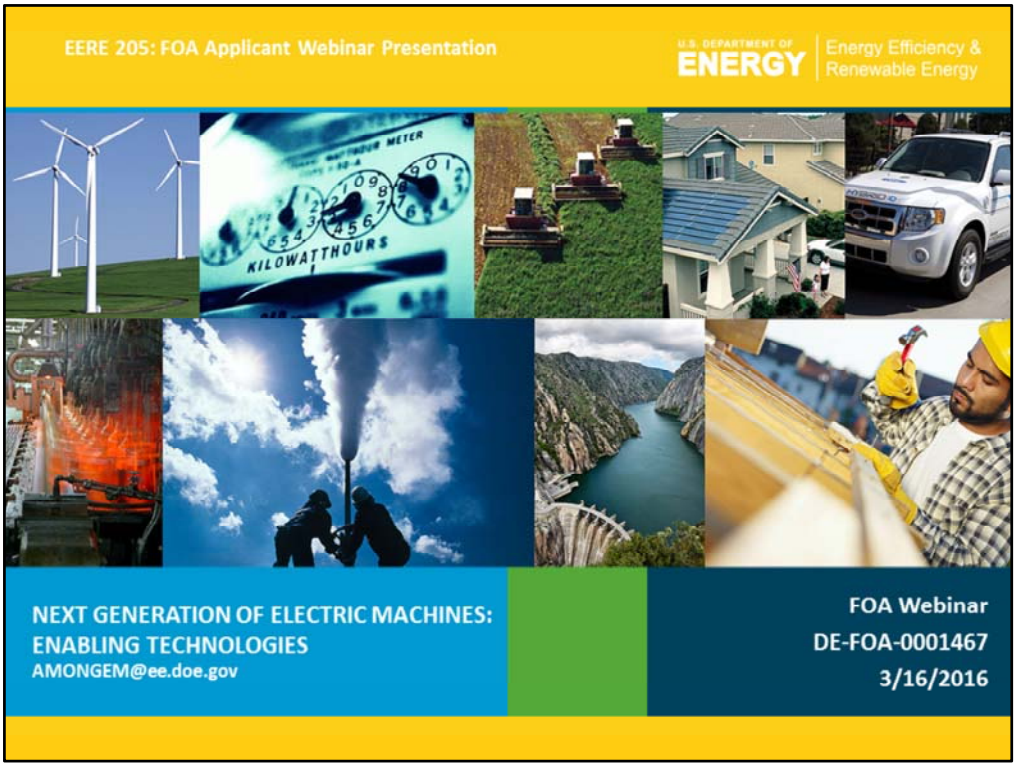
Next Generation Electric Machines: Enabling Technologies

FOA Webinar for DE-FOA-0001467

Presented 3/16/2016

Official PowerPoint Slides and Transcript

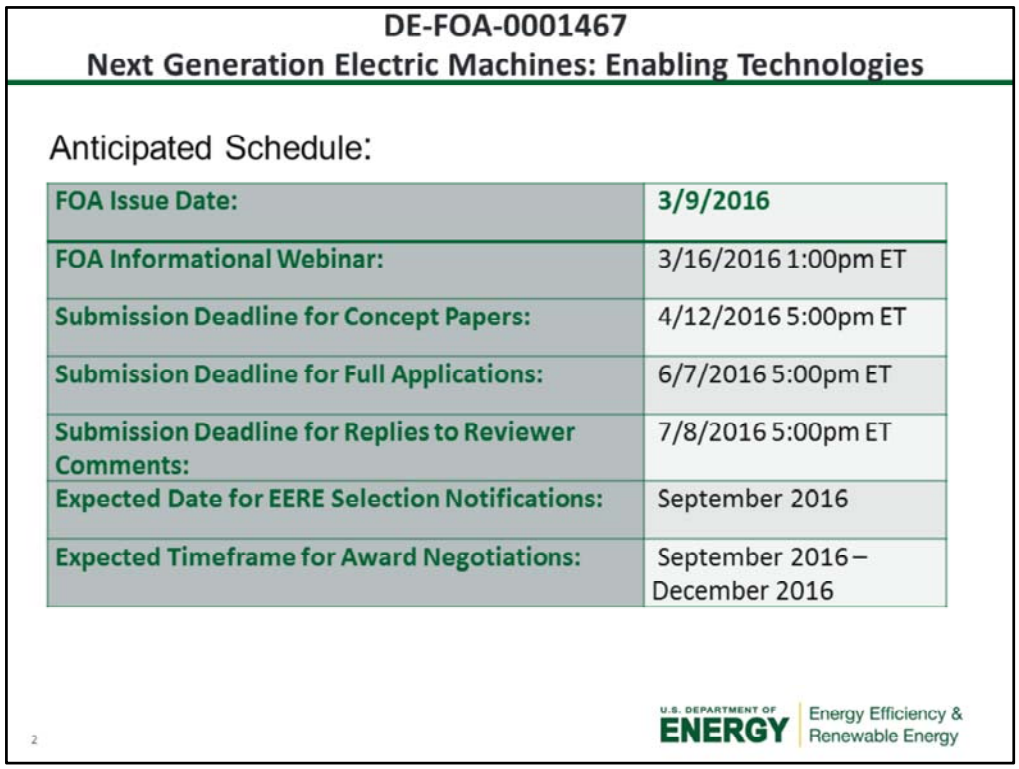
U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy



Good day everyone and welcome to our webinar. Thank you for your interest in the U.S. Department of Energy's efforts on renewable energy and energy efficiency. You are joining us for the Informational Webinar for Applicants and other Interested parties for the Next Generation Electric Machines: Enabling Technologies Funding Opportunity Announcement, or FOA, which was issued last week on March 9th. My name Anant Agarwal and I am a Technology Manager in the Advanced Manufacturing Office within the DOE's Office of Energy Efficiency and Renewable Energy. We hope to cover the basic aspects of the Funding Opportunity Announcement during this webinar.

Before we begin, I'd like to draw your attention to the email address on the left hand side of this cover page. This is the official mailbox to direct all of your questions during the entire FOA process. Please do not contact EERE individuals directly with questions, including myself. All questions received at this mailbox are posted publicly at the Q&A section of the FOA page on EERE Exchange in an anonymous way. The official answers to your questions will typically also be posted within 3 business days. Please be careful not to submit any language that might be business sensitive, proprietary or confidential.

Let's get started!

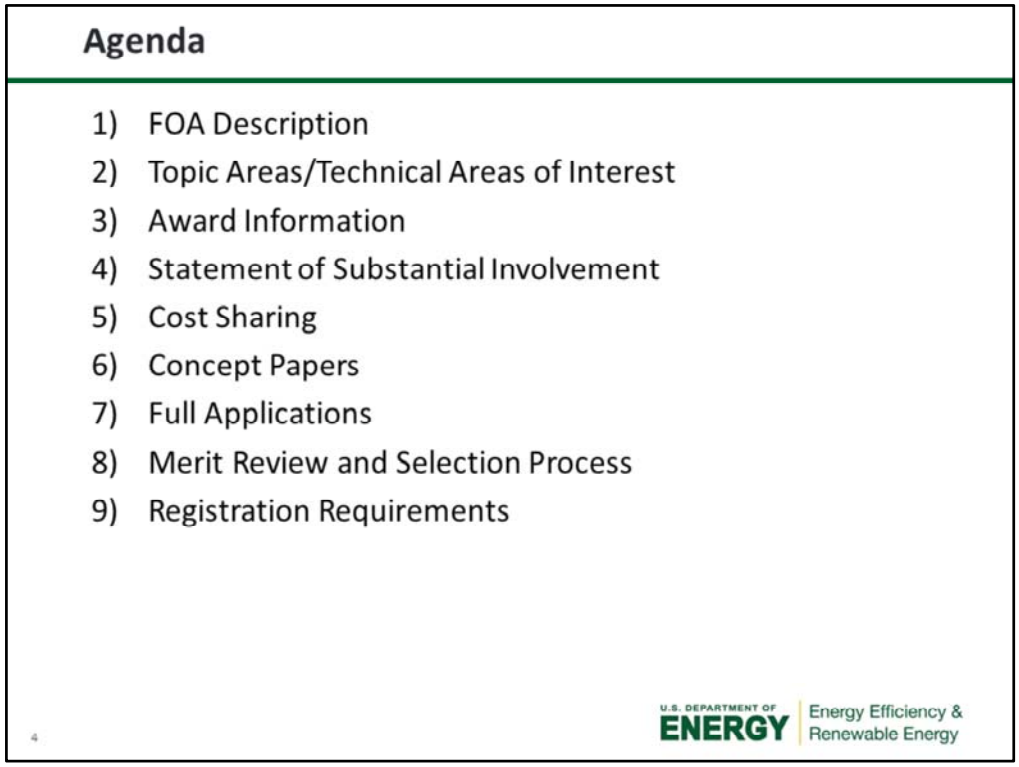


This slide shows the anticipated schedule for the FOA. The FOA has already been posted, and we are conducting the FOA Informational Webinar now. Please note that there are a few requirements that we will go over in the presentation that are different than in past FOAs, such as Replies to Reviewer Comments – we will cover all requirements for this FOA later in the presentation.

Notice

- All applicants are strongly encouraged to carefully read the Funding Opportunity Announcement DE-FOA-0001467 **("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 AMONGEM@ee.doe.gov.

READ SLIDE 3



The agenda for this presentation is as follows: READ SLIDE 4

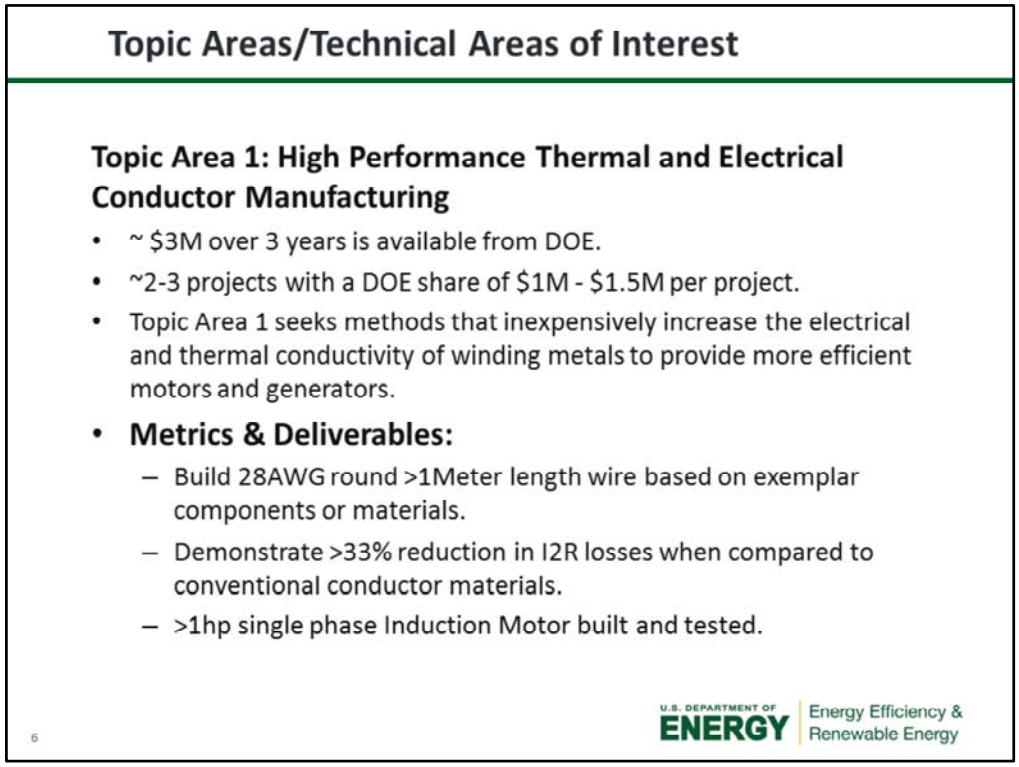
We encourage you to have a copy of the FOA in front of you for reference as we go through the presentation.

