Rodriguez, Susan (CONTR)

From:	Unruh, Timothy
Sent:	Wednesday, July 25, 2018 8:39 AM
To:	Jereza, Catherine
Cc:	Pesin, Michael; Fitzsimmons, Alexander
Subject:	SETO Topic 1 and WPTO Topic 2.2: OE Coordination and Topic Descriptions
Attachments:	1836 FOA - SMH_PSH - Mgmt Review - Topic 2.2.docx; DE-FOA-0001840_SETO_FY18
	FOA TOPIC 1 Systems Integration.docx

In my review of two FOA efforts with Cathy Tripodi on Monday, she wanted your thoughts on i) the analysis proposed by the Water Power Technology Office's (WPTO) TOPIC 2.2, attached, and, ii) your knowledge on WPTO and Solar Energy Technology Office's (SETO) coordination with OE.

She has requested a meeting for Friday, but I wanted to get you the information prior to the meeting. Let me know if you have questions. Below is a summary of the coordination history and plans as reported from each office for your reference.

Solar Office

- SETO worked closely with Gil Bindewald (OE) on the subtopics and specific language of topic 1 of the FOA.
- SETO requested OE involvement in the review process, but so far OE staff have been unable to participate due to other work commitments.
- SETO will be requesting OE to be part of the Federal Consensus Panel that recommends the selections for the FOA. That panel meets in late August.

Water Office

- Water Power Technologies Office / Hydropower Program has engaged OE on program-level development and strategy for the hydropower grid topics in this FOA.
 - For example, OE staff reviewed the hydropower RFI that issued in February; OE staff are a part of the informal DOE advisory group convened regularly to review current and planned activities including this FOA; and WPTO has made concerted outreach to OE staff to engage on strategy (Gil Bindewald).
- In addition, WPTO has spoken with OE staff on specific topics, including (b) (5)
 - Notably, WPTO director Alejandro Moreno and OE DAS Michael Pesin co-convened a briefing on July
 11 to discuss the Energy Storage Program's storage valuation program, as the OE program has invested
 in economic analytical tools which are currently used by WPTO to evaluate pumped storage
 hydropower.
- WPTO will invite OE staff to participate in merit review of the FOA and intends to continue to brief OE staff for coordination.

FOR INTERNAL USE ONLY DOE FINANCIAL ASSISTANCE PROGRAM SUMMARY (Competitive Financial Assistance)

(Please select applicable topic)

Critical Materials
 Cyber Security
 Energy-Water Nexus
 Grid Reliability

□ STEM Training

□ Energy Storage

□ Transportation

 \Box Other (write in):

Renewable energy

Scenario (check all that apply):

 \Box President's Request \Box House Mark

□ Senate Mark

□ Full Year CR

1. Program Office: Water Power Technologies Office

2. Financial Assistance Program: Funding Opportunity Announcement

3. FOA Title and Number (if available):

FOA-0001663: Marine and Hydrokinetic (MHK) Technology Development and Advancement. Topic Area 2: Open Topic – MHK Technology Development

4. How does this FOA align with the Secretary's strategic goals? Why use this vehicle? How is success measured?

Basic research: MHK technologies are at an early stage of development due to the fundamental scientific and engineering challenges of generating power from complex, low-velocity and high-density dynamics in a corrosive operational environment. These challenges are intensified by the high cost and lengthy permitting processes associated with in-water testing. To address these challenges, the Program invests in early-stage R&D specific to MHK applications to generate knowledge relevant for industry to develop and deploy innovative components, structures, materials, systems, and approaches to manufacturing. Industry deployment of MHK technologies for bulk power generation is nascent, and far from cost-competitiveness at the utility scale for MHK technologies.

5. Has the FOA been released? \Box No

⊠Yes. Date: FOA was issues on 12/15/2016. Original Selections announced in June 2017.

6. Expected number of awards:

Five (5) Alternate Selections

7. Specify whether the awards will be grants, cooperative agreements, or other (explain):

Cooperative Agreement

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8. Brief description of the FOA, including the intended purpose (please be brief, but specific):

Original (FY2017) FOA Marine and Hydrokinetic Technology Development and Advancement almed to invest in system advancement and sub-scale testing of high energy capture wave energy converters (WECs) and the development of innovative technologies that have the potential to significantly advance MHK technologies and the state of the MHK industry.

9. Background (e.g., has this same FOA been issued previously, if so, how long):

FOA was issued in December 2016; Original Selections were announced in June 2017.

10. Please indicate how the FOA is aligned with the FY 2018 Presidential Budget request and provide the relevant page number(s) in President's Budget. (If the FOA is proposed to execute Congressional direction/guidance, please provide that information in response to question 18 below.)

The five (5) alternate selections from FOA-1663 align with the FY 2018 Presidential Budget request by testing new proof of concept systems in laboratory settings to understand performance characteristics, validate numerical modeling predictions and assumptions, identify and mitigate reliability risks, and provide data to inform future R&D to improve early-stage designs across industry.

11. If a FOA for this program has been previously issued, what changes have been made to align with Administration priorities?

These additional awards would be from the 2017 FOA for MHK which focused on early-stage research and development. These awards align with objectives to invest in early-stage R&D that enables the domestic MHK industry to advance toward achieving cost competitiveness with local hurdle rates in remote and early adopter markets, and improve performance of MHK technology concepts and components.

12. Total amount of DOE funding available for awards made under the FOA (and any relevant breakdown):

Application Number	Topic Area #	Applicant	Federal Share	Non- Federal Cost Share	Total Cost	Federal Technical Rating
1663-1531	2	Resolute Marine Energy, Inc.	(b) (4)			
1663-1521	2	ORPC	· ·			
1663-1512	2	Oscilla Power Inc.	Í			
1663-1572	2	ENORASY LLC				
1663-1526	2	University of Alaska Fairbanks				

13. Total amount of funding by topic area, if applicable: N/A

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14. What entities are eligible to receive an award (e.g., universities, states, DOE laboratories, small businesses, etc.)?

15. Will the recipient be required to provide a cost share or is another Federal agency contributing funds? If so, please provide the amount and/or percentage:

Required Cost Share is 20%; University projects are allowed to request a Cost Share Walver to 10%. There are four (4) projects that will provide 20% Cost Share and one (1) university project that will provide 10%.

16. Budget Year of Funding (If multiple years, please provide a breakout by fiscal year. For example, if the combined FY 16 and FY17 total is \$10,000,000, please show the breakdown by fiscal year; FY16:\$5,000,000, FY17: \$5,000,000):

FY 2018: This selection would count towards a portion of the \$30M congressional direction in the FY18 Omnibus for marine energy industry-and university-led basic and applied research, development and validation projects.

17. Duration of Award Period: 🛛 1-3 years 🗌 Other: 5 Years

18. Please provide excerpts of the authorizing statute and any relevant appropriations report text about the program.

Energy Policy Act of 2005, section 931(a)(2)(E)(i) and the Energy Independence and Security Act of 2007 (EISA), Section-633 Marine and Hydrokinetic Renewable Energy Research and Development, Public Law 110-140 (Dec. 19, 2007).

19. Provide the Technology Readiness Level (1-9) expected for awarded projects, if applicable (see attached TRL definitions) and a brief explanation detailing how the level was determined:

3-5, please see table under q. 21 for details as to types of research being conducted relating to TRL levels.

20. Please provide upcoming milestone dates for the FOA release, notification of selectees, and actual awards.

Announce selection and start negotiations by 13 of June 2018, make an award before middle of August 2018.

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21. Please provide any other pertinent information.

Application Number	Applicant	Description of the project
1663-1531	Resolute Marine Energy, Inc.	The goals of this project are to: a) build and validate a model-scale seawater-compatible vane pump to facilitate hardware-in-the-loop (HIL) tests of a PTO system that can implement real-time controls; and b) perform pump seal endurance tests. HIL tests will provide physical evidence that real-time flap load modulation can be achieved by novel switch-mode hydraulic means inspired by techniques used in the field of power electronics. Pump seal endurance tests will provide confidence that targeted reliability and maintenance intervals can be achieved.
1663-1521	ORPC	ORPC Solutions proposes to investigate low stiffness cross-flow turbines to increase turbine efficiency by reducing the number of internal supports and increasing the effective aspect ratio of the turbine and consequently reducing tip losses. This Project will deliver a redesigned rotor utilizing high deflection foils for ORPC's TidGen® turbine. Relaxing the allowable deflection limit will have a significant impact on the performance of the turbine.
1663-1512	Oscilla Power Inc.	In this project, Oscilla Power, Inc. (OPI) will improve and optimize OPI's linear hybrid drivetrain technology to be able to achieve a rated capacity of over 400 kW per drivetrain while staying within subsystem cost, mass and size targets. The project team will demonstrate the effectiveness of these advancements through detailed laboratory 1:10 scale testing at Sandia National Laboratory and demonstrate >85% efficiency for the improved PTO all sea states less energetic than the rated condition.
1663-1572	ENORASY LLC	Enorasy has teamed up with Raytheon and University of Maine to build a 1:10 scale prototype of unique wave energy converter (WEC) that utilizes a rotating mass and control system to absorb power in a very efficient manner. This project includes numerical modeling, simulation, fabrication, assembly, testing, performance validation, and targets an ACE of 15m/\$M.
1663-1526	University of Alaska Fairbanks	The Water Horse is an oscillating hydrokinetic harvester designed to exhibit the required system dynamics through passive mechanism design, rather than active control to lower LCOE, and reduce system failures. System development has been conducted entirely in turbulent conditions to ensure operation at sites currently deemed unrecoverable resources by the National Renewable Energy Laboratory.

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

"Innovative Design Concepts for Standard Modular Hydropower and Pumped-Storage Hydropower"

Funding Opportunity Announcement (FOA) Number: DE-FOA-0001836 FOA Type: Initial CFDA Number: 81.087

FOA Issue Date:	(b) (
FOA Informational Webinar (Topic Areas 1 and 2):	
Standard Modular Hydropower Resources Webinar (Topic Area 1 Only):	
Submission Deadline for Concept Papers:	7
Submission Deadline for Full Applications:	
Expected Submission Deadline for Replies to Reviewer Comments:	
Expected Date for EERE Selection Notifications:	1
Expected Timeframe for Award Negotiations	

B. Topic Area 2 – New Use Cases for Pumped-Storage Hydropower

1. Background

Pumped storage hydropower comprises over 95% of the electrical energy storage in the United States today. Despite its significant contribution to grid-scale storage, new pumped storage hydropower plants are not being built in the U.S. Only one new pumped storage facility has been built since 1970, despite dramatic increases in storage supportive policies in the last ten years.¹ Existing pumped storage operations are shifting to adapt to new resources, market structures, demand patterns, and pricing signals.² Pumped storage technology in conventional configurations and uses (e.g. multi-hundred megawatt open- and closed-loop configurations) are complex, custom-designed civil engineering projects which may entail significant regulatory, cost, schedule, and geotechnical risks.

Critical limitations to new development include:

 Certainty on return on investment: It is not clear how to evaluate the revenue opportunities of a large storage asset on a forward basis. Establishing investment

¹ Cite Market Report for 1970 date, cite storage policy data.

² Reference Hydropower Vision, RFI responses, Market Report and PSH website

certainty over the lifetime of the asset is particularly difficult, compounded by the unpredictability evidenced by the rapid change in the electric system. Most utility and system planning timeframes are only about 20 years. In addition, pumped storage assets, due to their large generating and storage capacity, have the potential to influence market prices as price-makers rather than price-takers, which complicates how market operators interact with and take advantage of these assets. Modeling efforts for storage have advanced, and a recently established project within the Water Power Technologies Office will focus exclusively on improving the practice of valuation for pumped storage.

- Length of time to commissioning: The timeframe from site design to commissioning, including permitting, is over 10 years. This presents a significant competitive disadvantage to pumped storage, as the delay prevents developments from responding to a current system opportunity. The lack of certainty for return on investment is even further diminished by needing insight into long-term revenue streams beginning at least 10 years from project initiation. In comparison, provided the controls and communications are established, today's battery storage technologies can be sited and commissioned in less than a year.
- High initial and total capital costs: As the electricity system undergoes a transformation, grid-supporting technologies will be required. Supporting technologies on a bulk system scale with transmission-level commitments are evaluated and planned for, but rarely constructed. A portion of this challenge is structural: the significant upfront capital costs of very large supporting assets presents initiation risk and drives decisions toward incremental commitments. Over its lifetime, pumped storage assets may be very cost effective, but they still require substantial initial investment. To meaningfully drive down the total cost of pumped storage, technology and structural strategies must achieve reductions in the initial costs for project development.
- Siting opportunity and available value streams: The typically large scale of pumped storage technologies will push development toward large water bodies and locational coincidence of substations for interconnection opportunities. There are several other considerations to siting a pumped storage system that will affect costs and timelines, including environmental effects, scaled development, and integration with other infrastructure to access new revenues and benefits beyond traditional electricity revenues.

2. Description

To address the critical barriers mentioned above, Topic Area 2 explores new use cases for pumped storage hydropower that can improve electricity system resilience, reliability, and economics. Applicants are expected to propose innovative technology concepts, analysis, or enhanced modeling capabilities that define a new, updated role for pumped storage in the evolving electricity system in the United States.

This Topic Area is aligned with WPTO's new grid research initiative to focus investments on innovations which will optimize hydropower resources for a secure, sustainable,

cost-effective, and reliable electricity system, and responds to FY18 Congressional direction to offer a competitive funding opportunity for pumped storage hydropower. This Topic Area is also consistent with DOE's Beyond Batteries initiative, which drives technology beyond cost reductions toward improved performance and enhanced provision of services to the grid.

This Topic Area also builds on a previous FY2016 FOA, DE-FOA-0001455, which issued four awards for new pumped storage innovations that met specific technology characteristics, with the comparable goal of reducing pumped storage costs and timelines. The new emphasis in this FOA, however, is on an increase in value rather than a reduction in levelized costs.

WPTO is therefore soliciting applications for awards in two sub-topic areas:

- Sub-topic 2.1 Innovative conceptual designs for pumped storage systems
- Sub-topic 2.2 Modeling and analyzing the role of pumped storage in asset and system optimization
- a. <u>Sub-topic 2.2: Modeling and Analyzing the Role of Pumped Storage in Asset and</u> System Optimization

This sub-topic will support analysis of the technical capabilities of pumped storage to improve electricity system resilience, reliability, and economic efficiency, or to improve the performance of other grid assets. For example, modeling enhancements or analysis could explore the ability of storage to support system-wide strategies to manage fast ramps or high peak loads or investigate operational connections between storage and other grid assets such as solar photovoltaic (PV) or wind energy.

Among the family of storage technologies available and pre-commercial today, pumped storage hydropower facilities have distinguishing attributes. Pumped storage is the only storage technology capable of operating at the transmission level. It is capable of generating energy over a substantial duration of time, of providing high-volume injection or absorption of electricity, and of providing a broad range of essential grid reliability services.

Constructed mostly in the 1960s and 1970s, existing pumped storage hydropower plants were originally designed and optimized for daily energy shifting – pumping water from a lower elevation reservoir to a higher elevation reservoir during low load hours and generating during high-load hours when electricity is in greatest demand – to support continuous and efficient operation of large thermal generation resources.

However, this business model is changing. Today, pumped storage hydropower plants across the country are shifting to new operational paradigms. For certain pumped storage facilities, price swings in the last five years have resulted in an inversion of the traditional pumping-generating pattern, now pumping during the day and generating at

night, as evidenced by the submissions to the WPTO's DE-FOA-0001886: Expanding Hydropower and Pumper Storage's Contribution to Grid Resliency and Reliability Request for Information. In other instances, the timescale is fundamentally different. The traditional daily cycle of high- and low-load is no longer the primary operational driver; instead pumped storage hydropower is used for peak-shaving, intra-hour reliability requirements, or ramping.

If these trends continue, certain price and demand patterns are likely to emerge, some with significant consequences for large-scale storage. Projections from a recent study anticipate higher volatility in prices, very low value energy prices, higher premiums on flexibility and capacity, and inverse pricing spreads over the course of a day to a season. These changes may ripple effects beyond traditional procurement of electricity as energy, capacity, and ancillary services. For example, system operators may increasingly utilize pumped storage facilities as part of the transmission system, to manage transmission utilization and congestion. There are outstanding questions regarding about how well storage assets are afforded access to markets, given their unique operating characteristics, and under what circumstances a storage asset can provide both generation and transmission benefits without compromising market principles.

The optimal future role of pumped storage, both existing and proposed, is still not wellunderstood. Pumped storage assets can provide a broad range of benefits to the grid and to other assets, but a complete perspective of all of these benefits is rarely illustrated. Typically pumped storage benefits are evaluated at a portfolio-level for a specific purpose, such as transmission planning or resource adequacy over 10-20 years, which does not capture the full operational life (50-60 years) of a pumped storage plant. Capacity and transmission expansion models do not capture many of the services that pumped storage can provide and often overlook externalities. The analytical record is particularly shallow in evaluating pumped storage benefits to other grid assets, due in part to complexity and availability of comprehensive data.

In some instances, a complete perspective on value of pumped storage is limited by the lack of independent, real-world analyses that can be directly applied or used as reference cases. In others, the challenge is rooted in the current tools utilized within operations and planning practices. Models commonly employed in the electric power sector may not be well adapted to effective evaluation of pumped storage solutions, especially advanced technologies that permit even greater operational flexibility.

Technology innovations for pumped storage have focused on increasing plant flexibility with variable speed pumps and ternary (hydraulic bypass) systems. Proposed pumped storage developments may still be designed with fixed-speed pump design due to cost differential for the upgraded systems and uncertainty about the return on investment of utilizing the potential flexibility afforded by more innovative technologies. In addition, it is not clear whether the same technical benefits of flexibility can be achieved between

pumped storage plants and other mechanisms, such as an aggregation of smaller storage solutions or market expansion and design.

Therefore, to reduce the uncertainty regarding future investments and illustrate the value of storage at the bulk scale, this FOA invites applications for analyses and modeling enhancements that would collectively advance an understanding of the capabilities of pumped storage hydropower in electric system optimization or optimization of other grid assets, inclusive of generation and transmission.

This Sub-topic is intended to recruit applications for:

- Analyses that would illustrate to what extent, and in which cases, pumped storage hydropower can provide one or more specific material optimization benefits to electric system performance and/or other specific grid assets, or
- (2) Modeling enhancements that would make the benefits of pumped storage hydropower more visible, more effectively analyzed, or possible within existing electric system operations and planning practices.

Applications in this sub-topic should evaluate the potential for pumped storage hydropower to provide one or more specific benefits that accrue either to the system or to other assets, in particular benefits that are currently not well understood. An application must articulate its additional value to the current state of knowledge, and make explicit any linkages to benefits to other grid assets. Example linkages include transmission utilization improvements, operating in tandem within the same control footprint, or an adjustment in the merit order (generating stack) that helps other plants operate more efficiently, reduces wear and tear on other machines, uses less fuel, or reduces environmental impacts. Applications should select a real system, rather than theoretical systems and assets, at a meaningful scale. Benefits should be measurable and linked to grid properties such as resilience, reliability, sustainability, or economic efficiency. Table 3 below outlines the requirements for proposed analyses.

Proposed modeling enhancements should address gaps in effective characterization of new advanced pumped storage or full utilization of pumped storage assets. Applications for modeling enhancements should use the gaps analysis provided in [Appendix F] as a guideline for focus areas with the greatest need and the greatest opportunity for impact. The proposed enhancement is not required to be open source in order to be eligible for award under this sub-topic. However, applications should strike a balance between two objectives: *impact* (that at the conclusion of the work, the enhancement will be used and useful) and *availability* (that others can access the enhancement and understand how well it works without excessive cost).

Applications for modeling enhancements should incorporate operations and planning entities that would take advantage of such enhancements as part of the project team. If the proposed work involves a new feature of an existing model under commercial license, applicants should include a demonstration of support or engagement with the

owner of that model. Applicants are strongly encouraged to incorporate partners and stakeholders into the proposed work beyond a demonstration of support.

