Department of Energy (DOE)
Office of Energy Efficiency and Renewable Energy (EERE)

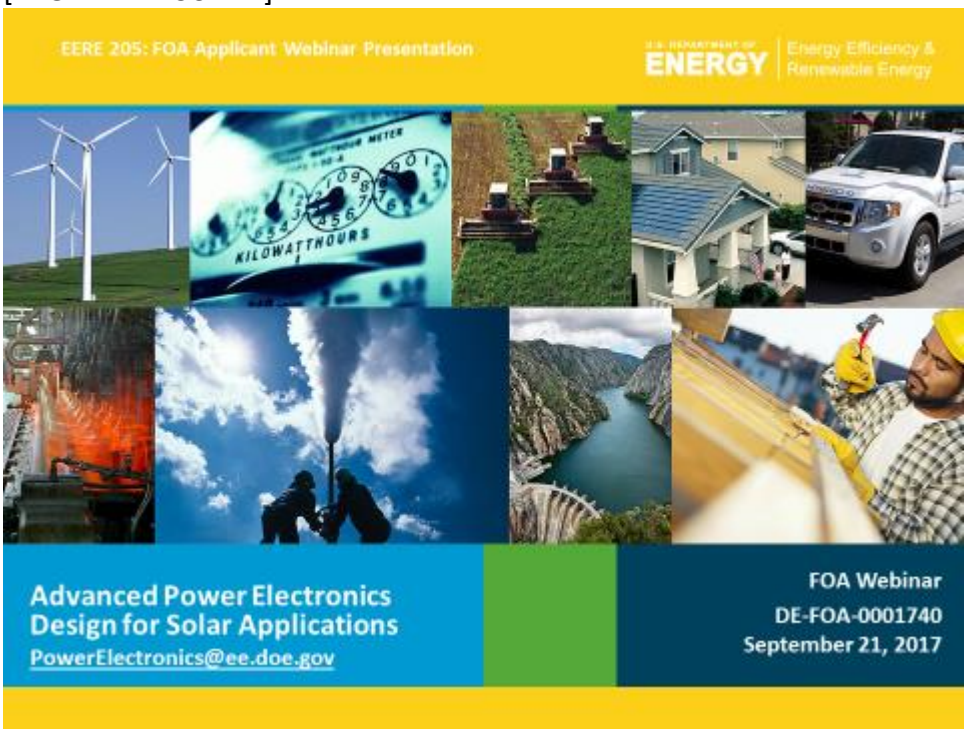
TRANSCRIPT – INFORMATIONAL WEBINAR – SEPTEMBER 21, 2017

Advanced Power Electronics Design for Solar Applications
Funding Opportunity Announcement (FOA) Number: DE-FOA-000174

[Transcript from the Information Webinar]
[Please see the controlling document, Funding Opportunity Announcement DE-FOA-0001740 ("FOA") on EERE Exchange for full details]

[Please note: this transcript covers the presentation portion of the webinar. For the Q&A discussion that followed, please see the FOA FAQ posted on EERE Exchange. Submit all questions to PowerElectronics@ee.doe.gov]

[BEGIN TRANSCRIPT]



Good afternoon 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 Advanced

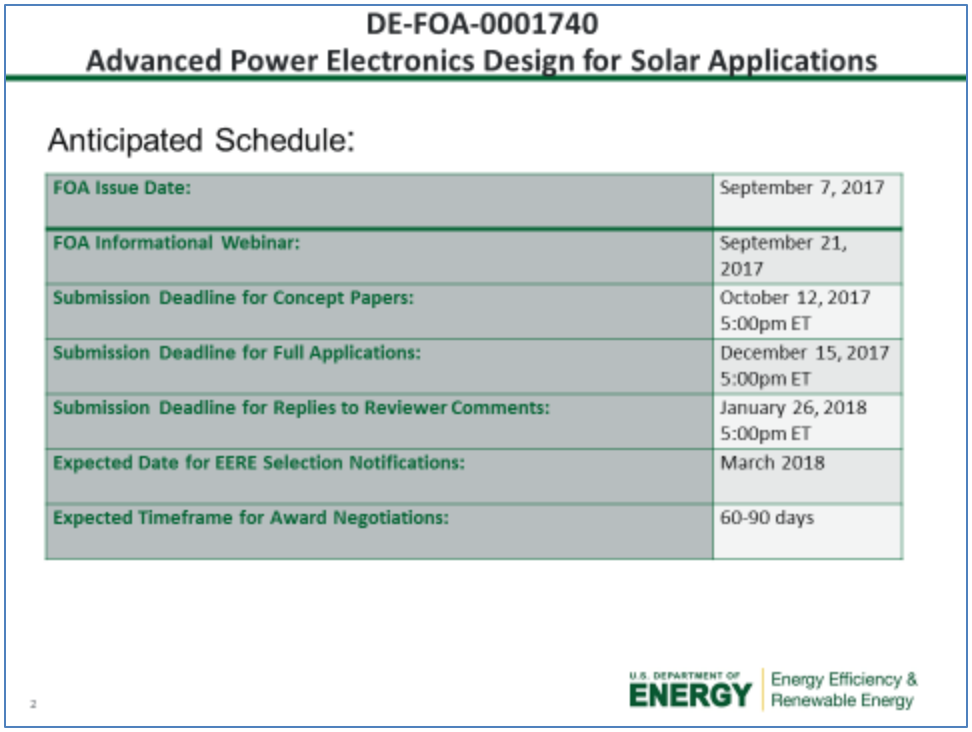
Power Electronics Design for Solar Applications Funding Opportunity Announcement, or FOA, which was issued on September 7th, 2017. My name is Jeremiah Miller and I am a Technology Manager in the Solar Energy Technologies Office within the DOE's Office of Energy Efficiency and Renewable Energy. We hope 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.

We will have a live Q&A period at the end of the webinar, so please type in your questions as they come up. Again, please be careful not to submit any language that might be business sensitive, proprietary or confidential. We will be posting all Q&As to EERE Exchange after the webinar. There may be questions that require further discussion with EERE staff and will not be addressed today. If you don't hear your question during the Webinar, please check EERE Exchange in the next few days as the answer will be posted there.

Also, just to be clear, there are no particular advantages or disadvantages to the application evaluation process with respect to participating on the webinar today. Your participation is completely voluntary.

Let's get started!



DE-FOA-0001740
Advanced Power Electronics Design for Solar Applications

Anticipated Schedule:

FOA Issue Date:	September 7, 2017
FOA Informational Webinar:	September 21, 2017
Submission Deadline for Concept Papers:	October 12, 2017 5:00pm ET
Submission Deadline for Full Applications:	December 15, 2017 5:00pm ET
Submission Deadline for Replies to Reviewer Comments:	January 26, 2018 5:00pm ET
Expected Date for EERE Selection Notifications:	March 2018
Expected Timeframe for Award Negotiations:	60-90 days

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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.

[INSERT SLIDE TEXT]
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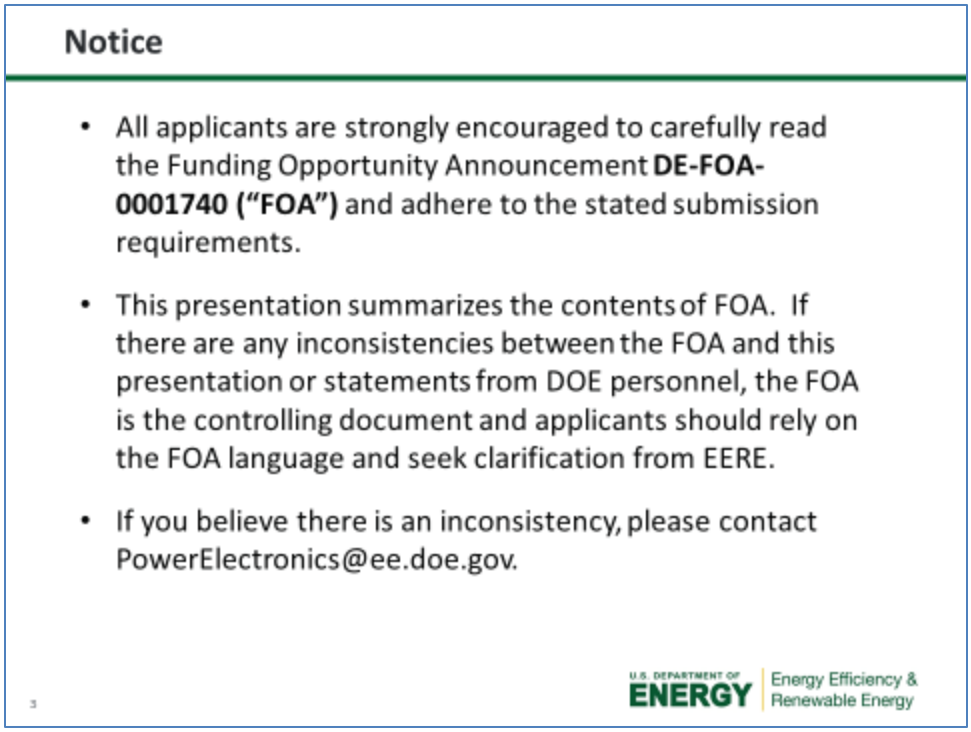
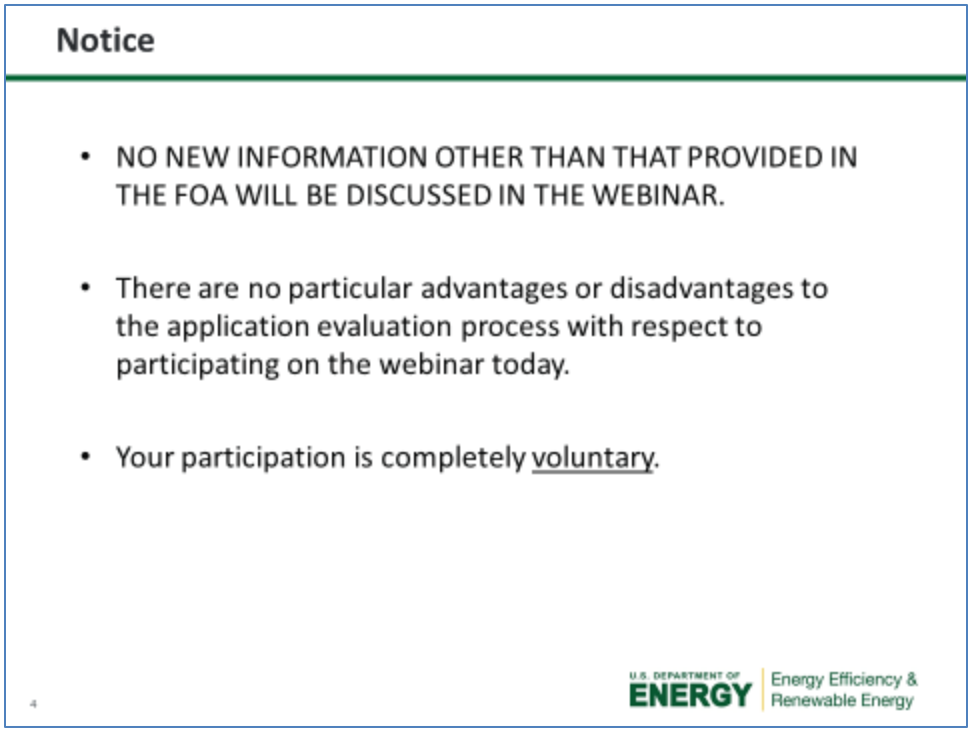


Notice

All applicants are strongly encouraged to carefully read the Funding Opportunity Announcement DE-FOA-0001740 ("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.

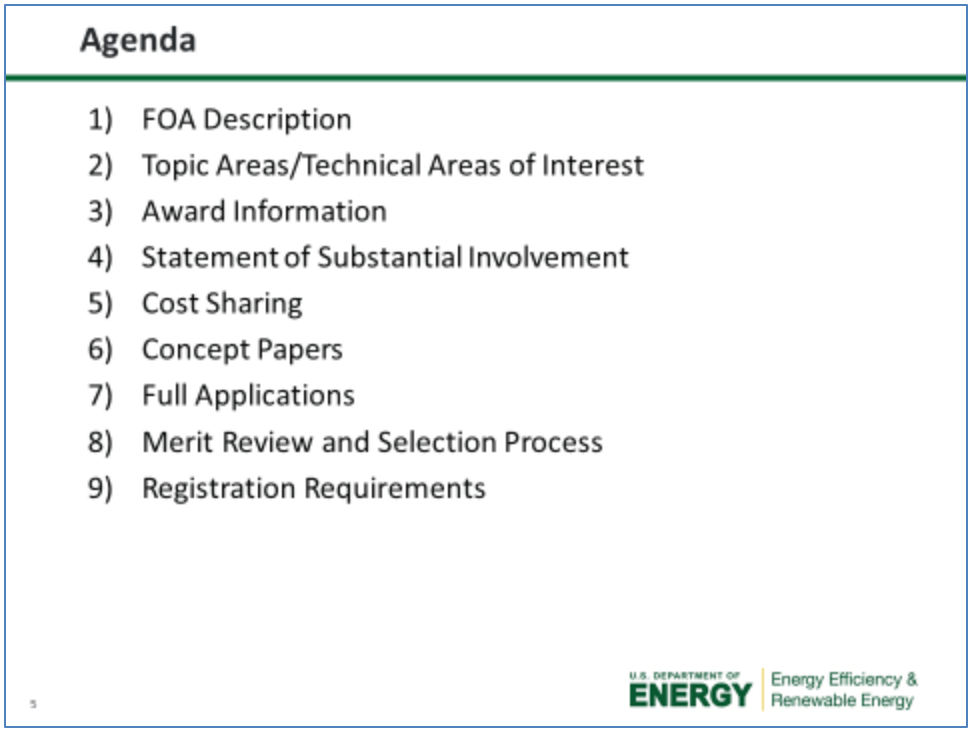
If you believe there is an inconsistency, please contact PowerElectronics@ee.doe.gov.



NO NEW INFORMATION OTHER THAN THAT PROVIDED IN THE FOA WILL BE DISCUSSED IN THE WEBINAR.

There are no particular advantages or disadvantages to the application evaluation process with respect to participating on the webinar today.

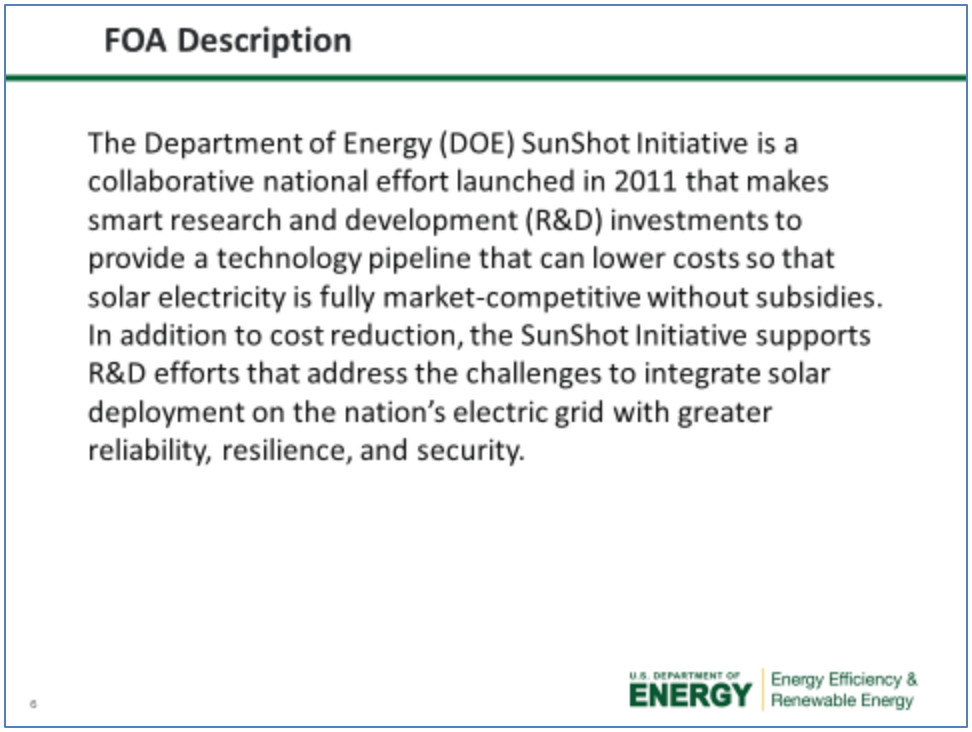
Your participation is completely voluntary.



