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U.S. DEPARTMENT OF ENERGY | Office of ENERGY EFFICIENCY & RENEWABLE ENERGY

SOLAR ENERGY TECHNOLOGIES OFFICE

Solar Energy Technologies Office
Fiscal Year 2019 Funding Program

Topic Area 5: Advanced Solar Systems Integration Technologies

Questions? Email
SETO.FOA@ee.doe.gov

energy.gov/solar-office

SI FOA Webinar – April 3, 2019
DE-FOA-0002064

Notice

- 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.

Notice

- All applicants are strongly encouraged to carefully read the Funding Opportunity **DE-FOA-0002064 ("FOA")** and adhere to the stated submission requirements.
- This presentation covers the FOA process and summarizes the contents of FOA for Topic 5.
- 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 at *SETO.FOA@ee.doe.gov*

SETO FY19 Funding Program (DE-FOA-0002064)

Anticipated Schedule:

FOA Issue Date	March 26, 2019
Informational Webinar	April 3, 2019, 2:00 pm ET
Submission Deadline for Mandatory Letter of Intent (LOI)	May 7, 2019, 5:00 pm ET
Submission Deadline for Concept Papers	May 14, 2019, 5:00 pm ET
Submission Deadline for Full Applications and SIPS Applications:	July 25, 2019, 5:00 pm ET
Expected Submission Deadline for Replies to Reviewer Comments:	September 6, 2019, 5:00 pm ET
Expected Date for EERE Selection Notifications:	November 2019
Expected Timeframe for Award Negotiations:	November 2019-February 2020

Agenda

1) Solar Energy Technologies Office Background
2) FOA Overview
3) Award Information
   - Statement of Substantial Involvement
   - Cost Sharing
4) FOA Timeline
   - Letters of Intent
   - Concept Papers
   - Full Applications
   - Merit Review and Selection Process
5) Registration Requirements

Solar Energy Technologies Office

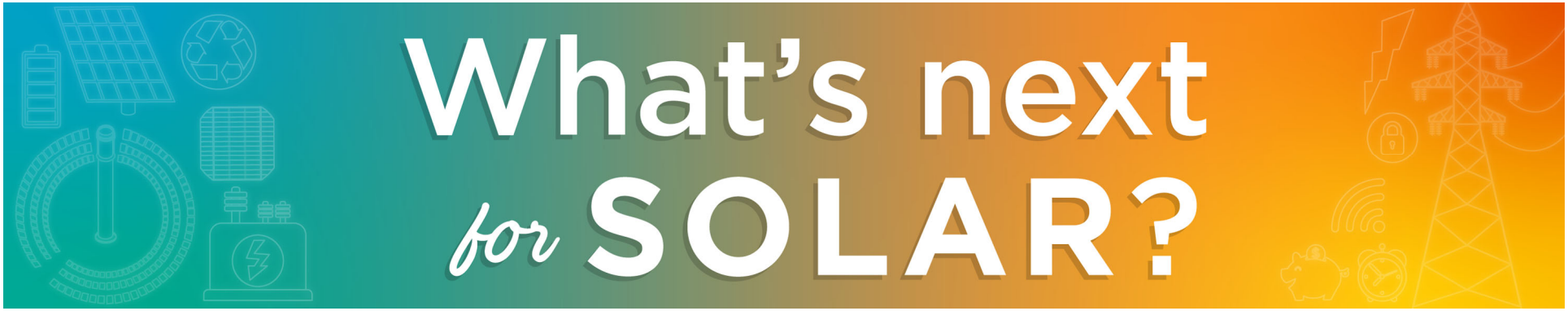
WHAT WE DO: The U.S. Department of Energy's Solar Energy Technologies Office supports early-stage research and development of solar technologies while focusing on **grid reliability**, **resilience**, and **security**.

HOW WE DO IT: The office uses a competitive solicitation process to address critical research gaps, ensuring the solar industry has the technological foundations needed to **lower solar electricity costs**, **ease grid integration**, and **enhance the use and storage of solar energy**.