Responsive applications will:

- Identify how the analysis or modeling enhancement meets the requirements established in Table 3 below or in modeling enhancements Appendix F;
- Demonstrate that the analysis or modeling enhancement would produce an innovative result or an innovative approach within the execution of the work;
- Propose work that will have a substantial, measurable impact on advancing an understanding of the full suite of benefits of pumped storage hydropower; and
- Propose a plan to disseminate the analysis or modeling enhancement to as wide an audience as possible (e.g., publication in the open literature, open source licensing, commercial licensing).

To gauge the extent to which modeling gaps are being addressed, WPTO intends to manage these projects as a portfolio, both in the selection process and during the period of performance. The portfolio of projects may include work being/to be performed at the National Labs and other entities.

Tab	e 3:	Requirements	for Pro	posed	Analy	sis
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Data choice	Data should be appropriate for the work-product goals. For instance, analytical work that focuses on curtailment reduction should use load and variable generation forecasts and operating data that accurately capture curtailment challenges.
Project Team	Where an analysis would describe the optimization of an asset or a system, the project team should include the owner or operator of that asset or system, at minimum evidenced by a letter of support. Applicants are strongly encouraged to incorporate partners and stakeholders into the proposed work beyond a demonstration of support.
Benefits	Benefits must be measurable and linked to grid properties such as resilience, reliability, sustainability, or economic efficiency. For economic benefits, the results should clearly show the lasting value provided to all stakeholders measured by net benefits such as lower electricity cost, efficient utilization of renewables and load, and others as applicable.
Assumptions and Definitions for Proposed Analysis	 Analyses should be representative of a real system, rather than theoretical systems and assets.

•	The analysis baseline should be representative of existing or expected near-term conditions (e.g., 2020 RPS-based generation
•	Models used to represent variable generation (e.g., wind and PV solar) should be realistic in terms of generation mix as well as spatial and temporal accuracy (e.g., the variability is not over- or under-represented, plant siting does not skew the results).
•	The approach to generator retirement should be clearly stated (e.g., if additional generation is added to a model, is some of the existing generation retired, and if so, how were the retirement choices determined?).
•	The underlying generation mix assumptions for forward-looking grid representations should be clearly defined (e.g., scenario X captures 2030 RPS requirements, scenario Y increases the amount of renewable generation from the current 20% on an annual energy basis to 40%)
•	Where unexpected forced outages are used in the analysis or modeling efforts, the nature of the forced outage should be described (e.g., fixed in time and amplitude across scenarios or varies from scenario to scenario).
•	The relevant geographic region should be clearly defined along with the regions connections and reliance on surrounding systems. The generation mix for the baseline and each scenario should be clearly identified by generation type (e.g., airframe-derivative, open cycle combustion turbines) and capacity. The generation mix of interconnected systems to the relevant region should also be reported.
•	The flexibility assumptions (e.g., ramp rate per minute as a percentage of rated capacity, minimum stable level, and start time) for each type (and size class, if applicable) of generation should be clearly stated.
•	The capacity reserve for the system (and each scenario or sensitivity) should be clearly stated.
•	Peak variable generation penetration should be reported both in terms of time of occurrence and percent of peak load.
•	The type of pumped storage hydropower technology should be clearly defined (synchronous, inverter-based, variable speed pumping, and so forth).

i. Work to be Conducted

At the end of the period of performance:

- Analysis: Awardees will produce a detailed, written technical report that describes the project team, data inputs, methodological approach, tools and models utilized, results of the analysis, dissemination plans, challenges in executing the work, and remaining gaps. All projects awardees will present publicly-sharable results in-person to WPTO and involved national laboratories at project conclusion at a summit event.
- Modeling enhancement: Awardees will produce a detailed written technical report that describes the modeling enhancement, its applicability and effect, dissemination and engagement, and remaining gaps. If the work is opensource, additional requirements for disposition of source code may apply. All applicants should anticipate provisions relating to Intellectual Property (IP) as part of award negotiation. All awardees will demonstrate the modeling enhancements in-person to WPTO and involved national laboratories at project conclusion.

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

Solar Energy Technologies Office (SETO) FY2018 Funding Opportunity Announcement (FOA)

FOA Number: DE-FOA-0001840

CFDA Number: 81.087	
FOA Issue Date:	April 17 th , 2018
Submission Deadline for Letter of Intent (LOI):	May 4 th , 2018,
	3:00pm ET
Informational Webinar: Visit EERE exchange FOA description for details regardir registration	ng webinar timing and
Submission Deadline for Concept Papers:	May 9 th , 2018,
 Applicants must submit a Concept Paper by 3:00pm ET on the due date listed above to be eligible to submit a Full Application. Topic Areas 2.1 and 3.1 SIPS applications must resubmit their LOI again as a concept paper by the concept paper deadline above to clear an administrative software restriction of EERE Exchange. 	3:00pm ET
Submission Deadline for Full Applications and SIPS Applications:	(b) (5)
Expected Submission Deadline for Replies to Reviewer Comments:	August 2 nd , 2018, 3:00pm ET
Expected Timeframe for EERE Selection Notifications:	September 2018

Topic 1 Advanced Solar Systems Integration Technologies

The Systems Integration (SI) subprogram supports early-stage research and development that advances the reliable, resilient, secure and affordable integration of solar energy onto the U.S. electric grid. For more in-depth discussion of solar grid integration, please visit "Solar Grid Integration" <u>https://energy.gov/eere/solar/downloads/technical-background-2018-seto-funding-opportunity-announcement</u>.

In 2011, solar power comprised less than 0.1% of the U.S. electricity supply with an installed capacity of just 1.2 gigawatts (GW). Solar now supplies nearly 2% of the annual U.S. electricity demand¹ with an installed capacity of roughly 47 GWs², and is continuing to grow. According to U.S. Energy Information Administration (EIA), in some states and regions, solar represents up to

¹ U.S. Energy Information Administration (EIA), Electric Power Monthly with Data for November 2017, published in January 2018. <u>https://www.eia.gov/electricity/monthly/current_month/epm.pdf</u>

² Source: Solar Energy Industries Association (SEIA), <u>http://www.sela.org/</u>

15% of total annual electricity generation. Instantaneous solar generation can reach a much higher level, more than 40% in some cases.³



Figure 1: For the first time, in March 2017 solar supplied 2% of the U.S. electricity demand, while wind and solar combined accounted for 10% of the U.S. electricity generation. (Source: EIA)

As the penetration of solar energy on the grid continues to increase, it becomes imperative to identify the associated technical, economic and regulatory challenges, and to develop impactful solutions in order to ensure compatibility with the existing grid and a smooth transition to a secure, reliable and resilient grid of the future.

Traditional grid 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 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 customers to manage their electricity use and participate in markets, and provide strong protection against physical and cyber risks.

The current business-as-usual trajectory for the electric industry will not result in a timely transition to a modernized grid⁴. Since large investments in the past and today in the nation's electric grid infrastructure will remain in service for decades, it is important that the U.S. make

³ For example, in the California Independent System Operator (CAISO) Monthly Renewables Performance Report, the 5-minute market data shows that at the maximum solar served almost 45% of the load in September 2017. See http://www.caiso.com/Documents/MonthlyRenewablesPerformanceReport-Nov2017.html

Department of Energy Grid Modernization Multiyear Program Plan (MYPP)

smart decisions to invest in enabling and forward-looking technologies that will support the creation of a modern grid infrastructure in the coming years. There is a critical need to foster innovations and new technology adoptions by decreasing regulatory, market and business model uncertainties, demonstrating technology maturity and reducing implementation risks.

The Department of Energy's Grid Modernization Initiative⁵, is a cross-cutting effort that aligns grid modernization efforts across the multiple DOE Program Offices. As part of the Grid Modernization Initiative (GMI), the SI subprogram supports targeted technology research and development (R&D) that addresses the technical challenges with achieving higher solar penetration, while supporting a safe, reliable, secure and cost-effective electric power system.

More broadly, the Grid Modernization Initiative focuses on the development of holistic solutions for the grid of the future. Several key technology areas have been identified in the Grid Modernization Multi-Year Program Plan (MYPP)⁶:

- Devices and Integrated Systems Testing;
- Sensing and Measurements;
- Systems Operations, Power Flow and Control;
- Design and Planning Tools;
- Security and Resilience; and
- Institutional Support.

Progress in all of these areas is considered crucial for the effective grid integration of solar energy and modernization of the grid, as illustrated in Figure 2. A specific focus of the SETO Systems Integration subprogram includes understanding the impacts of increasing penetration of solar energy on grid reliability and power quality, developing best practices for interconnecting and integrating solar with energy storage and synergistic technologies, addressing the variability of solar generation, researching power electronic technologies for flexible power flow control, enhancing situational awareness of solar generation at the grid edge and informing the standardization of interconnection, interoperability, and cybersecurity for PV and other distributed energy resources (DER) systems. Taking these all together, the goal is to advance the knowledge-base and the ability to integrate solar generation, at scale, into electric transmission and distribution systems in a cost-effective, secure, and reliable manner.

⁵ Accessed 01 November 2017, <u>https://energy.gov/under-secretary-sclence-and-energy/grid-modernization-initiative</u>

⁶ Department of Energy Grid Modernization Multiyear Program Plan (MYPP), Accessed 01 November 2017, https://energy.gov/downloads/grid-modernization-multi-vear-program-plan-mypp



Figure 2: Illustration of high level solar penetration in a modernized electricity power system.

In this FOA the SETO Systems Integration subprogram seeks to fund research in the following topic areas:

- Adaptive Solar Grid Integration;
- Solar Observability;
- Solar + X; and
- Innovative Pathways.

Modernizing the grid also requires a workforce capable of understanding and managing this dynamic and digital environment. For those interested in developing proposals related to training the digital grid workforce of the future, please refer to Topic 4 of this FOA.

Topic 1.1 Adaptive Solar Grid Integration

This topic will support applications to research and field validate innovative technologies that enable distributed solar photovoltaic (PV) to contribute to grid reliability and resilience by providing solar dispatchability and grid-support functions—Including energy, capacity, and reliability and resilience services. These technologies can be deployed throughout the electric distribution system. The approaches will focus on developing flexible interconnection requirements and dynamic hosting capacity concepts for solar PV as opposed to today's prevalent "firm" interconnection requirements and static hosting capacity planning. It is expected that the same design concepts will be applicable for energy storage and other distributed energy resources (DERs), Through the intelligent control of the distributed assets,

flexible interconnection requirements can increase the overall hosting capacity for solar and DERs in the distribution system, support diverse customer interconnection choices, improve system reliability and resilience, and reduce PV curtailment. Applications must consider diverse DER options (e.g. PV, energy storage, flexible load) available as well as power systems engineering alternatives, and demonstrate the benefits of the proposed technologies in the hosting capacity analysis. It should also be shown in these solutions how a fleet of PV systems from multiple customers at multiple locations will be able to respond to fast changing conditions under normal operations and provide power to critical loads during grid outages – with consideration of other DER options and distribution system constraints. Example projects may include, but are not limited to, control hardware and software innovations for smart PV inverters and DER management system (DERMS) that allow more flexibility to interconnection and operation of small scale PV and other DER systems.

Topic 1.2 Solar Observability

This topic will support applications to research, develop and validate observability or situational awareness technologies at the grid edge to support planning and operation with high PV penetration. Primary focus areas include PV-integrated sensor technologies, secure and robust communication, advanced data analytics (including machine learning) and detection of cyber-intrusion. Projects may also be considered with secondary focus areas, which enhance gridedge observability of solar systems by integration with additional planning, operations and business unit systems. All applications should have an assessment of economic viability of the system or component in the application and as part of the project.

Topic 1.3 Solar + X

This topic will support applications to research and field validate innovative approaches to Integrate Behind-the-Meter (BTM) solar PV with synergistic technologies (including but not limited to energy storage, building controls, demand response, electric vehicles, and other DERs) to support dispatchability and provide grid services - including energy, capacity, and reliability and resilience services – as a single control point. Projects will focus on research and development in control coordination and optimization of BTM customer-owned and co-located behind a single (master) meter: PV, storage, and other DER assets in response to broader system-wide conditions, with key interest in utilizing DER assets to provide critical power during outages. Projects may consider traditional "firm" DER interconnection requirements as well as emerging flexible interconnection approaches (such as those sought in Topic 1.1) and innovative compensation mechanisms. In an effort to minimize the overall system cost for solar integration arising from new hardware deployment, such as battery storage, , applicants are encouraged to consider how solar and load estimation, advanced data analytics, and artificial intelligence can be utilized in the operations of their proposed systems. All Applicants should have an assessment of economic viability of the system or component in the application as part of the project.

Topic 1.4 Innovative Pathways: Systems Integration

This topic will explore innovative approaches and models to accelerate the transfer of systems integration and related technologies from the lab into the real world. Rather than funding

research on individual technology solutions directly, applicants will research and develop new methods to advance research portfolios of solar (and related) technologies and overcome challenges endemic to the solar technology transfer space, including knowledge gaps between the research/industrial communities and constraints on access to necessary resources. Applicants must demonstrate a realistic pathway to test, scale and sustain the model after the period of performance. Potential areas of interest include, but are not limited to, models to deploy alternative capital (e.g., local public-private partnerships, foundations) for technology R&D or transfer, structures to incentivize industry-researcher collaboration, approaches to lower barriers such that new entrants can leverage existing facilities, data and build capacity (e.g., dormant manufacturing capacity or underutilized laboratory space), and methods to drive down the cost and accelerate processes around hardware validation and certification.

A. Description/Background

This Funding Opportunity Announcement (FOA) is being issued by the U.S. Department of Energy's (DOE), Office of Energy Efficiency and Renewable Energy (EERE), Solar Energy Technologies Office (SETO). This section describes the overall goals of SETO and the type of projects that are being solicited for funding support through this FOA.

In 2016, solar power surpassed 1% of annual electricity supply in the United States for the first time, and the Energy Information Administration projects that solar will grow to 5% of U.S. electricity by 2030.⁷ Further, if the price of solar electricity and/or energy storage declines more rapidly than projected, that percentage could be even higher.⁸ But solar is more than just a source of affordable electricity; it also provides the potential to improve grid reliability and resilience, increase employment,⁹ create business opportunities, increase energy diversity, and provide environmental benefits.

The mission of the Solar Energy Technologies Office (SETO) is to support early-stage research and development to improve the performance and flexibility of solar technologies that contribute to a reliable and resilient U.S. electric grid. The office invests in innovative research efforts that securely integrate more solar energy into the grid, enhance the use, storage and dispatch of solar energy, and lower solar electricity costs.

SETO focuses on two different solar energy technologies: photovoltaic (PV) technologies that directly convert sunlight into electricity, typically via a semiconductor, and concentrating solar thermal power (CSP) technologies that convert sunlight to heat, which can be converted or stored until needed, and then used to generate electricity or provide other energy services. Because sunshine varies with the time of day, location, and season, solar power systems must be paired with adaptive loads, other sources of power, or energy storage to deliver electricity whenever it's needed. This dependency reduces the value of solar power systems once solar starts to supply a significant fraction of the electricity within a given region and highlights the need for a focus on addressing grid integration challenges.

SETO, in partnership with other offices at DOE, launched the SunShot initiative in February 2011 with the goal of solar electricity becoming price-competitive with

⁷ U.S. Department of Energy, Energy Information Administration, International Energy Outlook 2017, DOE/EIA-0484 (2017).

⁸ P.A. Basore and W.J. Cole, "Comparing supply and demand models for future photovoltaic power generation in the USA," submitted to *Progress in Photovoltaics: Research and Applications*, 2017.

⁹ The Solar Foundation, National Solar Jobs Census, 2010 – 2016.

conventional utility sources by 2020.¹⁰ The SunShot 2020 goal has already been achieved for utility-scale PV, and with continued effort, it is likely to be achieved for grid-tied solar applications. As a result of this tremendous progress and in response to the growing deployment of solar in the U.S., SETO is increasing its focus on addressing the challenges related to seamlessly integrating high penetrations of solar energy onto the nation's electricity grid. Additionally, SETO set 2030 cost targets to further reduce the cost of solar electricity across all market sectors, which would make solar one of the most affordable sources of electricity and enable a substantial fraction of U.S. electricity demand to be supplied by solar technology.¹¹ The targets for the unsubsidized cost of electricity at the point of grid connection in a location with average U.S. solar resources are 3¢ per kilowatt-hour (kWh) for utility-scale photovoltaics, 4¢ per kWh for commercial rooftop photovoltaics, 5¢ per kWh for residential rooftop photovoltaics, and 5¢ per kWh for concentrating solar power with thermal energy storage.

By supporting early-stage research across the solar energy technology space through this FOA, SETO can foster innovation and enable integrated multi-technology solutions that can advance the widespread adoption of solar power while securely integrating it into the nation's energy grid.

Topic 1: Advanced Solar Systems Integration Technologies describes SETO research priorities in the seamless integration of high penetrations of solar energy onto the nation's electricity grid. Responsive projects would advance the prediction, monitoring, and control of solar power production, the capabilities of solar power electronics and the integration of solar energy with synergistic technologies.

Topic 2: Concentrating Solar Thermal Power Research and Development describes SETO research priorities that support solar technologies that focus sunlight to generate and store high-temperature heat for electricity generation and other end uses. Responsive projects would contribute to increasing solar power adoption and grid reliability often through combined power and storage.

Topic 3: Photovoltaic Research and Development describes SETO research priorities that support the further development of photovoltaic technologies that improve system reliability, annual energy yield, demonstrate performance of novel PV devices and develop new PV materials. Responsive projects would directly contribute to increasing PV affordability through continuous improvements in PV efficiency and reliability. SETO's work ensures that a pipeline of innovation continues to reduce PV system cost, increase power conversion efficiency, and reduce supply-chain capital expense.

¹⁰ SunShot Vision Study, NREL Technical Report DOE/GO-102012-3037, 2012.

¹¹ U.S. Dept. of Energy, The SunShot Initiative's 2030 Goal: 3¢ per Kilowatt Hour for Solar Electricity, 2016.

Topic 4: Improving and Expanding the Solar Industry through Workforce Initiatives describes SETO research priorities that support solar workforce development. Responsive projects would focus on increasing the size of the pipeline of skilled workers being employed by the solar industry while simultaneously working to increase the participation of veterans and other talent pools, providing increased value to the solar industry as a whole.

SETO's funding supports U.S. leadership in solar technology R&D by funding the next generation of innovative technologies and by developing domestic research talent.

Historically, SETO has released separate funding opportunities that address specific stages and types of solar research. For the first time, this funding program combines SETO funding efforts into one FOA for fiscal year 2018 (FY2018). Subject to availability of funds appropriated by Congress for the purpose of this program, the availability of future-year budget authority, and approval, SETO intends to adjust topic descriptions and reopen this funding program for new applications each year relatively soon after budget guidance has been provided. By providing a more streamlined and consistent FOA strategy SETO hopes to further accelerate the advancement of solar research.

Rodriguez, Susan (CONTR)

From: Sent: To:	Fitzsimmons, Alexander Wednesday, July 25, 2018 9:19 AM Jereza, Catherine
Subject:	RE: SETO Topic 1 and WPTO Topic 2.2: OE Coordination and Topic Descriptions
After the appointee	neeting works. Thanks!
From: Jereza, Cather	lne
Sent: Wednesday, Ju	ly 25, 2018 12:19 PM
To: Fitzsimmons, Ale	xander <alexander.fitzsimmons@ee.doe.gov></alexander.fitzsimmons@ee.doe.gov>
Subject: RE: SETO To	pic 1 and WPTO Topic 2.2: OE Coordination and Topic Descriptions
Sure – can we catch (up around 4 or after the appointee meeting?
From: Fitzsimmons, /	Alexander
Sent: Wednesday, Ju	ly 25, 2018 11:42 AM
To: Jereza, Catherine	<catherine.jereza@hg.doe.gov></catherine.jereza@hg.doe.gov>
Subject: RE: SETO To	pic 1 and WPTO Topic 2.2: OE Coordination and Topic Descriptions
Can we chat about th	nis?
From: Unruh, Timoth	ıy
Sent: Wednesday, Ju	ly 25, 2018 11:39 AM
To: Jereza, Catherine	< <u>Catherine.Jereza@Hq.Doe.Gov</u> >
Cc: Pesin, Michael <	<u>Aichael.Pesin@hq.doe.gov</u> >; Fitzsimmons, Alexander < <u>Alexander.Fitzsimmons@ee.doe.gov</u> >
Subject: SETO Topic	1 and WPTO Topic 2.2: OE Coordination and Topic Descriptions

In my review of two FOA efforts with Cathy Tripodi on Monday, she wanted your thoughts on i) the analysis proposed by the Water Power Technology Office's (WPTO) TOPIC 2.2, attached, and, ii) your knowledge on WPTO and Solar Energy Technology Office's (SETO) coordination with OE.