The agenda for this presentation is as follows:

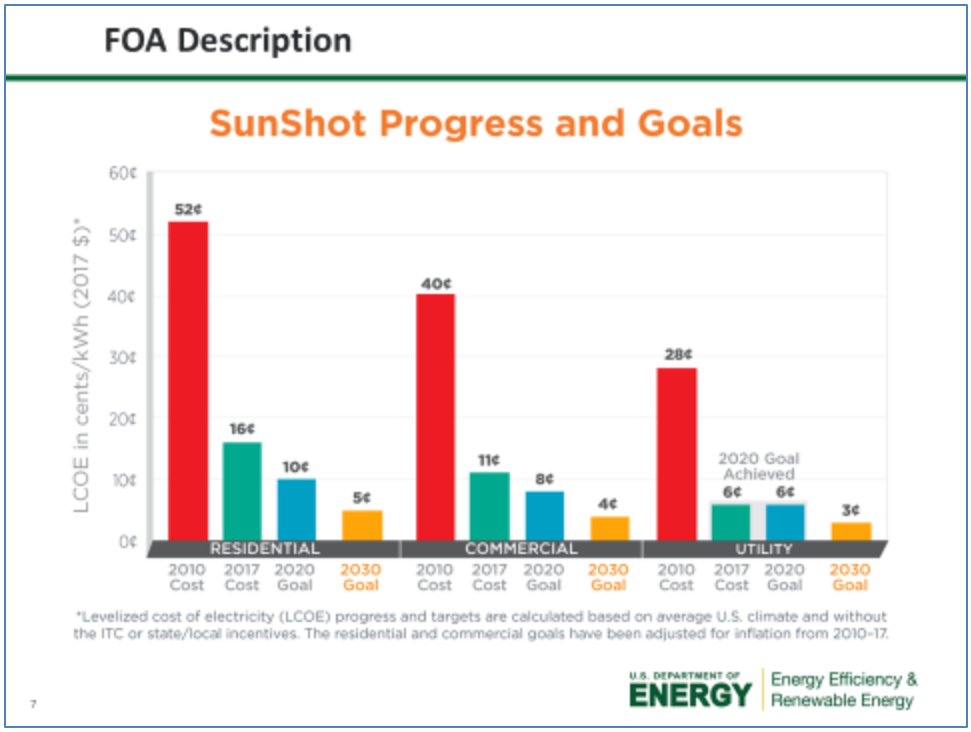
1) FOA Description
2) Topic Areas/Technical Areas of Interest
3) Award Information
4) Statement of Substantial Involvement
5) Cost Sharing
6) Concept Papers
7) Full Applications
8) Merit Review and Selection Process
9) Registration Requirements

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



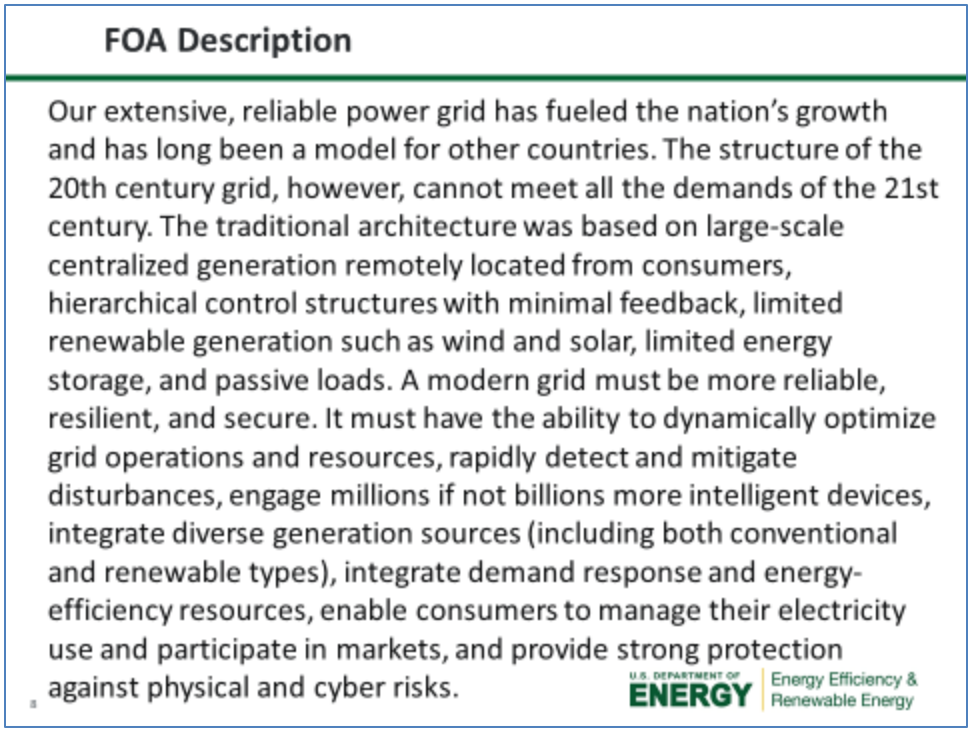
FOA Description

The Department of Energy (DOE) SunShot Initiative is a collaborative national effort launched in 2011 that makes smart research and development (R&D) investments to provide a technology pipeline that can lower costs so that solar electricity is fully market-competitive without subsidies. In addition to cost reduction, the SunShot Initiative supports R&D efforts that address the challenges to integrate solar deployment on the nation's electric grid with greater reliability, resilience, and security.

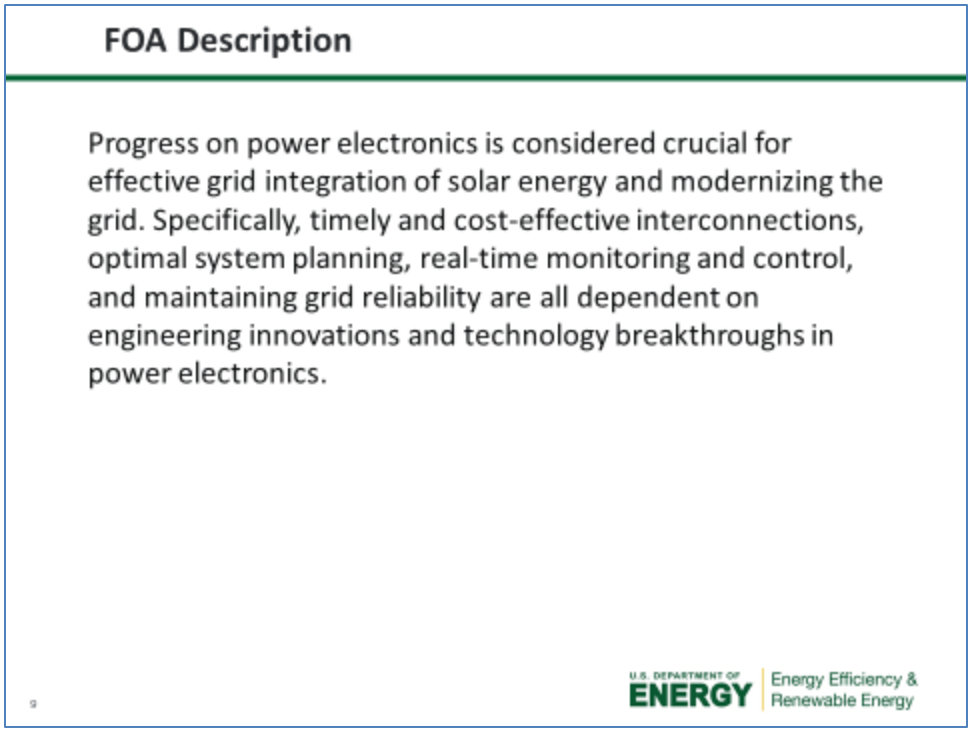


Recently, SunShot announced that the solar industry achieved SunShot's original 2020 utility-scale cost target of $0.06 per kilowatt-hour for utility-scale photovoltaic (PV) solar power, dropping from about $0.28 in 2010 Commercial and rooftop systems have not yet hit the 2020 targets, but are more than 85% of the way there.

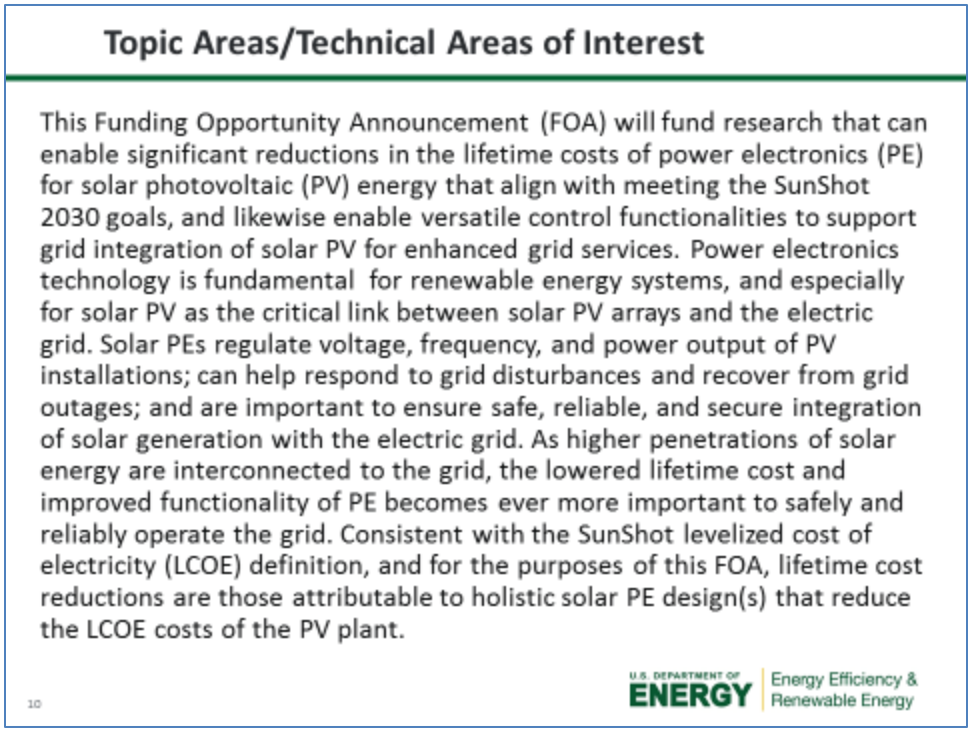
As a result of the progress to date and the tremendous potential for further cost reductions to enable widespread solar adoption across the U.S., SunShot's goal for 2030 is to cut the levelized cost of electricity (LCOE) from utility-scale solar by an additional 50% to $0.03 per kilowatt hour, while also addressing grid integration challenges and key market barriers in order to enable greater solar adoption.



Our extensive, reliable power grid has fueled the nation's growth and has long been a model for other countries. The structure of the 20th century grid, however, cannot meet all the demands of the 21st century. The traditional architecture was based on large-scale centralized generation remotely located from consumers, hierarchical control structures with minimal feedback, limited renewable generation such as wind and solar, limited energy storage, and passive loads. A modern grid must be more reliable, resilient, and secure. It must have the ability to dynamically optimize grid operations and resources, rapidly detect and mitigate disturbances, engage millions if not billions more intelligent devices, integrate diverse generation sources (including both conventional and renewable types), integrate demand response and energy-efficiency resources, enable consumers to manage their electricity use and participate in markets, and provide strong protection against physical and cyber risks.

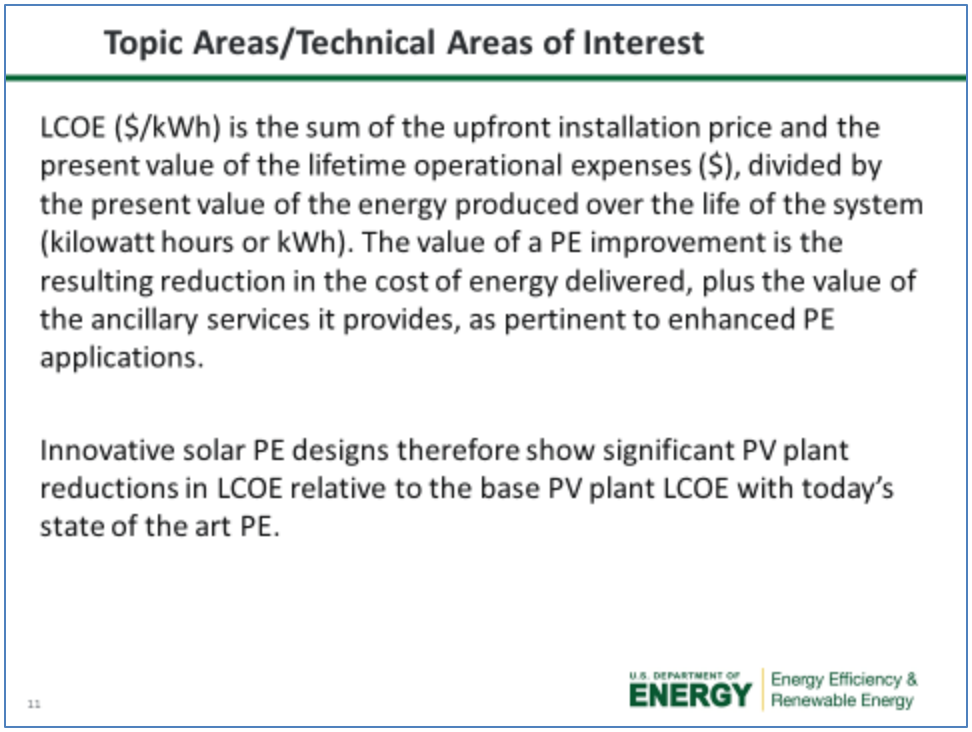


Progress on power electronics is considered crucial for effective grid integration of solar energy and modernizing the grid. Specifically, timely and cost-effective interconnections, optimal system planning, real-time monitoring and control, and maintaining grid reliability are all dependent on engineering innovations and technology breakthroughs in power electronics.



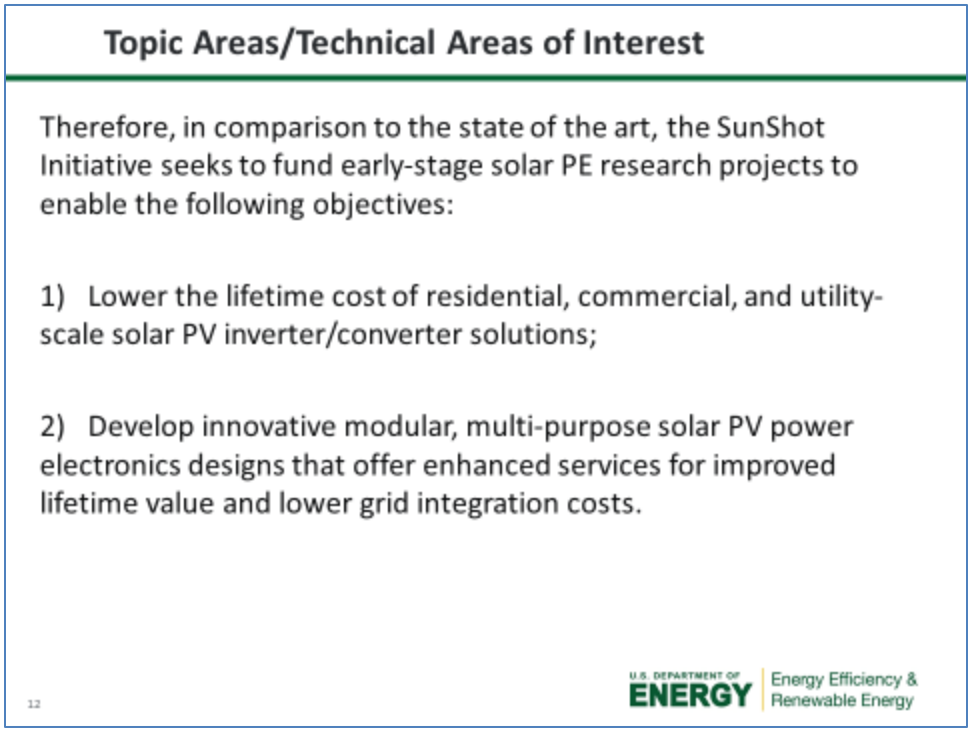
Topic Areas/Technical Areas of Interest

This Funding Opportunity Announcement (FOA) will fund research that can enable significant reductions in the lifetime costs of power electronics (PE) for solar photovoltaic (PV) energy that align with meeting the SunShot 2030 goals, and likewise enable versatile control functionalities to support grid integration of solar PV for enhanced grid services. Power electronics technology is fundamental for renewable energy systems, and especially for solar PV as the critical link between solar PV arrays and the electric grid. Solar PEs regulate voltage, frequency, and power output of PV installations; can help respond to grid disturbances and recover from grid outages; and are important to ensure safe, reliable, and secure integration of solar generation with the electric grid. As higher penetrations of solar energy are interconnected to the grid, the lowered lifetime cost and improved functionality of PE becomes ever more important to safely and reliably operate the grid. Consistent with the SunShot levelized cost of electricity (LCOE) definition, and for the purposes of this FOA, lifetime cost reductions are those attributable to holistic solar PE design(s) that reduce the LCOE costs of the PV plant.



LCOE ($/kWh) is the sum of the upfront installation price and the present value of the lifetime operational expenses ($), divided by the present value of the energy produced over the life of the system (kilowatt hours or kWh). The value of a PE improvement is the resulting reduction in the cost of energy delivered, plus the value of the ancillary services it provides, as pertinent to enhanced PE applications.

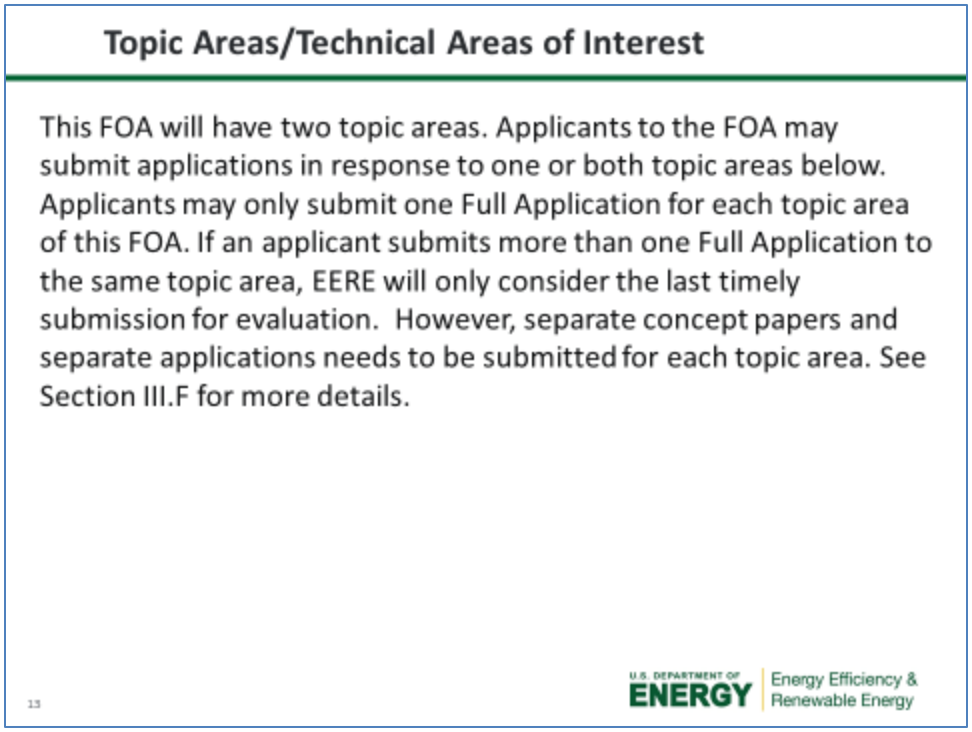
Innovative solar PE designs therefore show significant PV plant reductions in LCOE relative to the base PV plant LCOE with today's state of the art PE.



