FY 2019 Bioenergy Technologies Multi-Topic RFI (DE-FOA-00002020.0001)

DATE: January 2, 2019

SUBJECT: Request for Information (RFI) – Modification 0001 to Extend Response Due Date to January 18, 2019

Description

This Request for Information (RFI) modification 0001 extends the deadline for responses from January 4, 2019 to the new due date January 18, 2019, as highlighted in the Request for Information Response Guidelines section on page 8. All other requirements remain unchanged.

The U.S. Department of Energy (DOE) Office of Energy Efficiency and Renewable Energy (EERE) Bioenergy Technologies Office (BETO) is requesting information on research opportunities related to outdoor algae research, biomass characteristics and feedstock performance, and renewable energy from urban and suburban wastes to help inform its research priorities and funding strategies.

Purpose

BETO seeks information to help inform its research priorities, as part of its annual planning process. The purpose of this RFI is to solicit feedback from industry, academia, research laboratories, government agencies, and other stakeholders to help ensure research areas are relevant, timely, appropriate for federal government funding, and aligned with Administration priorities. This is solely a request for information and not a Funding Opportunity Announcement (FOA). No funding applications are being accepted in response to this RFI.

Specifically, BETO is seeking information related to the following three topic areas:

Topic 1. Outdoor Algae Research

BETO is seeking information on issues related to long-term outdoor production of algal feedstocks for applied research and development (R&D) purposes. BETO is specifically interested in information on capabilities and functionalities at current field sites, including best practices for iterating between indoor and outdoor R&D, in order to advance the robust production of algal feedstocks for use in biofuel and bioproduct applications.

This is a 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.

Topic 2. Biomass Characteristics and Feedstock Performance

BETO is interested in stakeholder input regarding how biomass characteristics can effect feedstock specifications for preprocessing and conversion in a biorefinery. DOE seeks information to gain a better understanding of how individual tissue and organ components of certain types of biomass (e.g., rind, pith, leaves, cobs from corn stover; and needles, juvenile wood, bark from forest residues) impact feedstock performance characteristics in preprocessing and conversion operations.

Topic 3. Renewable Energy from Urban and Suburban Wastes

BETO is seeking input regarding how best to structure a multi-university partnership to conduct research and enhance educational programs that improve renewable energy production from urban and suburban wastes. These waste streams may represent valuable feedstocks for the production and expansion of biofuels, bioproducts and biopower.

Disclaimer and Important Notes

This RFI is not a Funding Opportunity Announcement (FOA); therefore, 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. Final details, including the anticipated award size, quantity, and timing of EERE funded awards, will be subject to Congressional appropriations and direction.

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.** If, however, a respondent chooses to submit business sensitive, proprietary, or otherwise confidential information, it must be clearly and conspicuously marked as such in the response.

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-0002020. 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 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 Topics and Questions

Respondents are welcome to address any or all of the following questions, as well as share insights on information not presented in the questions.

To streamline the processing of your inputs, each topic contains a number of questions that cover the subject areas. Please respond to as many of the specific questions or topics as may be

deemed appropriate. 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. DOE will not respond to individual submissions or make public a compendium of responses, except as required by applicable law. A response to this RFI will not be viewed as a binding commitment to develop or pursue the project or ideas discussed. DOE will not compensate for information provided under this RFI. This RFI is not accepting applications for financial assistance or financial incentives. DOE has no obligation to respond to those who submit comments, and/or make available any feedback on any decision made based on the responses received. We greatly appreciate the time and consideration provided to enhance the relevance and timeliness of federally funded research.

Topic 1. Outdoor Algae Research

Long-term Outdoor Algal Cultivation

1. What cultivation improvement would have the greatest impact on robust outdoor harvest yields?
2. Are there agronomic approaches that algae cultivators should adopt that are not currently used?
3. What additional tools and/or sensors are most needed to enable accelerated, real-time outdoor data collection?

Iterating Between Indoor and Outdoor Experimentation

4. How do researchers and industry close the gap between indoor and outdoor algal production performance?
5. Are there any overlooked or experimental parameters that must be considered when designing a long-term outdoor cultivation campaign? What information from indoor or outdoor experiments enables predictive forecasting of algal culture performance?
6. What best practices can strengthen the knowledge transfer when iterating between indoor and outdoor experiments?

General

7. Which metrics, in addition to biomass productivity ($g/m^2/day$) and product yield (gallons/acre/year), could DOE use to inform progress (e.g., parasitic energy loss; operating costs; capital costs; input feedstock characteristics; volumetric throughput; online time; feedstock to fuel efficiency; gallons of fresh water consumed per ton of algal biomass produced; gallons of waste water treated per ton of algal biomass produced)?
8. What are the most effective strategies to encourage sharing of cultivation and conversion data?

Topic 2. Biomass Characteristics and Feedstock Performance

Relating Biomass Physical and Chemical Characteristics to Feedstock Performance in Handling and Conversion Operations