She has requested a meeting for Friday, but I wanted to get you the information prior to the meeting. Let me know if you have questions. Below is a summary of the coordination history and plans as reported from each office for your reference.

Solar Office

- SETO worked closely with Gil Bindewald (OE) on the subtopics and specific language of topic 1 of the FOA.
- SETO requested OE involvement in the review process, but so far OE staff have been unable to participate due to other work commitments.
- SETO will be requesting OE to be part of the Federal Consensus Panel that recommends the selections for the FOA. That panel meets in late August.

Water Office

• Water Power Technologies Office / Hydropower Program has engaged OE on program-level development and strategy for the hydropower grid topics in this FOA.

- For example, OE staff reviewed the hydropower RFI that issued in February; OE staff are a part of the informal DOE advisory group convened regularly to review current and planned activities including this FOA; and WPTO has made concerted outreach to OE staff to engage on strategy (Gil Bindewald).
- In addition, WPTO has spoken with OE staff on specific topics, including (b) (5)

- -

- Notably, WPTO director Alejandro Moreno and OE DAS Michael Pesin co-convened a briefing on July 11 to discuss the Energy Storage Program's storage valuation program, as the OE program has invested in economic analytical tools which are currently used by WPTO to evaluate pumped storage hydropower.
- WPTO will invite OE staff to participate in merit review of the FOA and intends to continue to brief OE staff for coordination.

Rodriguez, Susan (CONTR)

From:	Jereza, Catherine
Sent:	Wednesday, July 25, 2018 9:31 AM
То:	Gilbert Bindewald III (Gilbert.Bindewald@hq.doe.gov);Pesin, Michael
Subject:	FW: SETO Topic 1 and WPTO Topic 2.2: OE Coordination and Topic Descriptions
Attachments:	1836 FOA - SMH_PSH - Mgmt Review - Topic 2.2.docx; DE-FOA-0001840_SETO_FY18
	_FOA_TOPIC 1 Systems Integration.docx

Hi Gil - I believe you mentioned this is much improved since last year, which is terrific! But in the spirit of keeping our coordination moving in a positive direction we're doing a reality check on Friday.

I'd like to focus on what's working and any points you feel were left unresolved that perhaps I need to push on because we really need it to happen.

Can we talk sometime beforehand? The meeting is at 1pm, Fri.

Thanks! Katie

From: Unruh, Timothy

Sent: Wednesday, July 25, 2018 11:39 AM

To: Jereza, Catherine <Catherine.Jereza@Hq.Doe.Gov>

Cc: Pesin, Michael <Michael.Pesin@hq.doe.gov>; Fitzsimmons, Alexander <Alexander Fitzsimmons@ee.doe.gov> **Subject:** SETO Topic 1 and WPTO Topic 2.2: OE Coordination and Topic Descriptions

In my review of two FOA efforts with Cathy Tripodi on Monday, she wanted your thoughts on i) the analysis proposed by the Water Power Technology Office's (WPTO) TOPIC 2.2, attached, and, ii) your knowledge on WPTO and Solar Energy Technology Office's (SETO) coordination with OE.

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- WPTO will invite OE staff to participate in merit review of the FOA and intends to continue to brief OE staff for coordination.

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

"Innovative Design Concepts for Standard Modular Hydropower and Pumped-Storage Hydropower"

Funding Opportunity Announcement (FOA) Number: DE-FOA-0001836 FOA Type: Initial

CFDA Number: 81.087

FOA Issue Date:](b) (5
FOA Informational Webinar (Topic Areas 1 and 2):	1
Standard Modular Hydropower Resources Webinar (Topic Area 1 Only):	7
Submission Deadline for Concept Papers:	
Submission Deadline for Full Applications:	
Expected Submission Deadline for Replies to Reviewer Comments:	-
Expected Date for EERE Selection Notifications:	7
Expected Timeframe for Award Negotiations	

B. Topic Area 2 – New Use Cases for Pumped-Storage Hydropower

1. Background

Pumped storage hydropower comprises over 95% of the electrical energy storage in the United States today. Despite its significant contribution to grid-scale storage, new pumped storage hydropower plants are not being built in the U.S. Only one new pumped storage facility has been built since 1970, despite dramatic increases in storage supportive policies in the last ten years.¹ Existing pumped storage operations are shifting to adapt to new resources, market structures, demand patterns, and pricing signals.² Pumped storage technology in conventional configurations and uses (e.g. multi-hundred megawatt open- and closed-loop configurations) are complex, custom-designed civil engineering projects which may entail significant regulatory, cost, schedule, and geotechnical risks.

Critical limitations to new development include:

 Certainty on return on investment: It is not clear how to evaluate the revenue opportunities of a large storage asset on a forward basis. Establishing investment

¹ Cite Market Report for 1970 date, cite storage policy data.

² Reference Hydropower Vision, RFI responses, Market Report and PSH website

certainty over the lifetime of the asset is particularly difficult, compounded by the unpredictability evidenced by the rapid change in the electric system. Most utility and system planning timeframes are only about 20 years. In addition, pumped storage assets, due to their large generating and storage capacity, have the potential to influence market prices as price-makers rather than price-takers, which complicates how market operators interact with and take advantage of these assets. Modeling efforts for storage have advanced, and a recently established project within the Water Power Technologies Office will focus exclusively on improving the practice of valuation for pumped storage.

- Length of time to commissioning: The timeframe from site design to commissioning, including permitting, is over 10 years. This presents a significant competitive disadvantage to pumped storage, as the delay prevents developments from responding to a current system opportunity. The lack of certainty for return on investment is even further diminished by needing insight into long-term revenue streams beginning at least 10 years from project initiation. In comparison, provided the controls and communications are established, today's battery storage technologies can be sited and commissioned in less than a year.
- High initial and total capital costs: As the electricity system undergoes a transformation, grid-supporting technologies will be required. Supporting technologies on a bulk system scale with transmission-level commitments are evaluated and planned for, but rarely constructed. A portion of this challenge is structural: the significant upfront capital costs of very large supporting assets presents initiation risk and drives decisions toward incremental commitments. Over its lifetime, pumped storage assets may be very cost effective, but they still require substantial initial investment. To meaningfully drive down the total cost of pumped storage, technology and structural strategies must achieve reductions in the initial costs for project development.
- Siting opportunity and available value streams: The typically large scale of pumped storage technologies will push development toward large water bodies and locational coincidence of substations for interconnection opportunities. There are several other considerations to siting a pumped storage system that will affect costs and timelines, including environmental effects, scaled development, and integration with other infrastructure to access new revenues and benefits beyond traditional electricity revenues.

2. Description

To address the critical barriers mentioned above, Topic Area 2 explores new use cases for pumped storage hydropower that can improve electricity system resilience, reliability, and economics. Applicants are expected to propose innovative technology concepts, analysis, or enhanced modeling capabilities that define a new, updated role for pumped storage in the evolving electricity system in the United States.

This Topic Area is aligned with WPTO's new grid research initiative to focus investments on innovations which will optimize hydropower resources for a secure, sustainable,

cost-effective, and reliable electricity system, and responds to FY18 Congressional direction to offer a competitive funding opportunity for pumped storage hydropower. This Topic Area is also consistent with DOE's Beyond Batteries initiative, which drives technology beyond cost reductions toward improved performance and enhanced provision of services to the grid.

This Topic Area also builds on a previous FY2016 FOA, DE-FOA-0001455, which issued four awards for new pumped storage innovations that met specific technology characteristics, with the comparable goal of reducing pumped storage costs and timelines. The new emphasis in this FOA, however, is on an increase in value rather than a reduction in levelized costs.

WPTO is therefore soliciting applications for awards in two sub-topic areas:

- Sub-topic 2.1 Innovative conceptual designs for pumped storage systems
- Sub-topic 2.2 Modeling and analyzing the role of pumped storage in asset and system optimization
- a. <u>Sub-topic 2.2: Modeling and Analyzing the Role of Pumped Storage in Asset and</u> <u>System Optimization</u>

This sub-topic will support analysis of the technical capabilities of pumped storage to improve electricity system resilience, reliability, and economic efficiency, or to improve the performance of other grid assets. For example, modeling enhancements or analysis could explore the ability of storage to support system-wide strategies to manage fast ramps or high peak loads or investigate operational connections between storage and other grid assets such as solar photovoltaic (PV) or wind energy.

Among the family of storage technologies available and pre-commercial today, pumped storage hydropower facilities have distinguishing attributes. Pumped storage is the only storage technology capable of operating at the transmission level. It is capable of generating energy over a substantial duration of time, of providing high-volume injection or absorption of electricity, and of providing a broad range of essential grid reliability services.

Constructed mostly in the 1960s and 1970s, existing pumped storage hydropower plants were originally designed and optimized for daily energy shifting – pumping water from a lower elevation reservoir to a higher elevation reservoir during low load hours and generating during high-load hours when electricity is in greatest demand – to support continuous and efficient operation of large thermal generation resources.

However, this business model is changing. Today, pumped storage hydropower plants across the country are shifting to new operational paradigms. For certain pumped storage facilities, price swings in the last five years have resulted in an inversion of the traditional pumping-generating pattern, now pumping during the day and generating at

night, as evidenced by the submissions to the WPTO's DE-FOA-0001886: Expanding Hydropower and Pumper Storage's Contribution to Grid Resliency and Reliability Request for Information. In other instances, the timescale is fundamentally different. The traditional daily cycle of high- and low-load is no longer the primary operational driver; instead pumped storage hydropower is used for peak-shaving, intra-hour reliability requirements, or ramping.

If these trends continue, certain price and demand patterns are likely to emerge, some with significant consequences for large-scale storage. Projections from a recent study anticipate higher volatility in prices, very low value energy prices, higher premlums on flexibility and capacity, and inverse pricing spreads over the course of a day to a season. These changes may ripple effects beyond traditional procurement of electricity as energy, capacity, and ancillary services. For example, system operators may increasingly utilize pumped storage facilities as part of the transmission system, to manage transmission utilization and congestion. There are outstanding questions regarding about how well storage assets are afforded access to markets, given their unique operating characteristics, and under what circumstances a storage asset can provide both generation and transmission benefits without compromising market principles.

The optimal future role of pumped storage, both existing and proposed, is still not wellunderstood. Pumped storage assets can provide a broad range of benefits to the grid and to other assets, but a complete perspective of all of these benefits is rarely illustrated. Typically pumped storage benefits are evaluated at a portfolio-level for a specific purpose, such as transmission planning or resource adequacy over 10-20 years, which does not capture the full operational life (50-60 years) of a pumped storage plant. Capacity and transmission expansion models do not capture many of the services that pumped storage can provide and often overlook externalities. The analytical record is particularly shallow in evaluating pumped storage benefits to other grid assets, due in part to complexity and availability of comprehensive data.

In some instances, a complete perspective on value of pumped storage is limited by the lack of independent, real-world analyses that can be directly applied or used as reference cases. In others, the challenge is rooted in the current tools utilized within operations and planning practices. Models commonly employed in the electric power sector may not be well adapted to effective evaluation of pumped storage solutions, especially advanced technologies that permit even greater operational flexibility.

Technology innovations for pumped storage have focused on increasing plant flexibility with variable speed pumps and ternary (hydraulic bypass) systems. Proposed pumped storage developments may still be designed with fixed-speed pump design due to cost differential for the upgraded systems and uncertainty about the return on investment of utilizing the potential flexibility afforded by more innovative technologies. In addition, it is not clear whether the same technical benefits of flexibility can be achieved between

pumped storage plants and other mechanisms, such as an aggregation of smaller storage solutions or market expansion and design.

Therefore, to reduce the uncertainty regarding future investments and illustrate the value of storage at the bulk scale, this FOA invites applications for analyses and modeling enhancements that would collectively advance an understanding of the capabilities of pumped storage hydropower in electric system optimization or optimization of other grid assets, inclusive of generation and transmission.

This Sub-topic is intended to recruit applications for:

- (1) Analyses that would illustrate to what extent, and in which cases, pumped storage hydropower can provide one or more specific material optimization benefits to electric system performance and/or other specific grid assets, or
- (2) Modeling enhancements that would make the benefits of pumped storage hydropower more visible, more effectively analyzed, or possible within existing electric system operations and planning practices.

Applications in this sub-topic should evaluate the potential for pumped storage hydropower to provide one or more specific benefits that accrue either to the system or to other assets, in particular benefits that are currently not well understood. An application must articulate its additional value to the current state of knowledge, and make explicit any linkages to benefits to other grid assets. Example linkages include transmission utilization improvements, operating in tandem within the same control footprint, or an adjustment in the merit order (generating stack) that helps other plants operate more efficiently, reduces wear and tear on other machines, uses less fuel, or reduces environmental impacts. Applications should select a real system, rather than theoretical systems and assets, at a meaningful scale. Benefits should be measurable and linked to grid properties such as resilience, reliability, sustainability, or economic efficiency. Table 3 below outlines the requirements for proposed analyses.

Proposed modeling enhancements should address gaps in effective characterization of new advanced pumped storage or full utilization of pumped storage assets. Applications for modeling enhancements should use the gaps analysis provided in [Appendix F] as a guideline for focus areas with the greatest need and the greatest opportunity for impact. The proposed enhancement is not required to be open source in order to be eligible for award under this sub-topic. However, applications should strike a balance between two objectives: *impact* (that at the conclusion of the work, the enhancement will be used and useful) and *availability* (that others can access the enhancement and understand how well it works without excessive cost).

Applications for modeling enhancements should incorporate operations and planning entities that would take advantage of such enhancements as part of the project team. If the proposed work involves a new feature of an existing model under commercial license, applicants should include a demonstration of support or engagement with the

owner of that model. Applicants are strongly encouraged to incorporate partners and stakeholders into the proposed work beyond a demonstration of support.

Responsive applications will:

- Identify how the analysis or modeling enhancement meets the requirements established in Table 3 below or in modeling enhancements Appendix F;
- Demonstrate that the analysis or modeling enhancement would produce an innovative result or an innovative approach within the execution of the work;
- Propose work that will have a substantial, measurable impact on advancing an understanding of the full suite of benefits of pumped storage hydropower; and
- Propose a plan to disseminate the analysis or modeling enhancement to as wide an audience as possible (e.g., publication in the open literature, open source licensing, commercial licensing).

To gauge the extent to which modeling gaps are being addressed, WPTO intends to manage these projects as a portfolio, both in the selection process and during the period of performance. The portfolio of projects may include work being/to be performed at the National Labs and other entities.

Data choice	Data should be appropriate for the work-product goals. For instance, analytical work that focuses on curtailment reduction should use load and variable generation forecasts and operating data that accurately capture curtailment challenges.
Project Team	Where an analysis would describe the optimization of an asset or a system, the project team should include the owner or operator of that asset or system, at minimum evidenced by a letter of support. Applicants are strongly encouraged to incorporate partners and stakeholders into the proposed work beyond a demonstration of support.
Benefits	Benefits must be measurable and linked to grid properties such as resilience, reliability, sustainability, or economic efficiency. For economic benefits, the results should clearly show the lasting value provided to all stakeholders – measured by net benefits such as lower electricity cost, efficient utilization of renewables and load, and others as applicable.
Assumptions and Definitions for Proposed Analysis	 Analyses should be representative of a real system, rather than theoretical systems and assets.

Table 3: Requirements for Proposed Analysis

 The analysis baseline should be representative of existing or expected near-term conditions (e.g., 2020 RPS-based generation)
mix).
 Models used to represent variable generation (e.g., wind and PV solar) should be realistic in terms of generation mix as well as spatial and temporal accuracy (e.g., the variability is not over- or
under-represented, plant siting does not skew the results).
 The approach to generator retirement should be clearly stated (e.g., if additional generation is added to a model, is some of the existing generation retired, and if so, how were the retirement choices determined?).
 The underlying generation mix assumptions for forward-looking grid representations should be clearly defined (e.g., scenario X captures 2030 RPS requirements, scenario Y increases the amount of renewable generation from the current 20% on an annual energy basis to 40%).
 Where unexpected forced outages are used in the analysis or modeling efforts, the nature of the forced outage should be described (e.g., fixed in time and amplitude across scenarios or varies from scenario to scenario).
 The relevant geographic region should be clearly defined along with the regions connections and reliance on surrounding systems. The remember gain for the begoling and each second is a band be.
 The generation mix for the baseline and each scenario should be clearly identified by generation type (e.g., airframe-derivative, open cycle combustion turbines) and capacity. The generation mix of interconnected systems to the relevant region should also be reported.
 The flexibility assumptions (e.g., ramp rate per minute as a percentage of rated capacity, minimum stable level, and start time) for each type (and size class, if applicable) of generation should be clearly stated.
 The capacity reserve for the system (and each scenario or sensitivity) should be clearly stated.
 Peak variable generation penetration should be reported both in terms of time of occurrence and percent of peak load.
 The type of pumped storage hydropower technology should be clearly defined (synchronous, inverter-based, variable speed pumping, and so forth).

i. Work to be Conducted

At the end of the period of performance:

- Analysis: Awardees will produce a detailed, written technical report that describes the project team, data inputs, methodological approach, tools and models utilized, results of the analysis, dissemination plans, challenges in executing the work, and remaining gaps. All projects awardees will present publicly-sharable results in-person to WPTO and involved national laboratories at project conclusion at a summit event.
- Modeling enhancement: Awardees will produce a detailed written technical report that describes the modeling enhancement, its applicability and effect, dissemination and engagement, and remaining gaps. If the work is opensource, additional requirements for disposition of source code may apply. All applicants should anticipate provisions relating to Intellectual Property (IP) as part of award negotiation. All awardees will demonstrate the modeling enhancements in-person to WPTO and involved national laboratories at project conclusion.

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

Solar Energy Technologies Office (SETO) FY2018 Funding Opportunity Announcement (FOA)

FOA Number: DE-FOA-0001840

FOA Issue Date:	April 17th, 2018	
Submission Deadline for Letter of Intent (LOI):	May 4 th , 2018,	
	3:00pm ET	
Informational Webinar: Visit EERE exchange FOA description for details regardir registration	ig webinar timing and	
Submission Deadline for Concept Papers:	May 9th, 2018,	
 Applicants must submit a Concept Paper by 3:00pm ET on the due date listed above to be eligible to submit a Full Application. Topic Areas 2.1 and 3.1 SIPS applications must resubmit their I.OI again as a concept paper by the concept paper deadline above to clear an administrative software restriction of EERE Exchange. 	3:00pm ET	
Submission Deadline for Full Applications and SIPS Applications:	(b) (5)	
Expected Submission Deadline for Replies to Reviewer Comments:	August 2 nd , 2018, 3:00pm ET	
Expected Timeframe for EERE Selection Notifications:	September 2018	

Topic 1 Advanced Solar Systems Integration Technologies

The Systems Integration (SI) subprogram supports early-stage research and development that advances the reliable, resilient, secure and affordable integration of solar energy onto the U.S. electric grid. For more in-depth discussion of solar grid integration, please visit "Solar Grid Integration" <u>https://energy.gov/eere/solar/downloads/technical-background-2018-seto-funding-opportunity-announcement</u>.