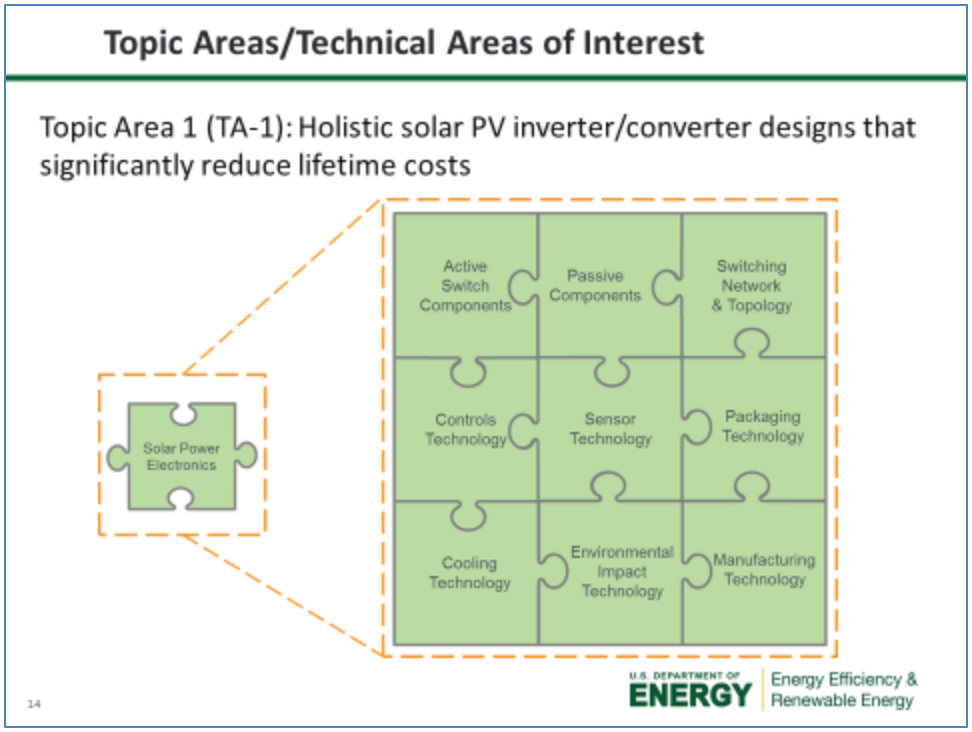
Therefore, in comparison to the state of the art, the SunShot Initiative seeks to fund early-stage solar PE research projects to enable the following objectives:

1) Lower the lifetime cost of residential, commercial, and utility-scale solar PV inverter/converter solutions;

2) Develop innovative modular, multi-purpose solar PV power electronics designs that offer enhanced services for improved lifetime value and lower grid integration costs.



This FOA will have two topic areas. Applicants to the FOA may submit applications in response to one or both topic areas below. Applicants may only submit one Full Application for each topic area of this FOA. If an applicant submits more than one Full Application to the same topic area, EERE will only consider the last timely submission for evaluation. However, separate concept papers and separate applications needs to be submitted for each topic area. See Section III.F for more details.



Topic Area-1 seeks Holistic solar PV inverter/converter designs that significantly reduce lifetime costs.

This Topic Area targets early-stage research and development of solar PV inverter/converter designs that reduce system cost, increase efficiency and equipment reliability that reduce solar PV lifetime costs, in support of SunShot's 2030 cost goals.

In terms of constituent technologies internal to solar PE designs, the following figure conceptually presents the integral technologies that map to fundamental PE functions. As conceptually presented in the figure, applicants will need a holistic "Solar Power Electronics" design (i.e. left-hand side of the diagram) that incorporates the multi-objective advancement of constituent technologies (i.e. the right-hand side of the diagram).

These constituent technologies are identified as: active switch components, passive components, switching network and topology, controls technology, sensor technology, packaging technology, cooling technology, environmental impact technology, and manufacturing technology.

For this FOA, it is anticipated that successful applicants will submit holistic PE design solutions that will consider design tradeoffs, interactions and optimizations within, between, and systematically of these constituent technologies in a manner that achieves significant lifetime cost savings.

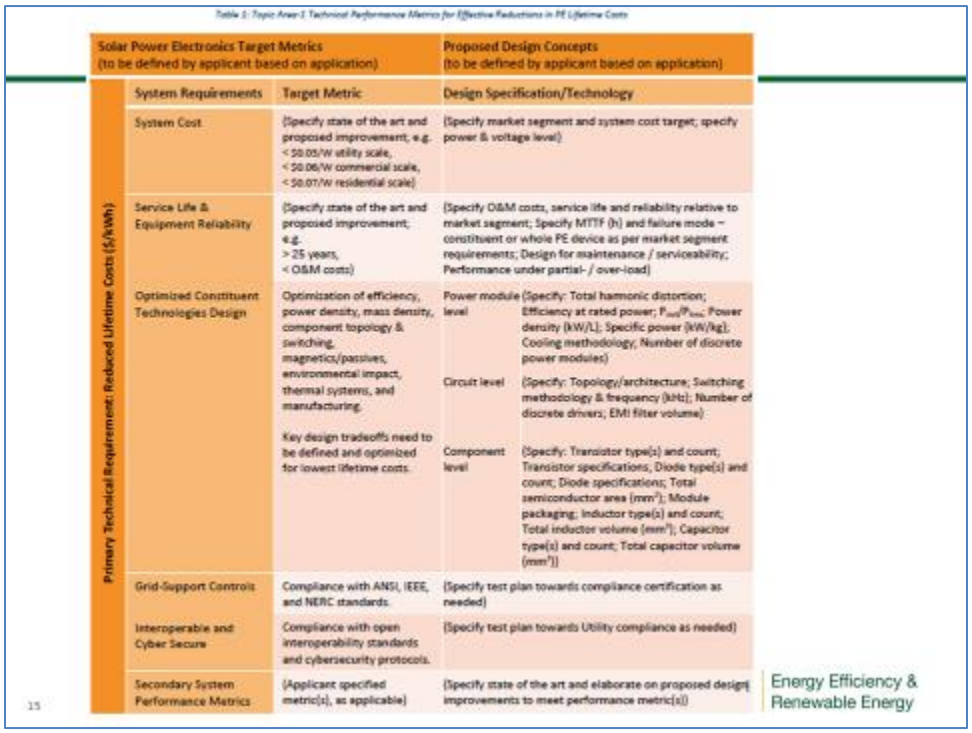


Table 1: Topic Area-1 Technical Performance Metrics for Effective Reductions in PE Lifetime Costs

Solar Power Electronics Target Metrics (to be defined by applicant based on application)		Proposed Design Concepts (to be defined by applicant based on application)	
Primary Technical Requirement: Reduced Lifetime Costs ($/kWh)	System Requirements	Target Metric	Design Specification/Technology
	System Cost	(Specify state of the art and proposed improvement; e.g. < $0.05/W utility scale, < $0.06/W commercial scale, < $0.07/W residential scale)	(Specify market segment and system cost target; specify power & voltage level)
	Service Life & Equipment Reliability	(Specify state of the art and proposed improvement; e.g. > 25 years, < O&M costs)	(Specify O&M costs, service life and reliability relative to market segment; Specify MTTF (h) and failure mode – constituent or whole PE device as per market segment requirements; Design for maintenance / serviceability; Performance under partial- / over-load)
	Optimized Constituent Technologies Design	Optimization of efficiency, power density, mass density, component topology & switching, magnetics/passives, environmental impact, thermal systems, and manufacturing. Key design tradeoffs need to be defined and optimized for lowest lifetime costs.	Power module level: (Specify: Total harmonic distortion; Efficiency at rated power; P_{out}/P_{loss}; Power density (kW/L); Specific power (kW/kg); Cooling methodology; Number of discrete power modules) Circuit level: (Specify: Topology/architecture; Switching methodology & frequency (kHz); Number of discrete drivers; EMI filter volume) Component level: (Specify: Transistor type(s) and count; Transistor specifications; Diode type(s) and count; Diode specifications; Total semiconductor area (mm^2); Module packaging; Inductor type(s) and count; Total inductor volume (mm^3); Capacitor type(s) and count; Total capacitor volume (mm^3))
	Grid-Support Controls	Compliance with ANSI, IEEE, and NERC standards.	(Specify test plan towards compliance certification as needed)
	Interoperable and Cyber Secure	Compliance with open interoperability standards and cybersecurity protocols.	(Specify test plan towards Utility compliance as needed)
	Secondary System Performance Metrics	(Applicant specified metric(s), as applicable)	(Specify state of the art and elaborate on proposed design improvements to meet performance metric(s))

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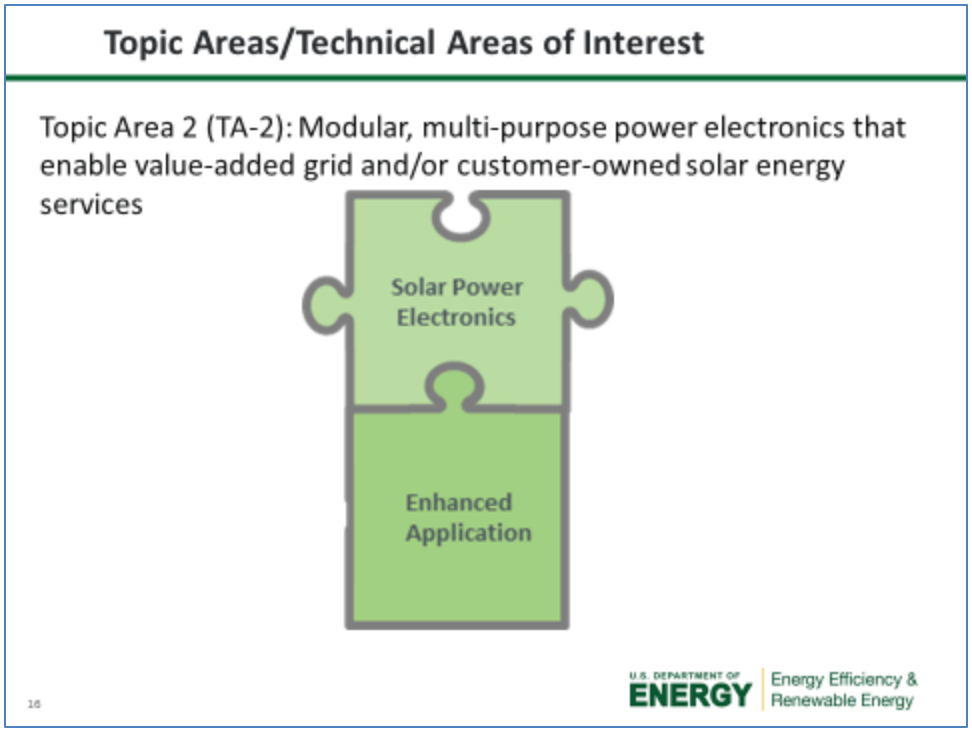
In order to identify and to gauge the potential impact of novel PE designs for solar applications, metrics for comparison are required. In agreement with the SunShot 2030 goal, the "Primary Technical Requirement" is to reduce PV plant lifetime cost ($/kWh) by up to 50% as attainable from power electronics design optimization of system requirements such as initial cost ($/W), service life and reliability, optimized constituent technologies design, enhanced grid support controls, and interoperability and cybersecurity.

Significant reductions in solar PV plant lifetime costs through innovative PE design requires major improvement in one or more system design metrics. The following table illustrates the technical system performance metrics that span innovative PE design options for lower lifetime solar PV costs.

Topic Area-1 applicants are required to submit proposed designs in accordance with this table, including addressing the table entries that must be specified by the applicant (i.e. system cost, service life & reliability, operations and maintenance (O&M) costs, the proposed design concepts, and as applicable for secondary metrics), and elaborating in the full application on proposed design details to describe key innovations and design tradeoffs in support of the overall goal of reduced PE lifetime costs.



Another set of PE design opportunities includes coordinated voltage and power flow control, system operation during grid disturbance or microgrid islanding, synthetic inertia for grid support, coordination with other grid and customer equipment, and other new functionality.

Topic Area-2 therefore seeks Enhanced Functionality for Grid Services through modular, multi-purpose solar PV power electronics designs that offer enhanced services for improved lifetime value and lower grid integration costs.

As the grid interface point to solar energy, the envisioned modular, multi-purpose PE technology can extend the value of solar energy systems beyond basic power generation to services that align with future grid needs. Conceptually, this is presented in following figure where the enhanced functionality is modular to the base PE design. Therefore the base PE system is the inverter/converter that meets existing PV plant DC-to-AC electricity conversion needs today, and the enhanced application is a physical, modular addition from the base PE to enable supplementary functionality. These enhanced applications would for instance provide facility and/or grid energy services, such as PE predictive maintenance & fault detection, improved anti-islanding, improved power quality, multiple distributed energy resource (DER) control coordination, and real-time price response.

This Topic Area targets early-stage research and development of modular, multi-purpose power electronics designs that enable value-added grid and/or customer-owned solar energy solutions for enhanced services. The enhanced application functionality should be a modular extension

from the base solar PE inverter/converter. The physical PE system therefore is the design optimized, base inverter/converter plus modular equipment (and/or control logic) to enable the enhanced application – conceptually presented in the following figure. To have market impact, the value generated over the lifetime of the PE solution by the enhanced functionality will need to be greater than the cost to add and maintain the functionality.

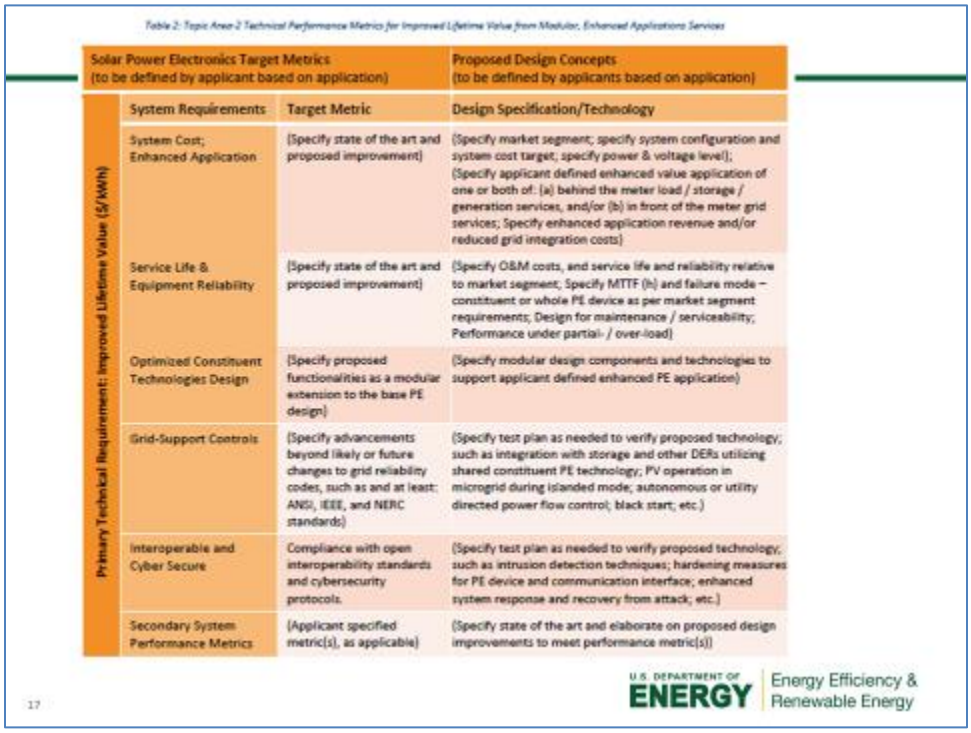


Table 2: Topic Area-2 Technical Performance Metrics for Improved Lifetime Value from Modular, Enhanced Applications Services

	Solar Power Electronics Target Metrics (to be defined by applicant based on application)		Proposed Design Concepts (to be defined by applicants based on application)
Primary Technical Requirement: Improved Lifetime Value ($/kWh)	System Requirements	Target Metric	Design Specification/Technology
	System Cost; Enhanced Application	(Specify state of the art and proposed improvement)	(Specify market segment; specify system configuration and system cost target; specify power & voltage level); (Specify applicant defined enhanced value application of one or both of: (a) behind the meter load / storage / generation services, and/or (b) in front of the meter grid services; Specify enhanced application revenue and/or reduced grid integration costs)
	Service Life & Equipment Reliability	(Specify state of the art and proposed improvement)	(Specify O&M costs, and service life and reliability relative to market segment; Specify MTTF (h) and failure mode – constituent or whole PE device as per market segment requirements; Design for maintenance / serviceability; Performance under partial- / over-load)
	Optimized Constituent Technologies Design	(Specify proposed functionalities as a modular extension to the base PE design)	(Specify modular design components and technologies to support applicant defined enhanced PE application)
	Grid-Support Controls	(Specify advancements beyond likely or future changes to grid reliability codes, such as and at least: ANSI, IEEE, and NERC standards)	(Specify test plan as needed to verify proposed technology; such as integration with storage and other DERs utilizing shared constituent PE technology; PV operation in microgrid during islanded mode; autonomous or utility directed power flow control; black start; etc.)
	Interoperable and Cyber Secure	Compliance with open interoperability standards and cybersecurity protocols	(Specify test plan as needed to verify proposed technology; such as intrusion detection techniques; hardening measures for PE device and communication interface; enhanced system response and recovery from attack; etc.)
	Secondary System Performance Metrics	(Applicant specified metric(s), as applicable)	(Specify state of the art and elaborate on proposed design improvements to meet performance metric(s))

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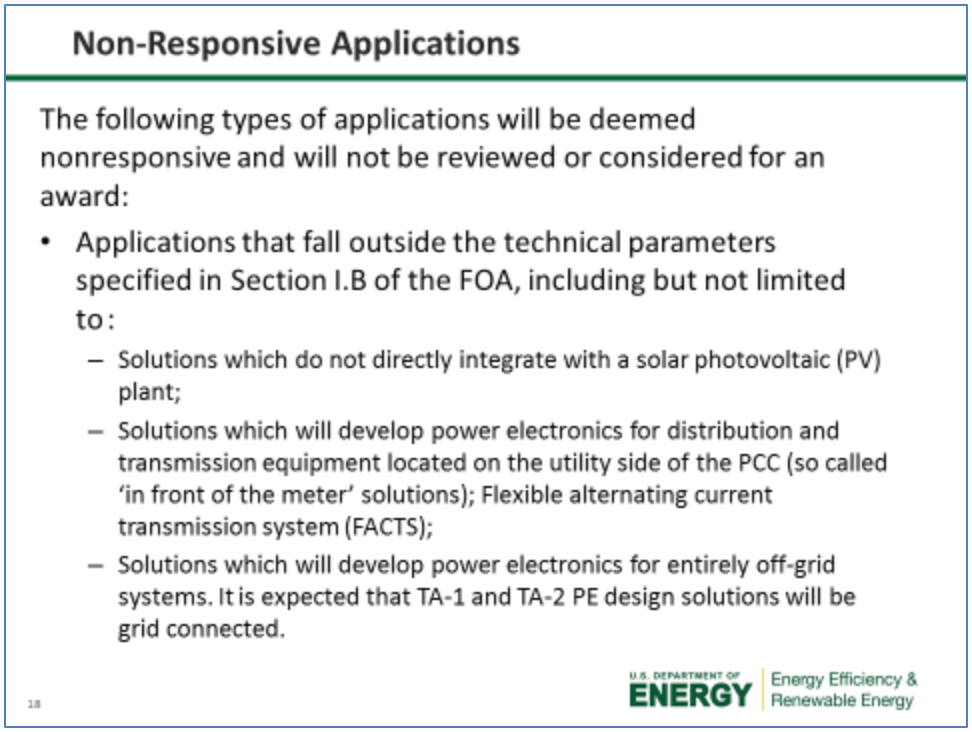
In terms of TA-2 Technical Performance Metrics, modular, multi-purpose PE designs that enable value-added grid and/or PV site value can be achieved through a variety of innovation pathways. To accommodate a diverse range of solar PE+enhancement designs that have distinct performance and cost-benefit criteria, applicants in TA-2 are responsible for defining and justifying the value and relevant lifetime system cost impacts for their given use case.