2030 Cost Goals Enable Double the Solar

SETO's 2030 Cost Targets

- SETO works to achieve 2030 SunShot targets that reduce the cost of solar by an additional 40% to 70% beyond 2018 costs. Achieving these targets would make solar one of the most affordable sources of new electricity generation. The targets for the unsubsidized, levelized cost of energy (LCOE) at the point of grid connection are:
  - $0.03 per kilowatt-hour (kWh) for utility-scale PV
  - $0.04 per kWh for commercial rooftop PV
  - $0.05 per kWh for residential rooftop PV
  - $0.05 per kWh for CSP with thermal energy storage



Achieving SETO's priorities across the solar energy technology landscape requires sustained, multifaceted innovation. For our FY19 Funding Program, the office intends to support high-impact, early-stage research in the following areas:

- **Topic 1: Photovoltaics Research and Development**
- **Topic 2: Concentrating Solar-Thermal Power Research and Development**
- **Topic 3: Balance of Systems Soft Costs Reduction**
- **Topic 4: Innovations in Manufacturing: Hardware Incubator**
- **Topic 5: Advanced Solar Systems Integration Technologies**

Topic Descriptions – Topic 5

Topic Area 5: Advanced Solar Systems Integration Technologies

- SETO's systems integration research focuses on using solar energy for greater grid resilience and improved reliability. This will be accomplished through advancements that enable effective operations with increasing penetration of solar energy, with particular FOA focus on:
  - (1) Advanced dynamic PV models & Adaptive distribution protection
  - (2) Solar, energy storage and DER technologies providing grid services
  - (3) Integrating PV inverter data and sensors measurements into utility operations, Grid forming inverter controls, and Cybersecurity for PV
- All applications should focus on overcoming high PV penetration integration challenges, identified as 50% solar penetration or more compared to peak load on the distribution feeder system

Topic 5.1: Adaptive Distribution Protection

- SETO seeks to fund two interrelated technical approaches:
- (a) advanced modeling of dynamics of solar inverters and PV plants during disturbances, and
- (b) innovative, scalable software and hardware protection designs for distribution systems with high solar penetrations.

Topic 5.1.A: Advanced Dynamic Models for Smart Inverters

- Advance models that will better predict power system and PV plant responses to extreme events, like potential grid instability issues when too much inverter-based generation goes off-line.
- Develop and validate advanced modeling of smart inverters to enable accurate and fast analysis of the dynamic response of individual, aggregate, or utility-scale PV systems.
- Provide better understanding of the dynamic behaviors of inverters with advanced control functions and their interactions with bulk power systems, distribution systems, and microgrids. The proposed PV system dynamic models should be standard to enable industry-wide adoption.
- More details are available in the FOA on what successful projects would entail.

Topic 5.1.B: Adaptive Protection for Distribution Grids

- Fund enhanced power system protection solutions for distribution grids with high penetrations of PV. The main goal of this research area is to develop and field-validate effective and scalable adaptive protection solutions to enhance system reliability and resilience, with an emphasis on software.
- More details are available in the FOA on what successful projects would entail.

Topic 5.2: Grid Services from Behind-the-Meter Solar & Other DERs

- Research, development, and validation of grid services by BTM solar co-located with other DER through innovative approaches for smart control and optimization technologies.
- The main objective of this topic is to research and develop grid services using small-scale solar generation and other DER technologies, potentially through aggregation of BTM solar.
- More details are available in the FOA on what successful projects would entail.

Topic 5.3: Advanced PV Controls and Cybersecurity

- This topic will support research in three interrelated areas:
  - Innovative and scalable methods to integrate data measurements from PV inverters and sensors into utility information systems
  - Advanced controls for grid-forming inverters to establish system frequency and voltage and thus enable collaborative operation for enhanced resilience
  - Cybersecurity capabilities for solar technology, including encryption, signal integrity, authentication, firmware updates, and resilience over the lifetime of the assets

Topic 5.3.A: Integration of Data from PV Inverters and Behind-the-Meter Sensors

- The main objective of this topic is to develop and field-validate the integration of data from smart inverters and other BTM resources into utility information systems to enhance distribution grid visibility and operational situational awareness. The lack of BTM situational awareness has caused several grid operation challenges. The projects in this area will integrate data from BTM sensors to enhance the visibility and enable control of distributed solar energy resources, facilitate system restoration efforts, and improve distribution system resiliency.
- More details are available in the FOA on what successful projects would entail.

Topic 5.3.B: Advanced Controls for Grid-forming Inverters

- The main objective of this topic is to develop and field-validate next-generation grid-forming smart PV inverters that can collectively establish frequency, maintain voltage magnitude, provide stability, and enable black start in a distribution feeder with high penetration of PV.
- This topic seeks to advance grid-forming inverter controls to include functionality like coordinated control between grid-forming and grid-feeding inverters, islanded operation, dynamic operation, stability margins, coordination with other generation. Projects should focus on the controls of multiple grid-forming PV inverters.
- More details are available in the FOA on what successful projects would entail.

