REQUEST FOR INFORMATION
U.S. Department of Energy
Office of Energy Efficiency and Renewable Energy

Request for Information (RFI): Manufacturing Renewable Carbon Fibers
DE-FOA-0000975

ISSUE DATE: August 20, 2013

CLOSING DATE: September 6, 2013, 5:00 PM EDT

SUBJECT: Request for Information (RFI) on the need for federal financial assistance for the research, development, demonstration and deployment (RDD&D) of emerging renewable carbon fiber technologies.

DESCRIPTION: The U.S. Department of Energy (DOE) seeks feedback from public and private sector stakeholders regarding the state of technology development and commercial readiness of emerging renewable carbon fiber technologies. Information is also sought in identifying what barriers to commercialization exist and the appropriate role for DOE with regard to additional investment in RDD&D to promote broad adoption.

BACKGROUND: The Bioenergy Technologies Office (BETO) is a key component of DOE's Energy Efficiency and Renewable Energy (EERE) portfolio. EERE seeks to provide clean, safe, secure, affordable, and reliable energy from diverse domestic resources, along with the benefits of increased energy security and reduced criteria pollutants and greenhouse gas emissions. Heightened public and private sector interest in the utilization of biomass as a feedstock for renewable chemicals and materials applications has drawn the attention of the DOE, particularly materials that can dramatically reduce the consumption of fossil fuels. BETO would like to solicit information on the state of technology development and commercialization in the manufacture of carbon fibers. While carbon fibers are manufactured commercially using petroleum-derived acrylonitrile (ACN), there are emerging technology pathways to biomass-derived acrylonitrile (bio-ACN) that may offer a cost competitive and potentially high performance alternative.

PURPOSE: The purpose of this RFI is to solicit feedback from industry, academia, research laboratories, government agencies, and other public and private sector stakeholders to assist DOE with the development of a strategic program in renewable carbon fibers (RCF) and possibly issue a Funding Opportunity Announcement (FOA) that supports the development of RCF technologies. The program could include, but is not limited to, investigations of biological and/or non-biological conversion and processing technologies to transform biomass components (cellulose, hemicellulose or lignin) into chemicals like acrylonitrile (ACN) that can be used in existing polyacrylonitrile (PAN)-based manufacturing of high performance carbon fibers.

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.

DOE'S UNDERSTANDING OF THE STATE OF THE INDUSTRY:
DOE hosted a workshop on June 4-5, 2013 in Detroit, Michigan to understand the technology options, applications, and the state of the industry for carbon fiber composites, particularly with respect to expanding the use of these lightweight materials in the mainstream automotive industry. The focus of the workshop was on renewable precursors to carbon fibers that can displace fossil-based raw materials. The workshop participants included researchers, engineers, analysts, auto-manufacturers, business developers, and government officials that span the biomass to carbon fiber end use supply chain. The workshop proceedings may be found on DOE's website:
http://www1.eere.energy.gov/bioenergy/carbon_fiber_workshop.html

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. In accordance with the Federal Acquisition Regulations, 48 C.F.R. 15.201(e), responses to this notice are not offers and cannot be accepted by the Government to form a binding contract. EERE will not provide reimbursement for costs incurred in responding to this RFI. Respondents are advised that DOE 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 must NOT include any information in their responses that might be considered business sensitive, proprietary, or otherwise confidential. Responses must be submitted with the understanding that their contents will be publicly disclosed and, in the event of a public disclosure, DOE will NOT notify respondents or provide any opportunity to revise or redact submitted information.**

REQUEST FOR INFORMATION QUESTIONS:
In responding to this RFI, respondents are encouraged to provide as much pertinent information on carbon fiber technology and manufacturing as possible. Collaborations between researchers, equipment vendors, and institutional or industrial companies should be emphasized:

1. Is the company or the company/institution you represent a polyacrylonitrile (PAN)-based carbon fiber manufacturer? If yes, please describe your capabilities. If not, please identify the scientific or engineering area(s) of interest, technologies, manufacturing processes, and/or supply chain component (including end-use) that you or your company/institution represent.

2. DOE's understanding is that a high performance carbon fiber exceeds a tensile strength of 250 kilopounds per square inch (ksi) and a Young's modulus of 25 megapounds per square inch (Msi). If a biomass-derived acrylonitrile (bio-ACN) was available at sufficient quantities to manufacture PAN-based carbon fiber, what are the technical challenges and limitations that would need to be overcome for bio-ACN to be acceptable for manufacturing a high performance carbon fiber composite? What are the key stages of the PAN or carbon fiber manufacturing process that the new bio-ACN would need to be tested in to provide assurances with respect to functional equivalency?

3. DOE is aware of the highly proprietary nature of the current carbon fiber manufacturing processes from monomer blending to promote PAN or white fiber production through carbonization to make the black fiber. Would a pre-commercial R&D partnership with industrial manufacturers of white fibers and black fibers be necessary to establish the acceptability of bio-ACN? Please explain your rationale and cite the publicly available technical references (e.g. publications, conference proceedings, existing industry standards) that support your answer.

4. If you are a carbon fiber manufacturer, would your company be willing to or interested in participating in a consortium to demonstrate the feasibility of manufacturing cost-competitive carbon fibers from renewably-derived PAN or other production methods? If not, please share your key concerns with such an arrangement.

5. DOE is aware that the majority of the manufacturing nameplate capacity of PAN white fibers was located outside of the United States as of 2005. Nevertheless, in the event DOE issues a FOA regarding renewable carbon fiber, DOE will require recipients to make commitments that enhance U.S. competitiveness in manufacturing carbon fibers. If you answered affirmatively to Question 4. above, would you be willing to commit to conducting certain activities in the United States, (e.g., manufacturing, R&D, administration, and/or testing)? Please explain your rationale in terms of economic, political, and/or technical considerations.

The Bioenergy Technologies Office is grateful for your assistance and comments in helping build the bioenergy and renewable chemicals industry in the United States.

REQUEST FOR INFORMATION RESPONSE GUIDELINES: All responses to this RFI must be provided as an attachment in an e-mail message addressed to RenewableCF@go.doe.gov with the subject line "Response to RFI" no later than 5:00pm (EDT) on September 6, 2013. **Responses must be provided as a Microsoft Word (.doc/.docx) no more than three (3) pages in length, 12 point font, 1 inch margins, and no more than 2MB in size. Only electronic responses will be accepted. Responses submitted by any other means will not be considered by DOE.** Questions regarding the content of this RFI must be submitted to RenewableCF@go.doe.gov with the subject line "Question" within the same RFI issuance and closing dates.

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.

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. Any additional comments that are not responsive to a particular question should be set out separately at the end of your response to this RFI as "Additional Comments."

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.