FOA Description

AMO's Next Generation Electric Machines (NGEM) program is an RD&D effort leveraging recent technology advancements in power electronics and electric motors to develop a new generation of energy efficient, high power density, high speed, integrated drive systems for a wide variety of critical energy applications.

This specific Financial Opportunity Announcement (FOA) is focused on advancing key enabling technologies that can take the development of electric machines a giant step further by addressing significant reductions in three major categories of energy losses in an electric machine.

READ SLIDE 5

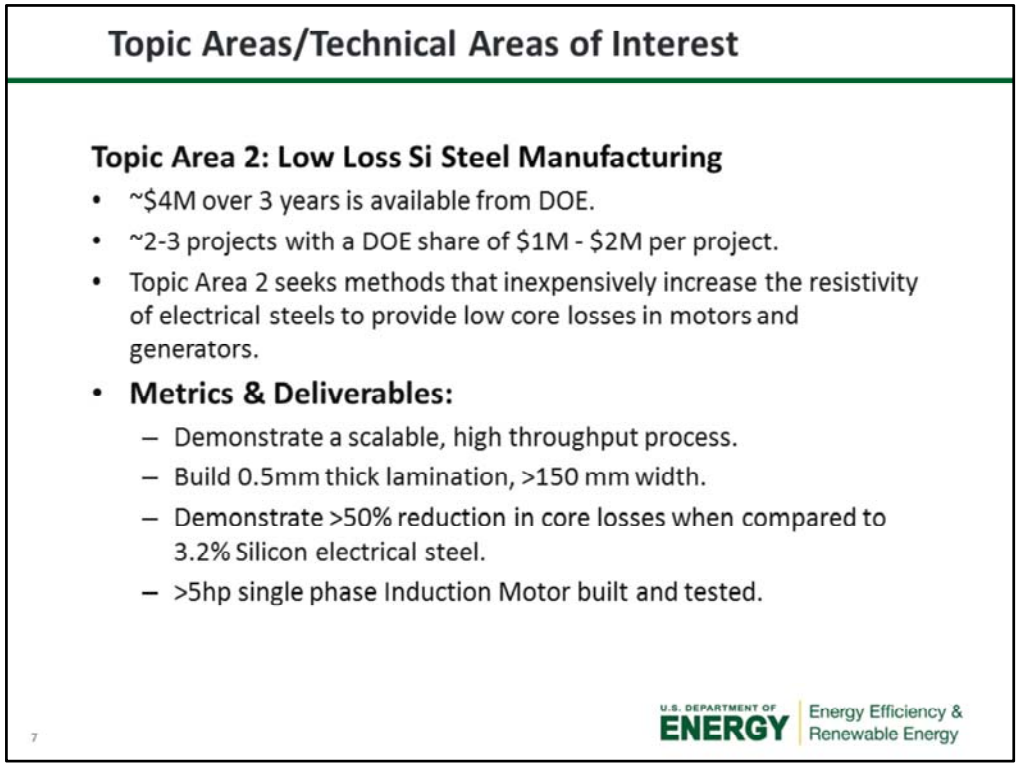


There are a total of 4 Topic Areas under this FOA. Within Topic Area 1, **High Performance Thermal and Electrical Conductor Manufacturing,** an estimated $3.0 million over 3 years is available from DOE and approximately 2-3 projects could be selected with a DOE share of $1.0 million - $1.5 million per project.

Topic Area 1 of this FOA seeks methods that inexpensively increase the electrical and thermal conductivity of winding metals to provide more efficient motors and generators.

Deliverables for this category are divided in two stages. In the first stage, a 28AWG round wire based of exemplar components or materials will be built at minimum of at least one meter in length. A minimum of 33% reduction in I^2R losses per unit weight or volume (in W/g or W/cm^3) will be demonstrated over a similar 28AWG, single build film-insulated, round copper or aluminum wire operating at 150°C and cooled through natural ventilation and radiation.

In the second stage, an industry standard minimum one hp single phase IM will be built and tested using the improved high performance wire from stage 1.



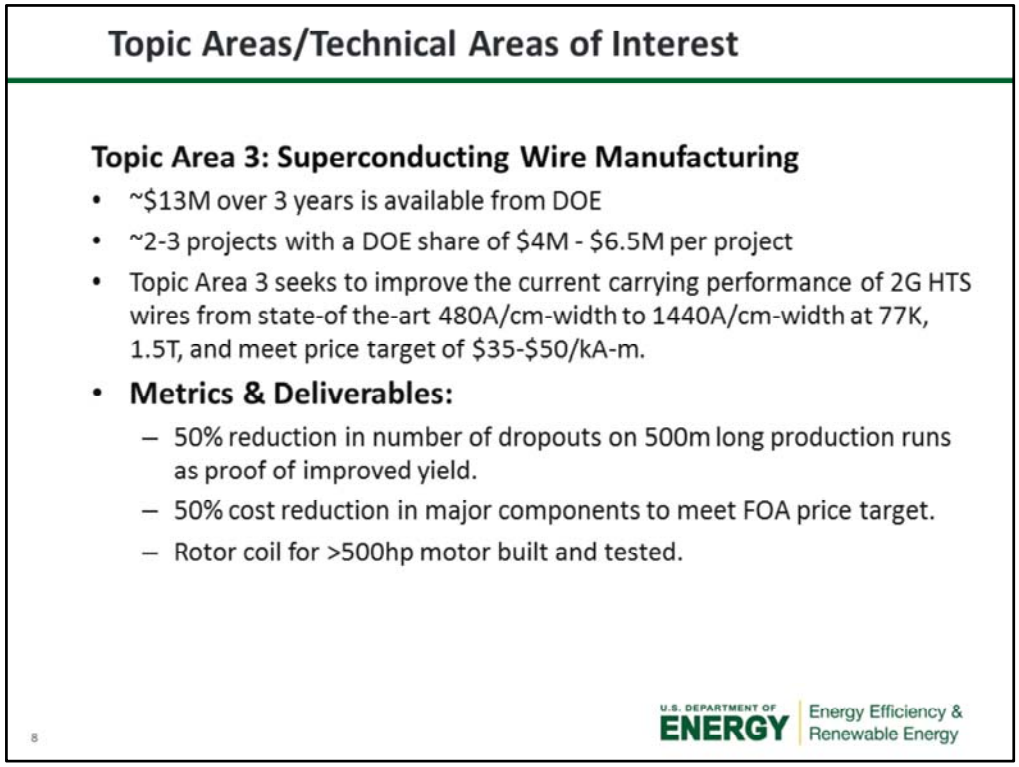
Within Topic Area 2, an estimated $4.0 million over 3 years is available from DOE and approximately 2-3 projects could be selected with a DOE share of $1.0 million - $2.0 million per project.

Topic Area 2 seeks methods that inexpensively increase the resistivity of electrical steel to provide low core losses in motors and generators.

Applicants to this topic would develop and demonstrate a scalable, high throughput process to make low loss soft magnetic materials with performance target provided in the FOA.

Deliverables for Topic Area 2 are divided into two stages. In the first stage, a 0.5mm thick lamination of exemplar material will be built at minimum of 150 mm width. A minimum of 50% reduction in core losses per unit weight (W/g) will be demonstrated over a 3.2% Si steel of similar thickness operating at 60Hz and 400Hz.

In the second stage, an industry standard minimum five hp single phase IM will be built and tested using the improved low loss soft magnetic material from stage 1.



Under Topic Area 3, **Superconducting Wire Manufacturing,** an estimated $13.0 million over 3 years is available from DOE and approximately 2-3 projects could be selected with a DOE share of $4.0 million - $6.5 million per project.

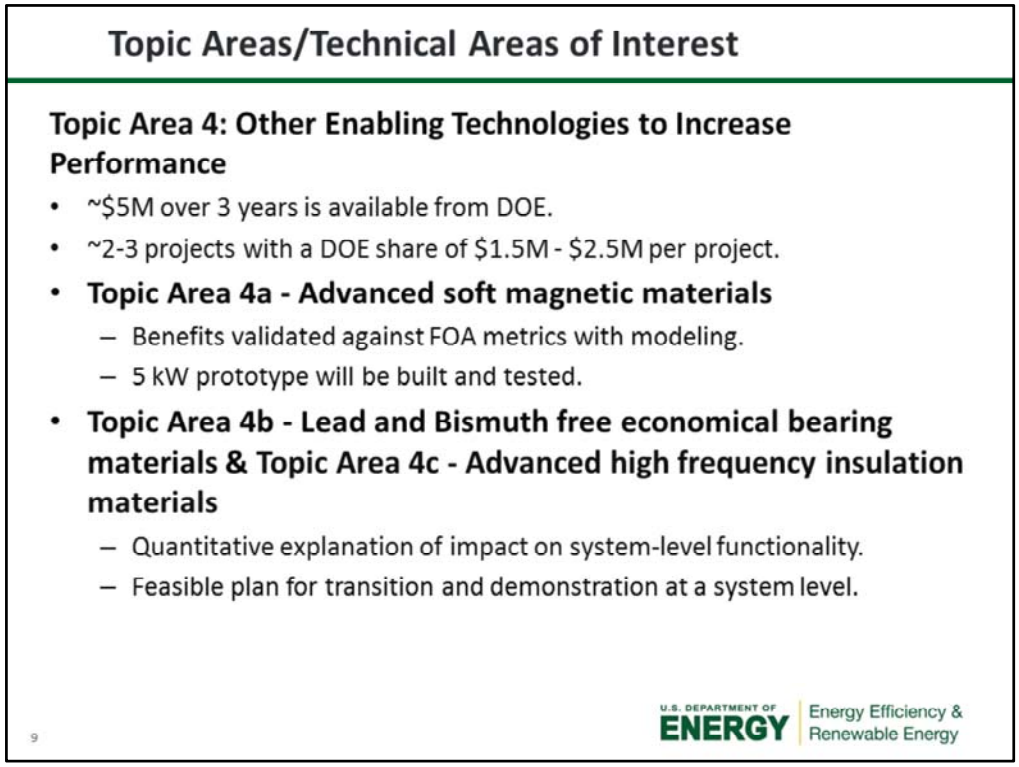
Topic Area 3 seeks to improve the current carrying performance of 2G HTS wires from state-of the-art 480A/cm-width to 1440A/cm-width at operating condition of 77°K, 1.5T. and/or bring down the manufacturing costs of 2G HTS wires through doubling the yield in kilometer long lengths, and/or reducing the cost of major components by 50%.