Topic 5.3.C: Photovoltaic Systems Cybersecurity

- The main objective of this topic is to develop and field-validate enhanced cybersecurity capabilities for solar PV equipment, such as PV inverters and converters, to improve cybersecurity over the lifetime of the assets. PV systems often use communications tools to transmit data to grid operators and others, and this provides opportunities for cyberattack.
- This topic seeks to address several challenges that PV systems pose to cybersecurity, such as the required telecommunications infrastructure, volume of data, interoperability, latency, robustness of the proposed solutions during disturbances and outages, and telecommunications failures.
- The projects should use novel approaches that include supply chain management, encryption, signal integrity, authentication, firmware updates, or technologies to boost PV resilience to cyberattacks.

Estimated Award Funding Information

Topic 5: Advanced Solar Systems Integration Technologies (20% to 50% cost share, TRL 2 to 6)		
5.1	Adaptive Distribution Protection	• $14 million total • $5 million maximum per award • Up to 3 years • 3 to 4 awards
5.2	Grid Services from Behind-the-Meter (BTM) Solar and other DERs	• $12 million total • $3 million maximum per award • Up to 3 years • 4 to 5 awards
5.3	Advanced PV Controls and Cybersecurity	• $18 million total • $5 million maximum per award • Up to 3 years • 4 to 6 awards

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.A or I.B of the FOA
- Applications for proposed technologies that are not based on sound scientific principles (e.g., violates the law of thermodynamics).
- Other topic areas designated specifically not of interest can be found within each Topic Area description in Section I.B. of the FOA.

Teaming Partner List

- To facilitate the formation of new project teams for this FOA, a Teaming Partner List is available at EERE Exchange
- Any organization that would like to be included on this list should submit the following information to SETO.FOA@ee.doe.gov
  - Organization Name, Contact Name, Contact Address, Contact Email, and Contact Phone
  - Organization Type, Area of Technical Expertise, Topic Area, and Brief Description of Capabilities
- By submitting this information, you consent to the publication of the above-referenced information
- By facilitating this Teaming Partner List, EERE does not endorse or otherwise evaluate the qualifications of the entities that self-identify themselves for placement on the Teaming Partner List

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:

- 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.

Cost Sharing Requirements

- The cost share must be at least 20% of the total allowable costs for R&D projects and 50% of the total allowable costs for demonstration and commercial application projects and must come from non-federal sources unless otherwise allowed by law.*
- The following table illustrates the anticipated focus and required cost share for projects' demonstration activities, along with the anticipated time frames for each phase. Demonstration is an option for all projects in Topics 1, 2, 4, and 5 but may not be possible or applicable, depending on the technology, technology readiness level, or current regulations and market structures.**

	Budget Period 1	Budget Period 2	Budget Period 3
R&D projects without demonstration	Research and development (20% cost share)		
R&D projects with demonstration In Budget Period 3	Research and development (20% cost share)		Demonstration (50% cost share)

NOTE:

*The sum of the government share, including FFRDC costs if applicable, and the recipient share of allowable costs equals the total allowable cost of the project. See 2 CFR 200.306 and 2 CFR 910.130 for the applicable cost sharing requirements

** Any proposed project with demonstration is required to provide at least 50% cost share during the validation period See Appendix F of the FOA for further discussion of technology readiness levels.

Cost Share Contributions

- 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
- If you are selected for award negotiations, 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
- Please note, vendors/contractors may NOT provide cost share. Any partial donation of goods or services is considered a discount and is not allowable.

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
For-profit entities	FAR Part 31 http://farsite.hill.af.mil/reghtml/regs/far2afmcfars/fardfars/far/31.htm
All other non-federal entities	2 CFR Part 200 Subpart E - Cost Principles https://www.ecfr.gov/cgi-bin/text-idx?node=2:1.1.2.2.1.5&rgn=div6

Allowable Cost Share

- Cash Contributions
  - May be provided by the Prime Recipient, Subrecipients, or a Third Party (may not be provided by vendors/contractors)

- In-Kind Contributions
  - Can include, but are not limited to: the donation of space or use of equipment.

