U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

Bioenergy Technologies MEGA-BIO: Bioproducts to Enable Biofuels

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FOA Webinar

DE-FOA-0001433

2/16/2016

Notice

- All applicants are strongly encouraged to carefully read the Funding Opportunity Announcement DE- FOA-0001433 **("Bioenergy Technologies MEGA-BIO: Bioproducts to Enable Biofuels FOA")** and adhere to the stated submission requirements.
- This presentation summarizes the contents of FOA. If there are any inconsistencies between the FOA and this presentation or statements from DOE personnel, the FOA is the controlling document and applicants should rely on the FOA language and seek clarification from EERE.
- If you believe there is an inconsistency, please contact BETOMEGABIOFOA@ee.doe.gov

Agenda

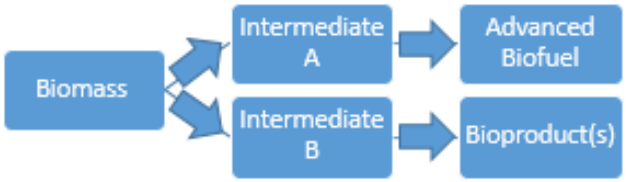
1) FOA Description
2) Award Information
3) Concept Papers
4) Full Applications
5) Merit Review and Selection Process
6) Registration Requirements
7) Statement of Substantial Involvement
8) Cost Sharing

BETO MEGA-BIO FOA Description (1/2)

- As BETO increasingly focuses on hydrocarbon fuels, it is examining strategies that capitalize on revenue from bioproducts as part of cost-competitive biofuel production.
- A variety of technology pathways can be used to produce hydrocarbon biofuels, but many of them require the production of value-added chemicals and products in the near-term to achieve an attractive rate of return on cost-competitive fuels.
- Value-added chemicals and products can also incentivize the de-risking of "front end" processes (from feedstock logistics through to deconstruction) which are also necessary for fuel production.
- It is important to note that while bioproducts are seen as a valuable strategy for enabling fuels, BETO is **not** interested in pursuing R&D solely on bioproducts without a fuels component.

BETO MEGA-BIO FOA Description (2/2)

A. Conversion pathway from biomass to biofuels and bioproducts via a platform chemical. The platform chemical could be a biomass deconstruction product (like glucose) or it could be a product or products that have been upgraded from an intermediate, like ethylene or benzene, toluene, and xylenes (BTX).



B. Conversion pathway based on co-production of biofuels and bioproducts. Intermediate B could be a waste stream, like lignin.

C. Conversion pathway from biomass to biofuels. Biomass is deconstructed to an intermediate such as a sugar, bio-oil, or syngas. This intermediate is then upgraded to a fuel. In this scenario, the intermediate could be a marketable bioproduct (e.g. methanol in a Methanol to Gasoline pathway).

D. Conversion pathway from biomass to non-fuel bioproducts. Pathways that do not have a fuels component are not of interest.

Topic Areas/Technical Areas of Interest

There are two topic areas:

- **Topic Area 1:** Early TRL (TRL 2-3) R&D to optimize **one** unit operation of the proposed conversion pathway.

- **Topic Area 2:** Middle TRL (TRL 4-5) R&D optimize and integrate **multiple** unit operations of the proposed conversion pathway.

Non-Responsive Applications (1/3)

The following types of applications will be deemed nonresponsive and will not be reviewed or considered for an award:

- Applications that fall outside the technical parameters specified in Sections I.A and I.B of the FOA, including but not limited to:
  - Applications for proposed technologies that are not based on sound scientific principles (e.g., violates the laws of thermodynamics).
  - Applications that propose R&D on a biomass conversion pathway that does not include a strategy for producing cost-competitive biofuels;
  - Applications that propose systems that are not sustainable and/or are not economical (excessive freshwater, unit operations, etc.) when scaled for commercial operation.
  - Applications that do not explain how the proposed R&D will lower the overall cost of producing a biofuel.