In 2011, solar power comprised less than 0.1% of the U.S. electricity supply with an installed capacity of just 1.2 gigawatts (GW). Solar now supplies nearly 2% of the annual U.S. electricity demand¹ with an installed capacity of roughly 47 GWs², and is continuing to grow. According to U.S. Energy Information Administration (EIA), in some states and regions, solar represents up to

¹ U.S. Energy Information Administration (EIA), Electric Power Monthly with Data for November 2017, published in January 2018. <u>https://www.eia.gov/electricity/monthly/current_month/epm.pdf</u>

² Source: Solar Energy Industries Association (SEIA), <u>http://www.seia.org/</u>

15% of total annual electricity generation. Instantaneous solar generation can reach a much higher level, more than 40% in some cases.³



Figure 1: For the first time, in March 2017 solar supplied 2% of the U.S. electricity demand, while wind and solar combined accounted for 10% of the U.S. electricity generation. (Source: EIA)

As the penetration of solar energy on the grid continues to increase, it becomes imperative to identify the associated technical, economic and regulatory challenges, and to develop impactful solutions in order to ensure compatibility with the existing grid and a smooth transition to a secure, reliable and resilient grid of the future.

Traditional grid 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 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 customers to manage their electricity use and participate in markets, and provide strong protection against physical and cyber risks.

The current business-as-usual trajectory for the electric industry will not result in a timely transition to a modernized grid⁴. Since large investments in the past and today in the nation's electric grid infrastructure will remain in service for decades, it is important that the U.S. make

³ For example, in the California Independent System Operator (CAISO) Monthly Renewables Performance Report, the 5-minute market data shows that at the maximum solar served almost 45% of the load in September 2017. See http://www.caiso.com/Documents/MonthlyRenewablesPerformanceReport-Nov2017.html

⁴ Department of Energy Grid Modernization Multiyear Program Plan (MYPP)
smart decisions to invest in enabling and forward-looking technologies that will support the creation of a modern grid infrastructure in the coming years. There is a critical need to foster innovations and new technology adoptions by decreasing regulatory, market and business model uncertainties, demonstrating technology maturity and reducing implementation risks.

The Department of Energy's Grid Modernization Initiative⁵, is a cross-cutting effort that aligns grid modernization efforts across the multiple DOE Program Offices. As part of the Grid Modernization Initiative (GMI), the SI subprogram supports targeted technology research and development (R&D) that addresses the technical challenges with achieving higher solar penetration, while supporting a safe, reliable, secure and cost-effective electric power system.

More broadly, the Grid Modernization Initiative focuses on the development of holistic solutions for the grid of the future. Several key technology areas have been identified in the Grid Modernization Multi-Year Program Plan (MYPP)⁶:

- Devices and Integrated Systems Testing;
- Sensing and Measurements;
- Systems Operations, Power Flow and Control;
- Design and Planning Tools;
- Security and Resilience; and
- Institutional Support.

Progress in all of these areas is considered crucial for the effective grid integration of solar energy and modernization of the grid, as illustrated in Figure 2. A specific focus of the SETO Systems Integration subprogram includes understanding the impacts of increasing penetration of solar energy on grid reliability and power quality, developing best practices for interconnecting and integrating solar with energy storage and synergistic technologies, addressing the variability of solar generation, researching power electronic technologies for flexible power flow control, enhancing situational awareness of solar generation at the grid edge and informing the standardization of interconnection, interoperability, and cybersecurity for PV and other distributed energy resources (DER) systems. Taking these all together, the goal is to advance the knowledge-base and the ability to integrate solar generation, at scale, into electric transmission and distribution systems in a cost-effective, secure, and reliable manner.

⁵ Accessed 01 November 2017, <u>https://energy.gov/under-secretary-science-and-energy/grld-modernization-initiative</u>

⁶ Department of Energy Grid Modernization Multiyear Program Plan (MYPP), Accessed 01 November 2017, <u>https://energy.gov/downloads/grid-modernization-multi-year-program-plan-mypp</u>



Figure 2: Illustration of high level solar penetration in a modernized electricity power system.

In this FOA the SETO Systems Integration subprogram seeks to fund research in the following topic areas:

- Adaptive Solar Grid Integration;
- Solar Observability;
- Solar + X; and
- Innovative Pathways.

Modernizing the grid also requires a workforce capable of understanding and managing this dynamic and digital environment. For those interested in developing proposals related to training the digital grid workforce of the future, please refer to Topic 4 of this FOA.

Topic 1.1 Adaptive Solar Grid Integration

This topic will support applications to research and field validate innovative technologies that enable distributed solar photovoltaic (PV) to contribute to grid reliability and resilience by providing solar dispatchability and grid-support functions—including energy, capacity, and reliability and resilience services. These technologies can be deployed throughout the electric distribution system. The approaches will focus on developing flexible interconnection requirements and dynamic hosting capacity concepts for solar PV as opposed to today's prevalent "firm" interconnection requirements and static hosting capacity planning. It is expected that the same design concepts will be applicable for energy storage and other distributed energy resources (DERs), Through the intelligent control of the distributed assets,

flexible interconnection requirements can increase the overall hosting capacity for solar and DERs in the distribution system, support diverse customer interconnection choices, improve system reliability and resilience, and reduce PV curtailment. Applications must consider diverse DER options (e.g. PV, energy storage, flexible load) available as well as power systems engineering alternatives, and demonstrate the benefits of the proposed technologies in the hosting capacity analysis. It should also be shown in these solutions how a fleet of PV systems from multiple customers at multiple locations will be able to respond to fast changing conditions under normal operations and provide power to critical loads during grid outages – with consideration of other DER options and distribution system constraints. Example projects may include, but are not limited to, control hardware and software innovations for smart PV inverters and DER management system (DERMS) that allow more flexibility to interconnection and operation of small scale PV and other DER systems.

Topic 1.2 Solar Observability

This topic will support applications to research, develop and validate observability or situational awareness technologies at the grid edge to support planning and operation with high PV penetration. Primary focus areas include PV-integrated sensor technologies, secure and robust communication, advanced data analytics (including machine learning) and detection of cyber-intrusion. Projects may also be considered with secondary focus areas, which enhance grid-edge observability of solar systems by integration with additional planning, operations and business unit systems. All applications should have an assessment of economic viability of the system or component in the application and as part of the project.

Topic 1.3 Solar + X

This topic will support applications to research and field validate innovative approaches to integrate Behind-the-Meter (BTM) solar PV with synergistic technologies (including but not limited to energy storage, building controls, demand response, electric vehicles, and other DERs) to support dispatchability and provide grid services - including energy, capacity, and reliability and resilience services - as a single control point. Projects will focus on research and development in control coordination and optimization of BTM customer-owned and co-located behind a single (master) meter: PV, storage, and other DER assets in response to broader system-wide conditions, with key interest in utilizing DER assets to provide critical power during outages. Projects may consider traditional "firm" DER interconnection requirements as well as emerging flexible interconnection approaches (such as those sought in Topic 1.1) and innovative compensation mechanisms. In an effort to minimize the overall system cost for solar integration arising from new hardware deployment, such as battery storage, , applicants are encouraged to consider how solar and load estimation, advanced data analytics, and artificial intelligence can be utilized in the operations of their proposed systems. All Applicants should have an assessment of economic viability of the system or component in the application as part of the project.

Topic 1.4 Innovative Pathways: Systems Integration

This topic will explore innovative approaches and models to accelerate the transfer of systems integration and related technologies from the lab into the real world. Rather than funding

research on individual technology solutions directly, applicants will research and develop new methods to advance research portfolios of solar (and related) technologies and overcome challenges endemic to the solar technology transfer space, including knowledge gaps between the research/industrial communities and constraints on access to necessary resources. Applicants must demonstrate a realistic pathway to test, scale and sustain the model after the period of performance. Potential areas of interest include, but are not limited to, models to deploy alternative capital (e.g., local public-private partnerships, foundations) for technology R&D or transfer, structures to incentivize industry-researcher collaboration, approaches to lower barriers such that new entrants can leverage existing facilities, data and build capacity (e.g., dormant manufacturing capacity or underutilized laboratory space), and methods to drive down the cost and accelerate processes around hardware validation and certification.

Doc 4

Rodriguez, Susan (CONTR)

From:	Jereza, Catherine
Sent:	Thursday, July 26, 2018 4:26 AM
To:	Bindewald III, Gilbert;Pesin, Michael
Subject:	RE: SETO Topic 1 and WPTO Topic 2.2: OE Coordination and Topic Descriptions

Great. Let's build on the good engagement. I agree - some formalization of roles will is necessary.

Thanksl Katie

From: Bindewald III, Gilbert

Sent: Wednesday, July 25, 2018 8:28 PM

To: Jereza, Catherine <Catherine.Jereza@Hq.Doe.Gov>; Pesin, Michael <Michael.Pesin@hq.doe.gov> Subject: RE: SETO Topic 1 and WPTO Topic 2.2: OE Coordination and Topic Descriptions

On the SETO side, they have been active communicators. Guohui and I have (bi)weekly calls and I plan to participate in their upcoming review process. They have also engaged Dan on the PR modeling work, and I feel want to be genuinely supportive. Only concern(s) given complementary mission objectives is how to formalize roles and appropriate engagement strategy, as well as how to maintain awareness after projects are awarded. That is higher level discussion.

Vehicle and water programs have also engaged, which I think is good.

Michael is back Friday but I might be able to meet before then.

From: Jereza, Catherine <<u>Catherine.Jereza@Hq.Doe.Gov</u>> Date: Wednesday, Jul 25, 2018, 12:30 PM To: Bindewald III, Gilbert <<u>Gilbert.Bindewald@hq.doe.gov</u>>, Pesin, Michael <<u>Michael.Pesin@hq.doe.gov</u>> Subject: FW: SETO Topic 1 and WPTO Topic 2.2: OE Coordination and Topic Descriptions

Hi Gil - I believe you mentioned this is much improved since last year, which is terrific! But in the spirit of keeping our coordination moving in a positive direction we're doing a reality check on Friday.

I'd like to focus on what's working and any points you feel were left unresolved that perhaps I need to push on because we really need it to happen.

Can we talk sometime beforehand? The meeting is at 1pm, Fri.

Thanks! Katie

From: Unruh, Timothy Sent: Wednesday, July 25, 2018 11:39 AM To: Jereza, Catherine <<u>Catherine.Jereza@Hg.Doe.Gov</u>> Cc: Pesin, Michael <<u>Michael.Pesin@hq.doe.gov</u>>; Fitzsimmons, Alexander <<u>Alexander.Fitzsimmons@ee.doe.gov</u>> Subject: SETO Topic 1 and WPTO Topic 2.2: OE Coordination and Topic Descriptions

In my review of two FOA efforts with Cathy Tripodi on Monday, she wanted your thoughts on i) the analysis proposed by the Water Power Technology Office's (WPTO) TOPIC 2.2, attached, and, ii) your knowledge on WPTO and Solar Energy Technology Office's (SETO) coordination with OE.

She has requested a meeting for Friday, but I wanted to get you the information prior to the meeting. Let me know if you have questions. Below is a summary of the coordination history and plans as reported from each office for your reference.

Solar Office

- SETO worked closely with Gil Bindewald (OE) on the subtopics and specific language of topic 1 of the FOA.
- SETO requested OE involvement in the review process, but so far OE staff have been unable to participate due to other work commitments.
- SETO will be requesting OE to be part of the Federal Consensus Panel that recommends the selections for the FOA. That panel meets in late August.

Water Office

- Water Power Technologies Office / Hydropower Program has engaged OE on program-level development and strategy for the hydropower grid topics in this FOA.
 - For example, OE staff reviewed the hydropower RFI that issued in February; OE staff are a part of the informal DOE advisory group convened regularly to review current and planned activities including this FOA; and WPTO has made concerted outreach to OE staff to engage on strategy (Gil Bindewald).
- In addition, WPTO has spoken with OE staff on specific topics, including (b) (5)
 - Notably, WPTO director Alejandro Moreno and OE DAS Michael Pesin co-convened a briefing on July 11 to discuss the Energy Storage Program's storage valuation program, as the OE program has invested in economic analytical tools which are currently used by WPTO to evaluate pumped storage hydropower.
- WPTO will invite OE staff to participate in merit review of the FOA and intends to continue to brief OE staff for coordination.

Doc 5

Rodriguez, Susan (CONTR)

From:	Tripodi, Ca
Sent:	Monday, Ju
То:	Walker, Bru
Subject:	Update: So
Attachments:	Solar Grid

ipodi, Cathy onday, July 30, 2018 1:44 PM alker, Bruce;Lotto, Adrienne;Jereza, Catherine odate: Solar Transmission Grid FOA olar Grid RFP.docx

Hi Bruce, Adrian and Katie:

The solar office has offered to rewrite Topic 1 in their Solar FOA. While it is on the street, we can just do an amendment to change it. Katie and I had reviewed it with the solar Team and we did not understand it and so I was hoping that you all could rewrite it to achieve the grid integration consistent with OEs mission. **Please see** (b) (5) and give me your suggested language as soon as you can. It is approximately \$50 million.

Thank you, Cathy T.

From: Tripodi, Cathy Sent: Monday, July 30, 2018 3:11 PM To: Walker, Bruce <Bruce.Walker@hq.doe.gov>; Lotto, Adrienne <Adrienne.Lotto@hq.doe.gov>; Jereza, Catherine <Catherine.Jereza@Hq.Doe.Gov> Subject: Solar Transmission Grid FOA

Hi Bruce, Adrian and Katie:

There is approximately \$50 million of a solar FOA that includes transmission grid matters. I think OE should have at least 3 people on the review panels. The dates needed for participation are:

(b) (5)

Independent Review Panel Federal Consensus Panel Discussion

Thank you, Cathy T. X65050

From: Unruh, Timothy

Sent: Monday, July 30, 2018 3:02 PM To: Tripodi, Cathy <<u>Cathy.Tripodi@hq.doe.gov</u>> Cc: Jereza, Catherine <<u>Catherine.Jereza@Hq.Doe.Gov</u>>; Fitzsimmons, Alexander <<u>Alexander.Fitzsimmons@ee.doe.gov</u>> Subject: Dates for Solar FOA review

There are two date periods we would like OE participation in for the Solar Program FOA Selection:

(b) (5)

Independent Review Panel Federal Consensus Panel Discussion

Thanks.

Timothy D. Unruh, Ph.D., PE, CEM, LEED AP United States Department of Energy Deputy Assistant Secretary – Renewable Power 1000 Independence Ave SW, Washington, DC 20585 (202) 586-2982 15-16

2

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

Solar Energy Technologies Office (SETO) FY2018 Funding Opportunity Announcement (FOA)

FOA Number: DE-FOA-0001840 CFDA Number: 81.087

Topic 1 Advanced Solar Systems Integration Technologies

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Monthly net electricity generation from selected fuels (Jan 2007 - Mar 2017) share of total electricity generation

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5

research on individual technology solutions directly, applicants will research and develop new methods to advance research portfolios of solar (and related) technologies and overcome challenges endemic to the solar technology transfer space, including knowledge gaps between the research/industrial communities and constraints on access to necessary resources. Applicants must demonstrate a realistic pathway to test, scale and sustain the model after the period of performance. Potential areas of interest include, but are not limited to, models to deploy alternative capital (e.g., local public-private partnerships, foundations) for technology R&D or transfer, structures to incentivize industry-researcher collaboration, approaches to lower barriers such that new entrants can leverage existing facilities, data and build capacity (e.g., dormant manufacturing capacity or underutilized laboratory space), and methods to drive down the cost and accelerate processes around hardware validation and certification.

A. Description/Background

This Funding Opportunity Announcement (FOA) is being issued by the U.S. Department of Energy's (DOE), Office of Energy Efficiency and Renewable Energy (EERE), Solar Energy Technologies Office (SETO). This section describes the overall goals of SETO and the type of projects that are being solicited for funding support through this FOA.

In 2016, solar power surpassed 1% of annual electricity supply in the United States for the first time, and the Energy Information Administration projects that solar will grow to 5% of U.S. electricity by 2030.⁷ Further, if the price of solar electricity and/or energy storage declines more rapidly than projected, that percentage could be even higher.⁸ But solar is more than just a source of affordable electricity; it also provides the potential to improve grid reliability and resilience, increase employment,⁹ create business opportunities, increase energy diversity, and provide environmental benefits.

The mission of the Solar Energy Technologies Office (SETO) is to support early-stage research and development to improve the performance and flexibility of solar technologies that contribute to a reliable and resilient U.S. electric grid. The office invests in innovative research efforts that securely integrate more solar energy into the grid, enhance the use, storage and dispatch of solar energy, and lower solar electricity costs.

SETO focuses on two different solar energy technologies: photovoltaic (PV) technologies that directly convert sunlight into electricity, typically via a semiconductor, and concentrating solar thermal power (CSP) technologies that convert sunlight to heat, which can be converted or stored until needed, and then used to generate electricity or provide other energy services. Because sunshine varies with the time of day, location, and season, solar power systems must be paired with adaptive loads, other sources of power, or energy storage to deliver electricity whenever it's needed. This dependency reduces the value of solar power systems once solar starts to supply a significant fraction of the electricity within a given region and highlights the need for a focus on addressing grid integration challenges.

SETO, in partnership with other offices at DOE, launched the SunShot Initiative in February 2011 with the goal of solar electricity becoming price-competitive with

⁷ U.S. Department of Energy, Energy Information Administration, International Energy Outlook 2017, DOE/EIA-0484 (2017).

⁸ P.A. Basore and W.J. Cole, "Comparing supply and demand models for future photovoltalc power generation in the USA," submitted to *Progress in Photovoltalcs: Research and Applications*, 2017.

⁹ The Solar Foundation, National Solar Jobs Census, 2010 – 2016.

conventional utility sources by 2020.¹⁰ The SunShot 2020 goal has already been achieved for utility-scale PV, and with continued effort, it is likely to be achieved for grid-tied solar applications. As a result of this tremendous progress and in response to the growing deployment of solar in the U.S., SETO is increasing its focus on addressing the challenges related to seamlessly integrating high penetrations of solar energy onto the nation's electricity grid. Additionally, SETO set 2030 cost targets to further reduce the cost of solar electricity across all market sectors, which would make solar one of the most affordable sources of electricity and enable a substantial fraction of U.S. electricity demand to be supplied by solar technology.¹¹ The targets for the unsubsidized cost of electricity at the point of grid connection in a location with average U.S. solar resources are 3¢ per kilowatt-hour (kWh) for utility-scale photovoltaics, 4¢ per kWh for commercial rooftop photovoltaics, 5¢ per kWh for residential rooftop photovoltaics, and 5¢ per kWh for concentrating solar power with thermal energy storage.

By supporting early-stage research across the solar energy technology space through this FOA, SETO can foster innovation and enable integrated multi-technology solutions that can advance the widespread adoption of solar power while securely integrating it into the nation's energy grid.

Topic 1: Advanced Solar Systems Integration Technologies describes SETO research priorities in the seamless integration of high penetrations of solar energy onto the nation's electricity grid. Responsive projects would advance the prediction, monitoring, and control of solar power production, the capabilities of solar power electronics and the integration of solar energy with synergistic technologies.

Topic 2: Concentrating Solar Thermal Power Research and Development describes SETO research priorities that support solar technologies that focus sunlight to generate and store high-temperature heat for electricity generation and other end uses. Responsive projects would contribute to increasing solar power adoption and grid reliability often through combined power and storage.

Topic 3: Photovoltaic Research and Development describes SETO research priorities that support the further development of photovoltaic technologies that improve system reliability, annual energy yield, demonstrate performance of novel PV devices and develop new PV materials. Responsive projects would directly contribute to increasing PV affordability through continuous improvements in PV efficiency and reliability. SETO's work ensures that a pipeline of innovation continues to reduce PV system cost, increase power conversion efficiency, and reduce supply-chain capital expense.

¹⁰ SunShot Vision Study, NREL Technical Report DOE/GO-102012-3037, 2012.

¹¹ U.S. Dept. of Energy, The SunShot Initiative's 2030 Goal: 3¢ per Kilowatt Hour for Solar Electricity, 2016.

Topic 4: Improving and Expanding the Solar Industry through Workforce Initiatives describes SETO research priorities that support solar workforce development. Responsive projects would focus on increasing the size of the pipeline of skilled workers being employed by the solar industry while simultaneously working to increase the participation of veterans and other talent pools, providing increased value to the solar industry as a whole.

SETO's funding supports U.S. leadership in solar technology R&D by funding the next generation of innovative technologies and by developing domestic research talent.