Unallowable Cost Share

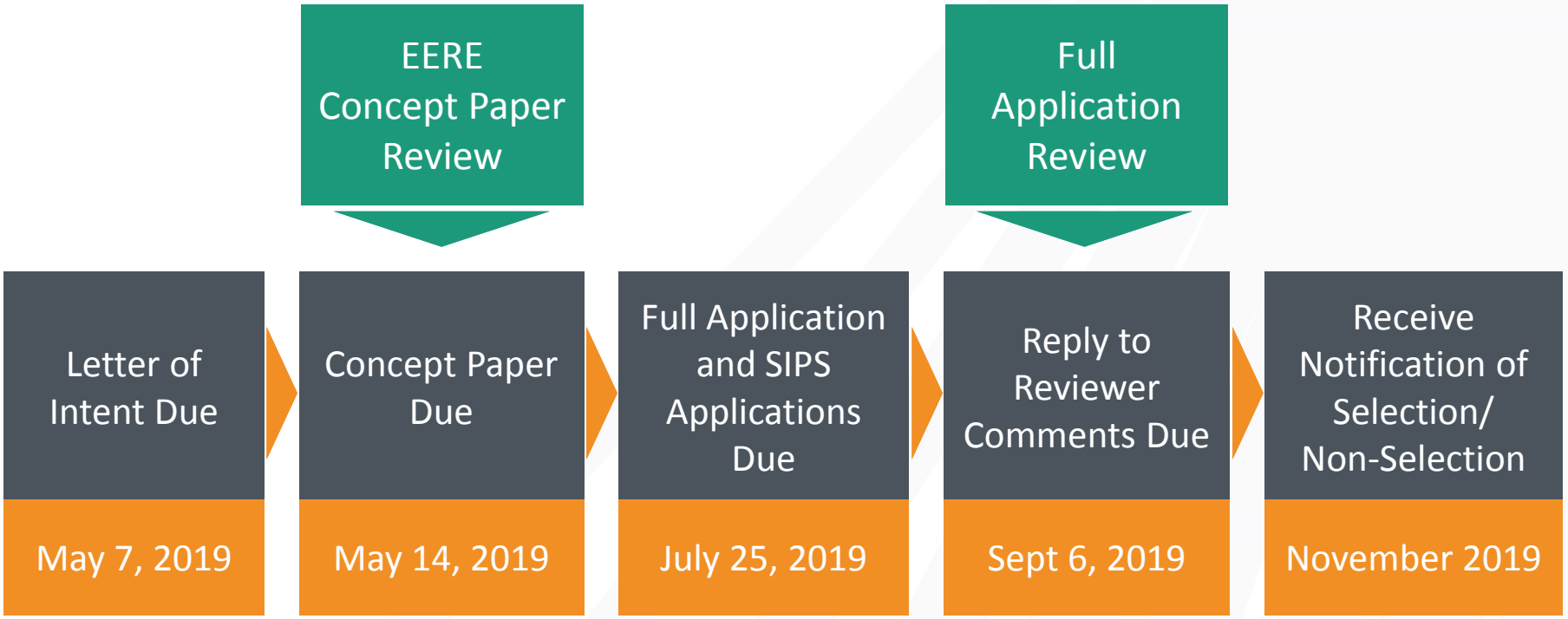
The Prime Recipient may **NOT** use the following sources to meet its cost share obligations including, but not limited to:

- 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
- The same cash or in-kind contributions for more than one project or program
- Vendor/contractor contributions

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 invoice must reflect, at a minimum, 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.7 of the FOA.

FOA Timeline



Expected Timeframe for Award Negotiations: November 2019 - February 2020

Required Letters of Intent

- Letters of Intent ("LOIs") are **REQUIRED** in order to be eligible to submit a Concept Paper and Full Application
- To be considered:
  - The LOI must comply with the content and form requirements of Section IV.B.1 of the FOA, and
  - The applicant must enter all required information and click the "Create Submission" button in EERE Exchange by the deadline stated in the FOA.
- The LOIs should not contain any proprietary or sensitive business information
- EERE will not provide notification of acceptance for Letters of Intent

Concept Papers

- Applicants must submit a Concept Paper
  - Each Concept Paper must be limited to a single concept or technology
- Section IV.D of the FOA states what information a Concept Paper should include and the page limits.
  - Failure to include the required content could result in the Concept Paper receiving a "discouraged" determination or the Concept Paper could be found to be ineligible
- Concept Papers must be submitted by May 14, 2019, through EERE Exchange
- EERE provides applicants with an "encouraged" or "discouraged" notification and 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.

Concept Paper Review

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

- **Overall FOA Responsiveness and Viability of the Project** ***(Weight: 100%).***
  This criterion involves consideration of the following sub-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 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**
- **SF-424 Application for Federal Assistance**
- **SF-424A Budget & Budget Justification**
- **Summary for Public Release**
- **Summary Slide**
- **Other Administrative Documents:**
  - **Subrecipient Budget Justification,** if applicable
  - **DOE WP for FFRDC**, if applicable
  - **Authorization from cognizant Contracting Officer for FFRDC**, if applicable
  - **SF-LLL Disclosure of Lobbying Activities**
  - **Foreign Entity and Performance of Work in the United States waiver requests**, if applicable
- **U.S. Manufacturing Plan** (except for Topic 1.2 and Topic 3)

Full Application Eligibility Requirements

➢ **Applicants must submit a Full Application by July 25, 2019**

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;
- ✓ 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.

