

Request for Information
U.S. Department of Energy
Office of Energy Efficiency and Renewable Energy
Bioenergy Technologies Office

**REVOLUTIONARY BIOMASS SUPPLY SYSTEMS SUPPORTING A
BILLION TON BIOECONOMY VISION**

DATE: June 8, 2016

SUBJECT: Request for Information (RFI)

DESCRIPTION: The U.S. Department of Energy (DOE), Office of Energy Efficiency and Renewable Energy (EERE), Bioenergy Technologies Office (BETO) seeks feedback from industry, academia, research laboratories, government agencies, and other stakeholders on issues related to mobilizing biomass resources to support a “billion-ton bioeconomy.” Existing feedstock supply systems are not adequate to reliably provide high-quality feedstock at the increasing volumes demanded over the next few decades by a growing bioeconomy. Current systems and technologies have limitations in providing uniform feedstocks with specified composition, shape, size, and moisture characteristics. New logistics and processing technologies and systems are needed to address these challenges to support a growing biomass derived industry and bioeconomy. Advanced systems in the future may involve central processing and distribution centers such as feedstock depots or be stand-alone operations.

BACKGROUND: BETO is a technology development office within EERE, and its mission is to develop and transform renewable biomass resources into commercially viable high-performance biofuels, bioproducts, and biopower through targeted research, development, and demonstration of technologies. BETO’s Feedstock Supply and Logistics (FSL) Program is responsible for developing technologies to support Advanced Feedstock Supply Systems (AFSS) that would enable mobilization of our immense (and growing) national biomass resources to support a robust and thriving bioeconomy.

The FSL Program recognizes that future development of AFSS depends on many factors such as energy markets (specifically oil, coal, natural gas, and renewable energy prices), the rate of growth of the bioeconomy, and policies. However, adaptation of current systems and the development of new technologies and approaches are needed to overcome the barriers associated with the collection/harvest, storage, preprocessing, and transportation of increasing volumes of biomass annually. Conceptually, supply systems and conversion processes will become more integrated and converge due to higher biomass demands at greater quality, and more innovative approaches will be needed to supply feedstock from across the U.S. (as compared to current local or regional supply sheds). Advanced logistical systems, such as depots, could integrate and leverage a wide range of preprocessing, storage, and transportation operations that are more cost-effective over a wider range of feedstocks and could reduce risks to the producers and the users.

The BETO-FSL Program sponsored a workshop on Feb 3-4, 2015, titled “Advanced Feedstock Supply System Validation Workshop.” The Workshop gathered experts from industry, BETO-funded laboratories, academia, and DOE to discuss approaches to address challenges associated with large-scale expansion of reliable feedstock supply system for bioenergy industry. DOE prepared a ‘Workshop Summary Report’¹ that sets forth the key considerations, assumptions, and reasoning behind the AFSS concept and summarizes stakeholder feedback that was received during the workshop.

PURPOSE: The purpose of this RFI is to solicit information from industry, academia, research laboratories, government agencies, and other stakeholders about specific aspects in the development of large-scale supply systems and technologies to eventually supply up to a billion dry tons of biomass feedstocks annually for a variety of end uses. To this end, DOE requests information about current high-technology operations, improved equipment and processes, ideas, and concepts as discussed earlier in the ‘Description’ and ‘Background’ sections. DOE’s goal is to develop the components of processing and handling (unit operations) of biomass and demonstrate the viability of an AFSS on-scale in the future. Information or ideas on small-scale focused demonstration projects pertaining to technology development and engineering solutions indicating priority, scale, and estimated investments will be valuable. This is solely a ‘Request for Information’ (RFI) and not a ‘Funding Opportunity Announcement’ (FOA). EERE is not accepting applications.

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,

¹ The workshop summary report is available at https://www.bioenergykdf.net/system/files/1/15-50315-R3_Summary_Report_Only_ONLINE.PDF

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-0001603](#). 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 CATEGORIES AND QUESTIONS:

CATEGORY 1: Preprocessing Technologies

The appropriate size of a biorefinery is influenced by feedstock supply capacity, reliability, quality, and cost of the feedstock. For economy of scale, it is likely that facilities of much larger capacities will be needed. Storage and specifically storage space then become an issue.

Densification of feedstock will likely resolve major storage and transportation issues, as well as in-feed flowability problems which cause process breakdown in conversion facilities.