Historically, SETO has released separate funding opportunities that address specific stages and types of solar research. For the first time, this funding program combines SETO funding efforts into one FOA for fiscal year 2018 (FY2018). Subject to availability of funds appropriated by Congress for the purpose of this program, the availability of future-year budget authority, and approval, SETO intends to adjust topic descriptions and reopen this funding program for new applications each year relatively soon after budget guidance has been provided. By providing a more streamlined and consistent FOA strategy SETO hopes to further accelerate the advancement of solar research.

Rodriguez, Susan (CONTR)

From: Sent: To: Subject: Jones-Albertus, Becca Monday, August 20, 2018 8:18 AM Gay, Charlie;Hamos, Ian RE: Tim's Summary of Meeting with EE-1

Hi lan,

Is the "standard template" that was created for FOAs the one that Fuel Cells used to brief their FOA? If not, can you send (as we aren't aware of any standard template)?

Thanks Becca

From: Gay, Charlie Sent: Monday, August 20, 2018 11:12 AM To: Hamos, Ian <Ian.Hamos@EE.doe.gov> Cc: Jones-Albertus, Becca <Becca.Jones-Albertus@ee.doe.gov> Subject: RE: Tim's Summary of Meeting with EE-1

Thanks lan:

On the FOA - (b) (5)

For the prize-related Power Connectors – NREL made the selections. I'll touch base with Victor to determine what information is available for packaging

- Charlie 202-287-1987

From: Hamos, Ian Sent: Monday, August 20, 2018 9:55 AM To: Gay, Charlie <<u>Charlie.Gay@EE.DOE.Gov</u>> Subject: Tim's Summary of Meeting with EE-1

Charlie,

Tim did meeting with EE-1 on Friday, and managed to discuss a couple solar items. Below are his readouts, which both require action from us that Tim asked me to get started.

• Solar FOA Language: EE-1 is still awaiting changes from OE-1 regarding Topic 1. (b) (5)

Please let me know thoughts on

such action.

• Solar Prize Briefing: EE-1 would like to see the 5 awards put into the standard template that was created for FOAs and then be re-briefed using that form.

I'm here to talk through anything you like, and happy to brainstorm/review as needed.

Thanks,

Ian Hamos Chief of Staff Office of the DAS for Renewable Power U.S. Department of Energy 1000 Independence Ave. SW Washington, DC, 20585

Rodriguez, Susan (CONTR)

From:	Gay, Charlie			
Sent:	Monday, August 27, 2018 2:35 PM			
То:	Unruh, Timothy			
Cc:	Hamos, Ian			
Subject:	RE: FOA Topic 1			
Attachments:	Misc1 showing changes.docx; Misc1.docx			
Follow Up Flag:	FollowUp			
Flag Status:	Completed			

HI Tim:

Attached is the revised language (Misc1) and a red line comparing revised with original (Misc1 showing changes).

- Charlie 202-287-1987

From: Unruh, Timothy Sent: Monday, August 27, 2018 5:27 PM To: Gay, Charlie <Charlie.Gay@EE.DOE.Gov> Cc: Hamos, Ian <Ian.Hamos@EE.doe.gov> Subject: RE: FOA Topic 1

Does someone have the revised language, I wonder?

From: "Gay, Charlie" <<u>Charlie.Gay@EE.DOE.Gov</u>> Sent: Aug 27, 2018 5:07 PM To: "Unruh, Timothy" <<u>Timothy.Unruh@EE.Doe.Gov</u>> Cc: "Hamos, Ian" <<u>Ian.Hamos@EE.doe.gov</u>> Subject: FW: FOA Topic 1

fyi

- Charlie 202-287-1987

From: Yuan, Guohui Sent: Monday, August 27, 2018 5:01 PM To: Gay, Charlie <<u>Charlie.Gay@EE.DOE.Gov</u>>; Jones-Albertus, Becca <<u>Becca.Jones-Albertus@ee.doe.gov</u>> Subject: FW: FOA Topic 1

From: Bobo, Diana <<u>Diana.Bobo@ee.doe.gov</u>> Date: Monday, Aug 27, 2018, 4:28 PM To: Fricker, Kyle <<u>Kyle.Fricker@EE.DOE.Gov</u>>, Yuan, Guohui <<u>Guohui.Yuan@EE.Doe.Gov</u>> Cc: Pfrangle, Clay <<u>Clay.Pfrangle@EE.Doe.Gov</u>> Subject: FOA Topic 1 Hi Kyle and Guohui,

Derek Passarelli just informed me that Kathy Tripodi is seeking to revise Topic 1 of the FOA and re-post. Are you available tomorrow to discuss the proposed language?

Thanks, Diana

Topic 1.1 Solar Grid Integration

This topic will support applications to research and field validate unique and innovative solutions that will improve the resiliency of the Energy Sector's capability to withstand all hazards; focusing on cyber and physical vectors. Specifically, the solutions should identify the strategic location of solar photovoltaic (PV) systems that will ensure the Energy Sector provides continuity of service in the face of wide spread and coordinated threats. These solutions can be deployed throughout the bulk power systems or associated transmission to distribution substations. It is expected that the same design concepts will be applicable for energy storage and other distributed energy resources (DERs). The approaches will test the systems' ability to operate and adapt at both steady and degraded states. Applications must consider diverse DER options (e.g. photovoltaics, energy storage, and flexible load) available as well as power systems engineering alternatives, and demonstrate the benefits of the proposed solutions. It should also be shown in these solutions how a fleet of multiple photovoltaics systems from multiple locations will be able to respond to fast changing conditions under normal operations and provide power to critical loads during grid outages - with consideration of other DER options and distribution system constraints. Example projects may include, but are not limited to, new design and use-case concepts, essential reliability services, adaptive capabilities, voltage support, previously uncontemplated and unique capabilities and control hardware and software innovations for smart PV inverters and DER management systems. Applications must have an assessment of economic viability of the proposed system, activity or component in the respective part of the project.

Applicant's solar photovoltaic projects may require working with critical infrastructure owners and operators and state, local, tribal and territories entities to take proactive steps to manage risk and strengthen the security and resilience of the Nation's critical infrastructure, considering all hazards that could have a debilitating impact on national security, economic stability, public health and safety, or any combination thereof. These solar photovoltaic projects shall seek to reduce vulnerabilities, minimize consequences, identify and disrupt threats, and hasten response and recovery efforts related to critical infrastructure to ensure public health and safety while improving national security and economic security.

Topic 1.2 Solar Situational Awareness and Analysis

This Topic will support applications to research and field validate unique and innovative solutions that will improve the resiliency of the Energy Sector's capability to withstand all hazards; focusing on cyber and physical vectors. Specifically, the solutions should enhance operator capability to observe solar systems deployed throughout the bulk power systems or associated transmission to distribution substations or Behind-the-Meter (BTM) solar including but not limited to battery storage, systems controls, and demand response. Primary focus areas include solar photovoltaic integrated sensor technologies, secure and robust electricity supply delivery and communication tools, advanced data analytics including Artificial Intelligence and Machine to Machine capabilities, and voltage testing. Projects with secondary focus areas may also be considered which include the integration of observed data into planning, operations and business unit systems that would operate at both steady and degraded states. Applications must have an assessment of economic viability of the proposed system, activity or component in the respective part of the project.

Applicant's solar situational awareness and analysis projects may require working with critical infrastructure owners and operators and state, local, tribal and territories entities to take proactive steps to manage risk and strengthen the security and resilience of the Nation's critical infrastructure, considering all hazards that could have a debilitating impact on national security, economic stability, public health and safety, or any combination thereof. These projects shall seek to contribute to one or more risk components: reduce vulnerabilities, minimize consequences, identify and disrupt threats, and/or hasten response and recovery efforts related to critical infrastructure to ensure public health and safety while improving national security and economic security.

Topic 1.3 Solar Technology Transfer

This topic will explore unique and innovative approaches to accelerate the transfer of solar system solutions that will improve the resiliency of the Energy Sector's capability to withstand all hazards; focusing on cyber and physical vectors. Potential areas of interest include, but are not limited to, projects or models that deploy alternative capital, for technology R&D transfer, incentivize industry-researcher collaboration, leverage existing facilities or capabilities, data and build approaches and methods that serve to drive down the hardware cost and ensure solutions, validation, certifications, resilience and electricity supply to withstand wide spread and coordinated threats compatible with Topic 1.1 and Topic 1.2

Applicant's solar technology transfer projects may require working with critical infrastructure owners and operators and state, local, tribal and territories entities to take proactive steps to manage risk and strengthen the security and resilience of the Nation's critical infrastructure, considering all hazards that could have a debilitating impact on national security, economic stability, public health and safety, or any combination thereof. These projects shall seek to contribute to one or more risk components: reduce vulnerabilities, minimize consequences, identify and disrupt threats, and/or hasten response and recovery efforts related to critical infrastructure to ensure public health and safety while improving national security and economic security.

(b) (5)

Topic 1.1—— Solar Grid Integration

This topic will support applications to research and field validate unique and innovative technologies solutions that enable distributed will improve the resiliency of the Energy Sector's capability to withstand all hazards; focusing on cyber and physical vectors. Specifically, the solutions should identify the strategic location of solar photovoltaic (PV) to contribute to grid-reliability and resilience by providing solar dispatchability and grid support functions---including energy, capacity, systems that will ensure the Energy Sector provides continuity of service in the face of wide spread and reliability and resilience services.coordinated threats. These technologiessolutions can be deployed throughout the electric bulk power systems or associated transmission to distribution system. The approaches will focus on developing flexible interconnection requirements and dynamic hosting-capacity concepts for solar PV as opposed to today's prevalent "firm" interconnection requirements and static hosting capacity planning, substations. It is expected that the same design concepts will be applicable for energy storage and other distributed energy resources (DERs), Through). The approaches will test the intelligent control of the distributed assets, flexible interconnection requirements can increase the overall hosting capacity for solarsystems' ability to operate and DERs in the distribution system, support diverse-customer interconnection choices, improve system reliabilityadapt at both steady and resilience, and reduce PY curtailment.degraded states. Applications must consider diverse DER options (e.g. PVphotovoltaics, energy storage, and flexible load) available as well as power systems engineering alternatives, and demonstrate the benefits of the proposed technologies in the hosting capacity analysis solutions. It should also be shown in these solutions how a fleet of PVmultiple photovoltaics systems from multiple customers at multiple locations will be able to respond to fast changing conditions under normal operations and provide power to critical loads during grid outages - with consideration of other DER options and distribution system constraints. Example projects may include, but are not limited to, new design and use-case concepts, essential reliability services, adaptive capabilities, voltage support, previously uncontemplated and unique capabilities and control hardware and software innovations for smart PV Inverters and DER management system (DERMS) that allow more flexibility to interconnection and operation of small scale PV and other DER systems. Applications must have an assessment of economic viability of the proposed system, activity or component in the respective part of the project.

Applicant's solar photovoltaic projects may require working with critical infrastructure owners and operators and state, local, tribal and territories entitles to take proactive steps to manage risk and strengthen the security and resilience of the Nation's critical infrastructure, considering all hazards that could have a debilitating impact on national security, economic stability, public health and safety, or any combination thereof. These solar photovoltaic projects shall seek to reduce vulnerabilities, minimize consequences, identify and disrupt threats, and hasten response and recovery efforts related to critical infrastructure to ensure public health and safety while improving national security and economic security.

Topic 1.2____(b) (5)

Situational Awareness and Analysis

This topic will support applications to research, develop and validate observability or situational awareness technologies at the grid edge to support planning and operation with high PV penetration. Topic will support applications to research and field validate unique and innovative

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Style Definition: Heading 2

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solutions that will improve the resiliency of the Energy Sector's capability to withstand all hazards; focusing on cyber and physical vectors. Specifically, the solutions should enhance operator capability to observe solar systems deployed throughout the bulk power systems or associated transmission to distribution substations or Behind-the-Meter (BTM) solar including but not limited to battery storage, systems controls, and demand response. Primary focus areas include PV-solar photovoltaic integrated sensor technologies, secure and robust <u>electricity supply delivery and</u> communication tools, advanced data analytics (including machine learning)Artificial Intelligence and detection of cyber-intrusion. Machine to Machine capabilities, and voltage testing. Projects may also be considered with secondary focus areas, may also be considered which enhance grid edge observability of solar systems by include the integration with additionalof observed data into planning, operations and business unit systems-All applications should-that would operate at both steady and degraded states. Applications must have an assessment of economic viability of the proposed system, activity or component in the application and asrespective part of the project.

Applicant's solar situational awareness and analysis projects may require working with critical infrastructure owners and operators and state, local, tribal and territories entities to take proactive steps to manage risk and strengthen the security and resilience of the Nation's critical infrastructure, considering all hazards that could have a debilitating impact on national security, economic stability, public health and safety, or any combination thereof. These projects shall seek to contribute to one or more risk components: reduce vulnerabilities, minimize consequences, identify and disrupt threats, and/or hasten response and recovery efforts related to critical infrastructure to ensure public health and safety while improving national security and economic security.

Topic 1.3------Solar +-XTechnology Transfer

This topic will support applications to research and field validate innovative approaches to integrate Behind-the-Meter (BTM) solar PV with synergistic technologies (including but not limited to energy storage, building controls, demand response, electric vehicles, and other DERs) to support dispatchability and provide grid services — including energy, capacity, and reliability and resilience services — as a single-control point. Projects will focus on research and development in control ecordination and optimization of BTM customer owned and co-located behind a single (master) meter: PV, storage, and other DER assets in response to broader system-wide-conditions, with key interest in utilizing DER assets to provide critical power during outages. Projects may consider traditional "firm" DER interconnection requirements as well as emorging flexible interconnection approaches (such as those sought in Topic 1.1) and innovative compensation mechanisms. In an effort to minimize the overall system cost for solar integration arising from new hardware deployment, such as battery storage, 7 applicants are encouraged to consider how solar and load estimation, advanced data analytics, and artificial intelligence can be utilized in the operations of their proposed systems. All Applicants should have an assessment of economic viability of the system or component in the application as part of the project.

Topic 1.4—— Innovative Pathways: Systems Integration

This topic will explore <u>unique and</u> innovative approaches and models to accelerate the transfer of systems integration and related technologies from the lab into the real world. Rather than funding

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research on individual technology solutions directly, applicants will research and develop new methods to advance research portfolios of solar (and related) technologies and overcome challenges endemic to the solar technology transfer space, including knowledge gaps betweensolar system solutions that will improve the research/industrial communities and constraints on access to necessary resources. Applicants must demonstrate a realistic pathway to test, scale and sustain the model after the period of performance-resiliency of the Energy Sector's capability to withstand all hazards; focusing on cyber and physical vectors. Potential areas of interest include, but are not limited to, projects or models tothat deploy alternative capital (e.g., loca) public private partnerships, foundations), for technology R&D or transfer,-structures to incentivize industry-researcher collaboration, approaches to lower barriers such that new entrants can leverage existing facilities or capabilities, data and build capacity (e.g., dormant manufacturing capacity or underutilized laboratory space), and methodsapproaches and methods that serve to drive down the hardware cost and accelerate processes around hardwareensure solutions, validation-and certifications, certifications, resilience and electricity supply to withstand wide spread and coordinated threats compatible with Topic 1.1 and Topic 1.2

Applicant's solar technology transfer projects may require working with critical infrastructure owners and operators and state, local, tribal and territories entities to take proactive steps to manage risk and strengthen the security and resilience of the Nation's critical infrastructure, considering all hazards that could have a debilitating impact on national security, economic stability, public health and safety, or any combination thereof. These projects shall seek to contribute to one or more risk components; reduce vulnerabilities, minimize consequences, identify and disrupt threats, and/or hasten response and recovery efforts related to critical infrastructure to ensure public health and safety while improving national security and economic security.

Rodriguez, Susan (CONTR)

From: Sent: To: Subject: Gay, Charlie Thursday, August 30, 2018 11:34 AM Hamos, Ian RE: Solar FOA Topic 1 Cancelation and Re-release

Thanks Ian - We'll probably send a courtesy copy to MA to minimize any potential misunderstanding......

- Charlie 202-287-1987

From: Hamos, Ian Sent: Thursday, August 30, 2018 2:21 PM To: Jacob, Bindu <Bindu.Jacob@ee.doe.gov> Cc: Unruh, Timothy <Timothy.Unruh@EE.Doe.Gov>; Gay, Charlie <Charlie.Gay@EE.DOE.Gov>; Pezzullo, Leslie <Leslie.Pezzullo@ee.doe.gov> Subject: RE: Solar FOA Topic 1 Cancelation and Re-release

Excellent, thanks!

Ian Hamos Chief of Staff Office of the DAS for Renewable Power U.S. Department of Energy 1000 Independence Ave. SW Washington, DC, 20585

From: Jacob, Bindu Sent: Thursday, August 30, 2018 2:03 PM To: Hamos, Ian <<u>Ian.Hamos@EE.doe.gov</u>> Cc: Unruh, Timothy <<u>Timothy.Unruh@EE.Doe.Gov</u>>; Gay, Charlie <<u>Charlie.Gay@EE.DOE.Gov</u>>; Pezzullo, Leslie <<u>Leslie.Pezzullo@ee.doe.gov</u>> Subject: RE: Solar FOA Topic 1 Cancelation and Re-release

(b) (5)

From: Hamos, Ian
Sent: Thursday, August 30, 2018 1:23 PM
To: Jacob, Bindu <<u>Bindu.Jacob@ee.doe.gov</u>>
Cc: Unruh, Timothy <<u>Timothy.Unruh@EE.Doe.Gov</u>>; Gay, Charlie <<u>Charlie.Gay@EE.DOE.Gov</u>>; Pezzullo, Leslie<<<u>Leslie.Pezzullo@ee.doe.gov</u>>
Subject: Solar FOA Topic 1 Cancelation and Re-release

Bindu,

As I'm sure you are aware, (b) (5)

Thanks,

Ian Hamos Chief of Staff Office of the DAS for Renewable Power U.S. Department of Energy 1000 Independence Ave, SW Washington, DC, 20585

Doc 9

Rodriguez, Susan (CONTR)

From: Sent: To: Subject: Jones-Albertus, Becca Friday, August 31, 2018 7:02 AM Hamos, Ian;Gay, Charlie RE: Following up

lan,

Just FYI - (b) (5) added back in....

though we hope it can be

Becca

From: Hamos, Ian Sent: Friday, August 31, 2018 9:25 AM To: Jones-Albertus, Becca <Becca.Jones-Albertus@ee.doe.gov>; Gay, Charlie <Charlie.Gay@EE.DOE.Gov>; Jayne, Kevin A. <Kevin.Jayne@ee.doe.gov> Subject: Fwd: Following up

Solar team,

We were asked yesterday on a quick turn to provide examples of disruptive technology (b) (5) Apparently that was interesting to them and they want more info. Can you help out here? Not sure exact timeline but I would imagine fairly quick. I'm on the way to NYC, so can you work directly with Kevin?

Kevin- can you let us know the timeline?

Tbanks,

Ian

From: "Jayne, Kevin A." <<u>Kevin Jayne@ee.doe.gov</u>> Sent: Aug 31, 2018 9:09 AM To: "Hamos, Ian" <<u>Ian.Hamos@EE.doe.gov</u>> Subject: Following up

Hey Ian,

Thanks again for sending along your list of disruptive technologies. Can you please provide more details on the technology listed below? Thanks!

Solar:^(b) (5) (b) (5)

Best,

Kevin

Doc 10

Rodriguez, Susan (CONTR)

From: Sent: To: Subject: Moreno, Alejandro Friday, August 31, 2018 1:38 PM Hamos, Ian FW: Solar NOI

Is this the re-worked solar Topic 1 w the new language you guys were talking about on Wed?