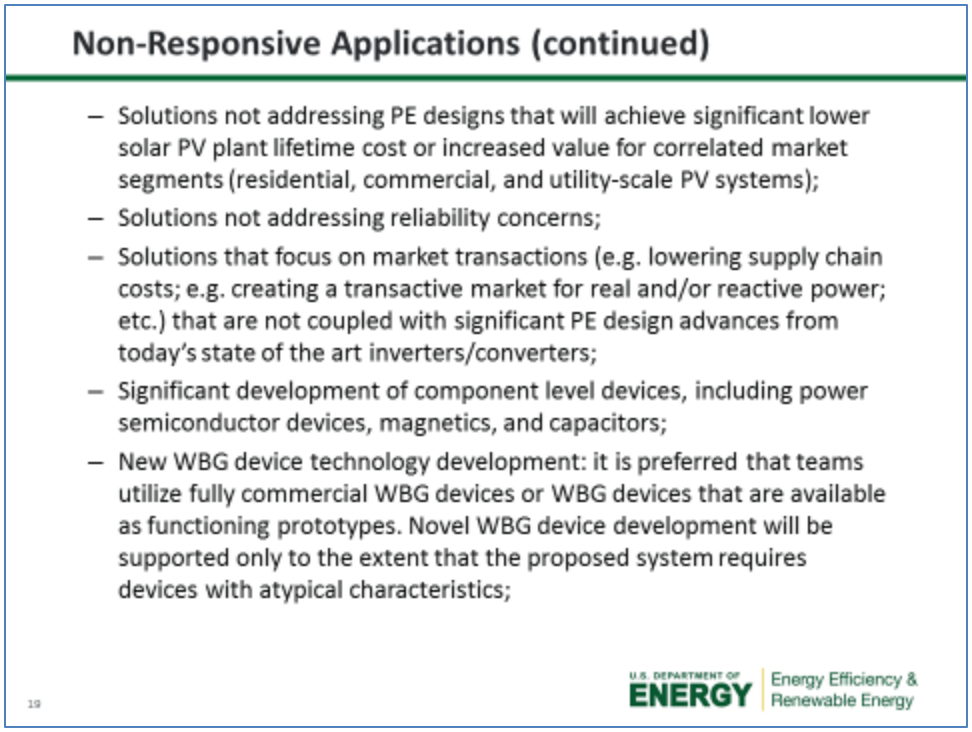
Topic Area-2 applicants are required to submit designs in accordance with this table, including addressing the table entries that must be specified by the applicant (i.e. system cost, service life & reliability, O&M costs, the proposed design concepts, and as applicable for secondary metrics) as defined by the proposed enhanced application, the state of the art, and innovation target metrics. Elaboration in the full application should include design details to describe key innovations and design tradeoffs in support of the overall goal to enable cost effective modular, multi-purpose enhanced PE applications for solar PV.



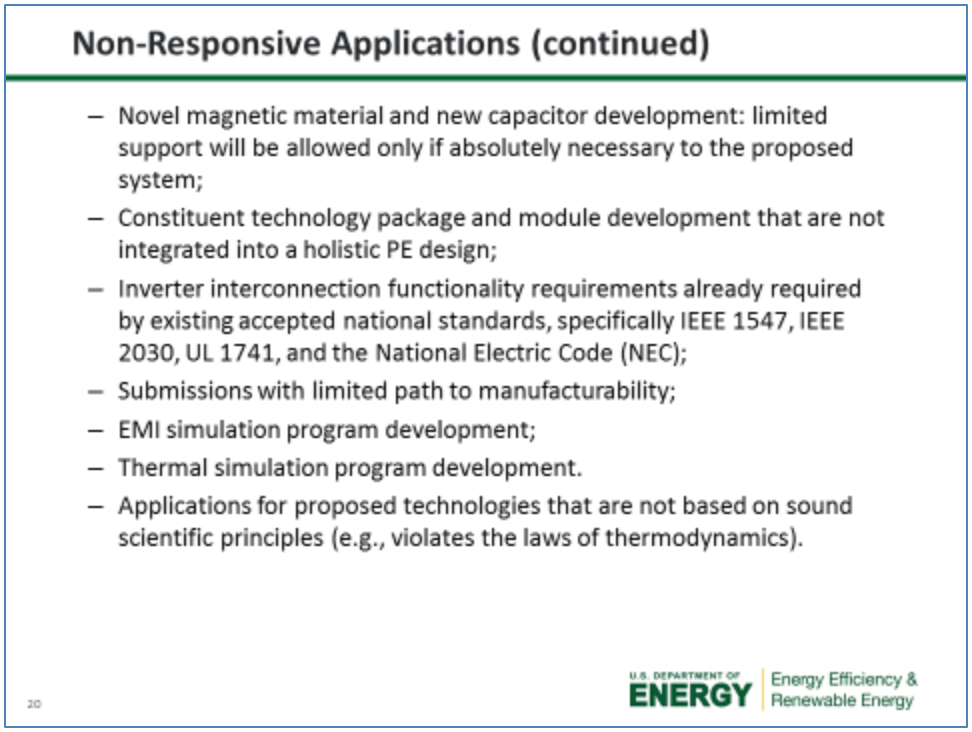
Non-Responsive Applications

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

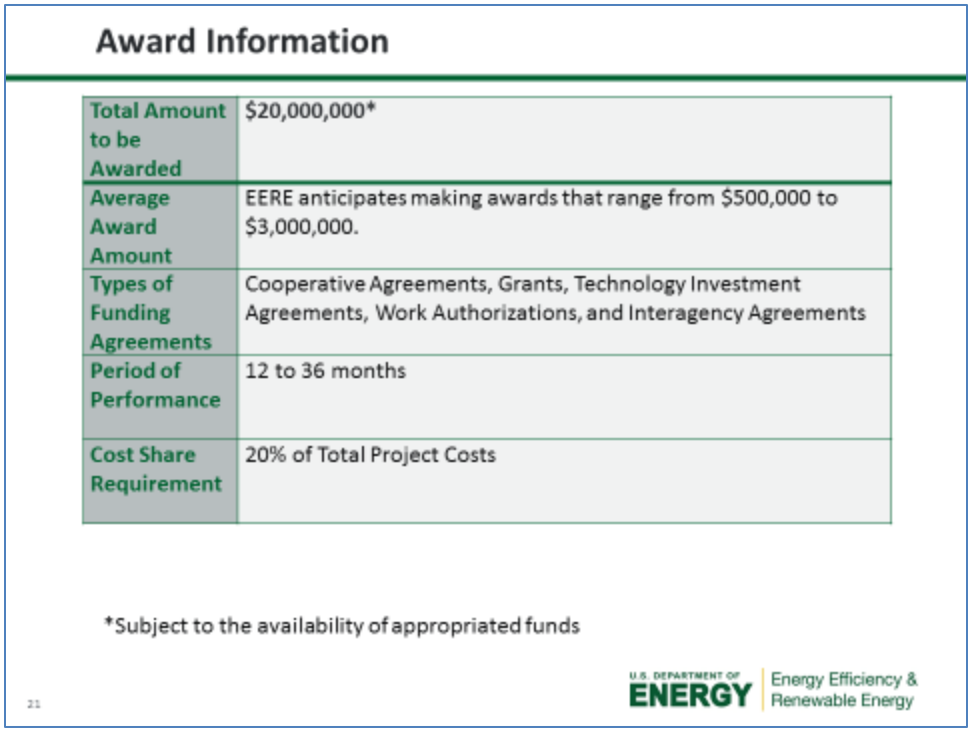
- Applications that fall outside the technical parameters specified in Section I.B of the FOA, including but not limited to:
    - Solutions which do not directly integrate with a solar photovoltaic (PV) plant;
    - Solutions which will develop power electronics for distribution and transmission equipment located on the utility side of the PCC (so called 'in front of the meter' solutions); Flexible alternating current transmission system (FACTS);
    - Solutions which will develop power electronics for entirely off-grid systems. It is expected that TA-1 and TA-2 PE design solutions will be grid connected.



- Continued non-responsive applications include:
  - Solutions not addressing PE designs that will achieve significant lower solar PV plant lifetime cost or increased value for correlated market segments (residential, commercial, and utility-scale PV systems);
  - Solutions not addressing reliability concerns;
  - Solutions that focus on market transactions (e.g. lowering supply chain costs; e.g. creating a transactive market for real and/or reactive power; etc.) that are not coupled with significant PE design advances from today's state of the art inverters/converters;
  - Significant development of component level devices, including power semiconductor devices, magnetics, and capacitors;
  - New WBG device technology development: it is preferred that teams utilize fully commercial WBG devices or WBG devices that are available as functioning prototypes. Novel WBG device development will be supported only to the extent that the proposed system requires devices with atypical characteristics;



- Continued non-responsive applications include:
  - Novel magnetic material and new capacitor development: limited support will be allowed only if absolutely necessary to the proposed system;
  - Constituent technology package and module development that are not integrated into a holistic PE design;
  - Inverter interconnection functionality requirements already required by existing accepted national standards, specifically IEEE 1547, IEEE 2030, UL 1741, and the National Electric Code (NEC);
  - Submissions with limited path to manufacturability;
  - EMI simulation program development;
  - Thermal simulation program development.
  - Applications for proposed technologies that are not based on sound scientific principles (e.g., violates the laws of thermodynamics).



Award Information

Total Amount to be Awarded	$20,000,000*
Average Award Amount	EERE anticipates making awards that range from $500,000 to $3,000,000.
Types of Funding Agreements	Cooperative Agreements, Grants, Technology Investment Agreements, Work Authorizations, and Interagency Agreements
Period of Performance	12 to 36 months
Cost Share Requirement	20% of Total Project Costs

*Subject to the availability of appropriated funds

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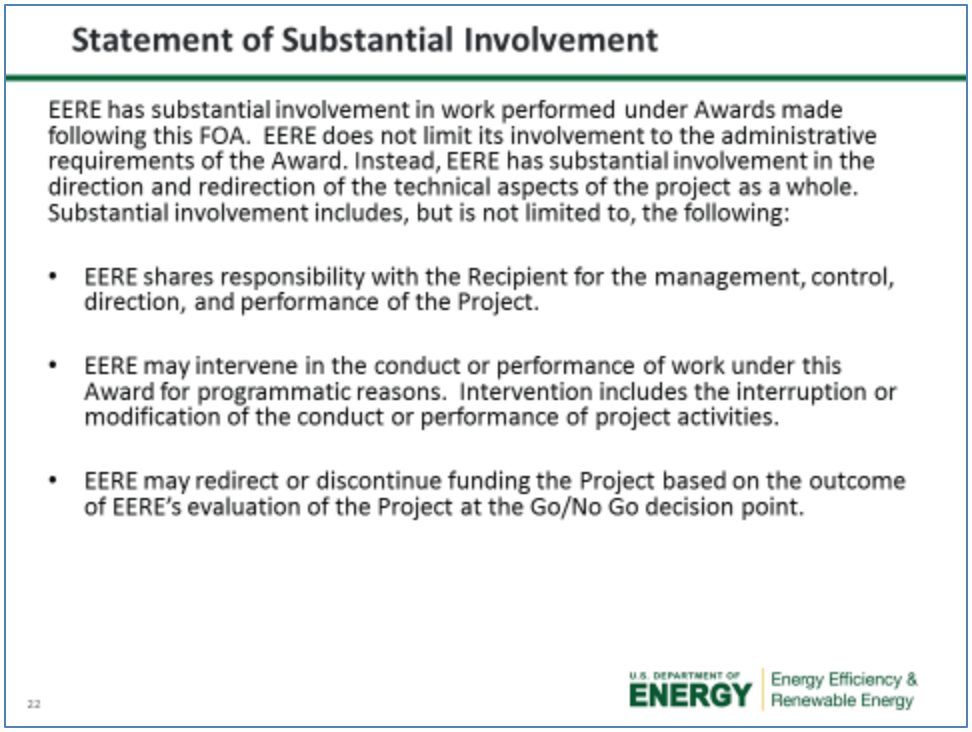
EERE expects to make approximately $20 million of Federal funding available for new awards under this FOA subject to the availability of appropriated funds. The average award amount is anticipated to range from $500,000 to $3,000,000.

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.



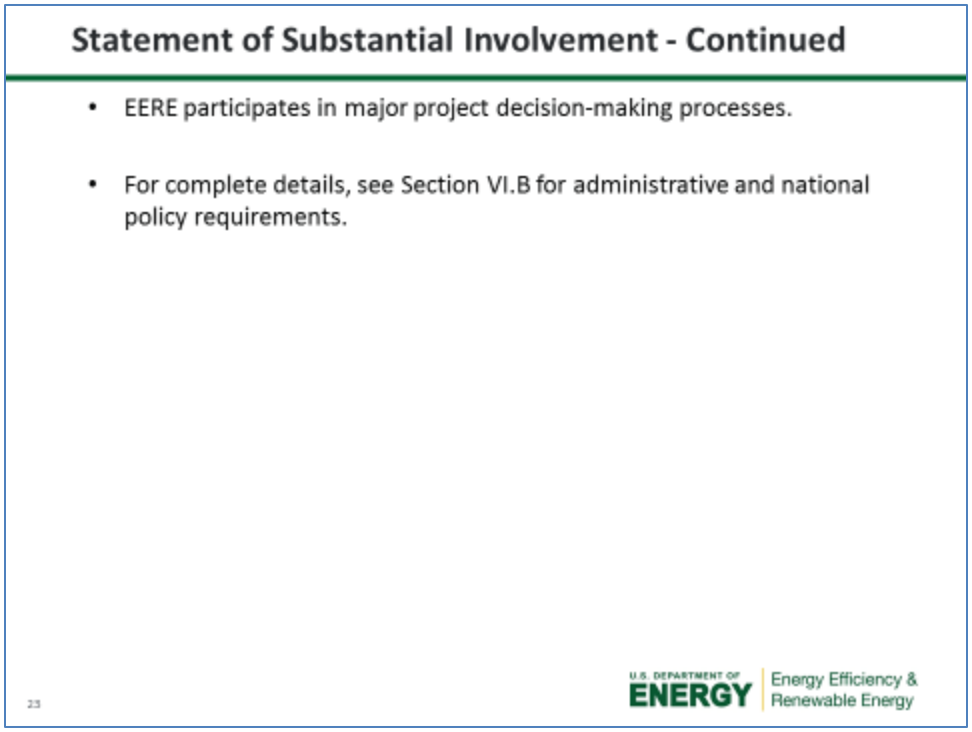
Under cooperative agreements, there will be what is known as "substantial involvement" between EERE and the Recipient during the performance of the project.

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:

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

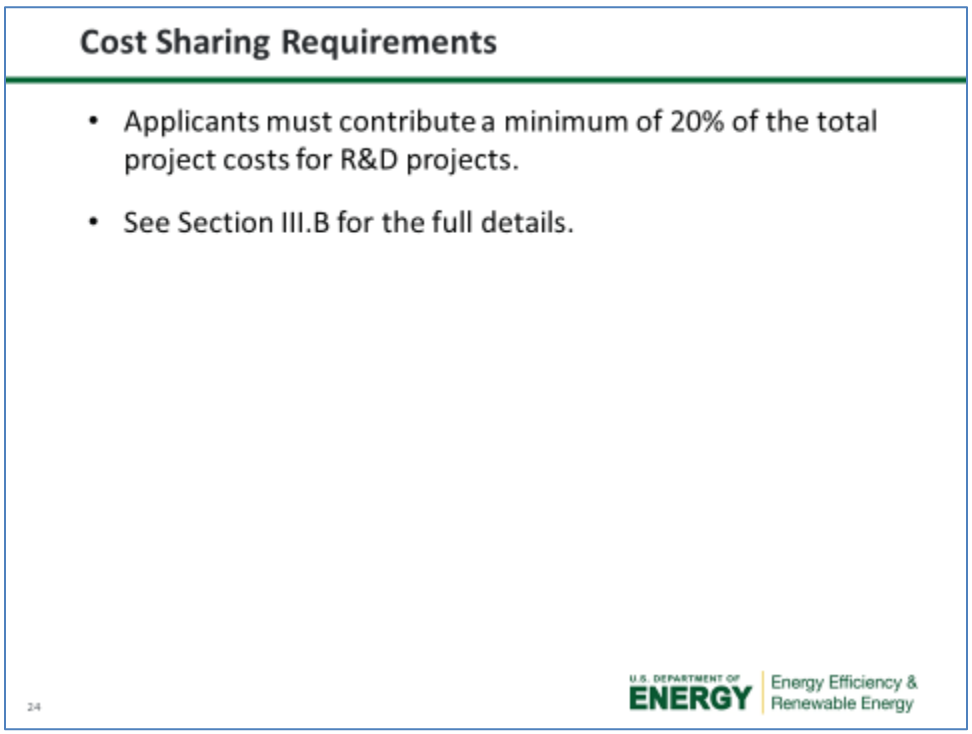
EERE may intervene in the conduct or performance of work under this Award for programmatic reasons. Intervention includes the interruption or modification of the conduct or performance of project activities.

