015

SUBJECT: Request for Information (RFI)

DESCRIPTION: The U.S. Department of Energy (DOE) is seeking input from industry, academia, and other biofuels stakeholders regarding supply systems and services for the cultivation, logistics, and preprocessing of algal feedstocks. The information may be used by DOE in support of Program planning.

BACKGROUND: Fuels derived from algal biomass qualify as advanced biofuels and have the potential to contribute significantly to the pool of advanced biofuels alongside fuels derived from terrestrial biomass. While algal biofuels have tremendous potential, most commercial entities cannot currently produce algal biofuels that are cost competitive with petroleum-derived fuels. The Bioenergy Technologies Office (BETO) Multiyear Program Plan (MYPP)¹ highlights some of the commercialization opportunities and challenges for algae. It is the intent of the Program to address the technology barriers that can directly impact the cost and sustainability of producing algal biofuels at commercial scale. Toward this end, the Program is investing in various algal biomass and biofuels production research and development (R&D) projects. Reliable and readily available supplies of sufficient volumes and varieties of algae biomass and metabolites are currently lacking and are needed to support current and anticipated DOE R&D program efforts.

PURPOSE: The purpose of this RFI is solely to solicit input for DOE consideration in the development of future algal biofuels and bioproducts R&D programs. Information obtained is meant to be used by DOE on a non-attribution basis. This RFI provides algae stakeholders with an opportunity to contribute their views of any requirements necessary to develop reliable and readily-available supplies of algal biomass, algal intermediates, and metabolites. Multiple types of algae, including microalgae, cyanobacteria, and macroalgae are of interest. This is solely a request for information and not a Funding Opportunity Announcement (FOA).

DISCLAIMER AND IMPORTANT NOTES: This RFI is not a Funding Opportunity Announcement (FOA); therefore, the Office of Energy Efficiency and Renewable Energy (EERE) is not accepting applications at this time. EERE may issue a FOA in the future based on or related to the content and responses to this RFI; however, EERE may also elect not to issue a FOA. There is no guarantee that a FOA will be issued as a result of this RFI. Responding to this RFI does not provide any advantage or disadvantage to potential applicants if EERE chooses to issue a FOA regarding the subject matter.

¹ DOE Bioenergy Technologies Office Multi-Year Program Plan: March 2015 Update.
http://energy.gov/sites/prod/files/2015/04/f22/mypp_beto_march2015.pdf

This is a Request for Information (RFI) only. EERE will not pay for information provided under this RFI and no project will be supported as a result of this RFI. This RFI is not accepting applications for financial assistance or financial incentives. EERE may or may not issue a Funding Opportunity Announcement (FOA) based on consideration of the input received from this RFI.

Any information obtained as a result of this RFI is intended to be used by the Government on a non-attribution basis for planning and strategy development; this RFI does not constitute a formal solicitation for proposals or abstracts. Your response to this notice will be treated as information only. EERE will review and consider all responses in its formulation of program strategies for the identified materials of interest that are the subject of this request. EERE will not provide reimbursement for costs incurred in responding to this RFI. Respondents are advised that EERE is under no obligation to acknowledge receipt of the information received or provide feedback to respondents with respect to any information submitted under this RFI. Responses to this RFI do not bind EERE to any further actions related to this topic.

PROPRIETARY INFORMATION: Because information received in response to this RFI may be used to structure future programs and FOAs and/or otherwise be made available to the public, **respondents are strongly advised to NOT include any information in their responses that might be considered business sensitive, proprietary, or otherwise confidential.**

Responses containing confidential, proprietary, or privileged information must be conspicuously marked as described below. Failure to comply with these marking requirements may result in the disclosure of the unmarked information under the Freedom of Information Act or otherwise. The U.S. Federal Government is not liable for the disclosure or use of unmarked information, and may use or disclose such information for any purpose.

If your response contains confidential, proprietary, or privileged information, you must include a cover sheet marked as follows identifying the specific pages containing confidential, proprietary, or privileged information:

Notice of Restriction on Disclosure and Use of Data:

Pages [list applicable pages] of this response may contain confidential, proprietary, or privileged information that is exempt from public disclosure. Such information shall be used or disclosed only for the purposes described in this RFI, DE-FOA-0001399. The Government may use or disclose any information that is not appropriately marked or otherwise restricted, regardless of source.