From: Grosso, Matthew Sent: Friday, August 31, 2018 4:23 PM To: Moreno, Alejandro <Alejandro.Moreno@ee.doe.gov> Subject: Solar NOI

https://eere-exchange.energy.gov/#Foald2bbe24fe-f075-4d1b-8ab7-0df723807696

Matthew J. Grosso, MPA, PMP Operations Supervisor Water Power Technologies Office O: 202-287-5350 M: (b) (6)

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Doc 11

Rodriguez, Susan (CONTR)

From: Sent: To: Subject:	DeCesaro, Jennifer Monday, September 10, 2018 6:39 AM Murley, Susanna (CONTR);Hamos, Ian RE: NOI announcement?	
Not yet Susanna. We will I	et you know when there are any updates,	
Jennifer DeCesaro U.S. D jennifer.decesaro@ee.doe	epartment of Energy O: +1.202.586.1040 M: (b) (6) .gov	I
From: Murley, Susanna (Co Sent: Monday, September To: Hamos, Ian <lan.hamo Subject: RE: NOI announce</lan.hamo 	DNTR) 10, 2018 9:37 AM s@EE.doe.gov>; DeCesaro, Jennifer <jennifer.decesaro@ee.de ement?</jennifer.decesaro@ee.de 	oe.gov>
Hi folks		
Have we heard anything fu	irther about this?	
Best,		
Susanna		
Susanna Murley Strategic Support Team Lea The Building People, LLC	d U.S. Department of Energy Solar Energy Technologies Office	

Contractor supporting the Solar Energy Technologies Office Office of Energy Efficiency and Renewable Energy Office: 202.287.1637 | Cell: (b) (6)

From: Hamos, Ian Sent: Wednesday, September 05, 2018 11:56 AM To: Murley, Susanna (CONTR) <<u>Susanna.Murley@EE.DOE.Gov</u>>; DeCesaro, Jennifer <<u>Jennifer.Decesaro@ee.doe.gov</u>> Subject: RE: NOI announcement?

Susanna - my understanding was (b) (5)

Ian Hamos Chief of Staff Office of the DAS for Renewable Power U.S. Department of Energy 1000 Independence Ave. SW Washington, DC, 20585 From: Murley, Susanna (CONTR)
Sent: Wednesday, September 05, 2018 11:52 AM
To: DeCesaro, Jennifer <<u>Jennifer.Decesaro@ee.doe.gov</u>>; Hamos, Ian <<u>Ian.Hamos@EE.doe.gov</u>>
Subject: NOI announcement?

Hey Jenn, Ian —

I heard that there was going to be a public announcement on SETO's topic 1 cancellation and the NOI, but since (b) (6) is OOO, I suspect that I'm out of the loop. (b) (5)

2

Best,

Susanna

Susanna Murley

Strategic Support Team Lead The Building People, LLC | U.S. Department of Energy Contractor supporting the Solar Energy Technologies Office Office of Energy Efficiency and Renewable Energy Office: 202.287.1637 | Cell: (b) (6)

Rodriguez, Susan (CONTR)

From: Sent: To: Subject: Pezzullo, Leslie Monday, September 10, 2018 2:46 PM Hamos, Ian FY18 revised topic

Hi lan,

Do you happen to know if the same ppf will be used for the updated solar topic 1 FOA?

Best, Leslie

Leslie Pezzulio | U.S. Department of Energy | O: 202.586.1514 | M: (b) (6)

| leslie.pezzullo@ee.doe.gov

Rodriguez, Susan (CONTR)

From:
Sent:
То:
Subject:
Attachments:

Pezzullo, Leslie Monday, September 10, 2018 3:22 PM Jacob, Bindu RE: Program Policy Factors PPF Matrix (9-10-2018)_v2.xlsx

Bindu,

Attached is the updated PPF matrix. I added the new Solar FOA for the re-issuance of Topic 1 and the AMO energy/water de-sal hub, but those were the only two "new" foas that were ready to be added. For the solar foa, I assumed that the same PPFs would be applied. Let me know if you want me to go ahead and send the attached with the email below – of if you want to forward, feel free.

Best,

Leslie

Alex,

Attached is the updated program policy factor (PPF) matrix. We've included two new FOAs in this version – the AMO Energy Water Desalination Hub FOA and the Solar Mega-FOA Topic 1 re-issuance. We assumed that the same PPFs in the original Solar FOA would be used in the new topic 1 foa, but that can be revised once we have a final version of the materials. Both FOAs are highlighted tan, indicating that neither has been posted. Please let us know if you have any questions.

Best regards,

From: Pezzullo, Leslie
Sent: Thursday, July 12, 2018 7:49 PM
To: Fitzsimmons, Alexander <Alexander.Fitzsimmons@ee.doe.gov>
Cc: Jayne, Kevin A. <Kevin.Jayne@ee.doe.gov>; Singer, William <William.Singer@ee.doe.gov>; Jacob, Bindu
<Bindu.Jacob@ee.doe.gov>
Subject: Program Policy Factors

Alex,

As promised, below are the five standard program policy factors (PPFs) that are listed in the FOA template. The sixth PPF listed below is the geographic diversity PPF that we are including in FOAs moving forward and will be added to the template.

- The degree to which the proposed project exhibits technological diversity when compared to the existing DOE
 project portfolio and other projects selected from the subject FOA
- 2. The degree to which the proposed project, including proposed cost share, optimizes the use of available EERE funding to achieve programmatic objectives
- 3. The level of industry involvement and demonstrated ability to accelerate commercialization and overcome key market barriers

- 4. The degree to which the proposed project is likely to lead to increased employment and manufacturing in the United States
- 5. The degree to which 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
- 6. The degree to which the proposed project, or group of projects, represent a desired geographic distribution (considering past awards and current applications)

We also developed a PPF matrix (attached) that identifies which PPFs were included in each published FOA. I've grouped and colored coded the PPFs as follows:

- standard PPFs are in green
- tailored PPFs that are either included in multiple FOAs or similar to a standard PPF in white, and
- FOA specific PPFs are in blue.

62% of FOAs in the matrix (13 out of 21) include all 5 of the standard PPFs. 6 of the 21 FOAs include the geographical diversity PPF.

Please let us know if you have any questions.

Best regards, Leslie

Leslie Pezzullo

Department of Energy Office of Energy Efficiency and Renewable Energy O; (202) 586-1514 C; (b) (6)
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Doc 14

Rodriguez, Susan (CONTR)

From:	Gay, Charlie
Sent:	Tuesday, September 18, 2018 4:08 AM
То:	Chalk, Steven
Cc:	Hamos, Ian;Fitzsimmons, Alexander
Subject:	RE: FOA topic 1
Attachments:	Resilient Distribution System 20 June 2017.docx

Hi Steve:

Understood - here's a possible structure, which could be positioned as a joint FOA with OE but without \$ from OE....

Total federal dollars: \$46M Topic 1.1: (b) (5) plus 20% cost share Topic 1.2: plus 50% cost share Labs could not be prime.

Topic 1.1 : <u>R&D</u> for solar situational awareness in strategic locations associated with critical infrastructure

Objective

The increasing deployment of utility-scale and distributed solar PV systems brings about serious challenges to electric power grid planning and operation. Solar situation awareness in strategic locations associated with critical infrastructure is required so that planners and operators can "see" solar generation throughout the system and at all times, analyze their contributions and impacts, and make control decisions for reliable, resilient, and secure grid operations. Ideally solar situation awareness should be performed automatically without manual interventions by system operators.

Solar PV systems often communicate to utilities, aggregators, and other grid operators over the public internet. As a result, the electric power system cyber-attack surface has significantly expanded. At the same time, solar energy systems are getting equipped with a range of grid-support functions that - if controlled or programmed improperly - present a risk of power system disturbances. As the experience and sophistication of cyber adversaries grow, so too must the US power system's defenses, situational awareness, and response and recovery strategies.

Therefore, research, development, and field validation are needed for solar situational awareness technologies and solutions to support planning and operation with high PV penetration. Primary focus areas will include integrating innovative sensor technologies, secure and robust communication, advanced data analytics (including machine learning) and detection of cyber-intrusion techniques with PV systems.

Approach

The technical approach will focus on developing and integrating sensing and communication technologies with utilityscale and distributed solar PV (and other DER technologies) to support planning and operation of power systems. Primary research areas include sensor technologies, secure and robust communications, advanced data analytics, data visualization that not only can be easily included in PV system design and integration, but also can enable real time autonomous and local-decision making to address solar generation and load variability without the need for massive data communication, especially in strategic locations associated with critical infrastructure. Solar situation awareness solutions must standardized interfaces for interoperability. Advanced data analytics techniques, including machine learning algorithms, should be used to complement ground-truth measurements. On the cyber security front, the research will leverage established industrial control and power system cyber security prior work to implement state-of-the-art cyber security best practices. The research should address the potential cyber security vulnerability in PV and DERs and develop and commercialize innovative technologies to harden PV systems, protect networks from penetration, detect intrusions, and effectively respond to cyber security breaches.

<u>Outcome</u>

Research in this area is expected to result in new software and hardware solutions and data analytical methods for solar situation awareness that enable and enhance system operators and/or automated devices to make correct planning and operation decisions.

Areas not of interest

- Solar irradiance forecasting models or irradiance database
- Generic cyber security technologies (or solutions) that are not integrated with solar PV
- Generic sensor and measurement technologies (or solutions) that are not integrated with solar PV
- Generic communication technologies (or solutions) that are not integrated with solar PV

Topic 1.2 : **validation** that (can also include R&D but) is mainly intended to demonstrate that proactive resiliency solutions based on solar perform as modeled on the grid system. This topic can also include tech transfer but would generally have 50% cost share.

Please see the attached 2017 GMLC Resilience Distribution System Lab Call. I think it is perfectly aligned with the guidance here. Also, I think the FOA will nicely complement the lab call since the lead organizations here are industry.

The only question is whether we (b) (5)

b) (b) (5)

We should discuss with OE to see a) (b) . The RDS lab call was jointly developed with OE, so the answer to al(b) (5) so OE may be interested.

Charlie 202-287-1987

From: Chalk, Steven Sent: Tuesday, September 18, 2018 6:56 AM To: Gay, Charlie <Charlie.Gay@EE.DOE.Gov> Cc: Hamos, ian <lan.Hamos@EE.doe.gov>; Fitzsimmons, Alexander <Alexander.Fitzsimmons@ee.doe.gov> Subject: FOA topic 1

Charlie- as you reorganize the FOA into a R&D topic and a R&D + Validation/Tech Transfer topic, please save all language as possible from previous version. Only work to emphasize/distinguish between topics.

Steven Chalk Deputy Assistant Secretary for Transportation Acting Deputy Assistant Secretary for Renewable Power Office of Energy Efficiency and Renewable Energy U.S. Department of Energy

Resilient Distribution Systems

An FY17 Project Call for the Grid Modernization Laboratory Consortium

A. Description/Background

Overview

The U.S. Department of Energy (DOE) has developed this Grid Modernization Laboratory Consortium (GMLC) Project Call as part of the Grid Modernization Initiative (GMI). This Project Call aims to advance research of resilient distribution systems through rigorous field validations. In particular, the Call focuses on the integration of clean distributed energy resources (DERs) and emerging grid technologies at regional scale.¹ The project results are expected to deliver credible information on technical and economic viability of the solutions as well as demonstrate viability to key stakeholders who are ultimately responsible for approving and investing in grid modernization activities. This FY17 GMLC Project Call builds on the momentum from the ongoing GMLC Foundational Activities of the FY16 GMLC Lab Call and continues research in the six technical areas laid out in the Grid Modernization Multi-Year Program Plan (MYPP). This FY17 GMLC Project Call is jointly developed and funded by the Office of Energy Efficiency and Renewable Energy (EERE) and the Office of Electricity Delivery and Energy Reliability (OE).

Objectives

This GMLC Project Call seeks to develop and validate innovative approaches to enhance the resilience of distribution systems (including microgrids) with high penetration of clean DERs. Technological advancements include control/coordination strategies, real-time system monitoring, robust communications infrastructure, grid planning and analytical platforms, and integration of multiple DER technologies.²

Grid modernization presents a complex bundle of technological, institutional and regulatory challenges. Thus, projects must include field validations that incorporate regionally appropriate solutions that verify the viability of distribution system design, validate architectural relationships and interoperability, quantify costs and benefits (i.e. characterize value proposition), ensure protection of system networks and data against cyber threats, and inform

¹ For the purpose of applications submitted under this Project Call, DER is defined as any controllable energy resource connected at the distribution-level. This can include generation, load, and/or energy storage.

[&]quot;Clean" characterizes the technology's role in reducing or eliminating pollution, with emphasis on energy efficiency and renewable energy technologies such as solar, wind, energy storage, building efficiency technologies, and electric vehicles.

² These technologies are further defined in the Grid Modernization Multi-Year Program Plan (MYPP) as six key technical areas: a) Devices and Integrated Systems Testing, b) Sensing and Measurements, c) System Operations, Power Flow, and Control, d) Design and Planning Tools, e) Security and Resilience and f) Institutional Support.

functional requirements for distribution system planning platforms and regulatory decisionsupport tools.

B. Scope of Work

The core technologies, tools, and analyses from the six technical areas of the MYPP (and reflected in the Foundational Activities of the FY16 GMLC Lab Call) will integrate into Regional Field Validations designed to validate foundational principles (e.g. architecture; interoperability; integration testing; valuation; cybersecurity; sensing and measurement strategy), and accelerate the implementation of early-stage research to widespread deployment. This FY17 GMLC Project Call specifically focuses on the following concept:

 Resilient distribution systems with high penetration of clean distributed energy resources: areas of potential research application include, but are not limited to, advances in real-time system monitoring; distributed control, including secure and robust communications networks; modeling and simulation techniques; design and planning tools; and coordination between the bulk system and intelligent, controllable distribution-level assets, including multiple microgrids.



2

The proposed project must be of a scale large enough to validate the feasibility of DER deployment and grid infrastructure modernization requirements. Each project should describe at a minimum: the scale of the field validation; performance objectives of the field validation (grid attributes); the criteria and requirements used in selecting site location(s); the current baseline of clean DER deployment in the region; the potential for significantly expanded amounts of clean DER on the distribution systems; the data collection and evaluation plan; the metrics for success, and the measurements that will be made to confirm success; and plans to disseminate this information.

All equipment and components proposed as part of the field validation should be actual equipment operating in real-world conditions without a proxy or a simulator in place of the actual equipment.³ This is to ensure that the technology is implemented and tested under the most commonly occurring conditions and therefore provides a pathway to facilitate large-scale deployment.

Definition of Resilience

Resilience is defined as the ability to prepare for and adapt to changing conditions and withstand and recover rapidly from disruptions. Resilience includes the ability to withstand and recover from deliberate physical and cyber attacks, accidents, or naturally occurring threats or incidents.⁴ Grid resilience focuses on the analysis and mitigation of the impacts to grid infrastructure resulting from infrequent yet large-consequence events. Project should use emerging resilience metrics being developed by the GMLC to measure the degree of enhancement in distribution system resilience. Other metrics can be proposed, but must be clearly defended.

Regional Diversity

Regional factors such as geographical and/or jurisdictional boundaries, energy resource availability, electric network topologies, infrastructure interdependencies, institutional and/or market structures, climatic conditions, topography and/or environmental concerns, and public policy influence grid modernization and DER technology deployment. Proposed projects shall identify and discuss similar characteristic elements relevant for the proposed region, and how the project provides critical understanding related to the achievement of resilient distribution systems. Projects should also discuss potential relevance/extendibility of these insights to other regions.

Projects should reflect "regions" based on the GMLC Regional Workshops, as illustrated below. Other regional definitions can be proposed by the GMLC, but must be clearly defended.

³ Simulations could be part of the proposal supporting the larger demonstration.

⁴ Grid Modernization: Metrics Analysis (GMLC1.1), Version 2.1, May 2017



Regional Institutional Support

State policymakers, regulatory agencies, and regional planning organizations play a critical role in shaping both the direction and pace of grid modernization. As part of the proposed project, the team should work with state and/or local governments, regulators, and other planning organizations to help improve, as appropriate, institutional and/or regulatory decision processes. This could include, for example, development and/or enhancement of advanced grid planning and analytical tools (and related power system models) as a platform for more effective information exchange.

Interoperability

The project team shall describe their strategies, plans, and processes for establishing and maintaining interoperability, and the utilization of open standards wherever possible. The team shall consider interoperability within their solution (among devices and/or subsystems) and at the external interfaces with other utility and customer systems. The project team shall indicate where they have chosen to utilize proprietary standards.

Post award, project teams will be required to submit an Interoperability Plan, detailing how they propose to implement and maintain these aspects of their solution.

Cybersecurity Principles

Resilient distribution systems require accompanying advancements in cybersecurity technologies so that innovative grid architectures are designed from the earliest stages to survive a cyber-incident.

The novel, resilient distribution-level power system technologies and system integration approaches proposed in response to this call, will likely require equally novel cybersecurity technologies to survive a cyber-incident. The project team is encouraged to select and integrate

one or more emerging cybersecurity technologies that is currently being developed by either the public or private sectors, that has reached a stage of development making it ready to advance through rigorous field validation, and that is matched to the needs of the emerging grid technologies proposed for development in response to this call. The expected outcome is twofold. One, integrate a novel cybersecurity technology that will strengthen the cybersecurity of the novel distribution-level power system technologies being proposed. Two, provide a platform to further advance the novel cybersecurity technology toward the objective of achieving broad adoption throughout the energy sector at regional scale.

A clear technical discussion that supports the selection of the emerging cybersecurity technology proposed for rigorous field validation, specifically describing how the selected technology is well-suited to bring cyber-resilience to the proposed distribution-level emerging grid technology must be provided. Also, a technical discussion that makes clear how the selected cybersecurity technology advances the state-of-the-art for energy infrastructure cybersecurity beyond existing capabilities must be provided

The project team shall also describe methods that will be used to assess the cybersecurity effectiveness of novel emerging cybersecurity technology that may be integrated and advanced through this project, as described above, as well as any traditional cybersecurity measures identified as necessary.

Post award, project teams will be required to submit a Cybersecurity Plan, detailing how they propose to implement and maintain these aspects of their solution. This plan must describe their approach to establishing and maintaining cybersecurity throughout their solution both strategically and tactically, and at the interfaces to external components and systems, for both novel and traditional cybersecurity measures.

Data Management

The project team should describe the approach to collect, organize and present project data. Information may include the project scope, schedule, and summary result; system baseline data; the potential for significantly expanded amounts of clean DER on the distribution systems; use cases and functional requirements; lab testing and field validation data; standards related to DER and emerging grid technologies; cost and benefits; applicable legislation and regulation concerning DER and grid technology deployment; and lessons learned and best practices.

Testing and Validation

The project team should describe a testing approach to verify the effectiveness of the proposed technology in achieving the program objectives and technical performance targets. Testing should include real hardware and software in addition to computer simulations. Testing and validation should use real world measurement data or high-fidelity synthesized data with sufficient granularity and duration. It is strongly encouraged that the project team leverages the Test Network and Open Library developed under GMLC FY16 Foundation Activities.

Value Analysis

The project team should describe the potential benefits of the project's investments in grid modernization and DER technologies on a distribution system in the relevant region. Furthermore, the project team should work with the Institutional Support team on Value Analysis to ensure pre- and post-deployment cost/benefit analysis using actual data obtained from the field validation. It is strongly encouraged that the project team leverages the Valuation Framework and Metrics developed under GMLC FY16 Foundation Activities.

C. Project Team

Each project submitted to this GMLC Project Call must include at least two (2) National Laboratory partners, and be carried out in active cooperation and collaboration with an electric utility (e.g., investor owned utility; electric cooperative; public power) that owns and/or operates grid facilities; at least one supplier of energy delivery control systems or components; and at least one entity that provides cybersecurity services to the energy sector and that will perform a red-teaming cybersecurity assessment of the technology developed in the proposed project. An integrated team approach that includes members of utilities, industry product and service suppliers, end users, state and municipal governments, Regional Transmission Organization (RTOs), universities, and others is strongly encouraged. A red-teaming cybersecurity assessment of the technology developed in the proposed project should be anticipated.

D. Funding

DOE envisions awarding multiple projects under this GMLC Project Call. The maximum number of projects selected is anticipated to be approximately 5. The number of projects will depend on the quality of the proposed activities and the availability of funds. The estimated period of performance for each project will be three years, including data collection and analysis.

The DOE anticipates having \$25-30 M of Federal funding available for this GMLC Project Call, and selected projects would be expected to provide a minimum cost share of 20% of the total allowable costs. At least 25% of Federal funding MUST go to non-National Laboratory partner(s). The management fee for subcontracts should be limited to the lowest amount possible. The average award size is expected to be \$5-7M DOE funds.