Non-Responsive Applications (2/3)

- Applications that do not use an acceptable feedstock as defined in Appendix E.
- Applications that use food or feed carbohydrates, lipids, or proteins (e.g. maize or wheat dextrose, beet sucrose, sugar cane or grain sorghum syrup, soybean oil or meal), and/or derivatives (e.g. amino acids from maize dextrose, glycerol from the transesterification of soybean oil).
- Applications that propose the production of biodiesel produced from transesterification or hydrotreating or hydrocracking of agronomic, natural plant oils (e.g., soybeans, palm, coconut, safflower, castor, algal).
- Applications that propose the production of alcohols or biogas. *Note that while ethanol and biogas are unacceptable final products, they will be accepted as process intermediates for upgrading to other advanced biofuels and products, if derived from applicable biomass sources.*

Non-Responsive Applications (3/3)

- ~~Applications that propose to develop technology that relies on purely heterotrophic algae cultivation.~~ Mod001
- Applications that propose mixotrophic algae cultivation strategies that utilize food-based sugars (i.e., derived from food-based crops including but not limited to corn, beets, sorghum, and sugar cane).
- Applications that propose to develop technology for the artificial lighting-based cultivation of algae for energy products (other than as an enabling tool for high throughput laboratory-based screening).
- Applications that propose the use of pure sugar feeds and/or 'model' intermediate feeds such as avicel, cane and starch sugar or model lignin compounds and mixtures. *Note, it is expected that the baseline validation, stage gate and final validations will be performed on cellulosic derived intermediates.*
- Applications that fail to include the appropriate data as outlined in the Technical and Economic Tables Template (Appendix F).

Award Information

Total Amount to be Awarded	Up to $11.3 million*
Average Award Amount	EERE anticipates making between 2-10 awards that range from $1M to $8M
Types of Funding Agreements	Cooperative Agreements
Period of Performance	Up to 36 months
Expected TRL	2-4 at the start 4-5 at completion
Cost Share Requirement	If Prime Recipient is domestic institution of higher education; domestic nonprofit entity; FFRDC; or U.S. State, local, or tribal government entity; and The Prime Recipient performs more than 50% of the project work, as measured by the Total Project Cost, Cost Share Requirement is 10%** Otherwise, Cost Share Requirement is 20%

*Subject to the availability of appropriated funds **FY16 funds only

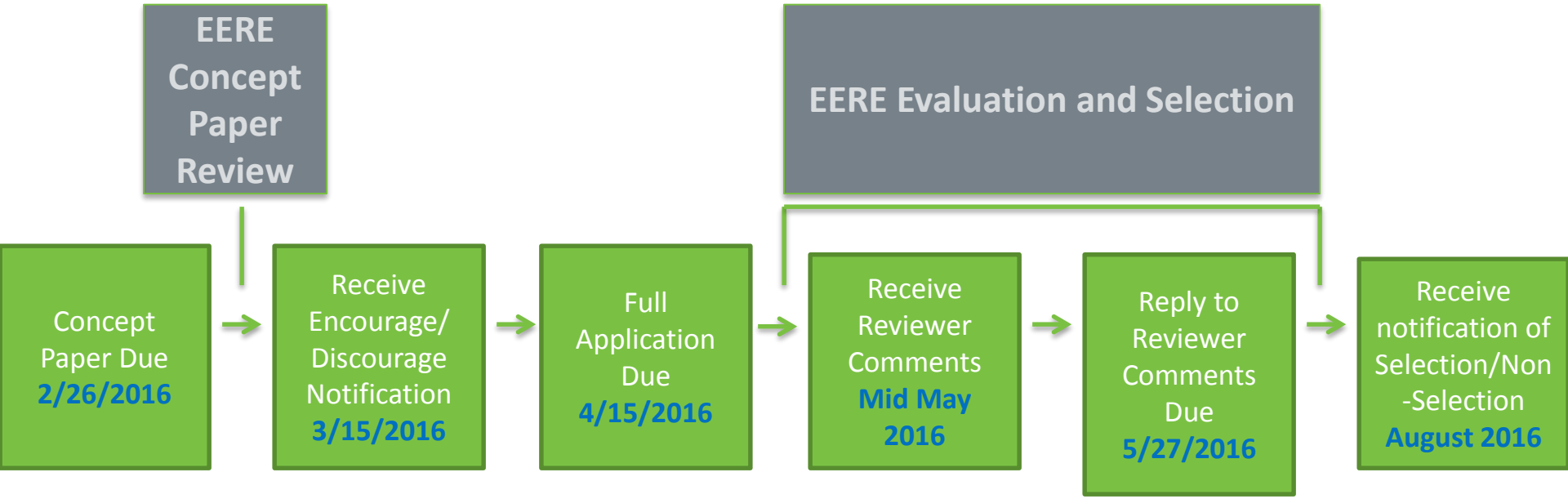
Who's Eligible to Apply?