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



EERE participates in major project decision-making processes.

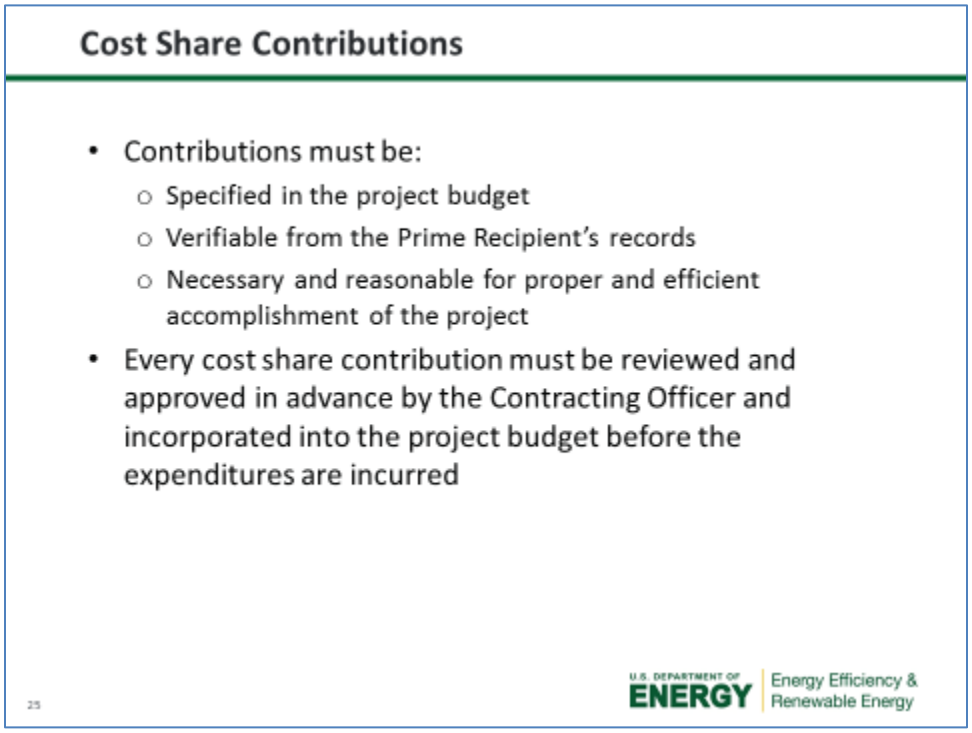
For complete details, see Section VI.B for administrative and national policy requirements.



Cost Sharing Requirements

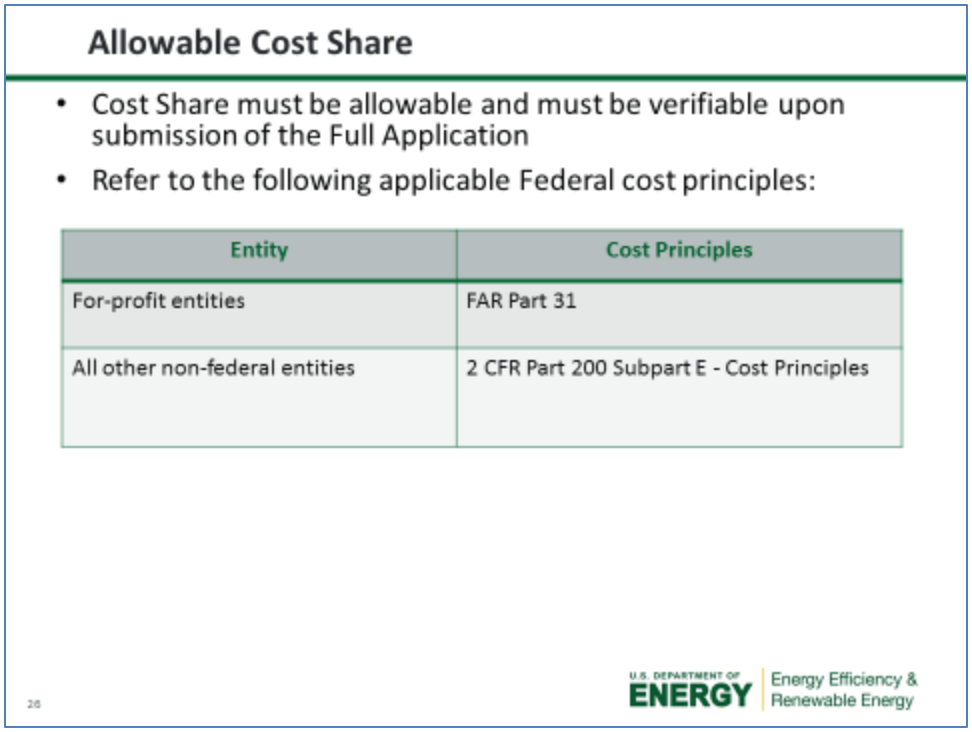
Applicants must contribute a minimum of 20% of the total project costs for R&D projects.

See Section III.B for the full details.



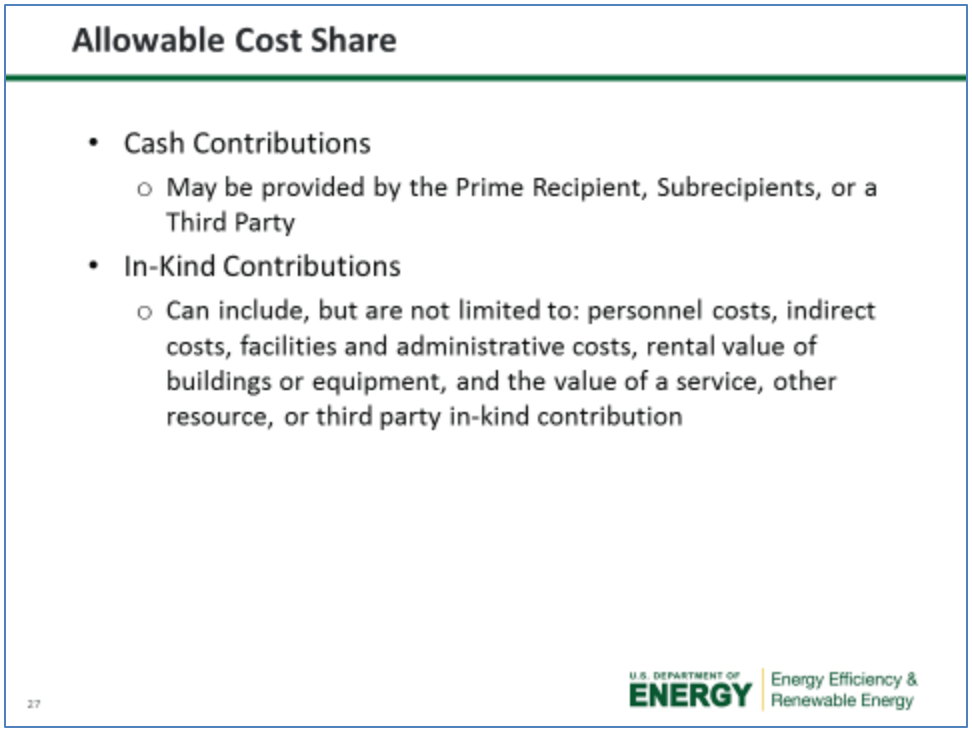
Cost Share Contributions

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.



Allowable Cost Share

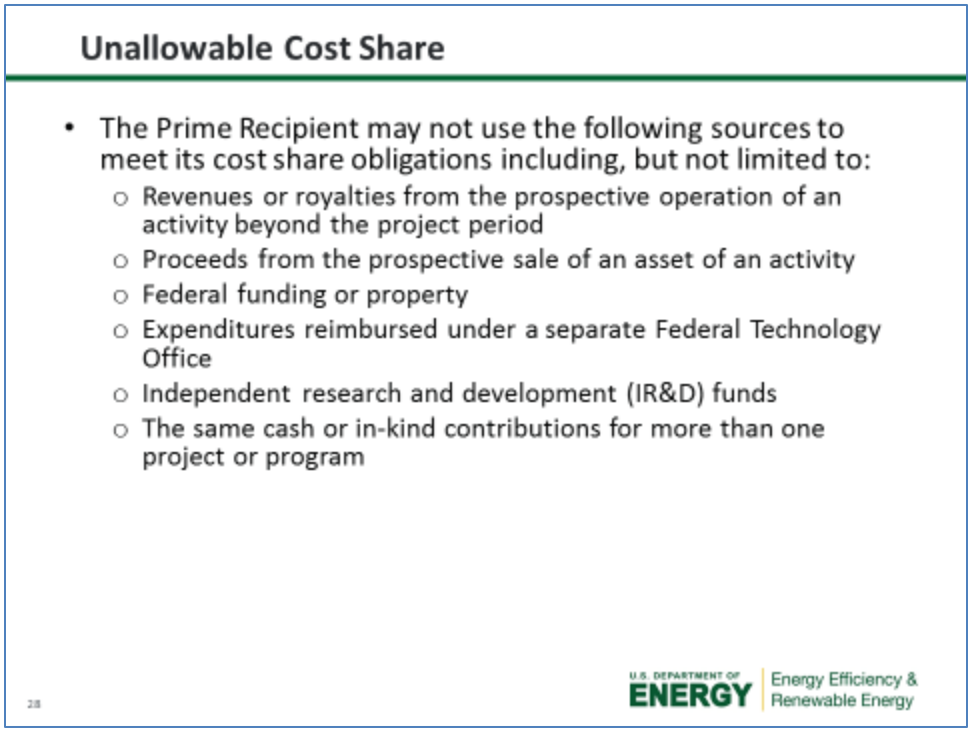
Cost Share must be allowable and must be verifiable upon submission of the Full Application. Please refer to this chart for your entity's applicable cost principles. It is imperative that you follow the applicable cost principles when creating your budget for the full application.



Allowable Cost Share

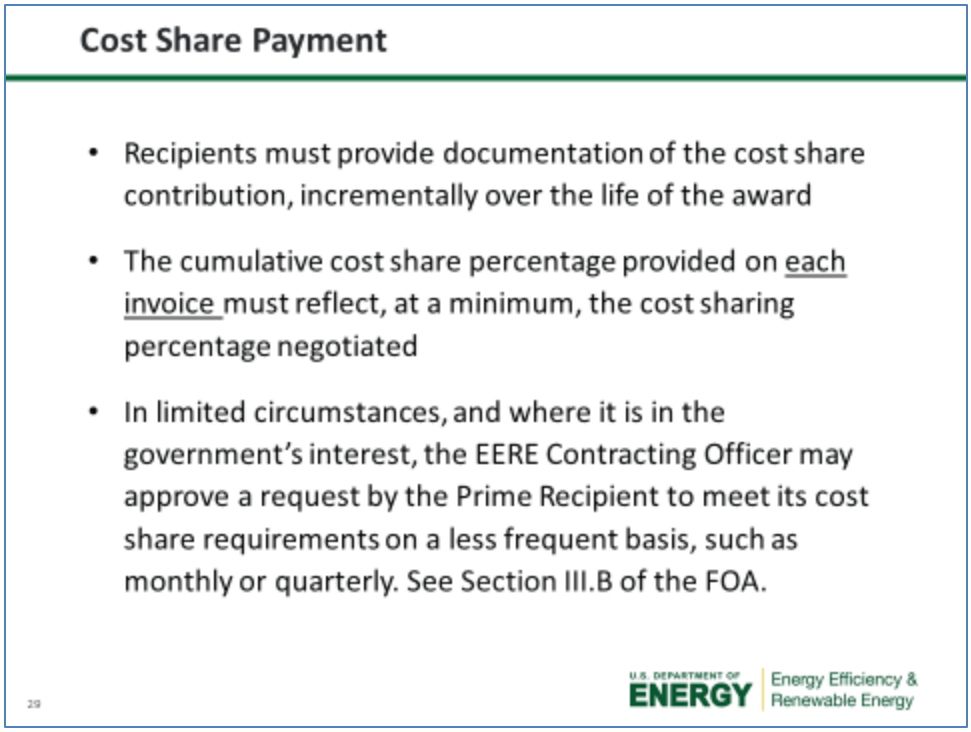
Cost share can provided in cash and/or in-kind. It can be provided by the Prime Recipient, subs, or a third party.

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, and equipment use.



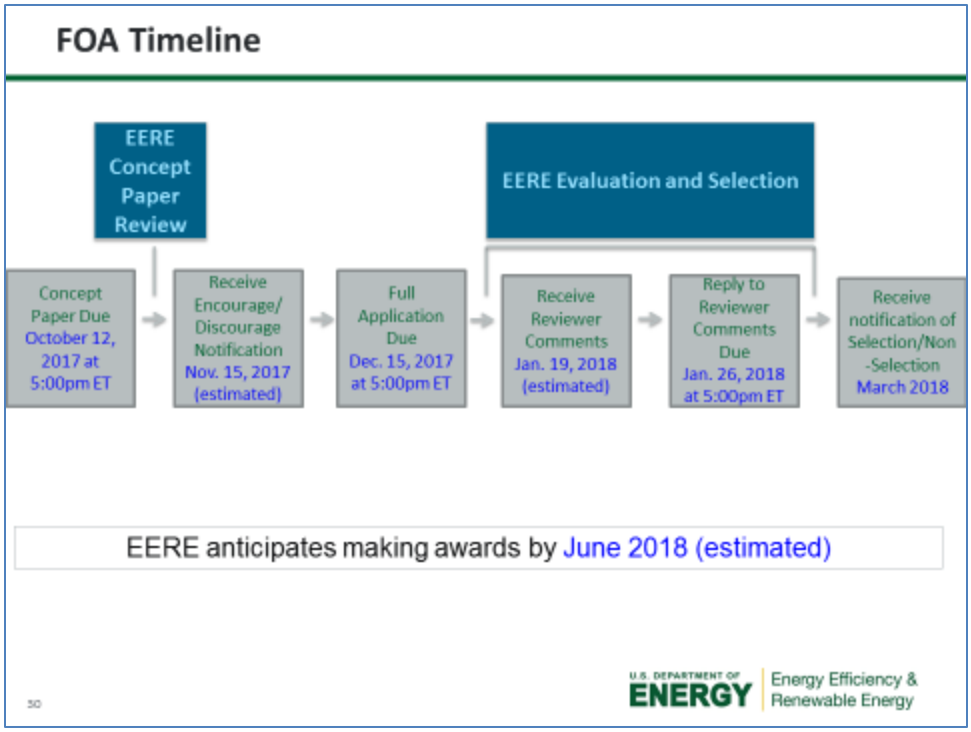
Unallowable Cost Share

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 is unallowable.



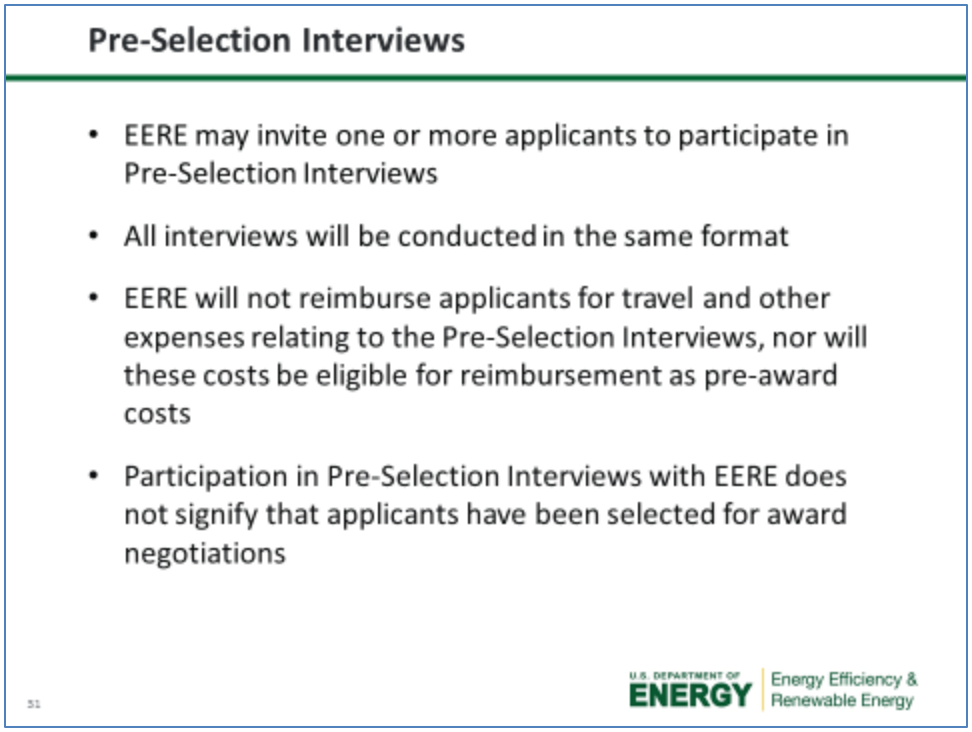
Cost Share Payment

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



FOA Timeline

EERE's Evaluation and Selection Process is shown in blue here. 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.