E. Evaluation Criteria

DOE anticipates selecting projects using the following evaluation criteria which are listed in order of importance:

- Technical Merit and Innovation This criterion will evaluate the degree of merit and innovation of the proposed technologies and system integration approaches to viably address the stated objectives of the GMLC Project Call. This includes the degree to which the project incorporates outputs from the activities of the FY16 GMLC Lab Call to validate foundational principles (e.g. architecture; interoperability; integration testing; valuation; cybersecurity).
- Significance and Impact This criterion will evaluate the degree to which the proposed technologies and system integration approaches will impact the ability of the electric utility and the overall energy sector to realize a resilient distribution system with significantly expanded penetration levels of clean DER and emerging grid technologies as well as sustainable net benefits when deployed at scale. DOE will also evaluate the regional diversity of the projects and reserves the right to select projects for award that represent a diversity of geographic regions while not being detrimental to the overall objectives of the Call.
- Project Execution and Management Approach This criterion will evaluate the degree to which the proposed project is well-structured to achieve the best possible outcomes. This includes the adequacy and feasibility of the management approach to develop a substantive workable collaboration between the National Laboratories, distribution utility partners, and other project team members, as well as the degree to which the project team will broadly share data and disseminate findings within the utility community.
- Team and Resources This criterion will evaluate the degree to which the proposed team and resources are likely to achieve the best possible outcomes at the best value for the Government. This includes the adequacy of quality, availability, and appropriateness of facilities and equipment to accomplish the project objectives, as well as diversity and the level of commitment of the project team to adopt the proposed methodology and/or technology solution post-project.

Doc 15

Rodriguez, Susan (CONTR)

From:	Hamos, Ian
Sent:	Tuesday, September 18, 2018 3:00 PM
To:	Chalk, Steven
Subject:	New Solar FOA Topic 1 with Watermark
Attachments:	DE-FOA-0001987 Advanced Solar Systems Integration Technologies FOA v2 no TCs w WM.docx

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As requested.

lan Hamos Chief of Staff Office of the DAS for Renewable Power U.S: Department of Energy 1000 Independence Ave. SW Washington, DC, 20585



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

Solar Systems Integration Technologies:

Solar Situational Awareness and Resilient Solutions for Critical Infrastructure

Funding Opportunity Announcement (FOA) Number: DE-FOA-0001987 FOA Type: Initial

CFDA Number: 81.087

A Number: 81.087	A				
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FOA Issue Date:				(b) (5)	
Letter of Intent Due Date					-
Submission Deadline for Full	Applications:		1. 		
Expected Submission Deadlin	e for Replies to Revi	ewer Commei	nts:		
Expected Date for EERE Select	ion Notifications:	and the second s	A CONTRACTOR		~~
Expected Timeframe for Awa	d Negotiations			60 days	

- To apply to this FOA, applicants must register with and submit application materials through EERE Exchange at https://eere-Exchange.energy.gov, EERE's online application portal.
- Applicants must designate primary and backup points-of-contact in EERE Exchange with whom EERE will communicate to conduct award negotiations. If an application is selected for award negotiations, it is not a commitment to issue an award. It is imperative that the applicant/selectee be responsive during award negotiations and meet negotiation deadlines. Failure to do so may result in cancelation of further award negotiations and rescission of the Selection.



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Questions about this FOA? Emai SI.FOA.SETO@ee.doe.gov



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Questions about this FOA? Emai SI.FOA.SETO@ee.doe.gov Problems with EERE Exchange? Email EERE- <u>EERE-ExchangeSupport@ha.doe.gov</u> Include FOA name and number in



I. Funding Opportunity Description

A. Description/Background

This Funding Opportunity Announcement (FOA) is being issued by the U.S. Department of Energy's (DOE) Office of Energy Efficiency and Renewable Energy (EERE), Solar Energy Technologies Office (SETO). This section describes the overall goals of SETO and the type of projects that are being solicited through this FOA.

In 2016, solar power surpassed 1% of annual electricity supply in the United States for the first time, and the Energy Information Administration projects that solar will grow to 5% of U.S. electricity by 2030¹. Further, if the price of solar electricity and/or energy storage declines more rapidly than projected, that percentage could be even higher.² But solar is more than just a source of affordable electricity; it also provides the potential to improve grid reliability and resilience, increase employment,³ create business opportunities, increase energy diversity, and provide environmental benefits.

The mission of the Solar Energy Technologies Office (SETO) is to support earlystage research and development to improve the performance and flexibility of solar technologies that contribute to a reliable and resilient U.S. electric grid. The office invests in innovative research efforts that securely integrate more solar energy into the grid, enhance the use, storage and dispatch of solar energy, and lower solar electricity costs.

SETO focuses on two different solar energy technologies: photovoltaic (PV) technologies that directly convert sunlight into electricity, typically via a semiconductor, and concentrating solar thermal power (CSP) technologies that convert sunlight to heat, which can be converted or stored until needed and then used to generate electricity of provide other energy services. Because sunshine varies with the time of day, location, and season, solar power systems must be paired with adaptive loads, other sources of power, or energy storage to deliver electricity whenever it's needed. This dependency reduces the value of solar power systems once solar starts to supply a significant fraction of the electricity within a given region and highlights the need for a focus on addressing grid integration challenges.

Questions about this FOA? Emai SI.FOA.SETO@ee.doe.gov

¹ U.S. Department of Energy, Energy Information Administration, International Energy Outlook 2017, DOE/EIA-0484 (2017).

 ² P.A. Basore and W.J. Cole, "Comparing supply and demand models for future photovoltaic power generation in the USA," submitted to *Progress in Photovoltaics: Research and Applications*, 2017.
 ³ The Solar Foundation, *National Solar Jobs Census*, 2010 – 2016.

SETO, in partnership with other offices at DOE, launched the SunShot Initiative in February 2011 with the goal of solar electricity becoming price-competitive with conventional utility sources by 2020.4 The SunShot 2020 goal has already been achieved for utility-scale PV, and with continued effort, it is likely to be achieved for grid-tied solar applications. As a result of this tremendous progress and in response to the growing deployment of solar in the U.S., SETO is increasing its focus on addressing the challenges related to seamlessly integrating high penetrations of solar energy onto the nation's electricity grid. Additionally, SETO set 2030 cost targets to further reduce the cost of solar electricity across all market sectors, which would make solar one of the most affordable sources of electricity and enable a substantial fraction of U.S. electricity demand to be supplied by solar technology.⁵ The targets for the unsubsidized cost of electricity at the point of grid connection in a location with average U.S. solar resources are 3¢ per kilowatt-hour (kWh) for utility-scale photovoltaics, 4¢ per kWh for commercial rooftop photovoltaics, 5 per kWh for residential rooftop photovoltaics, and 5¢ per kWh for concentrating solar power with thermal energy storage.

By supporting early-stage research across the solar energy technology space through this EOA, SETO can foster innovation and enable integrated multitechnology solutions that can advance the widespread adoption of solar power while securely integrating it into the nation's energy grid.

DOE is committed to improving the affordability of energy technologies and strengthening the Energy Sector's capability to withstand cyber and physical threats, including natural disasters. Improving the strategic location and situational awareness of solar systems can help ensure continuity of service in the face of widespread and coordinated threats. Developing innovative approaches to accelerate the transfer of solar system solutions that will improve Energy Sector resilience is also a priority.

The Systems Integration (SI) subprogram supports early-stage research and development that advances the reliable, resilient, secure and affordable integration of solar energy onto the U.S. electric grid. For more in-depth discussion of solar grid integration, please visit "Solar Grid Integration" <u>https://energy.gov/eere/solar/downloads/technical-background-2018-seto-funding-opportunity-announcement</u>.

⁴ SunShot Vision Study, NREL Technical Report DOE/GO-102012-3037, 2012.

⁵ U.S. Dept, of Energy, The SunShot Initiative's 2030 Goal: 3¢ per Kilowatt Hour for Solar Electricity, 2016.

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In 2011, solar power comprised less than 0.1% of the U.S. electricity supply with an installed capacity of just 1.2 gigawatts (GW). Solar now supplies nearly 2% of the annual U.S. electricity demand⁶ with an installed capacity of roughly 47 GWs⁷, and is continuing to grow. According to the U.S. Energy Information Administration (EIA), in some states and regions, solar represents up to 15% of total annual electricity generation. Instantaneous solar generation can reach a much higher level, more than 40% in some cases.⁸



Figure 1: For the first time, in March 2017 solar supplied 2% of the U.S. electricity demand, while wind and solar combined accounted for 10% of the U.S. electricity generation (Spurce: EIA)

As the penetration of solar energy on the grid continues to increase, it becomes imperative to identify the associated technical, economic and regulatory challenges, and to develop impactful solutions in order to ensure compatibility with the existing grid and a smooth transition to a secure, reliable and resilient grid of the future.

Traditional grid 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.

⁶ U.S. Energy Information Administration (EIA), Electric Power Monthly with Data for November 2017, published in January 2018. <u>https://www.eia.gov/electricity/monthlv/archive/ianuary2018.pdf</u>

⁷ Source: Solar Energy Industries Association (SEIA), <u>http://www.seia.org/</u>

⁸ For example, in the California Independent System Operator (CAISO) Monthly Renewables Performance Report, the 5-minute market data shows that at the maximum solar served almost 45% of the load in September 2017. See http://www.calso.com/Documents/MonthlyRenewablesPerformanceReport-Nov2017.html Questions about this FOA? Email SI.FOA.SETO@ee.doe.gov

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A modern grid must be 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 customers to manage their electricity use and participate in markets, and provide strong protection against physical and cyber risks.

The current business-as-usual trajectory for the electric industry will not result in a timely transition to a modernized grid⁹. Since large investments in the past and today in the nation's electric grid infrastructure will remain in service for decades, it is important that the U.S. make smart decisions to invest in enabling and forward-looking technologies that will support the creation of a modern grid infrastructure in the coming years. There is a critical need to foster innovation and new technology adoption by decreasing regulatory, market, and business model uncertainties, demonstrating technology maturity and reducing implementation risks.

The Department of Energy's Grid Modernization Initiative¹⁰, is a cross-cutting effort that aligns grid modernization efforts across the multiple DOE Program Offices. As part of the Grid Modernization Initiative (GMI), the SI subprogram supports targeted technology research and development (R&D) that addresses the technical challenges with achieving higher solar penetration, while supporting a safe; reliable, secure, and cost-effective electric power system.

More broadly, the Grid Modernization Initiative focuses on the development of holistic solutions for the grid of the future. Several key technology areas have been identified in the Grid Modernization Multi-Year Program Plan (MYPP)¹¹:

- Devices and Integrated Systems Testing;
- Sensing and Measurements;
- Systems Operations, Power Flow and Control;
- Design and Planning Tools;
- Security and Resilience; and
- Institutional Support

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⁹ Department of Energy Grid Modernization Multiyear Program Plan (MYPP)

¹⁰ Accessed 01 November 2017, <u>https://energy.gov/under-secretary-science-and-energy/grid-modernization-Initiative</u>

¹¹ Department of Energy Grid Modernization Multiyear Program Plan (MYPP), Accessed 01 November 2017, https://energy.gov/downloads/grid-modernization-multi-year-program-plan-mypp

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Progress in all of these areas is considered crucial for the effective grid integration of solar energy and modernization of the grid, as illustrated in Figure 2. A specific focus of the SETO Systems Integration subprogram includes understanding the impacts of increasing penetration of solar energy on grid reliability and power quality, developing best practices for interconnecting and integrating solar with energy storage and synergistic technologies, addressing the variability of solar generation, researching power electronic technologies for flexible power flow control, enhancing situational awareness of solar generation at the grid edge and informing the standardization of interconnection, interoperability, and cybersecurity for PV and other distributed energy resources (DER) systems. Taking these all together, the goal is to advance the knowledge-base and the ability to integrate solar generation, at scale, into electric transmission and distribution systems in a cost-effective, secure, and reliable manner.



Figure 2: Illustration of high level solar-penetration in a modernized electricity power system.

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B. Topic Areas/Technical Areas of Interest <u>Topic 1.1 R&D and Technology Transfer for solar situational awareness in</u> <u>strategic locations associated with critical infrastructure</u>

Situational awareness of solar photovoltaic (PV) systems in strategic locations is vital to managing risk and strengthening the security and resilience of the Nation's critical infrastructure (e.g., for safety, public health and national security). Further, the increasing deployment of utility-scale and distributed solar PV systems brings about challenges to electric power grid planning and operation. As more solar energy systems come online, grid operators across the country need new tools to ensure the secure, resilient and reliable operation of our nation's electric grid and delivery of energy services to our critical infrastructure.

This Topic will support applications to conduct R&D and technology transfer of unique and innovative solutions that will enhance grid operator's situational awareness of solar energy systems deployed throughout the bulk power system, associated substations; distribution system and/or Behind-the-Meter (BTM). Specifically, the solutions should focus on the situational awareness of solar photovoltaic (PV) systems in strategic locations with considerations of cyber and physical vectors to ensure the electric power grid provides continuity of service in the face of wide spread and coordinated threats. The project must result in greater resilience and assure energy services to the Nation's critical infrastructure.

Applications must consider diverse DER options (e.g. photovoltaics, energy storage, and flexible load) available as well as power systems engineering alternatives, and demonstrate the benefits of the proposed solutions. It should also be shown in these solutions how a fleet of multiple photovoltaics systems from multiple locations will be able to respond to fast changing conditions under normal operations and provide power to critical loads during grid outages – with consideration of other DER options and distribution system constraints. Example projects may include, but are not limited to, new design and use-case concepts, essential reliability services, adaptive capabilities, voltage support, previously uncontemplated and unique capabilities and control hardware and software innovations for smart PV inverters and DER management systems.

Technological advancements include control/coordination strategies, real-time system monitoring, robust communication structures, grid planning and analytical platforms, and integration of multiple DER technologies.

Primary focus areas include solar photovoltaic integrated sensor technologies, secure and robust communication tools, advanced data analytics including

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machine learning and artificial Intelligence, machine to machine capabilities, and data visualization. Projects should consider the integration of observed data into planning, operations and business unit systems that would operate at both steady and degraded states. The research should leverage established industrial control and power system cyber security work to implement state-of-the-art cyber security best practices for solar PV systems. Applications must also have an assessment of economic viability of the proposed system, activity or component. The project results are expected to develop the situational awareness tools and improve resilience in strategic locations associated with the critical infrastructure.

In addition to technology solutions, applicants must also explore unique and innovative approaches to accelerate the transfer of solar technology solutions that improve the solar situation awareness. Potential areas of interest include, but are not limited to, projects or models that deploy alternative capital, for technology R&D transfer, incentivize industry-researcher collaboration, leverage existing facilities or capabilities, data and build approaches and methods that serve to drive down the hardware cost and ensure solutions, validation, certifications, resilience and electricity supply can withstand wide spread and coordinated threats.

Applicants are encouraged to work with critical infrastructure owners and operators, industry, academia, and other stakeholders including state, local, tribal and territories entities to take proactive steps to manage risk and strengthen the security and resilience of the Nation's critical infrastructure, considering all hazards that could have a debilitating impact on national security, economic stability, public health and safety, or any combination thereof.

Topic 1.2 R&D, Technology Transfer and Validation of proactive resilience solutions for critical infrastucture.

This topic seeks applications that will conduct the R&D and technology transfer under Topic 1.1 and also include field validation. Validation should demonstrate how unique and innovative solutions enhance resiliency of the bulk power system and/or distribution systems (including microgrids) with high penetrations of solar PV systems. Specifically, the solutions validated should identify the strategic location of solar photovoltaic (PV) systems that will ensure the Energy Sector provides continuity of service to critical infrastructure in the face of wide spread and coordinated threats; focusing on cyber and physical vectors.

Field validation must be applicable and associated with critical infrastructure that verifies the viability of system design, validates architecture relationships and

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interoperability, ensures protection of system networks and data against cyber threats, and informs functional requirements for bulk and distribution system planning platforms and decision support tools. The Applicant must demonstrate through data and information that the technology solutions result in greater resilience and assure energy services to the Nation's critical infrastructure.

Applications must have an assessment of economic viability of the proposed system, activity or component in the respective part of the project. Applicant's solar photovoltaic projects may require working with critical infrastructure owners and operators and state, local, tribal and territories entities to take proactive steps to manage risk and strengthen the security and resilience of the Nation's critical infrastructure, considering all hazards that could have a debilitating impact on national security, economic stability, public health and safety, or any combination thereof. These solar photovoltaic projects shall seek to reduce vulnerabilities, minimize consequences, identify and disrupt threats, and hasten response and recovery efforts related to critical infrastructure to ensure public health and safety while improving national security and economic security.

In addition to the development and validation of technology solutions, applicants must also explore unique and innovative approaches to accelerate the transfer of solar technology solutions that improve resilience. Potential areas of interest include, but are not limited to, projects or models that deploy alternative capital, for technology R&D transfer, incentivize industry-researcher collaboration, leverage existing facilities or capabilities, data and build approaches and methods that serve to drive down the hardware cost and ensure solutions, validation, certifications, resilience and electricity supply can withstand wide spread and coordinated threats.

Cybersecurity and interoperability: Applicants should describe their strategies and plans for establishing and maintaining interoperability, and the utilization of open standards whereverpossible. Applicants should consider interoperability within their solution (among devices and/or subsystems) and at the external interfaces with other utility and customer systems. Applicants shall indicate where they have chosen to utilize proprietary standards.

Applicants should also describe their approach to establishing and maintaining cybersecurity throughout their solution, and at the interfaces to external components and systems. In accordance with the cybersecurity technique of defense-in-depth, applicants shall not cede responsibility for cybersecurity to the external boundaries of their proposed solution, nor shall they propose that it be added on at some later stage.

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Anticipated Phases and Cost Share Requirement by Topic

The following table illustrates the anticipated focus and required cost share by phase for each topic, along with the anticipated timeframes for each phase:

	Year 1 Year 2	Year 3
Topic 1.1: R&D and Technology	Research and development ((20% cost share)
Transfer for solar situational		
awareness		
Topic 1.2: R&D, Technology Transfer	Phase 1: Research and	Phase 2: Field
and Validation of proactive resilience	development (20% cost shar	e) Validation (50%
solutions		cost share)
	and the second	12.02

While the phases identify the type of activity and required cost share, each project will be divided into three one year budget periods, with go/no-go decision points between each budget period.

All work under EERE funding agreements must be performed in the United States. See Section IV. H.III and Appendix C.

C. Applications Specifically Not of Interest

The following types of applications will be deemed nonresponsive and will not be reviewed or considered (See Section III.D of the FOA):

• Applications that fall outside the technical parameters specified in Section I.B of the FOA.

- Applications for proposed technologies that are not based on sound scientific principles (e.g., violates the laws of thermodynamics).
- Undifferentiated research, products, and/or solutions: This FOA seeks innovative solutions that help achieve SETO goals. Incremental advancement of undifferentiated or duplicative efforts is insufficient to meet SETO goals and is not of interest to this FOA.
- Projects lacking influential impact from Federal funds: This FOA intends to fund projects where Federal funds will provide a clear and measurable impact, (e.g. retiring risk sufficiently for follow-on investment or catalyzing

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development.) Projects that have sufficient monies and resources to be executed regardless of federal funds are not of interest.

- Re-funding the same idea at the same technology readiness level: This FOA
- does not intend to re-fund prior SETO awardees for the same idea at the same technology readiness level.
- Products or solutions for systems which do not tie to a grid or micro-grid (i.e. wholly off-grid applications and portable power).
- Generic technologies or solutions that are not integrated with solar PV. These include sensor and measurement, communications, and cyber security.

D. Authorizing Statutes

The programmatic authorizing statute is EPACT 2005, Section 931 (a)(2).

Awards made under this announcement will fall under the purview of 2 CFR Part 200 as amended by 2 CFR Part 910.