Eligible applicants for this FOA include:

1. Individuals
2. Domestic Entities
3. Foreign Entities
4. Incorporated Consortia
5. Unincorporated Consortia

For more detail about each eligible applicant, please see Section III.A of the FOA for eligibility requirements

FOA Timeline



EERE anticipates making awards by September 2016

Concept Papers

- Applicants must submit a Concept Paper (may submit multiple concept papers - provided that each concept paper describes a unique, scientifically distinct project.)
- The Concept Paper must include a technology description (See Section IV.C of the FOA)
  - The technology description is limited to 3 pages, with 1 page addendum.
- Concept Papers must be submitted by 2/26/2016 5 p.m. Eastern Time through EERE Exchange, and must meet the content and form requirements (See Section IV.C of the FOA).
- EERE provides applicants with: (1) an “encouraged” or “discouraged” notification, and (2) the reviewer comments
- A "discouraged" notification conveys EERE's lack of programmatic interest in the proposed project, and is intended to save an applicant time and money from submitting a full application; however, an applicant who receives a "discouraged" notification may still submit a full application.

Concept Paper Criteria (Section V.A.1)

EERE evaluates the Concept Papers based on the following technical review criteria:

- The applicant clearly describes the proposed technology, describes how the technology is unique and innovative, and how the technology will advance the current state-of-the-art.
- The applicant clearly describes the current market or market potential for the proposed target(s).
- The applicant clearly describes in a quantitative manner how the proposed technology will enable biofuels production.
- The applicant has identified risks and challenges, including possible mitigation strategies, and has shown the impact that EERE funding and the proposed project would have on the relevant field and application.
- The applicant has the qualifications, experience, capabilities and other resources necessary to complete the proposed project.
- The proposed work, if successfully accomplished, would clearly meet the objectives as stated in the FOA.

Full Applications

- The Full Application includes:
  - **Technical Volume**: The key technical submission - info relating to the technical content, project team members, etc.
  - **Statement of Project Objectives**
  - **SF-424 Application for Federal Assistance:** The formal application signed by the authorized representative of the applicant.
  - **SF-424A Budget & Budget Justification (EERE 159):** a detailed budget and spend plan for the project.
  - **Summary/Abstract for Public Release**
  - **Summary Slide**
  - **Technical and Economic Data Tables**
  - **Validation Participation Agreement**
  - **Administrative Documents:** E.g., U.S. Manufacturing Plan, FFRDC Authorization (if applicable), Disclosure of Lobbying Activities, etc

Full Applications: Technical Volume Content (Section IV.D.2)

- **Technical Volume: the key technical component of the Full Application (25 pages)**

Content of Technical Volume
Cover Page
Project Overview
Background
Impact
Technical Description and Innovation
Workplan and Market Transformation Plan
Technical Qualifications and Resources

Full Application Eligibility Requirements

- Applicants must submit a Full Application by 4/15/2016
- Full Applications are eligible for review if:
  - The Applicant is an eligible entity (Section III.A of FOA);
  - The Applicant submitted an eligible Concept Paper;
  - The Cost Share requirement is satisfied (Section III.B of FOA);
  - The Full Application is compliant (Section III.C of FOA of FOA);
  - The proposed project is responsive to the FOA (Section III.D of FOA)
  - The Full Application meets any other eligibility requirements listed in Section III of the FOA.