In the first stage to triple the current carrying performance, improvements are expected from flux pinning and increase in superconducting film thickness, which should be quantified in cost/performance to meet the price goals. Minimum sample wire lengths must exceed 50m to prove the scalability of the technology.

Also in the first stage for yield improvement efforts, teams will show 50% reduction in number of dropouts on 500m long production runs.

Also in the first stage for cost reduction efforts, teams will show 50% cost reduction in major components to meet FOA price target.

In the second stage, one coil representing one rotor pole of an industry standard minimum 500hp motor will be built and tested using the improved HTS wire from the first stage.

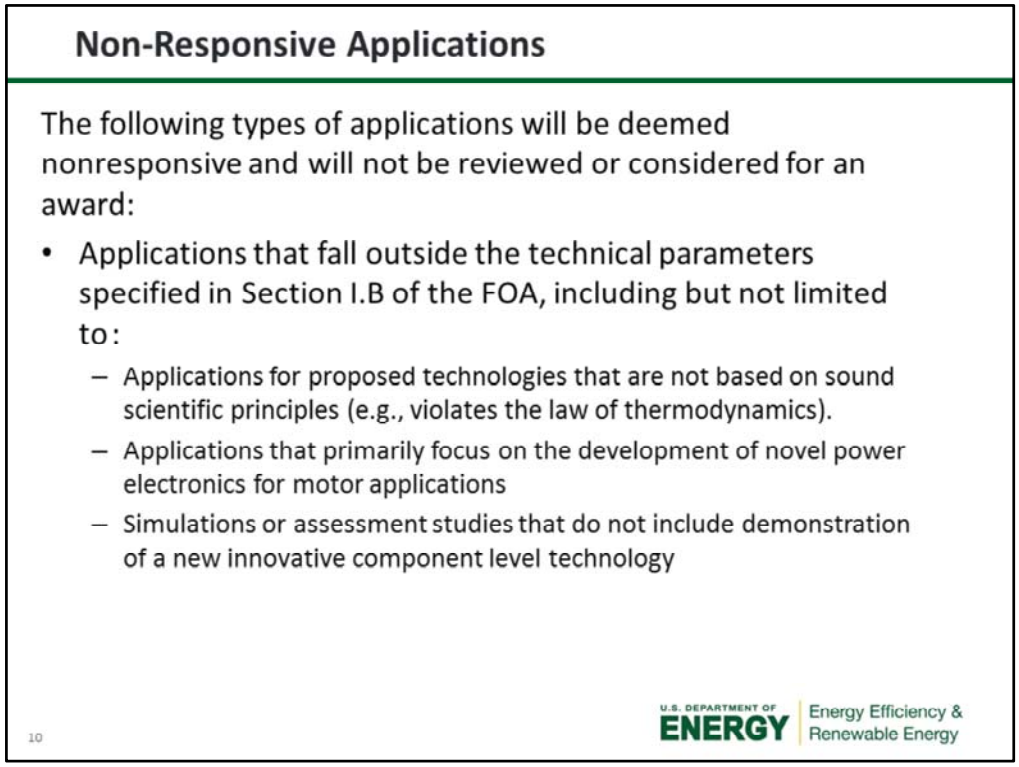


Under Topic Area 4, Other Enabling Technologies to Increase Performance, an estimated $5.0 million over 3 years is available from DOE and approximately 2-3 projects could be selected with a DOE share of $1.5 million - $2.5 million per project.

Under this Topic Area, DOE encourages RD&D efforts in advanced soft magnetics, high frequency insulation materials and lead free low loss bearing technologies.

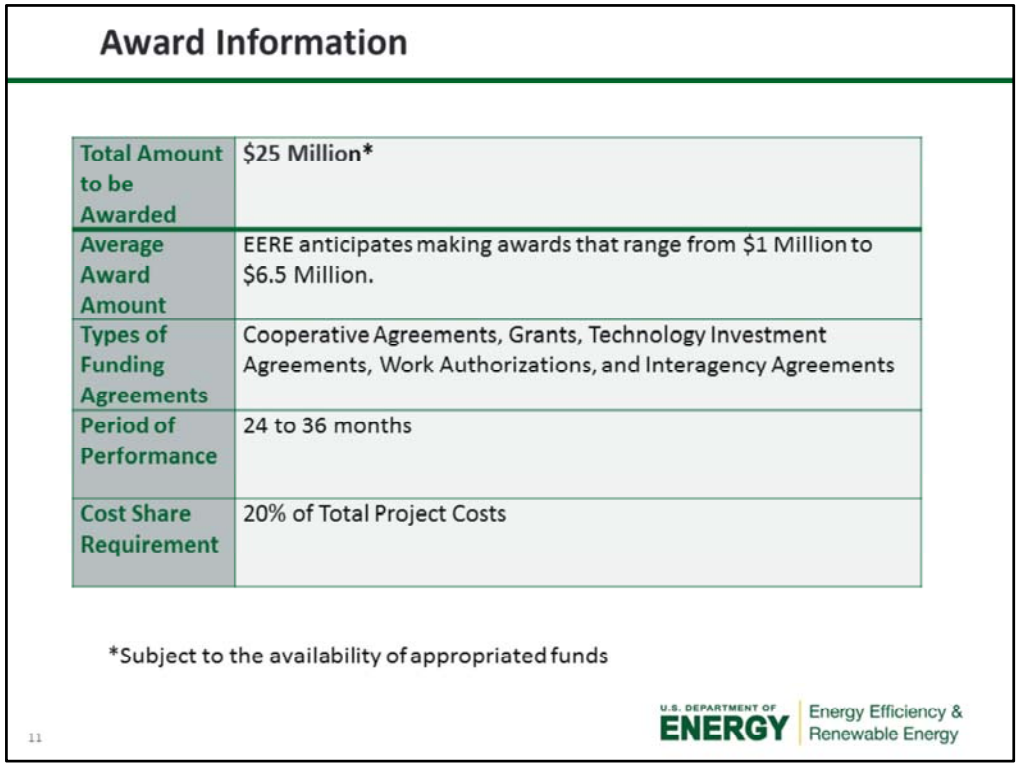
Deliverables for Advanced soft magnetic materials work are divided in two stages. In the first stage, the benefits of advanced soft magnetic material used in the proposed motor topology will be validated against the FOA metrics through mathematical and simulation modeling. In the second stage, a 5 kW prototype will be built and tested according to NEMA test standards using the optimized design from stage 1.

Deliverables for work on lead and bismuth free economical bearing materials and advanced high frequency insulation materials need not include incorporation into a full motor prototype. However, there must be a clear, compelling and quantitative explanation of the new component's impact on system-level functionality, and an outline of a feasible plan for subsequent transition and demonstration at a system level.



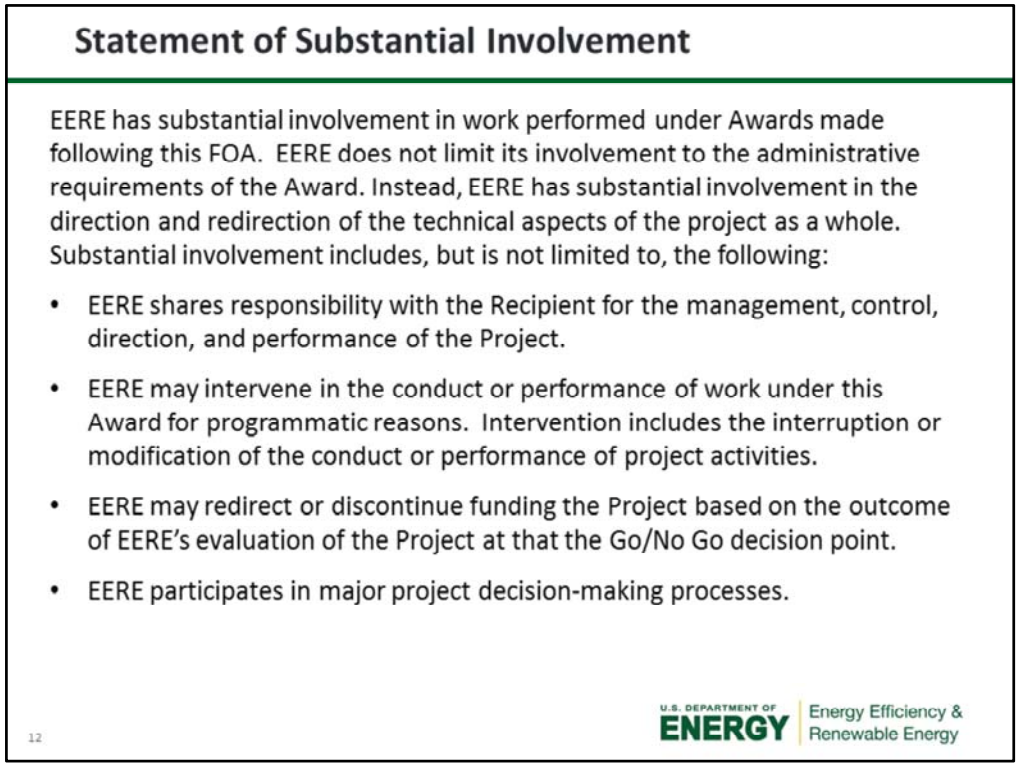
And now I will hand it over to Dr. Gibson Asuquo, Project Officer.

Read Slide 12

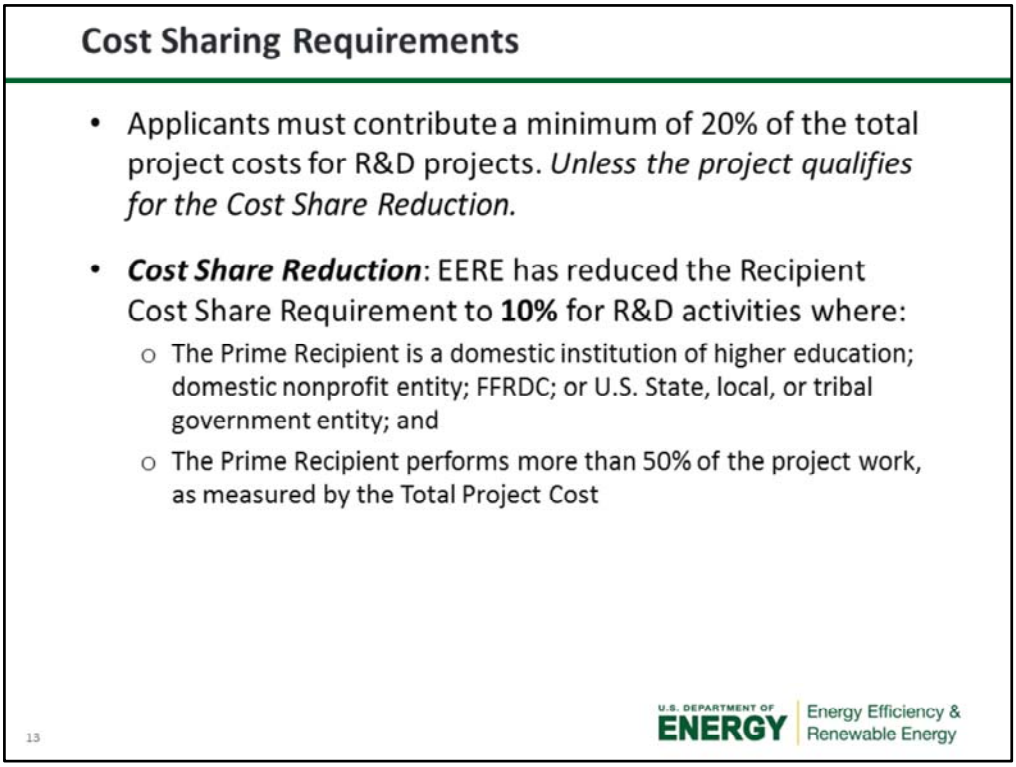


EERE expects to make approximately $25 million of Federal funding available for new awards under this FOA subject to the availability of appropriated funds. The average award amount is anticipated to range from $1 Million to $6.5 Million.