1. Is there a difference in soil contamination based on tissue type in corn stover? That is, is there often more or less soil contamination in rinds versus leaves or cobs? If so, how would you characterize the distribution? Cite published references if possible.
2. Is there a difference in soil contamination based on tissue type in pine residues? That is, is there often more or less soil contamination in needles versus juvenile wood or bark? If so, how would you characterize the distribution? Cite published references if possible.
3. How is contamination of harvested biomass (e.g. by fertilizer, pesticides, herbicides, and soil) distributed across the anatomical fractions of the plant? Where are these contaminants most/least prevalent? Why? Cite published references if possible.
4. How does rehydration/drying of biomass due to ambient humidity and/or precipitation or water movement in storage (due to asymmetric solar exposure) affect the compressibility and deformation of plant anatomical fractions? How does that affect flowability or particle size distribution or friction and adhesion forces of particles or total pore volume of particles in milling operations? Cite published references if possible.
5. What is your experience with the moisture holding characteristics of plant tissue components (i.e., anatomical fractions) of biomass? Cite published references if possible.
6. How do agricultural or forestry practices in the field impact the relative proportions of plant tissue types in collected corn stover or forestry residues? How does the collected tissue distribution affect the relative composition (cellulose, hemicellulose, lignin, extractive, inorganic element speciation, ratio of amorphous- to crystalline-cellulose, glass transition temperature for polymers) and/or ultimate/proximate analysis of the bulk material? Cite published references if possible.
7. What is your understanding of how different plant components (i.e., tissue types) from the same plant species differ in *intrinsic* inorganic element *content* (i.e., excluding soil contamination)? What is the relative abundance of inorganic element speciation by tissue type? Cite published references if possible.
8. Would you have an interest in collaborating with National Laboratories in addressing how biomass characteristics affect feedstock specifications? Would you be interested in participating directly in the Feedstock-Conversion Interface Consortium (FCIC), either as a participant in R&D projects, or as a potential member of the FCIC's Industry Advisory Board (IAB)? Please see https://fcic.inl.gov for more information about the FCIC.
9. How would you design a research program to address how one or more biomass characteristics affect feedstock specifications?
10. What challenges and/or barriers might prevent achieving a complete understanding of how biomass physical and chemical characteristics affect handling and conversion performance during preprocessing and conversion operations?

Biomass Characteristic Interaction with Storage and Handling

11. How does the rate of decomposition of biomass components of corn stover differ in storage? Of pine residues? Describe strategies for preventing decomposition losses during storage periods lasting up to one year.
12. How do comminution systems interact with biomass components differently (focusing on corn stover and/or pine residues)? How do the surfaces of the biomass components change with respect to friction and adhesion forces of particles?
13. Does transportation mode and distance traveled cause segregation and/or compaction of biomass constituents? What effect(s) (if any) does this have on downstream feedstock handling and conversion performance?
14. What are best practices for representative sampling of biomass solids at all stages of comminution?

Improving Economics and Development of Co-products

15. What opportunities or barriers do you see regarding the use of biomass characteristics to improve the economics of conversion of biomass to fuels, chemicals, or power?
16. How could merchandising of biomass components help to optimize feedstock quality and development of co-products and enhance the economics of the total process or loss of feedstock going into the conversion process?
17. Would developing the technology to accurately quantify biomass coming into a conversion facility or depot as tons of carbon or cellulose + hemicellulose + lignin instead of weight or volume be valuable? What are the advantages and disadvantages of this approach? Would it be worth adding descriptive caveats such as ash or alkali metal percentage?
18. How can co-product streams be developed to enhance the economics of collection of higher quality biomass streams?
19. How might a better understanding of biomass components (i.e., tissue types) and a thorough chemical and physical characterization of the biomass derived feedstock facilitate greater efficiencies in preprocessing to feedstocks or conversion?

<u>Topic 3. Renewable Energy from Urban and Suburban Wastes</u>

Technical Considerations

1. What are the most significant “suburban and urban wastes”? How might DOE prioritize research and development to convert these various wastes to biofuels, bioproducts, and biopower?
2. What are the highest priority technical challenges in converting urban and suburban waste streams into biofuels, bioproducts, and biopower and why?

3. What might constitute appropriate technology targets and metrics of success for research challenges? Please explain in detail with respect to rationales in support of proposed alternatives.
4. What kinds of technology targets would best facilitate collaboration across institutions and disciplines that are substantially greater than those that might be achieved by individual Principal Investigator (PI) or a single institution's efforts?
5. How should the DOE best encourage interdisciplinary collaboration that results in projects with shared objectives, comprised of research elements that would otherwise not have been conducted?

Educational Factors

6. What kinds of goals should the educational component strive to achieve for alternative energy production derived from urban and suburban waste, and why?
7. What kinds of programs would have the best chance of achieving such educational goals?
8. What are the elements of successful strategies to integrate technical and educational aims?
9. How can the DOE elicit proposals with a high degree of integration of technical and educational objectives?
10. What are some possible strategies to ensure that the educational components of consortia activities contribute to the improvement of alternative energy production from relevant waste feedstocks?
11. What kinds of project objectives or strategies would best contribute to long-term workforce development at multiple skill levels?
12. How might the DOE ensure that educational efforts include a diversity of target audiences, ranging from immediately applicable technical skills training to the development of future generations of researchers?
13. How might the educational component be designed to maximize its broader impact?

Integration and Project Structure

14. What might some valuable strategies be for integrating the private sector (including relevant NGOs) and national labs in multi-university partnerships?
15. What kinds of project/consortium structures might maximize integration between technical and educational objectives?
16. How might the DOE elicit proposals with an integrated set of overall goals and a strong plan for project coordination?

Request for Information Response Guidelines

Responses to this RFI must be submitted electronically to EERE_Bioenergy@ee.doe.gov no later than 5:00pm (ET) on January 18, 2019. Responses must be attached to an email. It is recommended that attachments with file sizes exceeding 25MB be compressed (i.e., zipped) to ensure message delivery. Responses must be provided as a Microsoft Word (.docx) attachment to the email, and no more than 6 pages in length, 12 point font, 1 inch margins. Only electronic responses will be accepted.

EERE will not respond to individual submissions or publicly publish 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; and
- Contact's address, phone number, and e-mail address.