In addition, (1) the header and footer of every page that contains confidential, proprietary, or privileged information must be marked as follows: “Contains Confidential, Proprietary, or Privileged Information Exempt from Public Disclosure” and (2) every line and paragraph containing proprietary, privileged, or trade secret information must be clearly marked with double brackets or highlighting.

EVALUATION AND ADMINISTRATION BY FEDERAL AND NON-FEDERAL

PERSONNEL: Federal employees are subject to the non-disclosure requirements of a criminal statute, the Trade Secrets Act, 18 USC 1905. The Government may seek the advice of qualified non-Federal personnel. The Government may also use non-Federal personnel to conduct routine, nondiscretionary administrative activities. The respondents, by submitting their response, consent to EERE providing their response to non-Federal parties. Non-Federal parties given

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access to responses must be subject to an appropriate obligation of confidentiality prior to being given the access. Submissions may be reviewed by support contractors and private consultants.

REQUEST FOR INFORMATION CATEGORIES AND QUESTIONS:

1. What is likely to be the most impactful area of research and development that should be funded to improve the overall economics of algal fuels and products (e.g., strain development; cost of production environments whether ponds, photobioreactors, hybrid systems, or attached growth; operating efficiencies; harvesting; dewatering; conversion)? Please describe why you consider the areas you've identified to be the most impactful.
2. Stakeholders have clearly communicated that both lab-scale and outdoor cultivation research is needed to advance algal biofuels. What is the minimum scale of outdoor cultivation research and development that needs to be performed to advance your algal biofuel technology along the commercialization pathway? If this is an iterative process between indoor and outdoor, please explain and provide what you believe to be the relevant steps in scaling toward commercialization.
3. What are the barriers to cost-effective downstream processing? What type of research and advancements will be most impactful to bring these costs down in the shortest amount of time?
4. The Program has focused on research that allows for integration to ensure upstream technologies (cultivation) are developed in the context of downstream technologies (harvesting and preprocessing). Is it a priority to continue to focus on integration of the entire process rather than the technological challenges of individual unit operations? Please describe why you consider integration a priority, or, alternatively, why you do not.
5. It is clear that communicating progress in terms of productivity ($\text{g/m}^2/\text{day}$) alone is not sufficient. What combination of metrics should DOE use to inform progress towards meeting the overall goal (e.g., parasitic energy loss; operating costs; capital costs; input feedstock characteristics; volumetric throughput; online time; feedstock to fuel efficiency)?
6. The current MYPP targets are "By 2018, demonstrate at non-integrated process development unit scale algae yield of 2,500 gallons or equivalent of biofuel intermediate per acre per year" and "By 2022, demonstrate at non-integrated process development unit-scale algae yield of 5,000 gallons biofuel intermediate per acre per year in support of nth plant model \$3/GGE algal biofuels." Do stakeholders believe these are reasonable and meaningful targets to be working toward? Please describe why you consider the targets to be meaningful, or, alternatively, why you do not.
7. The Algae Program recognizes the need to pursue algal bioproducts in support of the development of algal biofuels. As biofuels will remain a required product in the mix, how should the bioproducts/biofuels strategy be best addressed (split on a percentage basis such as 51% biofuels/49% bioproducts; energy; carbon; economics; etc.) and what

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metrics are the most useful to the industry (e.g., energy return on investment, petroleum displacement, energy equivalency to petroleum product, economic impact, etc.)?

8. Additional Comments

REQUEST FOR INFORMATION RESPONSE GUIDELINES: Responses to this RFI must be submitted electronically to GOHYPIRRFI@hq.doe.gov no later than 5:00pm (ET) on October 15, 2015. Responses must be provided as attachments to an email. It is recommended that attachments with file sizes exceeding 25MB be compressed (i.e., zipped) to ensure message delivery. Only electronic responses will be accepted.

Please identify your answers by responding to a specific question or topic if possible. Respondents may answer as many or as few questions as they wish.

EERE will not respond to individual submissions or publish publicly a compendium of responses. A response to this RFI will not be viewed as a binding commitment to develop or pursue the project or ideas discussed.

Respondents are requested to provide the following information at the start of their response to this RFI:

- Company / institution name;
- Company / institution contact;
- Contact's address, phone number, and e-mail address.

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