EERE intends to fund mostly cooperative agreements under this FOA, but may also fund Grants, TIAs, Work Authorizations, and Interagency Agreements. Cooperative Agreements include Substantial Involvement, which we will discuss next.

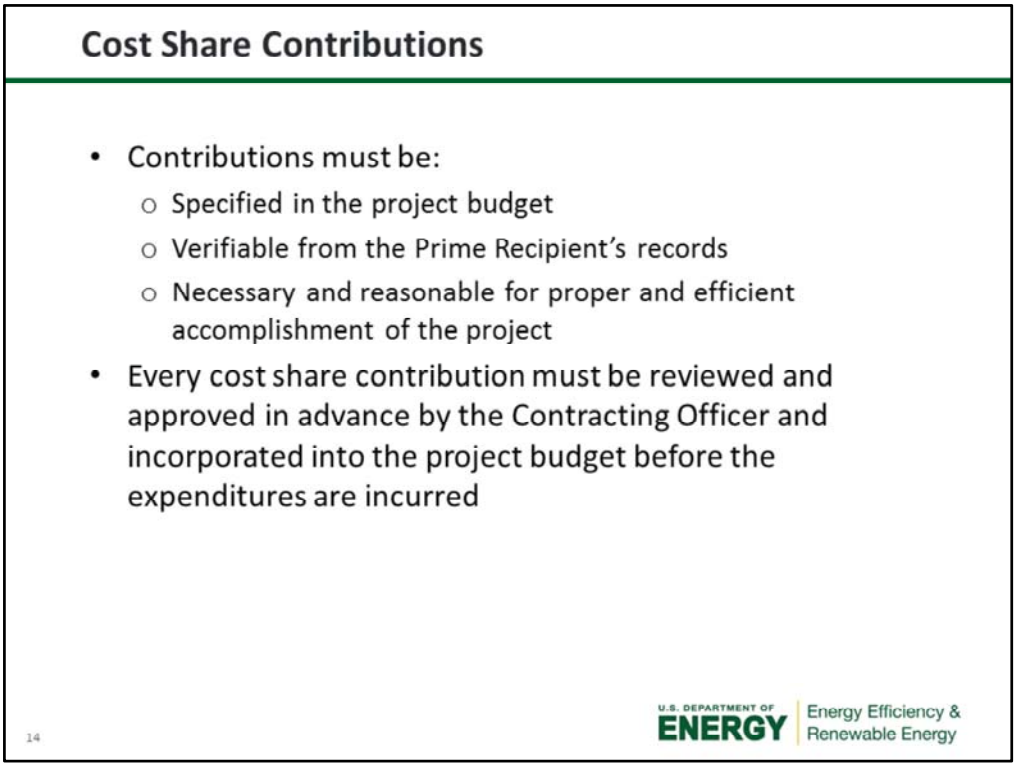


- Under cooperative agreements, there will be what is known as "substantial involvement" between EERE and the Recipient during the performance of the project which means EERE has substantial involvement in the direction and redirection of the technical aspects of the project as a whole.

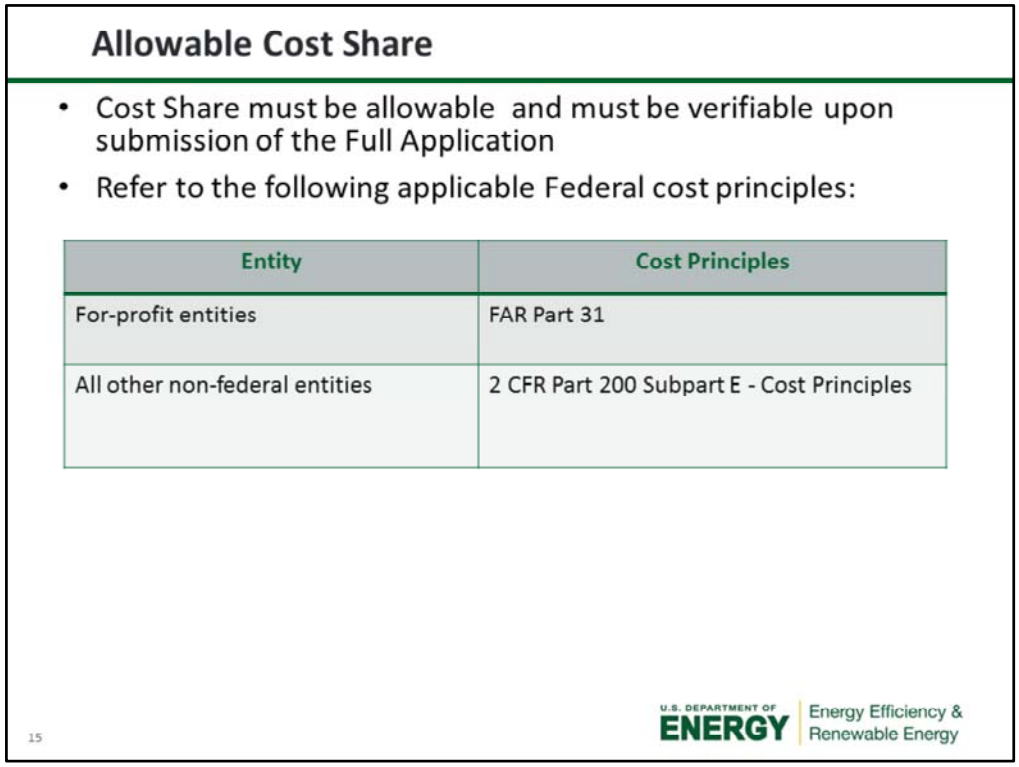


READ SLIDE 15

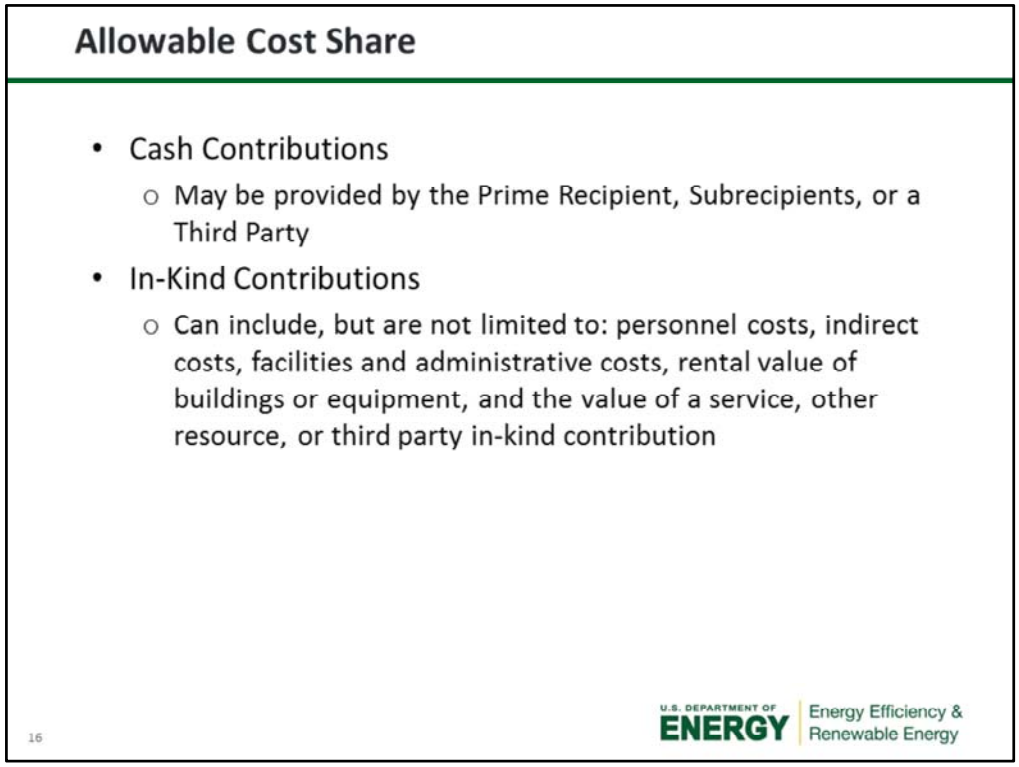
Applicants who believe their project qualifies for the reduced recipient cost share must be able to provide verification that the above requirements are satisfied



The total budget presented in the application must include both Federal (DOE), and Non-Federal (cost share) portions, thereby reflecting TOTAL PROJECT COSTS proposed. All costs must be verifiable from the Recipient's records and be necessary and reasonable for the accomplishment of the project.

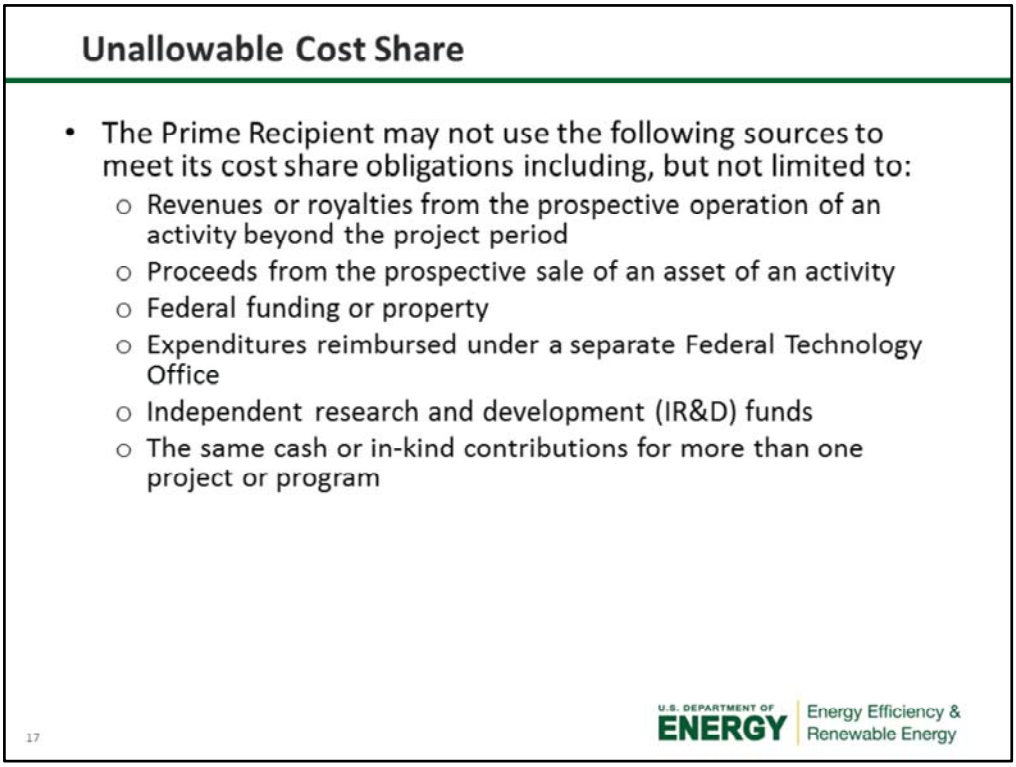


Cost Share must be allowable and must be verifiable upon submission of the Full Application. Please refer to this chart for your entity's applicable cost principles. It is imperative that you follow the applicable cost principles when creating your budget for the full application.