Technical and Economic Tables

- Technical and Economic tables must be included as part the application.
- Appendix F of the FOA is recommended template for tables.
  - The first tab in the Excel file is for a Block Flow Diagram ("BFD"):
    - Should be high-level and include the entire process from feedstock to all products including fuel.
    - The portion of the process being addressed in the application should be clearly highlighted.
    - Examples of BFDs are provided for both Topic Areas.
  - The second tab in Appendix F is the "Validation Table":
    - This table should include all process relevant technical data and performance metrics.
    - A Benchmark, Intermediate, and Final target data out of each proposed unit operation.
    - The "General Information section" should capture the general aspects of the project.

Technical and Economic Tables

- "Validation Table" continued:
  - The "Insert Other Key Performance Parameters" section contains 5 prescribed metrics. Other information may be added or deleted based on relevance. Examples of additional metrics are included in the KPP Examples tab
  - The "Unit Operation Material Steams" section is designed to capture the mass compositions of all streams flowing in and out of the proposed unit operations.
- The third tab contains the economic data for the process:
  - Should include the Technoeconomic data for an envisioned commercial-scale biorefinery that includes the proposed technology
  - Designed to evaluate the economic improvements to a commercial process that would be realized if the project's technical targets are achieved.
  - Should be filled out at an appropriate level for the project's TRL.
  - Design cases may be used for portions of the process outside of the project scope

Technical and Economic Tables

- The final 4 tabs in the Appendix F Tables include examples for:
  - The “Validation Tables” tab for Topic Area 1.
  - The “Validation Tables” tab for Topic Area 2.
  - Examples for the Key Performance Parameters for the “Insert Other Key Performance Parameters” section of the “Validation Tables” tab.
  - TRL Definitions.
- Initial on-site validations for projects selected for award will include:
  - Validation of BFD.
  - Validation of the “Validation Table” tab data, adding any additional relevant metrics, and understanding the provided targets.
  - Validation of the“TechnoEconomics” tab data and understanding the assumptions that went into each value and addressing if those assumptions are reasonable.

Merit Review and Selection Process (Full Applications)

- The Merit Review process consists of multiple phases that each include an initial eligibility review and a thorough technical review
- Rigorous technical reviews are conducted by reviewers that are experts in the subject matter of the FOA
- Ultimately, the Selection Official considers the recommendations of the reviewers, along with other considerations such as program policy factors, to make the selection decisions

Evaluation criteria Weighting for Full Applications

- Section V.A.2

	Criterion	Weighting
1	Technical Merit, Innovation, Impact	60%
2	Project Research and Commercialization Plan	30%
3	Team and Resources	10%

Full Application Merit Review Criterion 1

Criterion 1: Technical Merit, Innovation, and Impact (60%)

Project Overview

- Extent to which the applicant clearly identifies the target molecule(s);
- The extent to which the applicant clearly and accurately describes the current (or proposed) market for the target molecule, including the appropriateness of citations;
- The level of clarity and accuracy in the applicant's description of how the target molecule(s) (or similar products) are currently produced;
- The level of clarity, appropriateness and reasonableness in the applicant's logic for pursuing the chosen molecule(s) The level of clarity and reasonableness in the applicant's proposed route to target molecule(s) and fuels;
- Clarity of the applicant's block flow diagram, including illustrating the pathway for producing the target bioproduct(s) and biofuel(s);
- Extent to which the proposed target molecule(s) will be useful for enabling biofuels production in a quantifiable manner and reducing the risk of biofuels production.