A plan to develop AFSS capable of accessing and supplying these resources to biorefineries and other end users would be instrumental in developing a viable cellulosic biofuels industry. With this objective in mind:

1. Where can cost-effective improvements be made in biomass supply chains? What preprocessing technologies are needed along the supply chain to reduce costs and improve targets of specified feedstocks?
2. How should new technology development be prioritized to validate the ability of AFSS to reduce biomass quality risk and supply risk to biorefineries? How could the value of risk reduction be quantified? How should harvesting/handling/delivery systems be prioritized against preprocessing technologies?
3. BETO currently invests in a wide range of preprocessing research areas including high-moisture densification, size reduction and formatting, fractionation, ash reduction, blending, and innovative drying (among others). How should technology development of advanced preprocessing be prioritized among these areas to have the greatest impact on addressing current and likely future challenges that biorefineries face?
4. Are there any AFSS technologies that will revolutionize feedstock supply chains and what are the potential quantitative benefits?

CATEGORY 2: Quality Management

Biomass quality is critical for optimal conversion performance and is a key consideration when analyzing biomass cost and availability. AFSS can provide active quality management of feedstocks in a depot or processing center through preprocessing operations such as grinding, drying, densification, blending, mechanical and chemical separations, and other harvesting practices in the field to reduce moisture and ash/soil content, or to perform rapid compositional analysis and measurement using technologies such as infrared (NIR) and X-ray spectroscopy. Moisture, ash, inorganic, and carbohydrate contents are important parameters that significantly affect feedstock value and cause wide fluctuations of biofuel yield. Current feedstock supply systems are limited to actively address moisture and ash in biomass along the early stages of the feedstock supply chain.

Blending may allow biomass feedstocks of different qualities to be mixed and mobilized to meet the in-feed specifications and cost targets at the conversion facility based on the specific conversion process while also reducing biomass supply risk. Blending enables sourcing of various amounts of different biomass resources to a biorefinery. Depots may provide logistical solutions for sourcing multiple biomass resources to a biorefinery, whether these resources are dispersed or small in quantity. Depots may emerge as important feedstock supply chain business elements that lessen the complexity of a blended feedstock supply system. The economic advantage of a depot in this scenario may be its specialization to preprocess and supply a single blendstock that meets the required quality specifications. This specialization eliminates the need

for a single entity to make a capital investment and establishes expertise to contract, preprocess, and supply a diversity of resources that may have different preprocessing requirements.

1. Can the costs of blending two or more feedstocks justify benefits and impacts? Please explain why or why not.
2. How significant (costly) is the heterogeneous physical nature (particle size, surface area, pore size) of biomass in a conversion process, and what processing steps should be used to control it?
3. Given the importance of feedstock quality control on supply chain operations, can you provide examples of technologies that should be prioritized for development and for both cost and risk reduction? How should these technologies be best developed and applied--for specific applications (feedstock specific), specific field unit operations, in a central processing center, or another way?
4. What rapid analytical techniques are most appropriate for assessing chemical and physical characteristics of biomass-derived feedstocks? How do preprocessing steps change the chemical and physical characteristics of feedstocks?

CATEGORY 3: Strategies for Mobilizing a Billion Tons of Biomass Resources

Handling and processing large quantities of feedstock can be a challenge facing pioneer cellulosic biorefineries. The prospect of mobilizing and processing a billion tons of biomass is an immense challenge. Though estimates vary, it is likely that current feedstock supply systems will continue to handle and process biomass for the foreseeable future; AFSS will be stimulated when increased market demand triggers its initiation. Categories 1 and 2 discussed above could likely be prospective elements of AFSS. Within the context of this discussion, the following questions and issues are presented:

1. How can advanced biomass preprocessing be implemented with existing infrastructure?
2. What current challenges and limitations faced in current feedstock supply systems deserve highest priority for new technology development?
3. What biomass types could benefit the most from new technology development so as to have the greatest impact on commercial operations?
4. What is your opinion on developing market-flexible intermediate commodities to support the advanced biofuels industry? Is this an appropriate approach, or will development of market-flexible feedstocks hamper the speed of biofuels industry expansion?

REQUEST FOR INFORMATION RESPONSE GUIDELINES: Responses to this RFI must be submitted electronically to BETOAFSS@ee.doe.gov no later than 5:00 pm (EDT) on June 30, 2016. 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. **Responses must be provided as a Microsoft Word (.doc/.docx) or PDF attachment**

of no more than 5 pages in length, 12-point font, 1-inch margins, not to exceed 25MB in size. Only electronic responses will be accepted.

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;
- Stakeholder group(s) your response reflects (include all that apply from list below):
 - Small engine design/manufacturer
 - Small engine/fuels research
 - Small engine maintenance/repair
 - Small engine user
 - Fuel distribution/infrastructure
 - Government entity
 - Industry (please provide North American Industry Classification System [NAICS] code if possible)
 - Small business²
 - Academia
 - Research laboratory
 - Other (Please specify)

Please specify the category that you are responding to. Respondents may answer as many or as few questions as they wish. If you wish to provide input to more than one category of interest, you should submit a separate response for each category. Each response should not exceed 5 pages in length.

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.

² Small Business Qualifications: <https://www.sba.gov/content/am-i-small-business-concern>