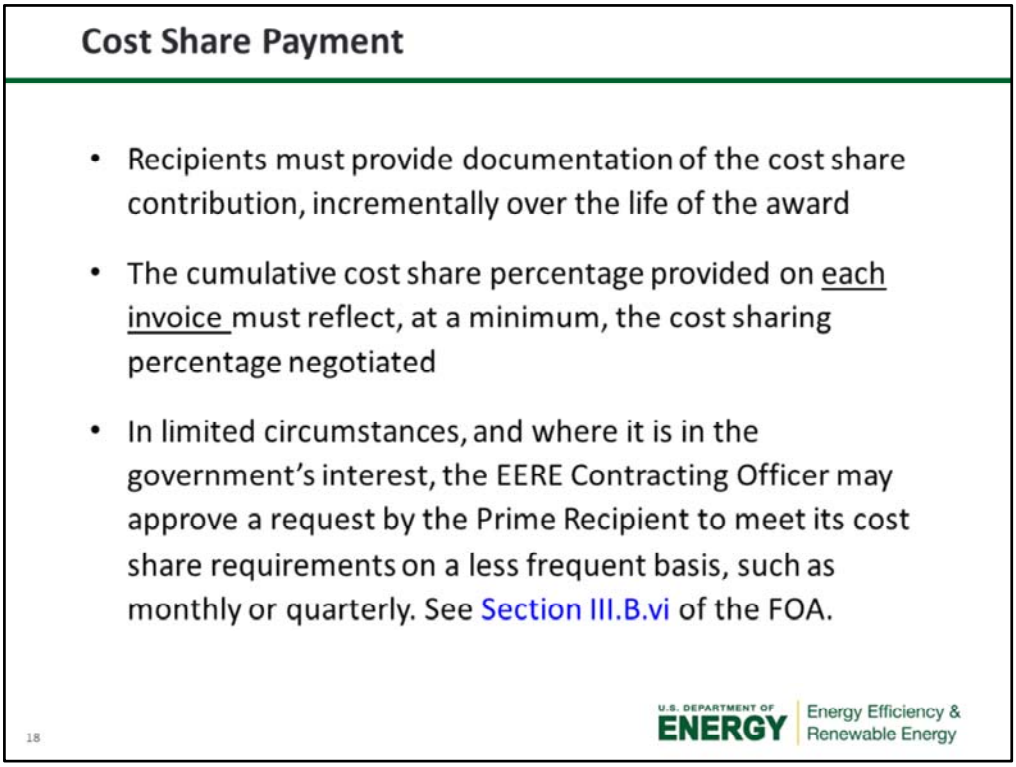


Cost share can be provided in cash and/or in-kind. It can be provided by the Prime Recipient, subs, or a third party.

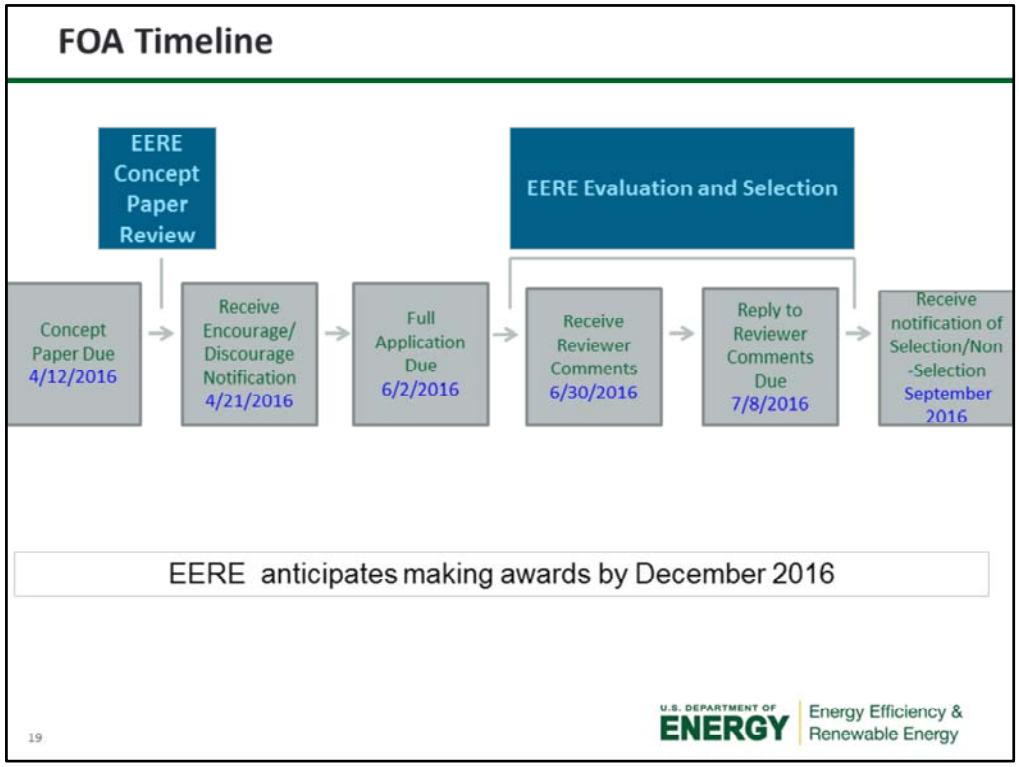
The basic definition of in-kind cost share is the donation of personnel time, equipment, facilities, or other items that an organization will contribute to the project. It can take many forms, each of which must be assigned a dollar value to be included in the budget. Some examples of in-kind cost share are the donation of work hours, facility use, equipment use.



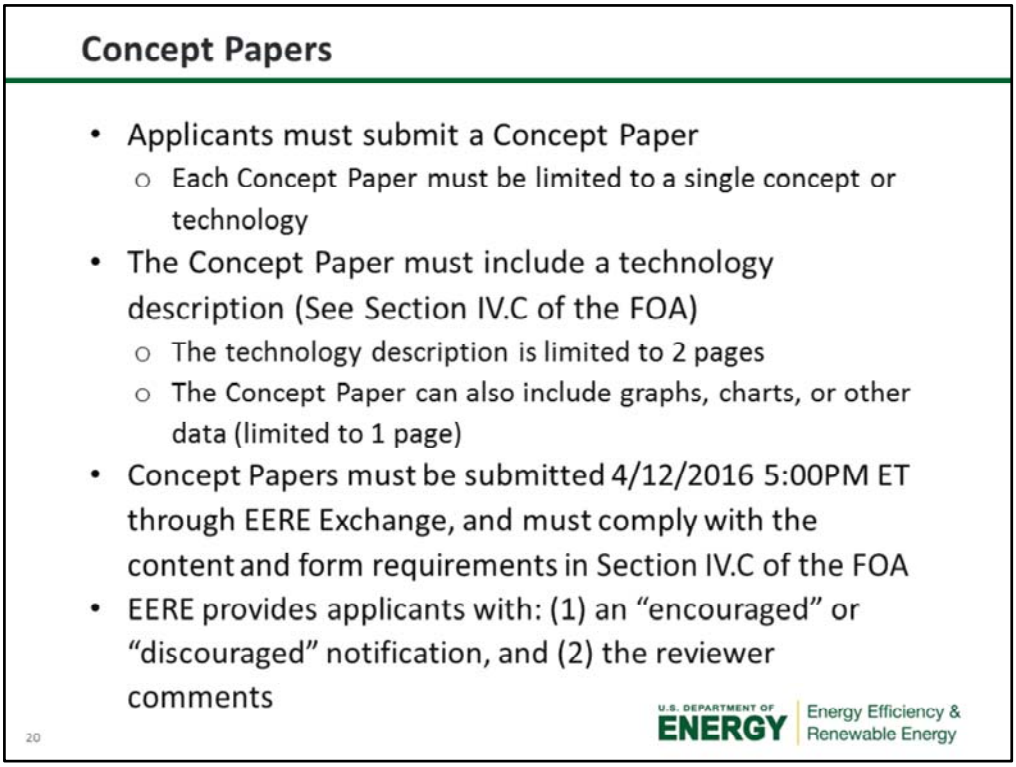
Be aware that there are items that are considered unallowable cost share. If a cost is considered unallowable, it cannot be counted as cost share. This slide provides some examples of cost share that are unallowable.



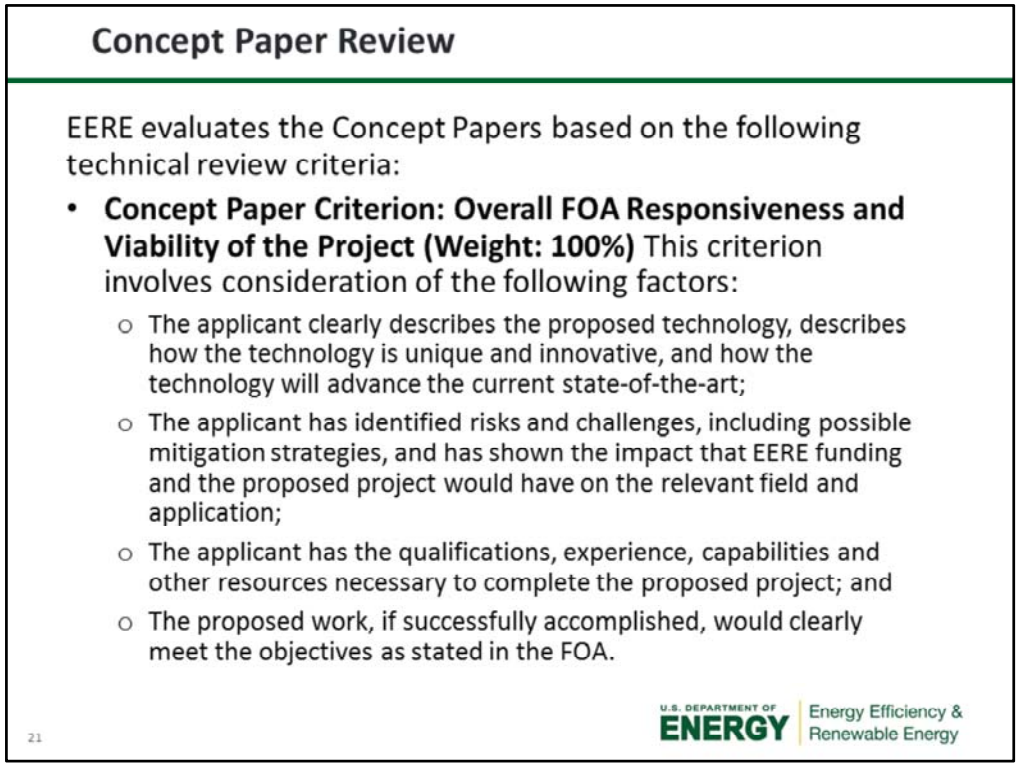
Cost Share must be provided on an invoice basis, unless a waiver is requested and approved by the DOE Contracting Officer.