(for full text see FOA Section 5.A.2)

Full Application Merit Review Criterion 1 (cont'd.)

Criterion 1: Technical Merit, Innovation, and Impact (60%)

Background

- Degree to which the applicant fully and accurately describes the state of the art, including a comparison of the applicant's technology to relevant technologies and the extent to which the applicant includes appropriate citations to defend his/her view of the state of the art;
- Extent to which the application specifically and convincingly demonstrates how the applicant will move the state of the art to the proposed advancement; and
- Sufficiency of technical detail in the application to assess whether the proposed work is scientifically meritorious and revolutionary, including relevant data, calculations, and discussion of prior work in the literature with analysis that supports the viability of the proposed work.

(for full text see FOA Section 5.A.2)

Full Application Merit Review Criterion 1 (cont'd.)

Criterion 1: Technical Merit, Innovation, and Impact (60%)

Impact of Technology Advancement

- The level of impact that DOE funding will have on the proposed project;
- The degree to which the applicant defined successful project outcomes;
- The degree to which the project supports the topic area objectives and target specifications and metrics;
- The potential impact of the project on advancing the state of the art;
- If the applicant is successful, the degree to which their success would impact the industry and other researchers; and
- The extent to which the applicant provides a compelling LCA or narrative explaining of how the proposed molecule(s) and fuel(s) will be produced from cellulosic biomass with an improved greenhouse gas profile (environmental impact);
- The extent to which the applicant justifies assumptions made in describing the proposed LCA/environmental impact and appropriateness of the associated references;
- The extent to which the applicant provides a compelling TEA or narrative explaining how the proposed route will enable the production of cost-competitive biofuels (economic impact); and
- The degree to which the assumptions in the TEA are based on verifiable and referenceable data.

(for full text see FOA Section 5.A.2)

Full Application Merit Review Criterion 1 (cont'd.)

Criterion 1: Technical Merit, Innovation, and Impact (60%)

Technical Description and Innovation

- Degree to which the research approach is clearly outlined and explained;
- Degree to which the applicant makes a compelling case for technical feasibility; and
- Degree to which the applicant provides previously acquired data where appropriate (if available).

(for full text see FOA Section 5.A.2)

Full Application Merit Review Criteria 2

Criterion 2: Project Research and Commercialization Plan (30%)

Research Approach and Workplan

- Degree to which the approach and critical path have been clearly described and thoughtfully considered;
- Degree to which the task descriptions are clear, detailed, timely, and reasonable, resulting in a high likelihood that the proposed Workplan will succeed in meeting the project goals;
- Level of clarity and reasonableness of the WBS;
- Level of clarity and reasonableness of the Gantt chart; and
- Reasonableness of schedule.

Identification of Technical Risks

- Discussion and demonstrated understanding of the key technical risk areas and barriers involved in the proposed work, and the quality of the mitigation strategies to address them.

Full Application Merit Review Criteria 2 (con't)

Criterion 2: Project Research and Commercialization Plan (30%)

Baseline, Metrics, and Deliverables

- The level of clarity in the definition of the baseline, metrics, milestones, and go/no-go decision points; and
- Relative to a clearly defined experimental baseline, the strength of the quantifiable metrics, milestones, and mid-point deliverables defined in the application, such that meaningful interim progress will be made.

Market Transformation Plan

- Extent to which the application specifically and convincingly assesses the current market and future markets when the product is produced at significant scale for the proposed bioproduct(s) with the most up-to-date and appropriate market information;
- Appropriateness of the market for the proposed bioproduct(s) and corresponding pathway;
- Adequacy of assessment of unique market risks associated with the proposed bioproduct and pathway;
- Identification of target market, competitors, and distribution channels for proposed technology along with known or perceived barriers to market penetration, including mitigation plan; and
- Comprehensiveness of commercialization plan including but not limited to product development and/or service plan, commercialization timeline, financing, product marketing, legal/regulatory considerations including intellectual property, infrastructure requirements, data dissemination, U.S. manufacturing plan etc., and product distribution.