Pre-Selection Interviews

As part of the merit review process, EERE may invite certain applicants to participate in Pre-Selection Interviews.

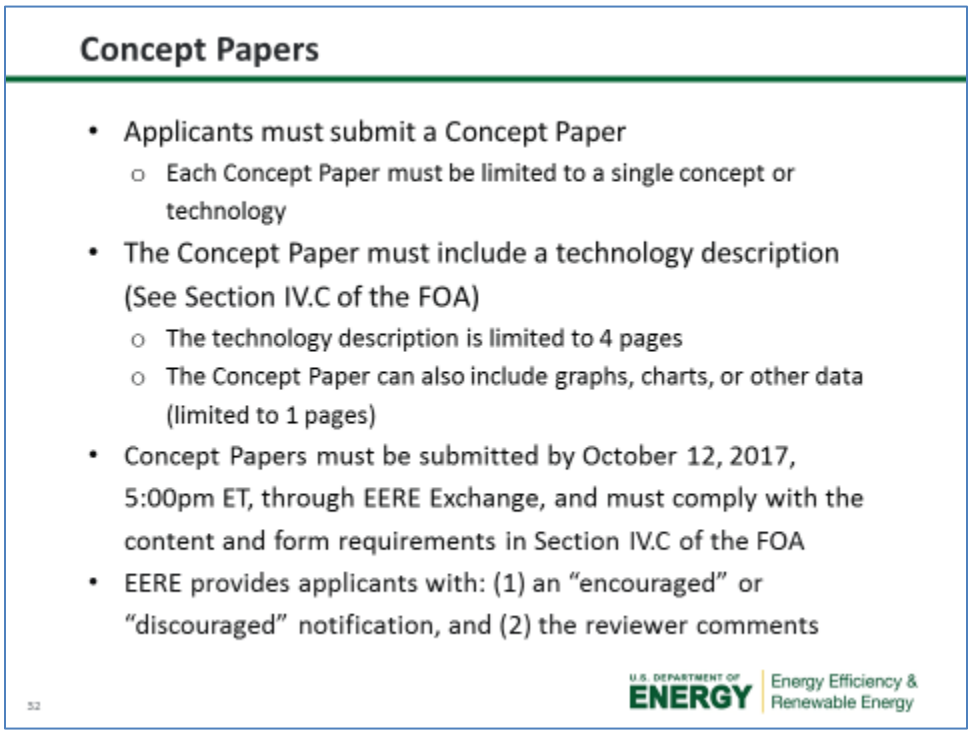
The invited applicants will meet with EERE to allow the Merit Review Panel to seek clarification on the contents of the Full Applications and otherwise ask questions regarding the proposed project. The information provided by applicants to EERE through Pre-Selection Interviews contributes to EERE's selection decisions.

As part of the evaluation and selection process, EERE may invite one or more applicants to participate in Pre-Selection Interviews. Pre-Selection Interviews are distinct from and more formal than pre-selection clarifications (See Section V.D.3 of the FOA). The invited applicant(s) will meet with EERE representatives to provide clarification on the contents of the Full Applications and to provide EERE an opportunity to ask questions regarding the proposed project. The information provided by applicants to EERE through Pre-Selection Interviews contributes to EERE's selection decisions.

EERE will arrange to meet with the invited applicants in person at EERE's offices or a mutually agreed upon location. EERE may also arrange site visits at certain Applicants' facilities. In the alternative, EERE may invite certain applicants to participate in a one-on-one conference with EERE via webinar, videoconference, or conference call.

EERE will not reimburse applicants for travel and other expenses relating to the Pre-Selection Interviews, nor will these costs be eligible for reimbursement as pre-award costs.

EERE may obtain additional information through Pre-Selection Interviews that will be used to make a final selection determination. EERE may select applications for funding and make awards without Pre-Selection Interviews. Participation in Pre-Selection Interviews with EERE does not signify that applicants have been selected for award negotiations.



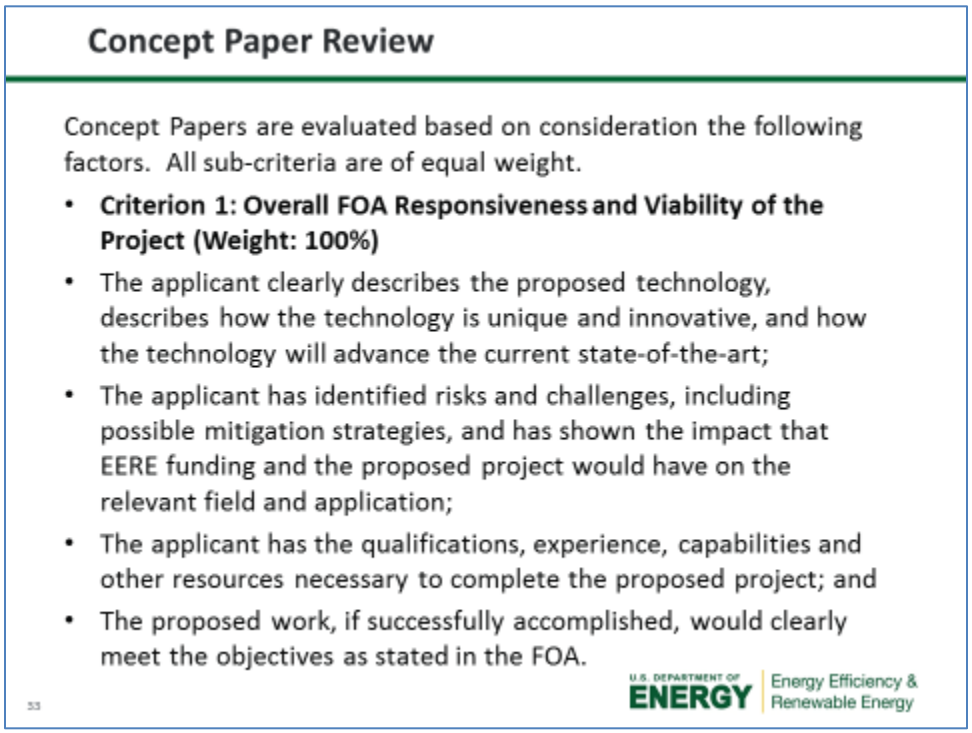
Concept Papers

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.

If an applicant fails to submit an eligible Concept Paper, the applicant is not eligible to submit a Full Application.

Concept Papers must be submitted by October 12, 2017, 5:00pm ET, through EERE Exchange.

EERE will provide applicants with either an encouraged or discouraged notification. A "discouraged" notification conveys EERE's lack of programmatic interest in the proposed project. An applicant who receives a "discouraged" notification may still submit a Full Application.



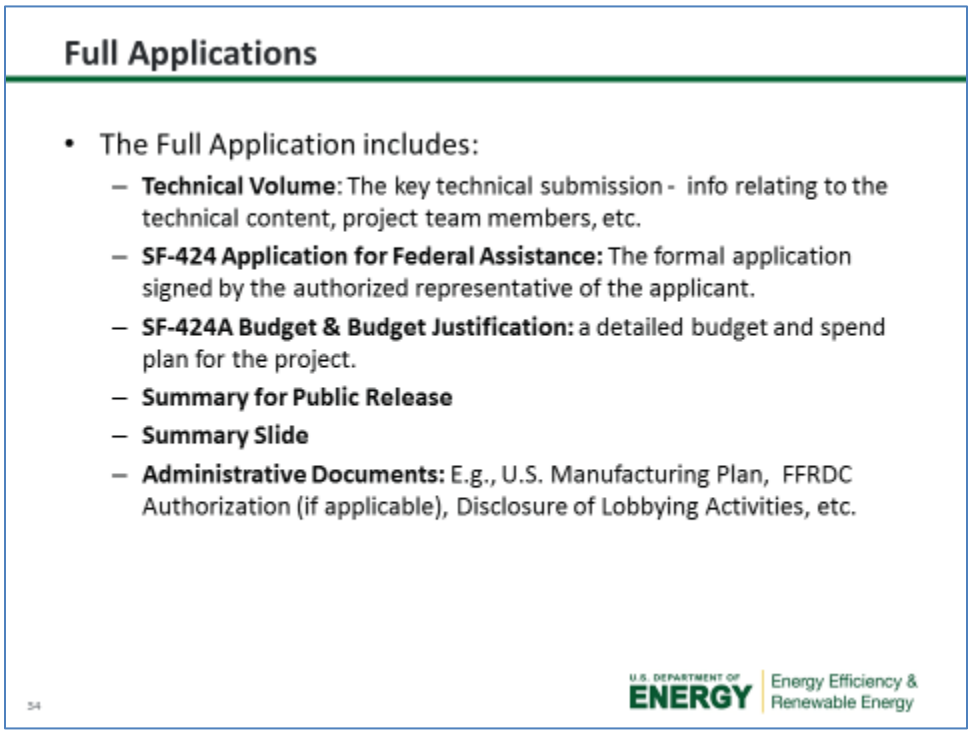
Concept Paper Review

Concept Papers are evaluated based on consideration the following factors. All sub-criteria are of equal weight.

- Criterion 1: Overall FOA Responsiveness and Viability of the Project (Weight: 100%)
- 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 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; and
- The proposed work, if successfully accomplished, would clearly meet the objectives as stated in the FOA.

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

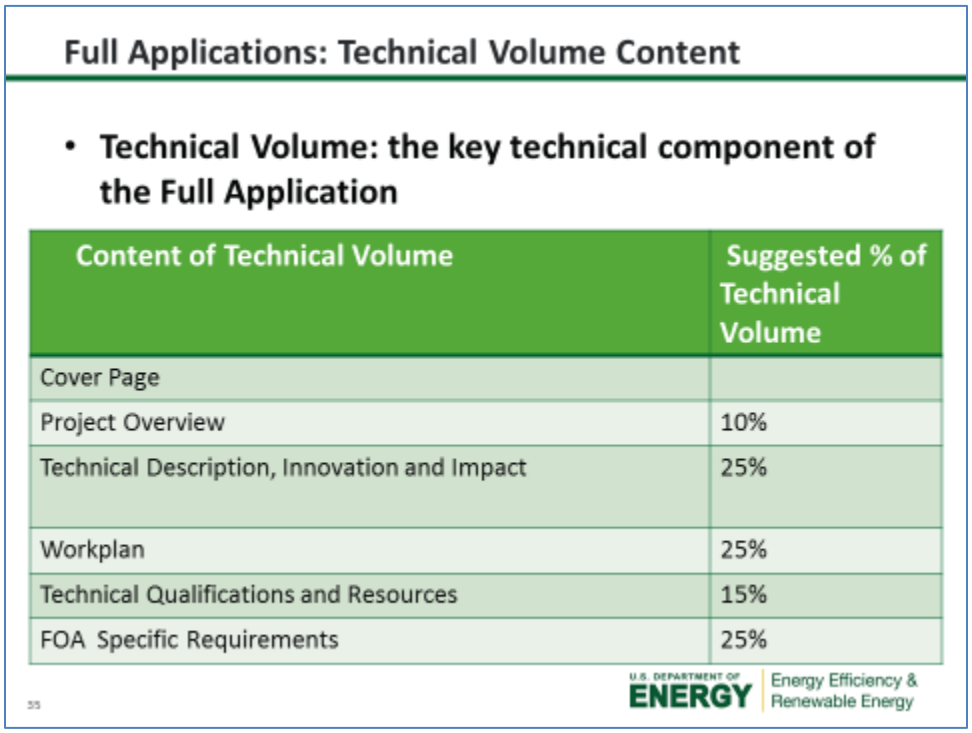


Full Applications

The Full Application includes:

- Technical Volume: The key technical submission. Applicants submit info pertaining to the technical content, project team members, etc.
- SF-424 Application for Federal Assistance: The formal application signed by the authorized representative of the applicant. Includes cost share amounts and Federal certifications and assurances.
- SF-424A Budget & Budget Justification: Budget documents that asks applicants to submit a detailed budget and spend plan for the project.
- Summary for Public Release: Applicants must provide a 1 page summary of their technology appropriate for public release.
- Summary Slide: Powerpoint slide that provides quick facts about the technology. Slide content requirements are provided in the FOA.

- Administrative Documents: E.g., U.S. Manufacturing Plan, FFRDC Authorization (if applicable), Disclosure of Lobbying Activities, etc.

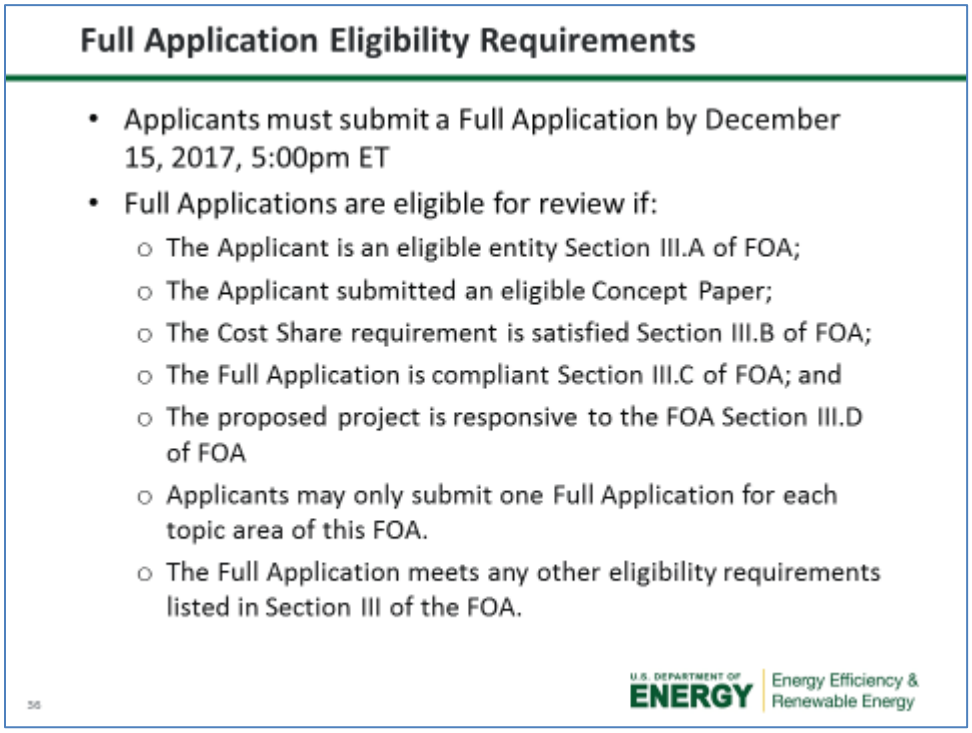


Full Applications: Technical Volume Content

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, technical qualifications and resources and [FOA Specific Requirements]. Please note that the percentages listed here are suggested and are not mandatory.

- The Cover Page will be a one page document and provides basic information on their project, such as title, topic area, points of contact, etc.
- The Project Overview constitutes approximately 10% of the Technical Volume and provides information on project background, goals, impact of EERE funding
- The Technical Description, Innovation, and Impact section is approximately 25% of the Technical Volume. It provides information on project relevance and outcomes, feasibility, and innovation/impacts. This ultimately provides the justification as to why EERE should fund the project.

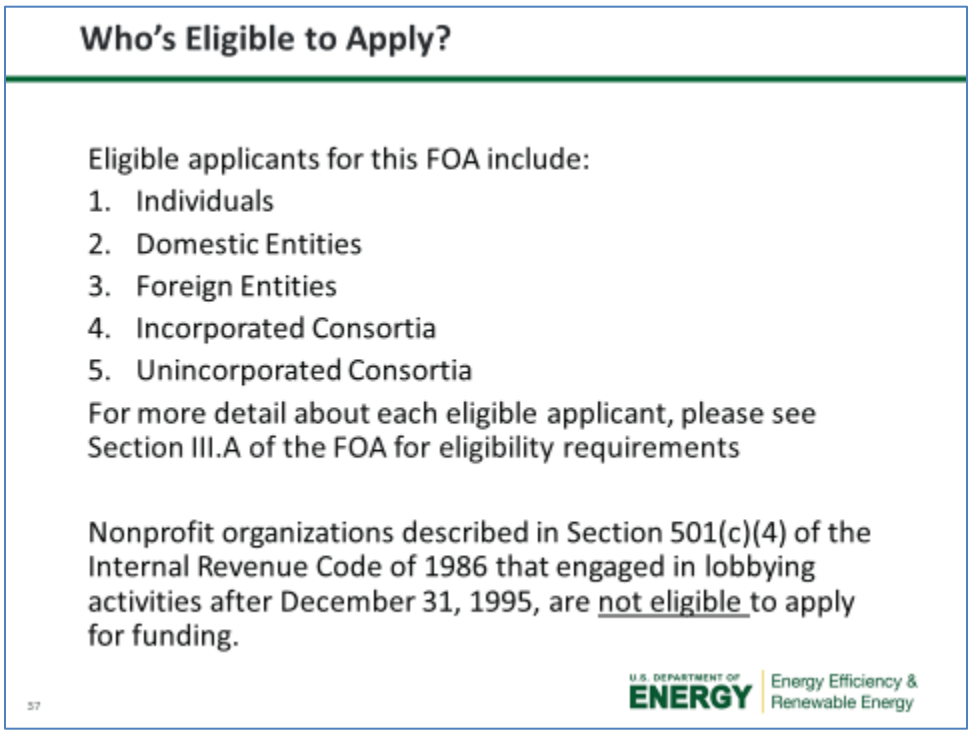
- The Workplan is the key element to the Technical Volume, and constitutes approximately 25% of the Technical Volume. It details the proposed milestones and project schedule. If selected for award negotiations, the Workplan serves as the starting point when negotiating the Statement of Project Objectives.
- The Technical Qualifications and Resources section is approximately 15% of the Technical Volume. It provides applicants and opportunity to provide information about the proposed project team and demonstrate how the applicant will facilitate the successful completion of the proposed project.
- As a part of the Technical Description, applicants should also submit the following, approximately 25% of the technical volume:
    - The applicant should provide the information requested in the applicable Topic Area performance metrics table (i.e. Table 1 or Table 2 of the FOA).
    - Applicants are encouraged to develop a simple high-level PV plant lifetime cost analysis (e.g. a LCOE model) that demarcates improvements from their proposed PE design and should submit this with their full application, and moreover reference and elaborate on key design innovations and tradeoffs to achieve improved PE lifetime value.