EERE's Evaluation and Selection Process is shown in the blue boxes. EERE will review Concept Papers, Replies to Reviewer Comments (which we will cover later in the presentation), and Full Applications. The gray boxes represent the actions that apply to applicants throughout the FOA process.



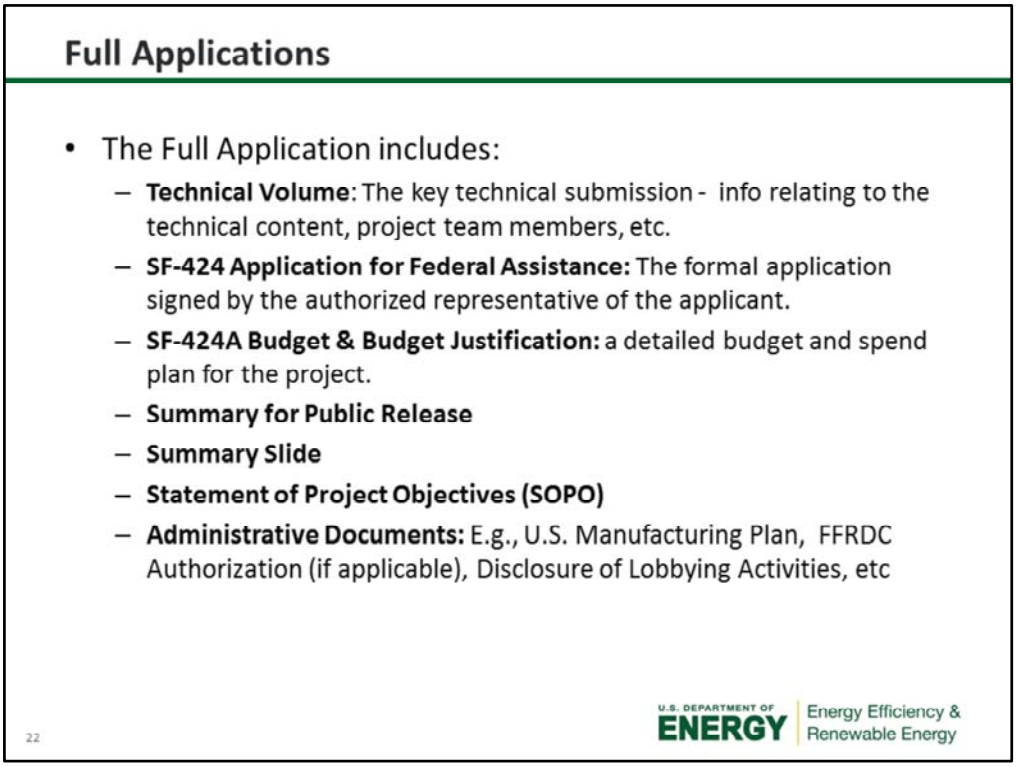
Concept Papers are required for this FOA. Concept Papers are brief descriptions of the proposed project. It allows applicants to submit their ideas with minimal time and expense. EERE will provide feedback on the proposed project so the Applicant can make an informed decision whether to expend additional resources to prepare a full application.



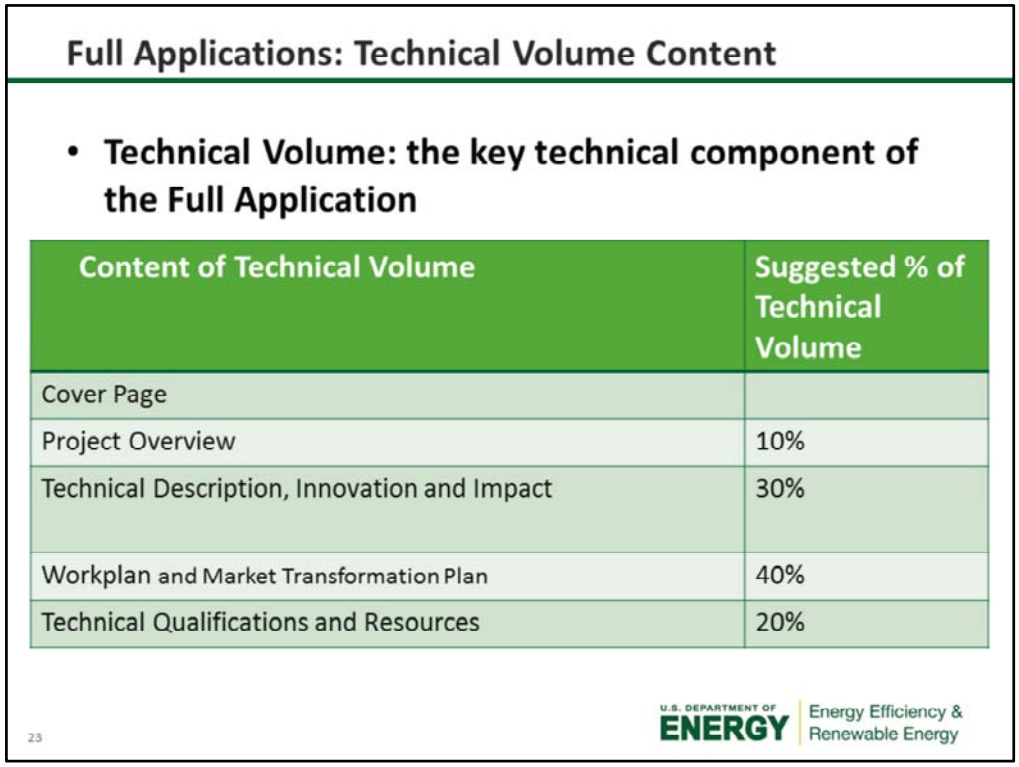
Please READ this SLIDE for concept paper review criterion which is weighted 100%

EERE will provide applicants with (1) either an “encouraged” or “discouraged” notification, and (2) the reviewer comments.

Please note that regardless of the date applicants receive the Encourage/Discourage notifications, the submission deadline for the Full Application remains the date stated on the FOA cover page

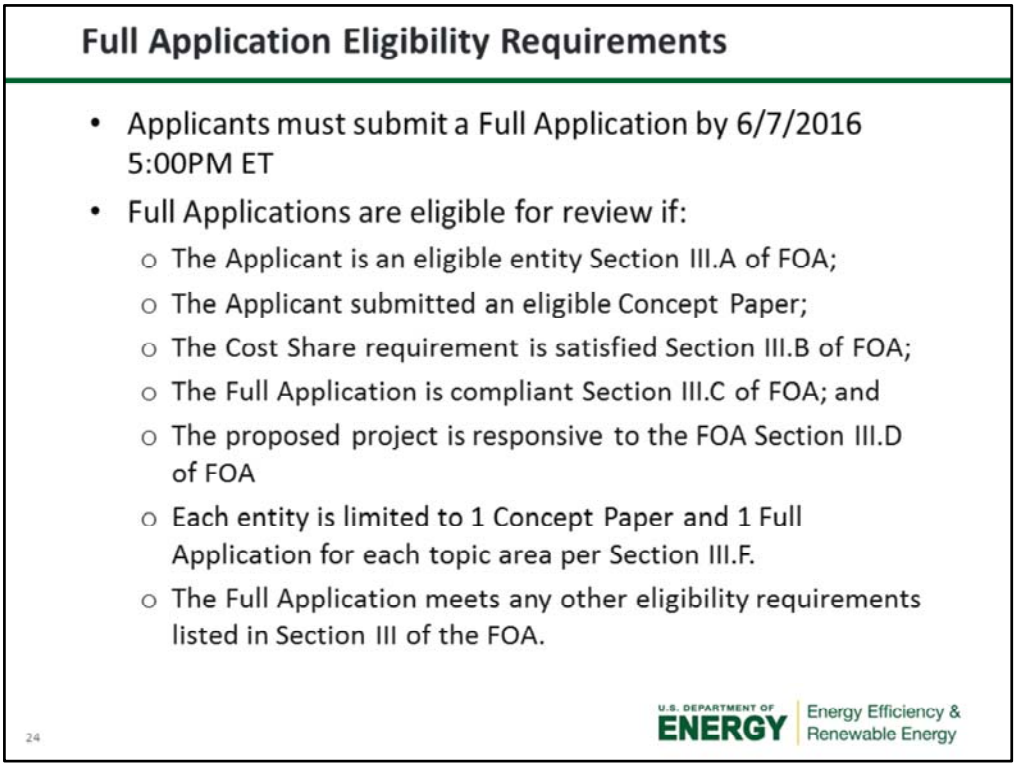


The Full Application includes the elements listed here in the slide.



The key technical component of the full application is the Technical Volume, which helps applicants frame the technical information that the application will be evaluated on. The Technical Volume provides information regarding what the project is, how the project tasks will be accomplished, and the project timetable.

The Technical Volume is comprised of a cover page, project overview, technical description, innovation, and impact, workplan and Market Transformation Plan, and technical qualifications and resources. Please note that the percentages listed here are suggested and are not mandatory.



Hell, this John Harrington and I will present the remaining slides. As we previously pointed out, applicants must submit full applications by June 7, 2016. EERE will conduct an eligibility review, and full application will be deemed eligible if: READ SLIDE

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

Nonprofit organizations described in Section 501(c)(4) of the Internal Revenue Code of 1986 that engaged in lobbying activities after December 31, 1995, are not eligible to apply for funding.