Full Application Merit Review Criteria 3

Criterion 3: Team and Resources (10%)

- The technical and management capability of the Principal Investigator(s) and the proposed team to address all aspects of the proposed work with a good chance of success. Qualifications, relevant expertise, and time commitment of the individuals on the team;
- The sufficiency of the facilities to support the work;
- Degree to which the proposed consortia/team demonstrates the ability to facilitate and expedite further development and commercial deployment of the proposed technologies;
- Level of participation by project participants as evidenced by letter(s) of commitment and how well they are integrated into the Workplan; and
- Reasonableness of budget and spend plan for proposed project and objectives.

Replies to Reviewer Comments

- EERE provides applicants with reviewer comments
- Applicants will have approximately a three day period in late May to prepare a Reply to Reviewer Comments ("Reply") to respond to comments
  - Page Limit: 3 Pages
- Applicants are not required to submit a Reply. It is optional.
- To be considered by EERE, a Reply must be submitted by the deadline and submitted through EERE Exchange.
- Please see Sections IV.E. and V.A.3 for additional information regarding Replies to Reviewer Comments

Selection Factors

The Selection Official may consider the merit review recommendation, program policy factors, and the amount of funds available in arriving at selections for this FOA.

Program Policy Factors (Section V.C.1)

- The Selection Official may consider program policy factors in making his/her selection decisions such as:
  - The degree to which the proposed project, including proposed cost share, optimizes the use of available EERE funding to achieve programmatic objectives;
  - The level of industry involvement and demonstrated ability to commercialize energy or related technologies;
  - Technical, market, organizational, and environmental risks associated with the project;
  - Whether the proposed project is likely to lead to increased employment and manufacturing in the United States;
  - Whether the proposed project will accelerate transformational technological advances in areas that industry by itself is not likely to undertake because of technical and financial uncertainty.
  - Whether the proposed project will advance the goals of the Climate Action Champion initiative, as committed to by the designated Champion pursuant to its designation agreement. The Climate Action Champion initiative goals include improving climate resilience and reducing greenhouse gas emissions.

- There are a number of additional program policy factors, as described in the FOA

Registration Requirements

- To apply to this FOA, Applicants must register with and submit application materials through EERE Exchange: https://eere-Exchange.energy.gov
- Obtain a "control number" at least 24 hours before the first submission deadline eere-exhange.energy.gov
- Although not required to submit an Application, the following registrations must be complete to received an award under this FOA:

Registration Requirement	Website
DUNS Number	http://fedgov.dnb.com/webform
SAM	https://www.sam.gov
FedConnect	https://www.fedconnect.net
Grants.gov	http://www.grants.gov

Means of Submission

- Concept Papers, Full Applications, and Replies to Reviewer Comments must be submitted through EERE Exchange at https://eere-Exchange.energy.gov
  - EERE will not review or consider applications submitted through other means
- The Users' Guide for Applying to the Department of Energy EERE Funding Opportunity Announcements can be found at https://eere-Exchange.energy.gov/Manuals.aspx

Key Submission Points

- Check entries in EERE Exchange
  - Submissions could be deemed ineligible due to an incorrect entry
- EERE strongly encourages Applicants to submit 1-2 days prior to the deadline to allow for full upload of application documents and to avoid any potential technical glitches with EERE Exchange
- Make sure you hit the submit button
  - Any changes made after you hit submit will un-submit your application and you will need to hit the submit button again
- For your records, print out the EERE Exchange Confirmation page at each step, which contains the application's Control Number