Full Application Eligibility Requirements

As we previously pointed out, applicants must submit full applications by December 15, 2017, 5:00pm ET. EERE will conduct an eligibility review, and full application will be deemed eligible 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; and
- The proposed project is responsive to the FOA Section III.D of FOA
- Applicants may only submit one Full Application for each topic area of this FOA.
- The Full Application meets any other eligibility requirements listed in Section III of the FOA.



Who's Eligible to Apply?

Eligible applicants for this FOA include:

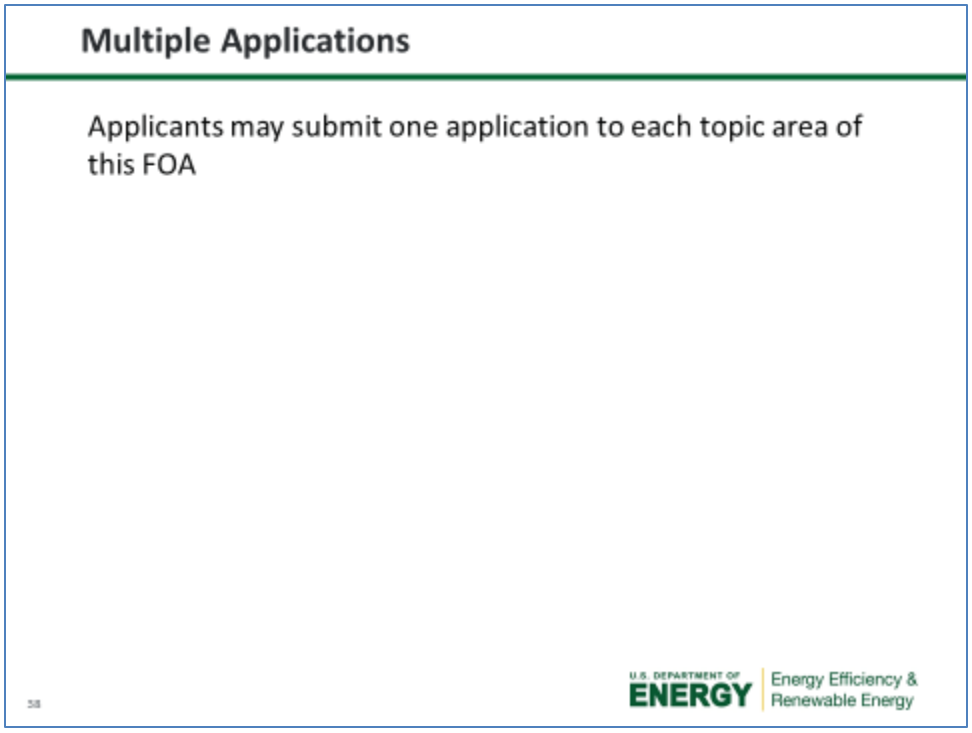
1) Individuals
2) Domestic Entities
3) Foreign Entities
4) Incorporated Consortia
5) Unincorporated Consortia

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.

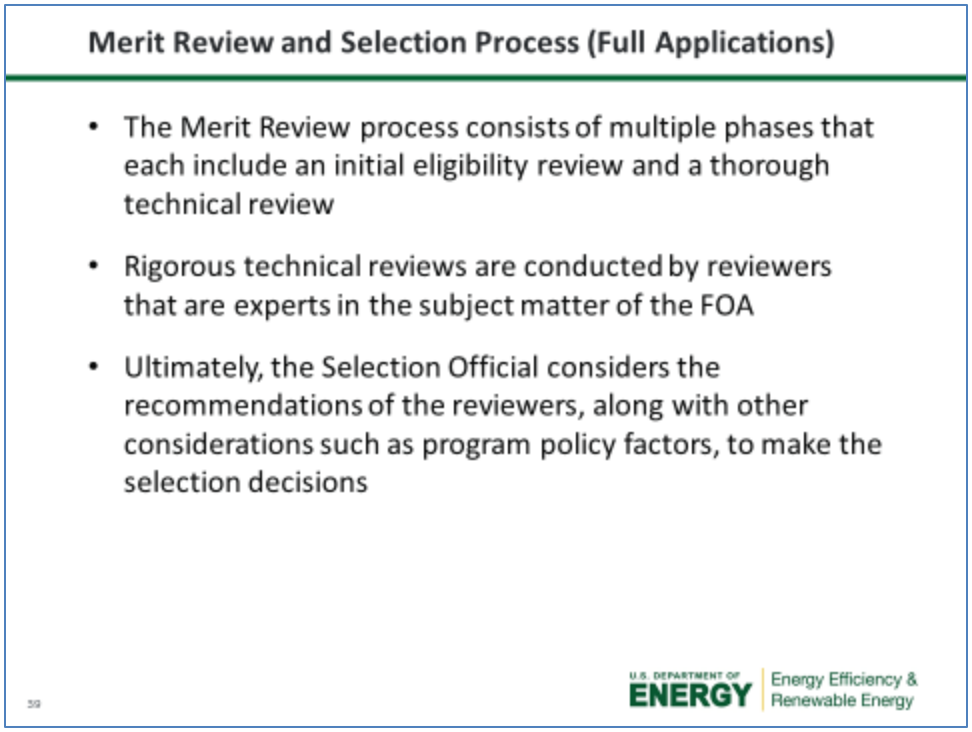
Please note that nonprofit organizations described in Section 501(c)(3) of the Internal Revenue Code of 1986 that engaged in lobbying activities after December 31, 1995, are not eligible to apply for funding.

Also, note that all Prime Recipients receiving funding under this FOA must be incorporated (or otherwise formed) under the laws of a State or territory of the United States. If a foreign entity applies for funding as a Prime Recipient, it must designate in the Full Application a subsidiary or affiliate incorporated (or otherwise formed) under the laws of a State or territory of the United States to be the Prime Recipient. The Full Application must state the nature of the corporate relationship between the foreign entity and domestic subsidiary or affiliate.



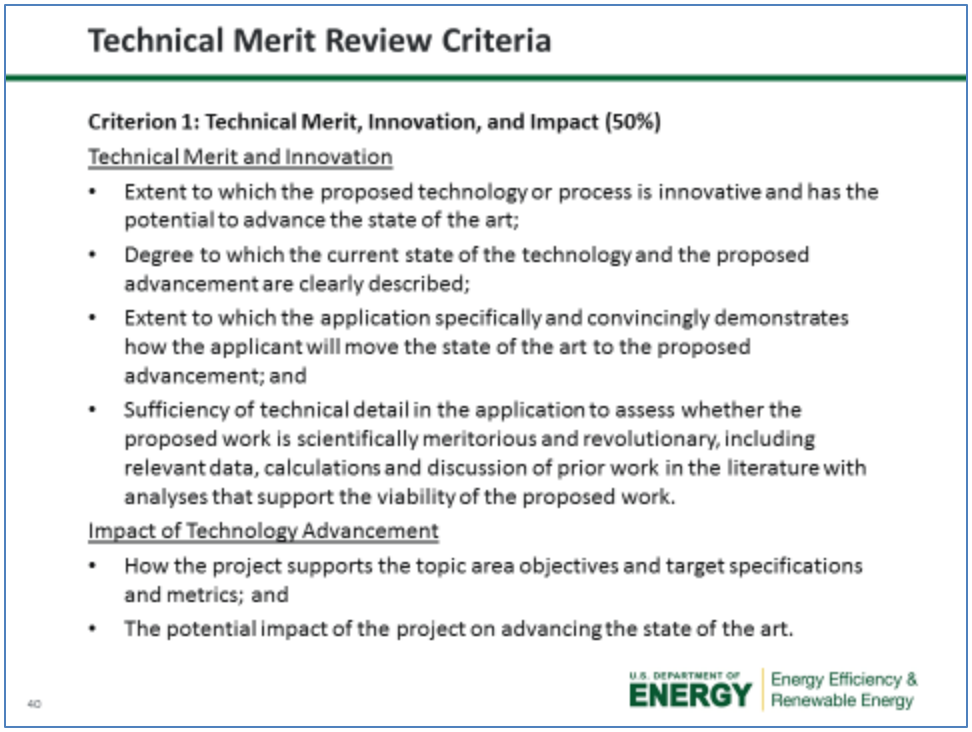
Multiple Applications

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



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



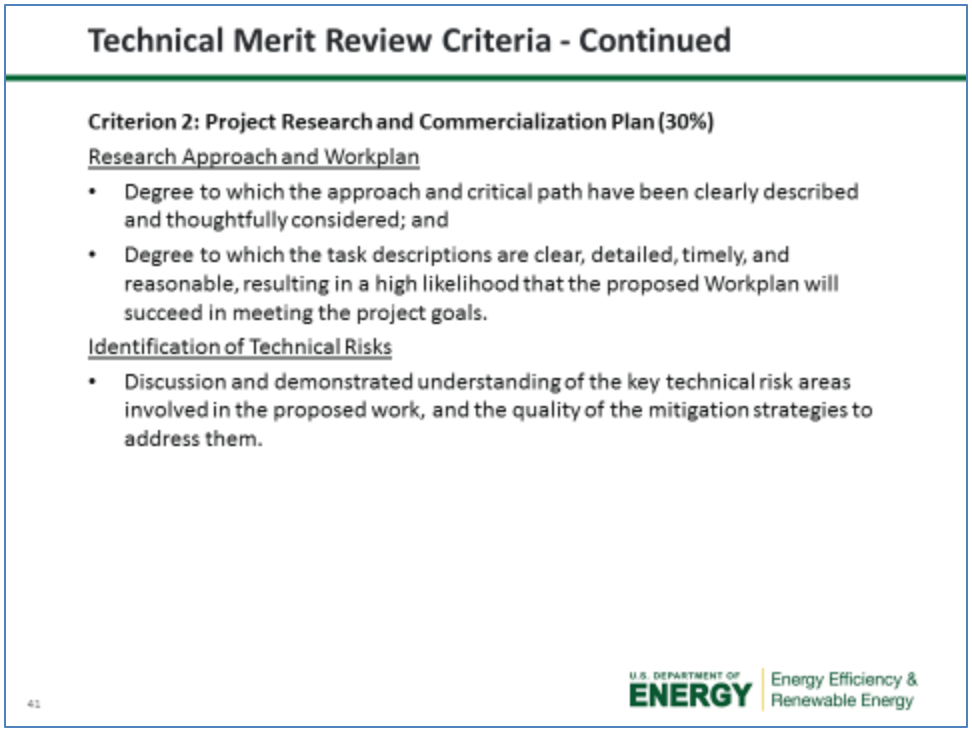
Technical Merit Review Criteria

Applications will be evaluated against the following merit review criteria:
Criterion 1: Technical Merit, Innovation, and Impact (50%)
Technical Merit and Innovation

- Extent to which the proposed technology or process is innovative and has the potential to advance the state of the art;
- Degree to which the current state of the technology and the proposed advancement are clearly described;
- 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 analyses that support the viability of the proposed work.

Impact of Technology Advancement

- How the project supports the topic area objectives and target specifications and metrics; and
- The potential impact of the project on advancing the state of the art.



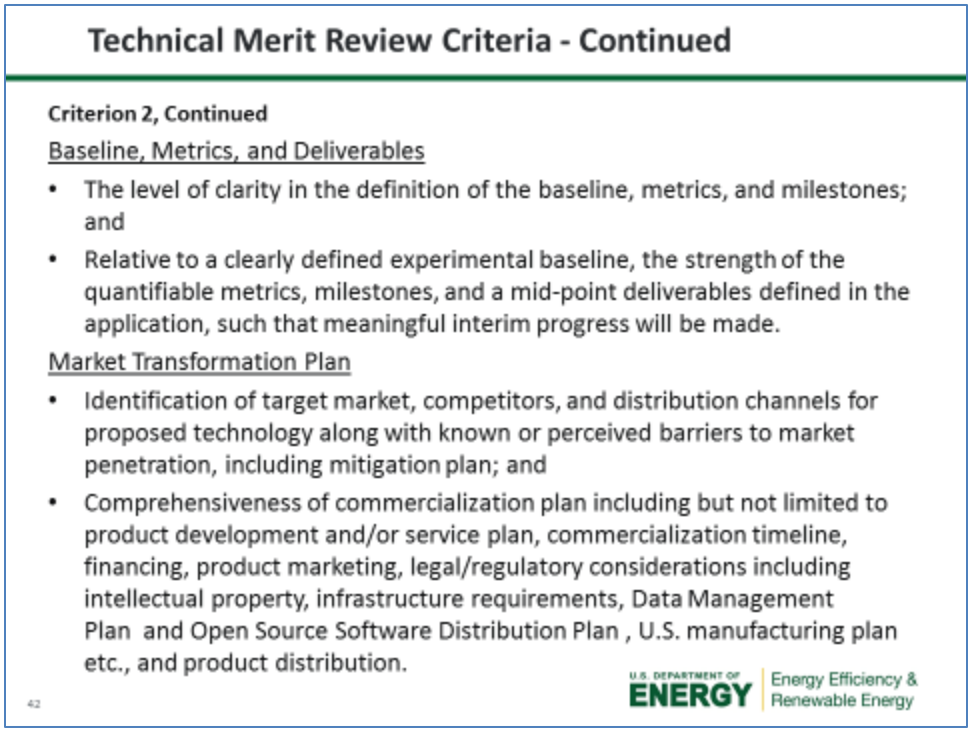
Criterion 2: Project Research and Commercialization Plan (30%)

Research Approach and Workplan

- Degree to which the approach and critical path have been clearly described and thoughtfully considered; and
- 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.

Identification of Technical Risks

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



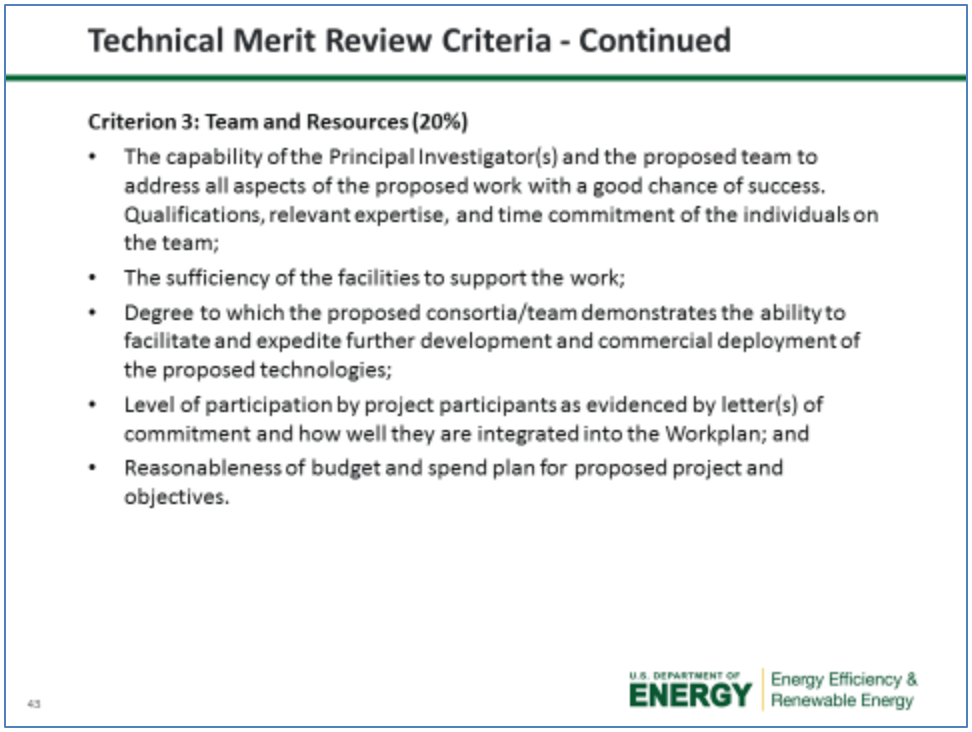
Criterion 2, Continued

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.

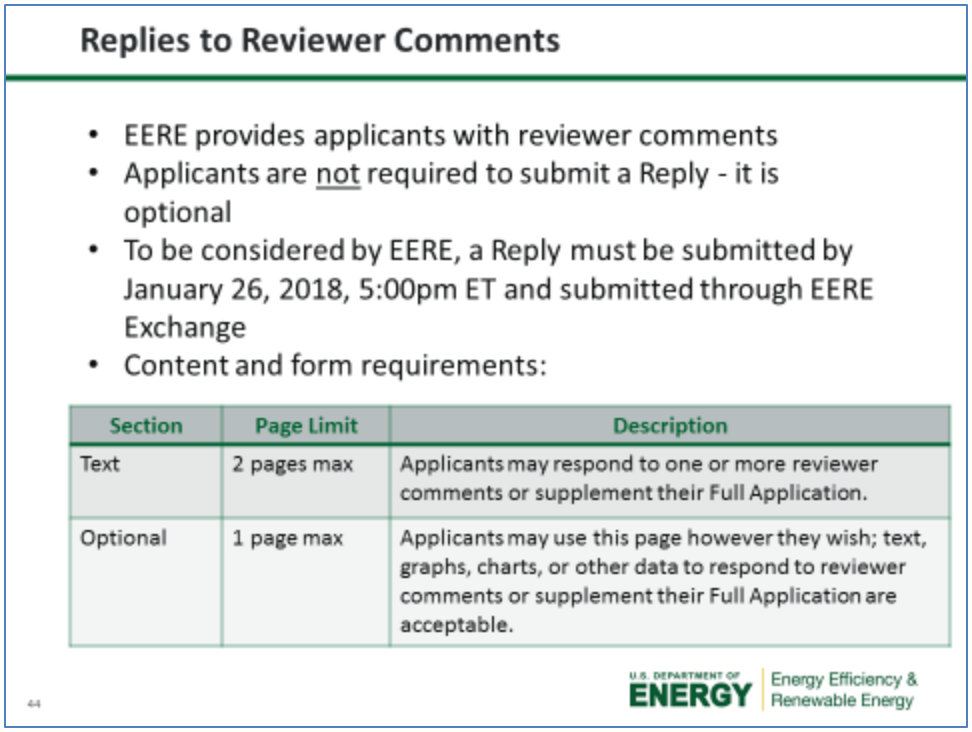
Market Transformation Plan

- 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 (20%)

- The 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.

