

## Request for Information (RFI) DE-FOA-00001951: Understanding Catalyst Production and Development Needs at National Laboratories

DATE: October 5, 2018  
SUBJECT: Request for Information (RFI)  
MODIFICATION: 000002

All modifications to the Request for Information are highlighted in **green** in the body of the RFI.

### Description and Purpose

The U.S. Department of Energy (DOE), Office of Energy Efficiency and Renewable Energy (EERE) Bioenergy Technologies Office (BETO) is requesting input from industry (including but not limited to research organizations, manufacturing organizations, catalyst manufacturers, and catalyst research consortia), academia, National Laboratories, government agencies, and other biofuels and bioproducts stakeholders on “catalyst production capability for biochemical and thermochemical processes”. Specifically, BETO seeks information to help identify and understand additional areas of research, capabilities, and yet-to-be-addressed challenges pertinent to production scale-up challenges (typically in multi-kilogram quantities) of novel catalysts used in technology development and engineering solutions for the efficient conversion of lignocellulosic, waste, and algal feedstocks to produce biofuels and bioproducts. The conversion technologies of interest include biological, thermochemical or hybrid processes. The class of catalysts include but are not limited to, for example, enzymes, immobilized enzymes, inorganic, and organic; and both homogeneous and heterogeneous types.

BETO, in addition, seeks information on capabilities and functionalities that need to be developed to be able to effectively research and test reactive processes with particular emphasis on unit operations and equipment comprising process development units (PDUs) located at National Laboratories that will enable successful transition of early stage research to engineering-scale research.

Please refer to the section on **Request for Information Categories and Questions** (see Pages 4 and 5) for additional feedback solicited as part of this RFI.

The purpose of this RFI is solely a request for information and not a Funding Opportunity Announcement (FOA). EERE is not accepting applications.

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## Background

The mission of DOE's BETO is to research and develop optimal transformations of domestic biomass resources into high performance biofuels, bioproducts, and biopower supported through public and private partnerships. Under the statutory authority of the Energy Policy Act (EPA) 2005, § 932(c), DOE is encouraged to partner with industry, stakeholders and institutions of higher education to conduct research and development (R&D) in advanced technological processes capable of increasing energy production from domestic lignocellulosic feedstocks, with emphasis on reducing the dependence on imported fossil fuels in U.S. manufacturing facilities, and other advanced processes that will enable the development of price-effective advanced biofuels and coproducts.

DOE has funded R&D seeking to advance technologies enabling the sustainable production of price-competitive biofuels and bioproducts. These technologies focus on developing drop-in biofuels capable of being used as gasoline, jet, diesel and marine fuels. They also promote the reduction of dependence on foreign oil, provide price-competitive fuels, spur domestic job growth, and lead to a thriving bioeconomy.

For purposes of potentially developing future funding opportunities, BETO is interested in understanding the opportunities and challenges associated with production of novel catalysts capable of minimizing / eliminating variations in catalyst performance while used for bench-scale and engineering-scale process development of biological, thermochemical and hybrid conversion technologies.

BETO is also interested in understanding the need for operational and capability enhancements for unit operations and equipment comprising PDUs that help to transition early stage research to engineering-scale research. Information on PDUs located at selected DOE National Laboratories and BETO consortia can be accessed via:

1. Idaho National Laboratory's [Biomass Feedstock National User Facility](#)
2. Lawrence Berkley Laboratory's [Advanced Bioprocess Process Development Unit](#)
3. National Renewable Energy Laboratory's [Integrated Biorefinery Research Facility](#)
4. National Renewable Energy Laboratory's [Thermochemical Users Facility](#)
5. Pacific Northwest National Laboratory's [Chemical and Biological Process Development](#)
6. [Agile BioFoundry Consortium](#)
7. [Bioprocessing Separations Consortium](#)
8. [Chemical Catalysis for Bioenergy Consortium](#)
9. [Feedstock and Conversion Interface Consortium](#)

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## 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:

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### **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-00001951. 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: *Catalyst production for biological processes***

1. Please describe the minimum amount of novel catalysts for biological conversion processes (biochemical catalysts) that can be produced in a single batch at your facility.
2. What is the maximum amount of biochemical catalysts that can be produced in a single batch at your facility?
3. Please describe the capabilities and functionalities of your facility for the development of small-scale production of catalysts.
4. Would you be interested in collaborating with third parties and National Laboratories in scaling from laboratory-scale catalyst recipes to small-scale production volumes?
5. What quality control methods and techniques would be adopted to ensure the produced catalyst meet the specification of the recipe from laboratory-scale reproducibly?
6. Do you envision any challenges or barriers for the small-scale production of novel catalysts?

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7. How do you describe your facility / organization – for example, contract manufacturing organization, research consortia, National Laboratory, academic institution, etc.?
8. How long have you been actively producing catalysts?

**Category 2: Catalyst production for thermochemical processes**

1. Please describe the minimum amount of novel catalysts for thermochemical conversion processes (thermochemical catalysts) that can be produced in a single batch at your facility.
2. What is the maximum amount of thermochemical catalysts that can be produced in a single batch at your facility?
3. Please describe the capabilities and functionalities of your facility for the development of small-scale production of catalysts.
4. Would you be interested in collaborating with third parties and National Laboratories in scaling from laboratory-scale catalyst recipes to small-scale production volumes?
5. What quality control methods and techniques would be adopted to ensure the produced catalyst meet the specification of the recipe from laboratory-scale reproducibly?
6. Do you envision any challenges or barriers for the small-scale production of novel catalysts?
7. How do you describe your facility / organization – for example, contract manufacturing organization, research consortia, National Laboratory, academic institution, etc.?
8. How long have you been actively producing catalysts?

**Category 3: Capabilities and functionalities to be developed in PDUs located at National Laboratories**

1. Please describe the current setup of the PDU that you have used or would be interested in using for scale-up work.
  - a. Include existing unit operations and equipment, and
  - b. Indicate which of the biological, thermochemical and hybrid processes can be handled.
2. Please describe gaps or deficiencies that currently exist with respect to unit operations and equipment at one or more of the DOE National Laboratory PDUs required to be able develop and test effective handling of catalytic biological, thermochemical and hybrid processes.
3. Please describe the functionalities that you perceive need to be developed or enhanced to enable effective bench-scale and engineering-scale research and experimentation of catalytic biochemical, thermochemical and hybrid processes in order to provide critical capabilities needed for PDU stakeholders.

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4. Please describe the science that you believe needs to be developed in order that research results at bench-scale and engineering-scale translate to larger scales more robustly.

### **Request for Information Response Guidelines**

Responses to this RFI must be submitted electronically to [CustomCatalystRFI@ee.doe.gov](mailto:CustomCatalystRFI@ee.doe.gov) no later than 5:00pm (ET) on **October 22, 2018**. 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 (.docx) attachment to the email, and no more than 15 pages in length, 12 point font, 1 inch margins. Only electronic responses will be accepted.

Please identify your answers by responding to a specific question or topic if applicable. 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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