READ SLIDE 27

Multiple Applications

Applicants may submit one concept paper and one application to each topic area of this FOA

READ SLIDE

Multiple Applications

- If an applicant submits more than one Concept Paper or Full Application under the same Topic Area, EERE will only consider the last timely submission for evaluation
  - Any other submissions received listing the same applicant will be considered non-compliant and not eligible for further consideration
  - This limitation does not prohibit an applicant from collaborating on other applications (e.g., as a potential Subrecipient or partner) so long as the entity is only listed as the Prime Applicant on one Concept Paper and Full Application submitted under this FOA

READ SLIDE 28

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

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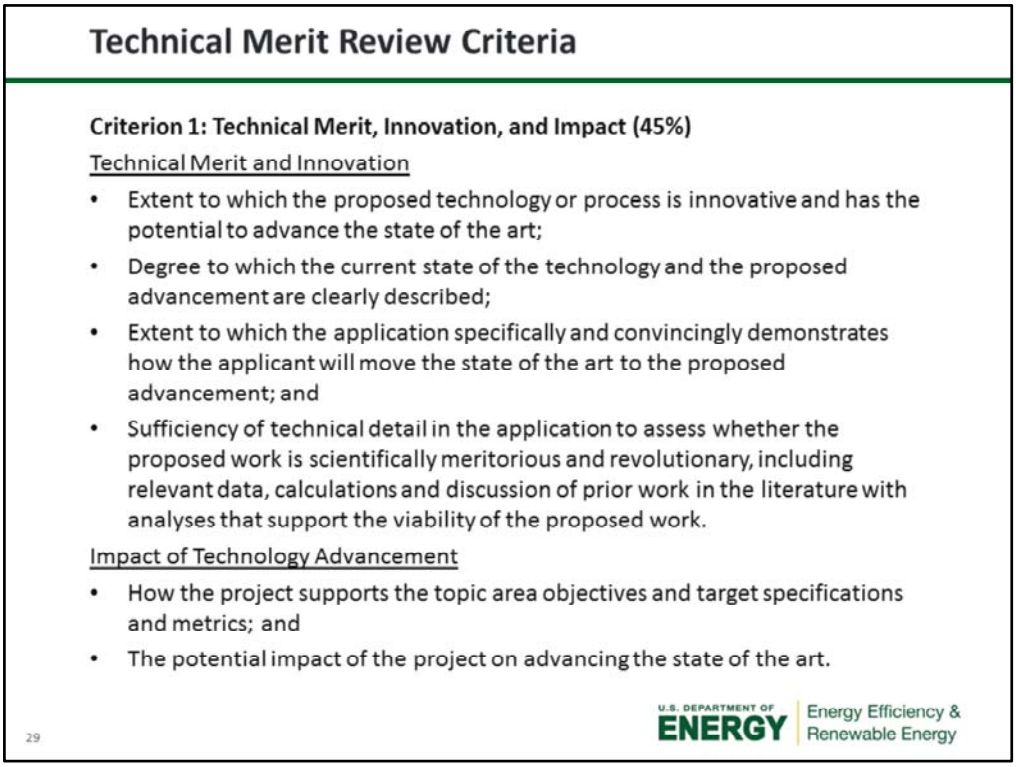
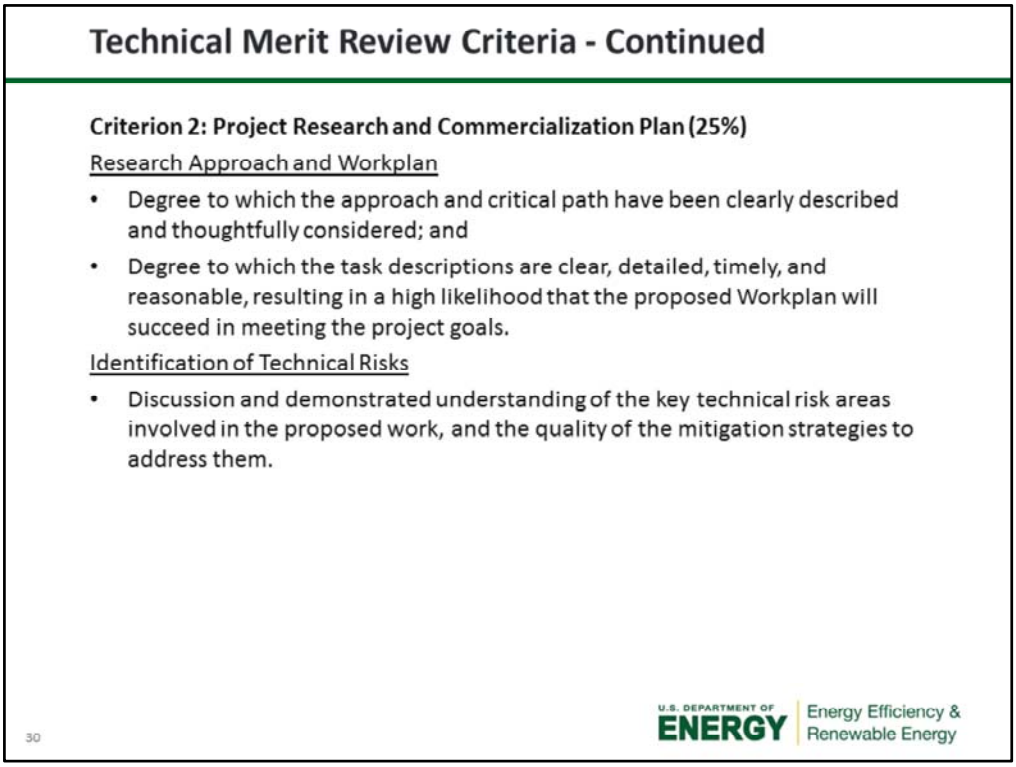


Applications will be evaluated against the following 4 merit review criteria: Criterion 1, Technical Merit, Innovation, and Impact with a weighting of 45%



Criterion 2, Project Research and Commercialization Plan with a weighting of 25%

Technical Merit Review Criteria - Continued

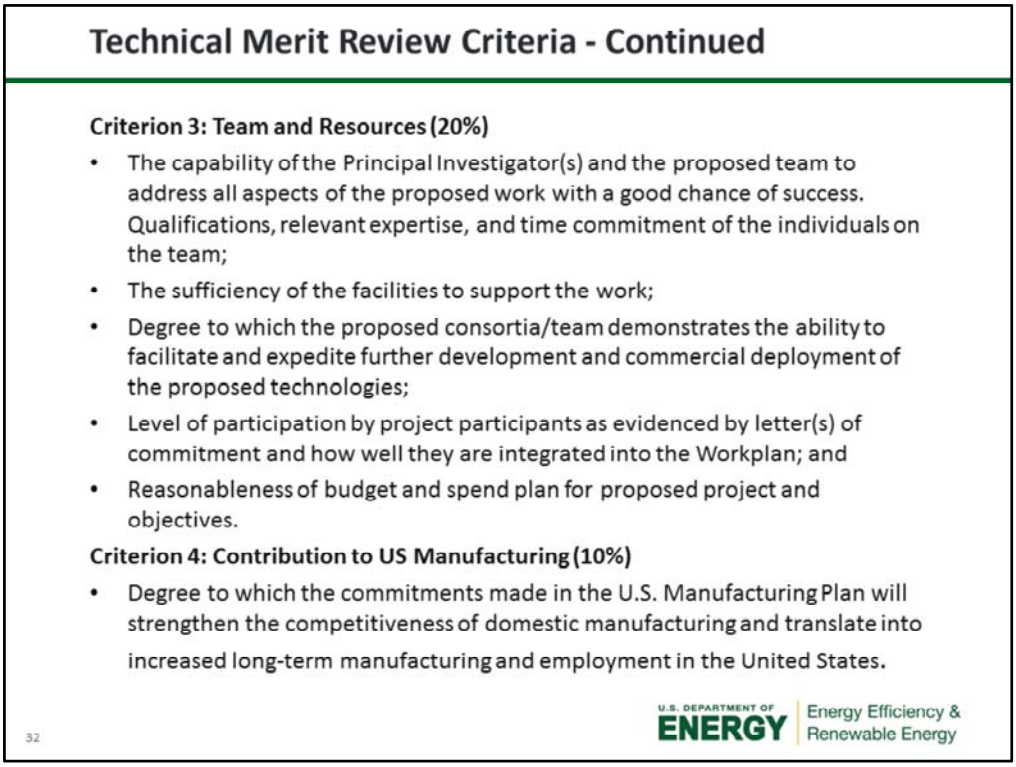
Criterion 2, Continued

Baseline, Metrics, and Deliverables

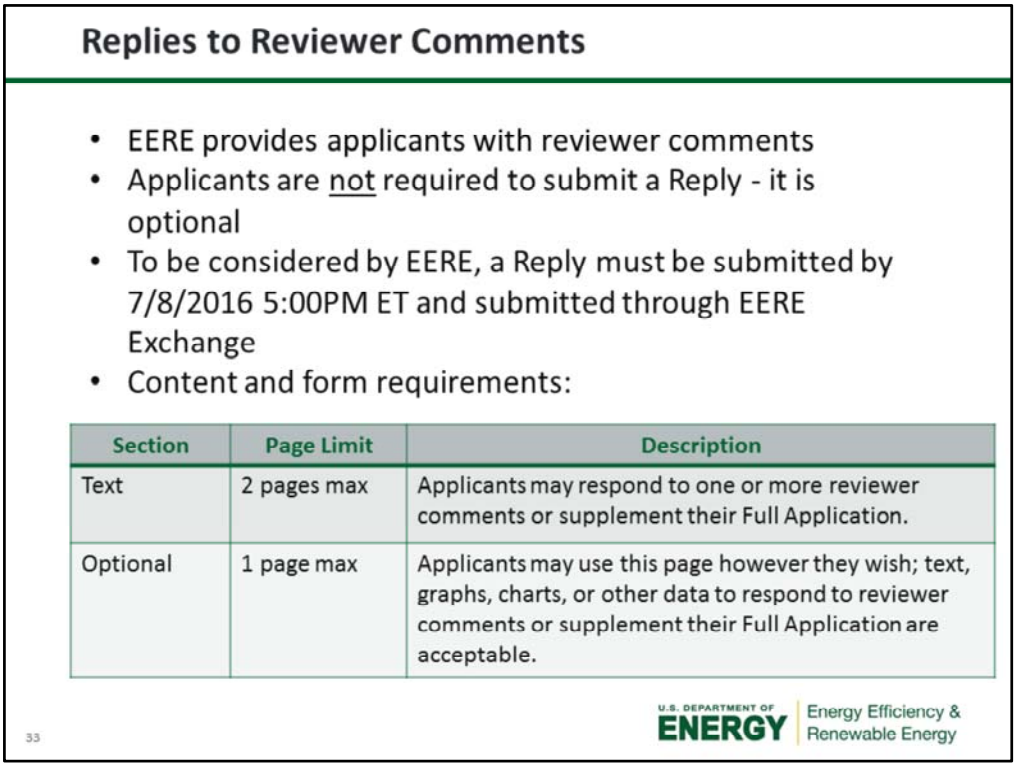
- The level of clarity in the definition of the baseline, metrics, and milestones; and
- Relative to a clearly defined experimental baseline, the strength of the quantifiable metrics, milestones, and a mid-point deliverables defined in the application, such that meaningful interim progress will be made.

Market Transformation Plan

- 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 Management Plan and Open Source Software Distribution Plan , U.S. manufacturing plan etc., and product distribution.



Criterion 3, team and resources with a weighting of 20% and Criterion 4 with a weighting of 10%.



The Full Application are reviewed by experts in the FOA topic area. After those experts review the applications, EERE will provide applicants with reviewer comments. Applicants will have a brief opportunity to review the comments and prepare a short Reply to Reviewer Comments responding to comments however they desire. The Reply to Reviewer Comments is due by the date and time provided on this slide. Applicants should anticipate receiving the independent reviewer comments approximately three business days before this due date. The Reply to Reviewer Comments is an optional submission; applicants are not required to submit a Reply to Reviewer Comments.

This a **customer centric** process that provides applicants with a unique opportunity to correct misunderstandings and misinterpretations and to provide additional data that might influence the selection process in their favor. The Replies are considered by the reviewers and the selection official.

Replies to Reviewer Comments must conform to the content and form requirements listed here, including maximum page lengths. If a Reply to Reviewer Comments is more than three pages in length, EERE will review only the first three pages and disregard any additional pages.