Applicant Points-of-Contact

- Applicants must designate primary and backup points-of-contact in EERE Exchange with whom EERE will communicate to conduct award negotiations
- It is imperative that the Applicant/Selectee be responsive during award negotiations and meet negotiation deadlines, expected to take place after July 2016.
- Failure to do so may result in cancellation of further award negotiations and rescission of the Selection

Statement of Substantial Involvement

EERE has substantial involvement in work performed under Awards made following this FOA. EERE does not limit its involvement to the administrative requirements of the Award. Instead, EERE has substantial involvement in the direction and redirection of the technical aspects of the project as a whole. Substantial involvement includes, but is not limited to, the following:

1. EERE shares responsibility with the Recipient for the management, control, direction, and performance of the Project.

2. EERE may intervene in the conduct or performance of work under this Award for programmatic reasons. Intervention includes the interruption or modification of the conduct or performance of project activities.

3. EERE may redirect or discontinue funding the Project based on the outcome of EERE's evaluation of the Project at that the Go/No Go decision point.

4. EERE participates in major project decision-making processes.

Cost Share Contributions

- Applicants must contribute a minimum of 20%*of the total project costs for R&D projects.
- Contributions must be:
  - Specified in the project budget
  - Verifiable from the Prime Recipient's records
  - Necessary and reasonable for proper and efficient accomplishment of the project
- Every cost share contribution must be reviewed and approved in advance by the Contracting Officer and incorporated into the project budget before the expenditures are incurred

*__*Cost Share Reduction*__: EERE has reduced the Recipient Cost Share Requirement to **10%** for R&D activities where:

- The Prime Recipient is a domestic institution of higher education; domestic nonprofit entity; FFRDC; or U.S. State, local, or tribal government entity; and
- The Prime Recipient performs more than 50% of the project work, as measured by the Total Project Cost

Allowable Cost Share

- Cost Share must be allowable and must be verifiable upon submission of the Full Application
- Refer to the following applicable Federal cost principles:

Entity	Cost Principles
Educational Institutions	2 CFR Part 200 Subpart E
State, Local, and Indian Tribal Governments	2 CFR Part 200 Subpart E
Non-profit Organizations	2 CFR Part 200 Subpart E
For-profit Organizations	FAR Part 31

Allowable Cost Share

- Cash Contributions
  - May be provided by the Prime Recipient, Subrecipients, or a Third Party

- In-Kind Contributions
  - Can include, but are not limited to: personnel costs, indirect costs, facilities and administrative costs, rental value of buildings or equipment, and the value of a service, other resource, or third party in-kind contribution

Unallowable Cost Share

- The Prime Recipient may not use the following sources to meet its cost share obligations including, but not limited to:
  - Revenues or royalties from the prospective operation of an activity beyond the project period
  - Proceeds from the prospective sale of an asset of an activity
  - Federal funding or property
  - Expenditures reimbursed under a separate Federal Technology Office
  - Independent research and development (IR&D) funds
  - The same cash or in-kind contributions for more than one project or program

Cost Share Payment

- Recipients must provide documentation of the cost share contribution, incrementally over the life of the award
- The cumulative cost share percentage provided on each billing period must reflect the cost sharing percentage negotiated
- In limited circumstances, and where it is in the government's interest, the EERE Contracting Officer may approve a request by the Prime Recipient to meet its cost share requirements on a less frequent basis, such as monthly or quarterly. See Section III.B.6 of the FOA.

Questions

- Questions about this FOA? Email BETOMEGABIOFOA@ee.doe.gov
  - All Q&As related to this FOA will be posted on EERE Exchange
    - You must select this specific FOA Number in order to view the Q&As
  - EERE will attempt to respond to a question within 3 business days, unless a similar Q&A has already been posted on the website
- Problems logging into EERE Exchange or uploading and submitting application documents with EERE Exchange? Email: EERE-ExchangeSupport@hq.doe.gov.
  - Include FOA name and number in subject line
- A digital copy of the slides will be posted on EERE Exchange following today's webinar