Who is Eligible to Apply?

Eligible applicants for this FOA include*

1. U.S. citizens and lawful U.S. permanent residents
2. For-profit entities
3. Educational institutions
4. Nonprofits
5. State, local, and tribal government entities
6. DOE/National Nuclear Security Administration (NNSA)/Federally Funded Research and Development Centers (FFRDCs)

*Eligibility restrictions apply to applicants for Topic 1 and Topic 4

- **See the FOA for more details**

Note:

- The scope of work performed by the prime recipient shall not be less than the scope of work performed by the subrecipients who are ineligible to be prime applicants, as measured by the total project costs.
- 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.
- Prime Recipients must be incorporated (or otherwise formed) under the laws of a State or territory of the United States and have a physical location for business operations in the United States.
- For more detail about eligible applicants, please see Section III.A of the FOA

Multiple Applications

- An entity may submit more than one LOI, Concept Paper, and Full Application to this FOA, provided that each application describes a unique, scientifically distinct project and provided that an eligible LOI and Concept Paper was submitted for each Full Application.

Merit Review and Selection Process (Full Applications)

- The Merit Review process consists of multiple phases that each include an 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

Full Applications will be evaluated against the merit review criteria shown below:

Criterion 1: Innovation and Impact (50% weight)

The project is innovative and impactful, assuming the stated outcomes can be achieved as written. The project is differentiated with respect to existing commercial products, solutions, or technologies. If successful, the project is scalable to have a broader impact and maintained at a sufficiently large scale after project completion.

Criterion 2: Quality and Likelihood of Completion of Stated Goals (30% weight)

The application demonstrates an understanding and appreciation of project risks and challenges the proposed work will face and incorporates reasonable assumptions related to the execution of the project (i.e. market size, customer participation, costs, speed of proposed scale-up or adoption). The information included for the project is validated through customer trials, data from prior work, report references, technical baselines established, etc. The stated goals of the project are SMART (Specific, Measurable, Achievable, Relevant, and Timely) and likely to be accomplished within the scope of this project. The proposed budget is reasonable to achieve the objectives proposed.

Criterion 3: Capability and Resources of the Applicant/Project Team (20% weight)

The team is well qualified and has the capability and resources necessary to successfully complete the project. The team (including proposed subrecipients) have the training and experience to achieve the final results on time and to specification. The project team is fully assembled and committed to the project (verified through letters of support) and has a demonstrated record of successful past performance.

Replies to Reviewer Comments

- EERE provides applicants with reviewer comments
- Applicants are not required to submit a Reply - it is optional
- To be considered by EERE, a Reply must be submitted by September 6, 2019 and submitted through EERE Exchange
- Content and form requirements:

Section	Page Limit	Description
Text	3 pages max	Applicants may respond to reviewer comments or supplement their Full Application with graphs, charts, or other data.

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

The Program Policy Factors for this FOA are:

- The degree to which:
  - The proposed project exhibits technological or programmatic diversity when compared to the existing DOE project portfolio and other projects selected from the subject FOA
  - The proposed project, including proposed cost share, optimizes the use of available EERE funding to achieve programmatic objectives
  - The proposed project will accelerate transformational technological, financial, or other advances in areas that industry by itself is not likely to undertake because of technical and financial uncertainty
  - The proposed project, or group of projects, represent a desired geographic distribution (considering past awards and current applications)
  - The proposed project avoids duplication/overlap with other publicly or privately funded work
  - The proposed project enables new and expanding market segments
  - The project promotes increased coordination with nongovernmental entities for demonstration of technologies and research applications to facilitate technology transfer
- The level of industry involvement and demonstrated ability to accelerate commercialization and overcome key market barriers
- Based on the commitments made in the U.S. Manufacturing Plan, the degree to which the proposed project is likely to lead to increased employment and manufacturing in the United States or provide other economic benefit to U.S. taxpayers

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 at https://eere-Exchange.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

Means of Submission

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

Questions

- Questions about this FOA? Email SETO.FOA@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 Q&As
  - EERE will attempt to respond to a question within 3 business days, unless a similar Q&A is already 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
- All questions asked during this presentation will be posted on EERE Exchange

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