Please see Sections IV.F. 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

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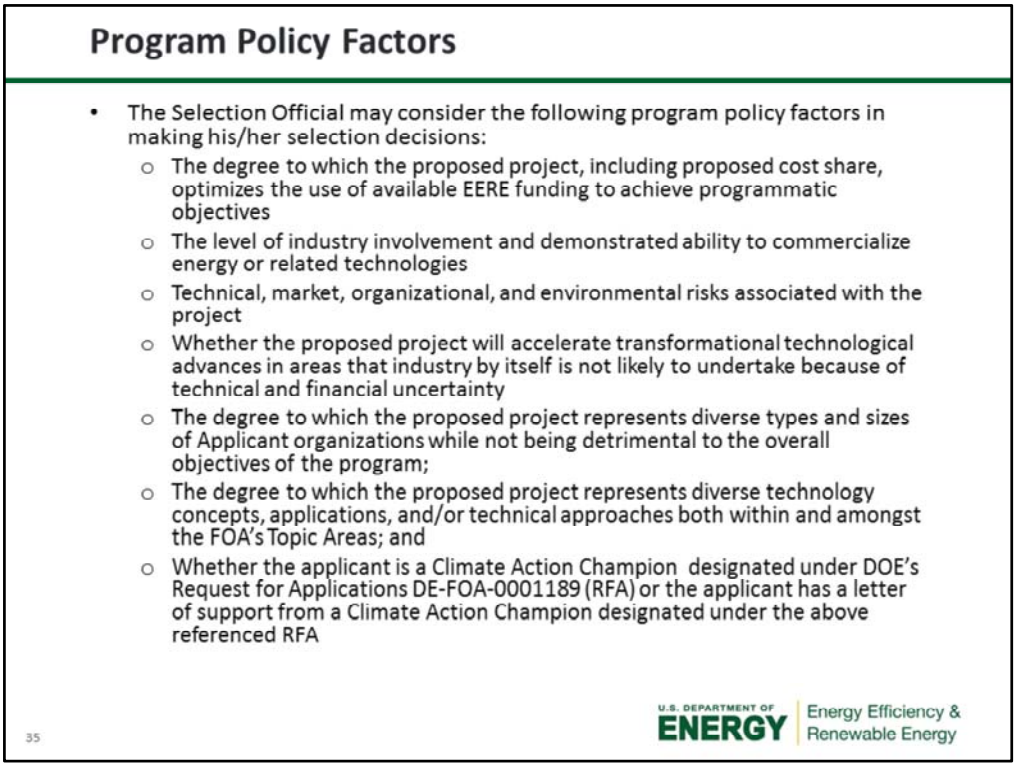
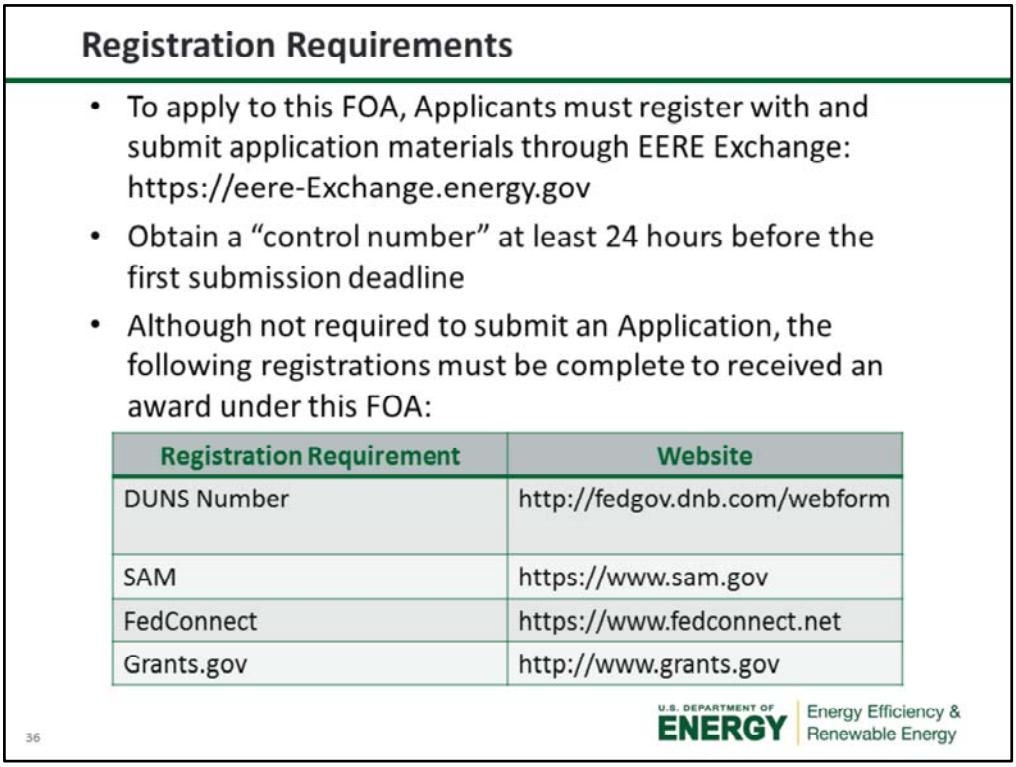
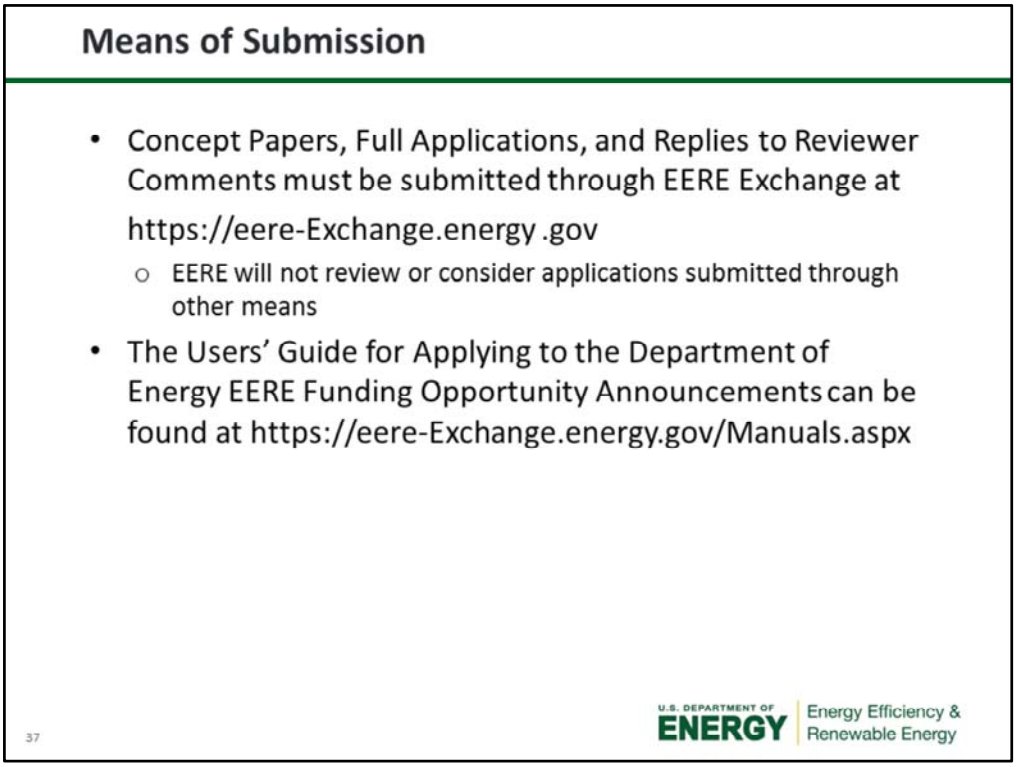


After the Merit Review process, the Selection Official may consider these program policy factors to come to a final selection decision.



There are several one-time actions before submitting an application in response to this FOA, and it is vital that applicants address these items as soon as possible. Some may take several weeks, and failure to complete them could interfere with an applicant's ability to apply to this FOA, or to meet the negotiation deadlines and receive an award if the application is selected.



All required submissions must come through EERE Exchange. EERE will not review or consider applications submitted through any other means.

Key Submission Points

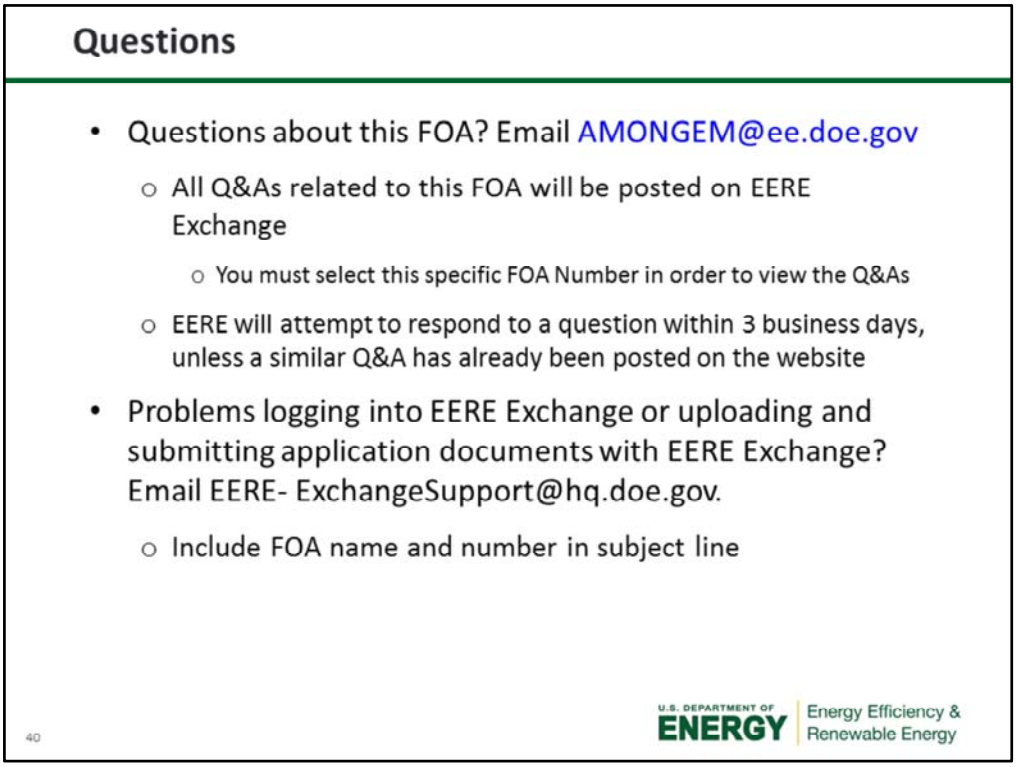
- Check entries in EERE Exchange
  - Submissions could be deemed ineligible due to an incorrect entry
- EERE strongly encourages Applicants to submit 1-2 days prior to the deadline to allow for full upload of application documents and to avoid any potential technical glitches with EERE Exchange
- Make 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

READ SLIDE 39

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
  - Failure to do so may result in cancellation of further award negotiations and rescission of the Selection

READ SLIDE 40



READ SLIDE 41

Thank you, this concludes our webinar for today.