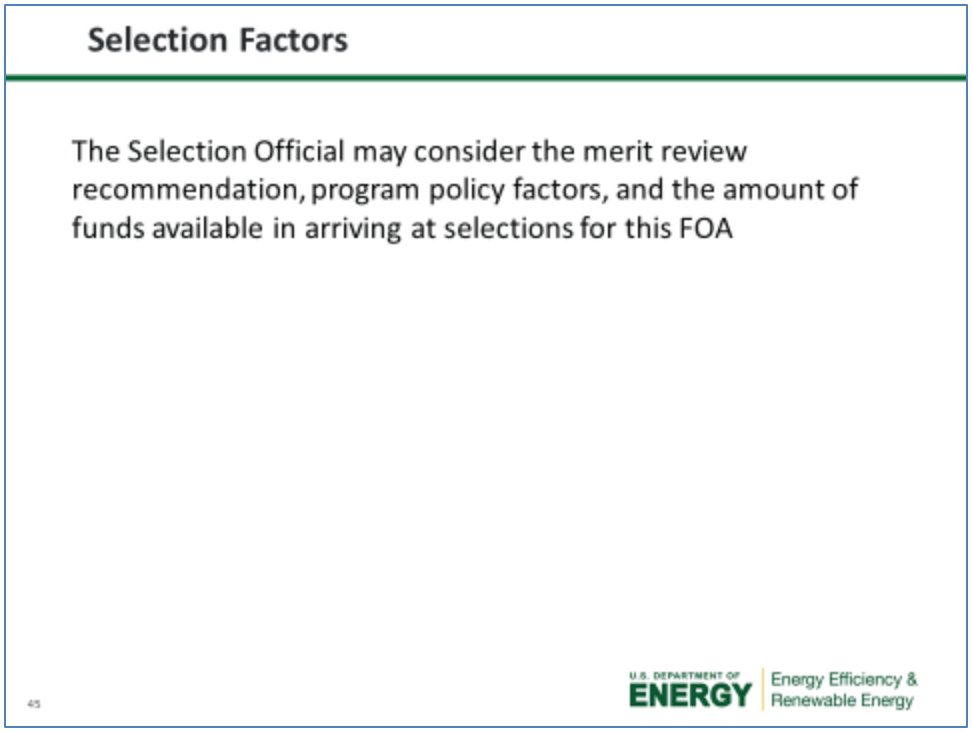


Replies to Reviewer Comments

The Full Application are reviewed by experts in the FOA topic area(s). 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.

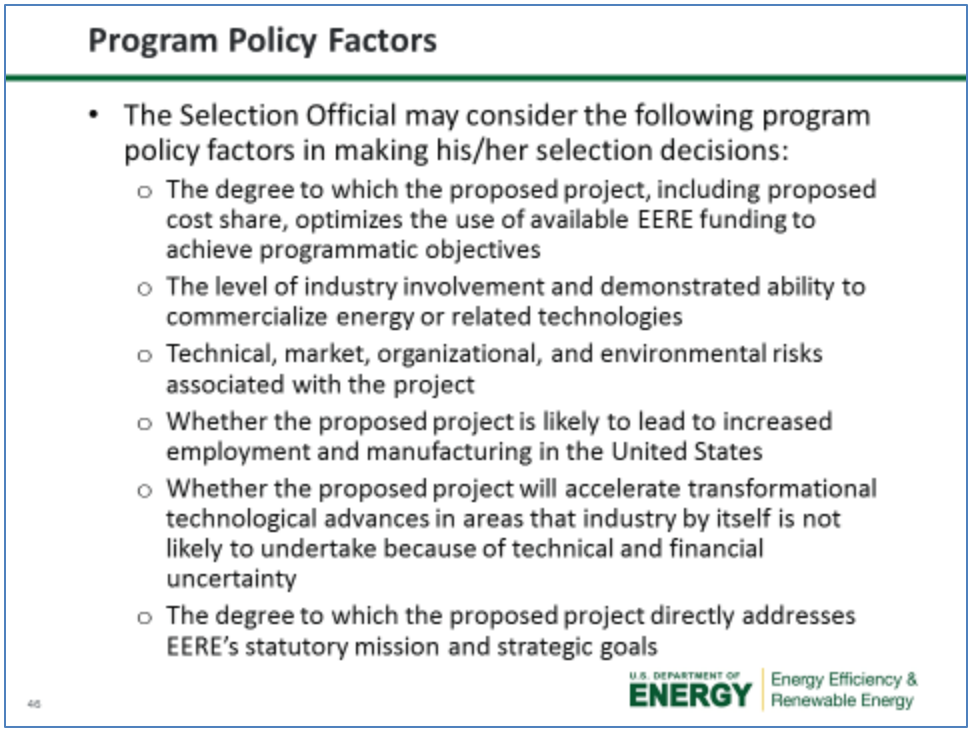
This is a **customer centric** process that provides applicants with a unique opportunity to correct misunderstandings and misinterpretations and to provide additional data that might influence the selection process in their favor. The Replies are considered by the reviewers and the selection official.

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

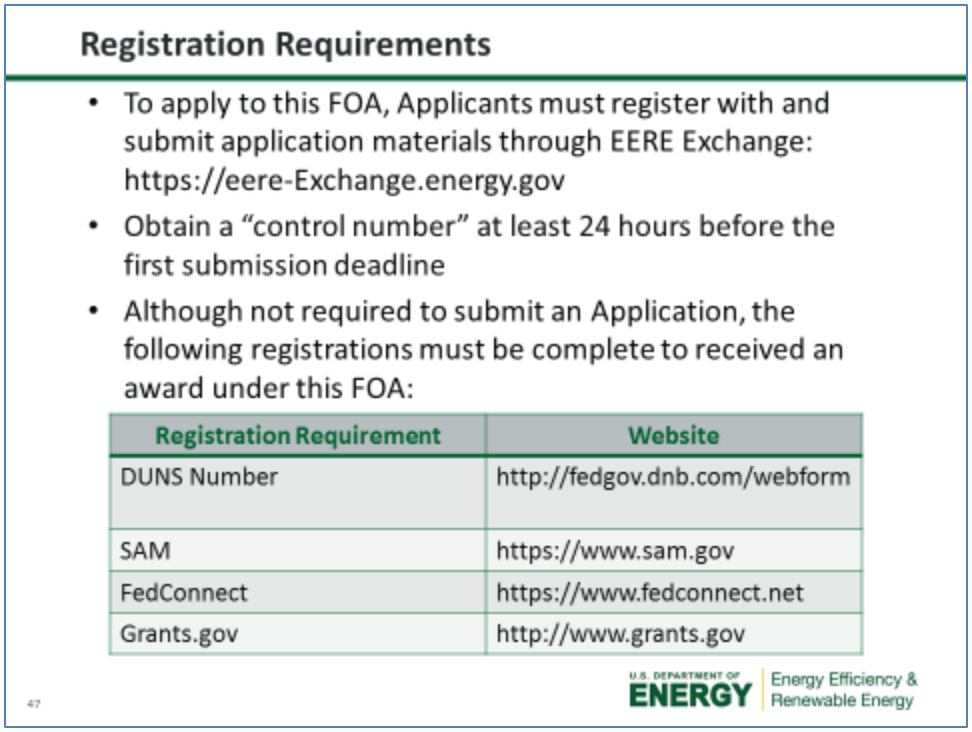
The Selection Official may consider the merit review recommendation, program policy factors, and the amount of funds available in arriving at selections for this FOA



Program Policy Factors

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

- The Selection Official may consider the following program policy factors in making his/her selection decisions:
  - 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
  - The degree to which the proposed project directly addresses EERE's statutory mission and strategic goals



Registration Requirements

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.

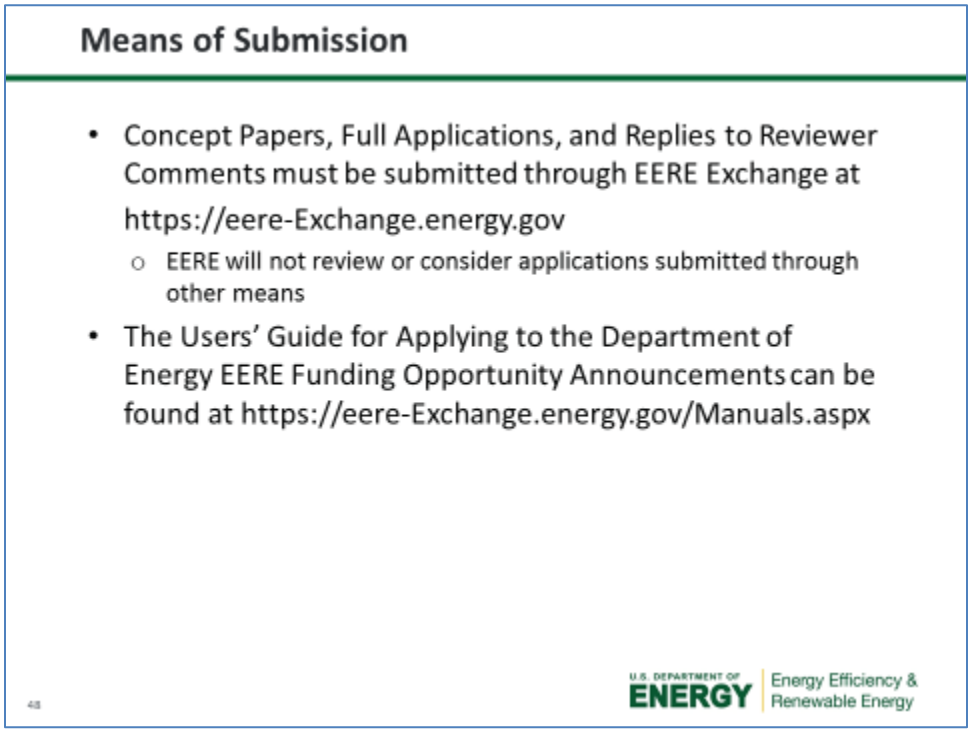
DUNS Number
Obtain a Dun and Bradstreet Data Universal Numbering System (DUNS) number.

System for Award Management
Register with the System for Award Management (SAM). Designating an Electronic Business Point of Contact (EBiz POC) and obtaining a special password called an MPIN are important steps in SAM registration. Please update your SAM registration annually.

Fedconnect
Register in FedConnect. To create an organization account, your organization's SAM MPIN is required. For more information about the SAM MPIN or other registration requirements, review the FedConnect Ready, Set, Go! Guide at the FedConnect site.

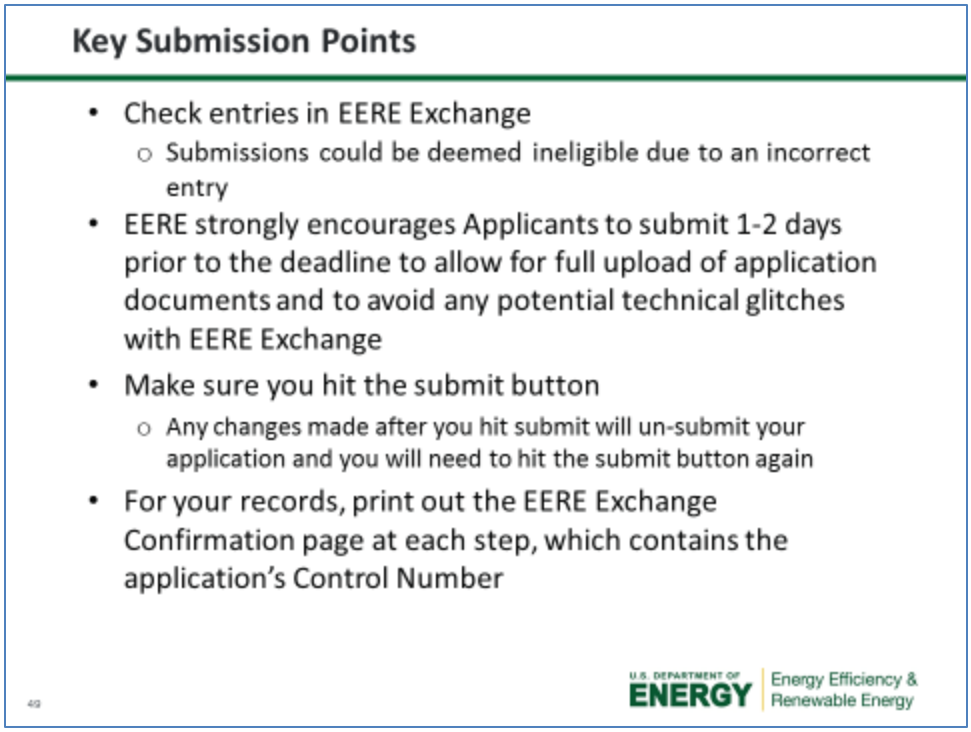
Grants.gov

Register in Grants.gov to receive automatic updates when Amendments to this FOA are posted. However, please note that Concept Papers, and Full Applications will not be accepted through Grants.gov.



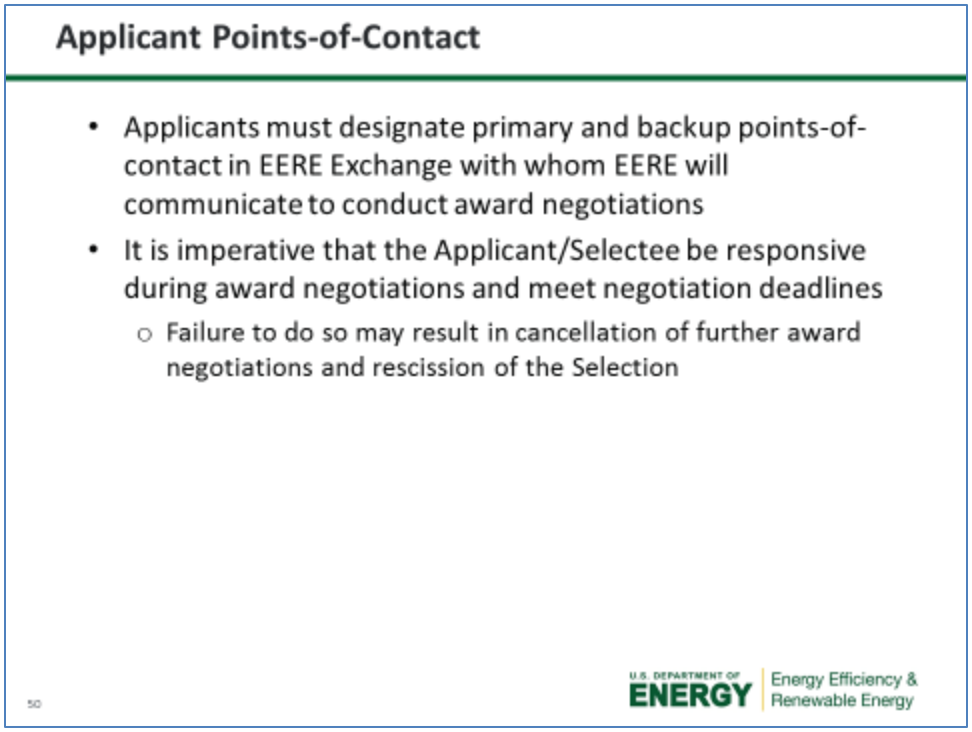
Means of Submission

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



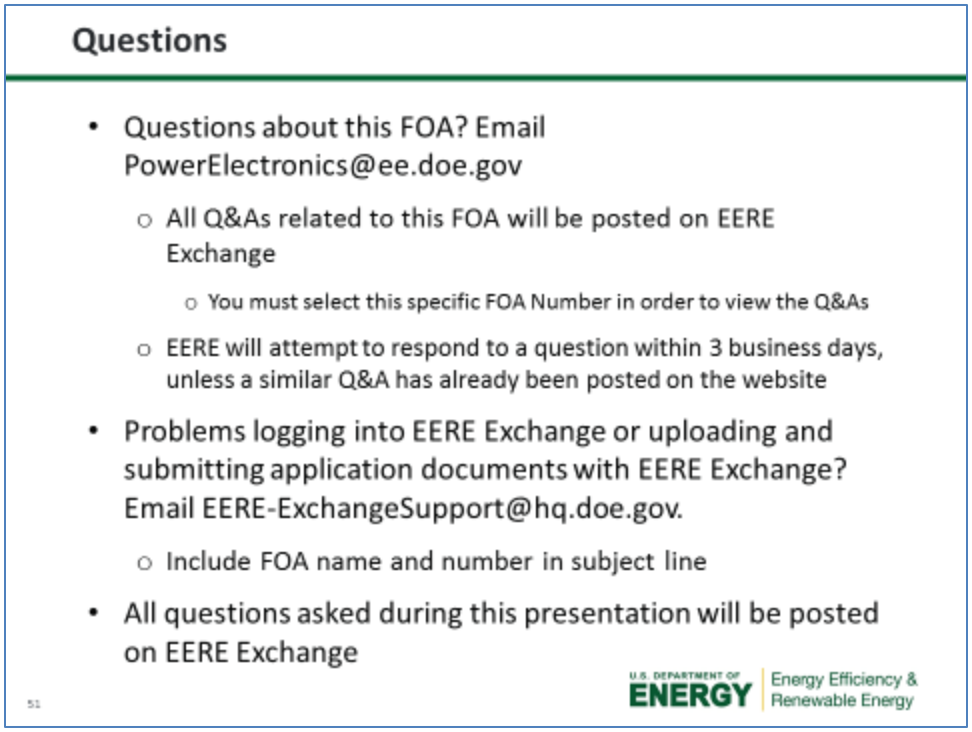
Key Submission Points

- 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



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



Questions

- Questions about this FOA? Email PowerElectronics@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
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[END TRANSCRIPT]

[Please note: this transcript covers the presentation portion of the webinar. For the Q&A discussion that followed, please see the FOA FAQ posted on EERE Exchange. Submit all questions to PowerElectronics@ee.doe.gov]