II. Award Information

A. Award Overview

i. Estimated Funding

EERE expects to make approximately \$46 million of Federal funding available for new awards under this EQA; subject to the availability of appropriated funds. EERE anticipates making approximately 10 awards under this FOA. EERE may issue one; multiple, or no awards. Individual awards may vary between \$2 and \$10 million.

EERE may issue awards in one, multiple, or none of the topic areas.

EERE may establish more than one budget period for each award and fund only the initial budget period(s). Funding for all budget periods, including the initial budget period, is not guaranteed. Before the expiration of the initial budget period(s), EERE may perform a down-select among different recipients and provide additional funding only to a subset of recipients.

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ii. Period of Performance

EERE anticipates making awards that will run up to 36 months in length, comprised of one or more budget periods. Project continuation will be contingent upon satisfactory performance and go/no-go decision review. At the go/no-go decision points, EERE will evaluate project performance, project schedule adherence, meeting milestone objectives, compliance with reporting requirements, and overall contribution to the program goals and objectives. As a result of this evaluation, EERE will make a determination to continue the project, re-direct the project, or discontinue funding the project.

iii. New Applications Only

EERE will accept only new applications under this EOA. EERE will not consider applications for renewals of existing EERE-funded awards through this FOA.

B. EERE Funding Agreements

Through Cooperative Agreements and other similar agreements, EERE provides financial and other support to projects that have the potential to realize the FOA objectives. EERE does not use such agreements to acquire property or services for the direct <u>benefit or</u> use of the United States Government.

i. Cooperative Agreements

EERE generally uses Cooperative Agreements to provide financial and other support to Prime Recipients.

Through Cooperative Agreements, EERE provides financial or other support to accomplish a public purpose of support or stimulation authorized by Federal statute. Under Cooperative Agreements, the Government and Prime Recipients share responsibility for the direction of projects.

EERE has substantial involvement in all projects funded via Cooperative Agreement. See Section VI.B.9 of the FOA for more information on what substantial involvement may involve.

ii. Funding Agreements with FFRDCs

In most cases, Federally Funded Research and Development Centers (FFRDC) are funded independently of the remainder of the Project Team. The FFRDC then executes an agreement with any non-FFRDC Project Team members to arrange work structure, project execution, and any other matters. Regardless

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of these arrangements, the entity that applied as the Prime Recipient for the project will remain the Prime Recipient for the project.

iii. Grants

Although EERE has the authority to provide financial support to Prime Recipients through Grants, EERE generally does not fund projects through Grants. EERE may fund a limited number of projects through Grants, as appropriate.

iv. Technology Investment Agreements

In rare cases and if determined appropriate, EERE will consider awarding a Technology Investment Agreement (TIA) to a non-FFRDC applicant. TIAs, governed by 10 CFR Part 603, are assistance instruments used to increase the involvement of commercial entities in the Department's research, development, and demonstration programs. A TIA may be either a type of cooperative agreement or an assistance transaction other than a cooperative agreement, depending on the intellectual property provisions. In both cases, TIAs are not necessarily subject to all of the requirements of 2 CFR Part 200 as amended by 2 CFR Part 910.

In a TIA, EERE may modify the standard Government terms and conditions, including but not limited to:

- Intellectual Property Provisions: EERE may negotiate special arrangements with recipients to avoid the encumbrance of existing intellectual property rights or to facilitate the commercial deployment of inventions conceived or first actually reduced to practice under the EERE funding agreement.
- Accounting Provisions: EERE may authorize the use of generally accepted accounting principles (GAAP) where recipients do not have accounting systems that comply with Government recordkeeping and reporting requirements.

EERE will be more amenable to awarding a TIA in support of an application from a consortium or a team arrangement that includes cost sharing with the private sector, as opposed to an application from a single organization. Such a consortium or teaming arrangement could include a FFRDC. If a DOE/NNSA FFRDC is a part of the consortium or teaming arrangement, the value of, and funding for the DOE/NNSA FFRDC portion of the work will be authorized and funded under the DOE field work authorization system and performed under

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the laboratory's Management and Operating contract. Funding for a non-DOE/NNSA FFRDC would be through an interagency agreement under the Economy Act or other statutory authority. Other appropriate contractual accommodations, such as those involving intellectual property, may be made through a "funds in" agreement to facilitate the FFRDCs participation in the consortium or teaming arrangement. If a TIA is awarded, certain types of information described in 10 CFR 603.420(b) are exempt from disclosure under the Freedom of Information Act for five years after DOE receives the information.

An applicant may request a TIA if it believes that using a TIA could benefit the RD&D objectives of the program (see section 603,225) and can document these benefits. If an applicant is seeking to negotiate a TIA, the applicant must include an explicit request in its Full Application. After an applicant is selected for award negotiation, the Contracting Officer will determine if awarding a TIA would benefit the RD&D objectives of the program in ways that likely would not happen if another type of assistance agreement (e.g., cooperative agreement subject to the requirements of 2 CFR Part 200 as amended by 2 CFR Part 910). The Contracting Officer will use the criteria in 10 CFR 603, Subpart B, to make this determination.

III. Eligibility Information

To be considered for substantive evaluation, an applicant's submission must meet the criteria set forth below. If the application does not meet these initial requirements, it will be considered non-responsive, removed from further evaluation, and ineligible for any award.

A. Eligible Applicants

i. Individuals

U.S. citizens and lawful permanent residents are eligible to apply for funding as a Prime Recipient or Subrecipient.

ii. Domestic Entities

For-profit entities, educational institutions, and nonprofits that are incorporated (or otherwise formed) under the laws of a particular State or territory of the United States are eligible to apply for funding as a Prime Recipient or Subrecipient. 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.

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State, local, and tribal government entities are eligible to apply for funding as a Prime Recipient or Subrecipient.

DOE/NNSA Federally Funded Research and Development Centers (FFRDCs) are eligible to apply for funding as a Subrecipient, but are not eligible to apply as a Prime Recipient.

Non-DOE/NNSA FFRDCs are eligible to apply for funding as a Subrecipient, but are not eligible to apply as a Prime Recipient.

Federal agencies and instrumentalities (other than DOE) are eligible to apply for funding as a Subrecipient, but are not eligible to apply as a Prime Recipient.

iii. Foreign Entities

Foreign entities, whether for-profit or otherwise, are eligible to apply for funding under this FOA. Other than as provided in the "Individuals" or "Domestic Entities" sections above, all Prime Recipients receiving funding under this FOA must be incorporated (or otherwise formed) under the laws of a State on 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.

Foreign entities may request a waiver of the requirement to designate a subsidiary in the United States as the Prime Recipient in the Full Application (i.e., a foreign entity may request that it remains the Prime Recipient on an award). To do so, the Applicant must submit an explicit written waiver request in the Full Application. <u>Appendix C lists the necessary information that must be included in a request to waive this requirement</u>. The applicant does not have the right to appeal EERE's decision concerning a waiver request.

In the waiver request, the applicant must demonstrate to the satisfaction of EERE that it would further the purposes of this FOA and is otherwise in the economic interests of the United States to have a foreign entity serve as the Prime Recipient. EERE may require additional information before considering the waiver request.

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iv. Incorporated Consortia

Incorporated consortia, which may include domestic and/or foreign entities, are eligible to apply for funding as a Prime Recipient or Subrecipient. For consortia incorporated (or otherwise formed) under the laws of a State or territory of the United States, please refer to "Domestic Entities" above. For consortia incorporated in foreign countries, please refer to the requirements in "Foreign Entities" above.

Each incorporated consortium must have an internal governance structure and a written set of internal rules. Upon request, the consortium must provide a written description of its internal governance structure and its internal rules to the EERE Contracting Officer.

v. Unincorporated Consortia

Unincorporated Consortia, which may include domestic and foreign entities, must designate one member of the consortium to serve as the Prime Recipient/consortium representative. The Prime Recipient/consortium representative must be incorporated (or otherwise formed) under the laws of a State or territory of the United States. The eligibility of the consortium will be determined by the eligibility of the Prime Recipient/consortium representative under Section III. A of the FOA.

Upon request, unincorporated consortia must provide the EERE Contracting Officer with a collaboration agreement, commonly referred to as the articles of collaboration, which sets out the rights and responsibilities of each consortium member. This agreement binds the individual consortium members together and should discuss, among other things, the consortium's:

Management structure;

- Method of making payments to consortium members;
- Means of ensuring and overseeing members' efforts on the project;
- Provisions for members' cost sharing contributions; and
- Provisions for ownership and rights in intellectual property developed previously or under the agreement.

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B. Cost Sharing

Cost Share 20%

For Topic 1.1, the cost share must be at least 20% of the total allowable costs for research and development projects (i.e., 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) and must come from non-Federal sources unless otherwise allowed by law. (See 2 CFR 200.306 and 2 CFR 910.130 for the applicable cost sharing requirements.)

Cost Share 50%

For Topic 1.2, the cost share must be at least 20% of the total allowable costs for Phase 1: research and development, and at least 50% for Phase 2: field validation.

To assist applicants in calculating proper cost share amounts, EERE has included a cost share information sheet and sample cost share calculation as Appendices B and C to this FOA.

i. Legal Responsibility

Although the cost share requirement applies to the project as a whole, including work performed by members of the project team other than the Prime Recipient, the Prime Recipient is legally responsible for paying the entire cost share. The Prime Recipient's cost share obligation is expressed in the Assistance Agreement as a static amount in U.S. dollars (cost share amount) and as a percentage of the Total Project Cost (cost share percentage). If the funding agreement is terminated prior to the end of the project period, the Prime Recipient is required to contribute at least the cost share percentage of total expenditures incurred through the date of termination.

The Prime Recipient is solely responsible for managing cost share contributions by the Project Team and enforcing cost share obligations assumed by Project Team members in subawards or related agreements.

ii. Cost Share Allocation

Each Project Team is free to determine how best to allocate the cost share requirement among the team members. The amount contributed by individual Project Team members may vary, as long as the cost share requirement for the project as a whole is met.

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iii. Cost Share Types and Allowability

Every cost share contribution must be allowable under the applicable Federal cost principles, as described in Section IV. H.i of the FOA. In addition, cost share must be verifiable upon submission of the Full Application.

Project Teams may provide cost share in the form of cash or in-kind contributions. Cost share may be provided by the Prime Recipient, Subrecipients, or third parties (entities that do not have a role in performing the scope of work). Vendors/Contractors may not provide cost share. Any partial donation of goods or services is considered a discount and is not allowable.

Cash contributions include, but are not limited to personnel costs, fringe costs, supply and equipment costs, indirect costs and other direct costs.

In-kind contributions are those where a value of the contribution can be readily determined, verified and justified but where no actual cash is transacted in securing the good or service comprising the contribution. Allowable in-kind contributions include, but are not limited to: the donation of volunteer time of the donation of space or use of equipment.

Project teams may use funding or property received from state or local governments to meet the cost share requirement, so long as the funding was not provided to the state or local government by the Federal Government.

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 (e.g., Federal grants, equipment owned by the Federal Government); or
- Expenditures that were reimbursed under a separate Federal Program.

Project Teams may not use the same cash or in-kind contributions to meet cost share requirements for more than one project or program.

Cost share contributions must be specified in the project budget, verifiable from the Prime Recipient's records, and necessary and reasonable for proper

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and efficient accomplishment of the project. As all sources of cost share are considered part of total project cost, the cost share dollars will be scrutinized under the same Federal regulations as Federal dollars to the project. Every cost share contribution must be reviewed and approved in advance by the Contracting Officer and incorporated into the project budget before the expenditures are incurred.

Applicants are encouraged to refer to 2 CFR 200.306 as amended by 2 CFR 910.130 & 10 CFR 603.525-555 for additional guidance on cost sharing.

iv. Cost Share Contributions by FERDCs

Because FFRDCs are funded by the Federal Government, costs incurred by FFRDCs generally may not be used to meet the cost share requirement. FFRDCs may contribute cost share only if the contributions are paid directly from the contractor's Management Fee or another non-Federal source.

v. Cost Share Verification

Applicants are required to provide written assurance of their proposed cost share contributions in their Full Applications.

Upon selection for award negotiations, applicants are required to provide additional information and documentation regarding their cost share contributions. Please refer to Appendix A of the FOA.

vi. Cost Share Payment

EERE requires Prime Recipients to contribute the cost share amount incrementally over the life of the award. Specifically, the Prime Recipient's cost share for each billing period must always reflect the overall cost share ratio negotiated by the parties (i.e., the total amount of cost sharing on each invoice when considered cumulatively with previous invoices must reflect, at a minimum, the cost sharing percentage negotiated). As FFRDC funding will be provided directly to the FFRDC(s) by DOE, Prime Recipients will be required to provide project cost share at a percentage commensurate with the FFRDC costs, on a budget period basis, resulting in a higher interim invoicing cost share ratio than the total award ratio.

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. Regardless of the interval requested, the Prime Recipient must be

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up-to-date on cost share at each interval. Such requests must be sent to the Contracting Officer during award negotiations and include the following information: (1) a detailed justification for the request; (2) a proposed schedule of payments, including amounts and dates; (3) a written commitment to meet that schedule; and (4) such evidence as necessary to demonstrate that the Prime Recipient has complied with its cost share obligations to date. The Contracting Officer must approve all such requests before they go into effect.

C. Compliance Criteria

Letters of Intent, Full Applications, and Replies to Reviewer Comments must meet all Compliance criteria listed below or they will be considered noncompliant. EERE will not review or consider noncompliant submissions, including Letters of Intent, Full Applications, and Replies to Reviewer Comments that were: submitted through means other than EERE Exchange; submitted after the applicable deadline; and/or submitted incomplete. EERE will not extend the submission deadline for applicants that fail to submit required information due to server/connection congestion.

i. Compliance Criteria

1. Letters of Intent

- Letters of Intent are deemed compliant if:
 - The applicant entered all required information and clicked the "Create Letter of Intent" button in EERE Exchange by the deadline stated in the FOA. Please note that by clicking the "Create Letter of Intent Button" this will create the applicant's control number to be used through the entire application process.

Full Applications

Full Applications are deemed compliant if:

- The applicant submitted a compliant Letter of Intent;
- The Full Application complies with the content and form requirements in Section IV.D of the FOA; and
- The applicant successfully uploaded all required documents and clicked the "Submit" button in EERE Exchange by the deadline stated in the FOA.

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3. Replies to Reviewer Comments

Replies to Reviewer Comments are deemed compliant if:

- The Reply to Reviewer Comments complies with the content and form requirements in Section IV.E of the FOA; and
- The applicant successfully uploaded all required documents to EERE Exchange by the deadline stated in the FOA.

D. Responsiveness Criteria

All "Applications Specifically Not of Interest," as described in Section I.C of the FOA, are deemed nonresponsive and are not reviewed or considered.

E. Other Eligibility Requirements

- i. Requirements for DOE/NNSA Federally Funded Research and Development Centers (FFRDC) Listed as the Applicant A DOE/NNSA FFRDC is not eligible to apply for funding under this FOA.
- ii. Requirements for DOE/NNSA and non-DOE/NNSA Federally Funded Research and Development Centers Included as a Subrecipient

DOE/NNSA and non-DOE/NNSA FFRDCs may be proposed as a Subrecipient on another entity's application subject to the following guidelines:

1. Authorization for non-DOE/NNSA FFRDCs

The Federal agency sponsoring the FFRDC must authorize in writing the use of the FFRDC on the proposed project and this authorization must be submitted with the application. The use of a FFRDC must be consistent with its authority under its award.

2. Authorization for DOE/NNSA FFRDCs

The cognizant Contracting Officer for the FFRDC must authorize in writing the use of the FFRDC on the proposed project and this authorization must be submitted with the application. The following wording is acceptable for this authorization:

Authorization is granted for the [Enter Laboratory Name] Laboratory to participate in the proposed project. The work

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> proposed for the laboratory is consistent with or complementary to the missions of the laboratory, and will not adversely impact execution of the DOE assigned programs at the laboratory.

3. Value/Funding

The value of and funding for the FFRDC portion of the work will not normally be included in the award to a successful applicant. Usually, DOE will fund a DOE/NNSA FFRDC contractor through the DOE field work proposal system and non-DOE/NNSA FFRDC through an interagency agreement with the sponsoring agency.

4. Cost Share

Although the FFRDC portion of the work is usually excluded from the award to a successful applicant, the applicant's cost share requirement will be based on the total cost of the project, including the applicant's and the FFRDC's portions of the project.

5. Responsibility

The Prime Recipient will be the responsible authority regarding the settlement and satisfaction of all contractual and administrative issues including, but not limited to disputes and claims arising out of any agreement between the Prime Recipient and the FFRDC contractor.

6. Limit on FFRDC Effort

The FFRDC effort, in aggregate, shall not exceed 50% of the total estimated cost of the project; including the applicant's and the FFRDC's portions of the effort.

F. Limitation on Number of Full Applications Eligible for Review

Applicants may submit a Letter of Intent, and Full Application to Sub-Topic 1.1 <u>OR</u> Sub-Topic 1.2, but not both. An application must describe a unique, scientifically distinct project.

G. Questions Regarding Eligibility

EERE will not make eligibility determinations for potential applicants prior to the date on which applications to this FOA must be submitted. The decision whether to submit an application in response to this FOA lies solely with the applicant.

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IV. Application and Submission Information

A. Application Process

The application process will include three phases: a Letter of Intent phase, Full Application phase, and Replies to Reviewer Comments phase. At each phase, EERE performs an initial eligibility review of the applicant submissions to determine whether they meet the eligibility requirements of Section III of the FOA. EERE will not review or consider submissions that do not meet the eligibility requirements of Section III. All submissions must conform to the following form and content requirements, including maximum page lengths (described below) and must be submitted via EERE Exchange at <u>https://eere-exchange.energv.gov/</u>, unless specifically stated otherwise. <u>EERE will not review or consider submissions submitted through means other than EERE Exchange, submissions submitted</u> <u>after the applicable deadline, and Incomplete submissions</u>. EERE will not extend deadlines for applicants who fail to submit required information and documents due to server/connection congestion. A control number will be issued when an applicant begins the EERE Exchange application process. This control number must be included with all Application documents, as described below.

The Letter of Intent, Full Application, and Reply to Reviewer Comments must conform to the following requirements:

- Each must be submitted in Adobe PDF format unless stated otherwise.
 Each must be written in English.
- All pages must be formatted to fit on 8.5 x 11 inch paper with margins not less than one inch on every side. Use Times New Roman typeface, a black font color, and a font size of 12 point or larger (except in figures or tables, which may be 10 point font). A symbol font may be used to insert Greek letters or special characters, but the font size requirement still applies. References must be included as footnotes or endnotes in a font size of 10 or larger. Footnotes and endnotes are counted toward the maximum page requirement.
- The Control Number must be prominently displayed on the upper right corner of the header of every page. Page numbers must be included in the footer of every page.

 Each submission must not exceed the specified maximum page limit, including cover page, charts, graphs, maps, and photographs when printed using the formatting requirements set forth above and single spaced. If applicants exceed the maximum page lengths indicated below, EERE will

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review only the authorized number of pages and disregard any additional pages.

Applicants are responsible for meeting each submission deadline. <u>Applicants are</u> <u>strongly encouraged to submit their Letter of Intent, Full Applications at least 48</u> <u>hours in advance of the submission deadline</u>. Under normal conditions (i.e., at least 48 hours in advance of the submission deadline), applicants should allow at least 1 hour to submit a Full Application or Reply to Reviewer Comments. Once the Letter of Intent, Full Application, or Reply to Reviewer Comments is submitted in EERE Exchange, applicants may revise or update that submission until the expiration of the applicable deadline. If changes are made, the applicant must resubmit the Letter of Intent, Full Application, or Reply to Reviewer Comments before the applicable deadline.

EERE urges applicants to carefully review their Full Applications and to allow sufficient time for the submission of required information and documents. All Full Applications that pass the initial eligibility review will undergo comprehensive technical merit review according to the criteria identified in Section V.A.i of the FOA.

i. Additional Information on EERE Exchange

EERE Exchange is designed to enforce the deadlines specified in this FOA. The "Apply" and "Submit" buttons will automatically disable at the defined submission deadlines. Should applicants experience problems with EERE Exchange, the following information may be helpful.

Applicants that experience issues with submission <u>PRIOR</u> to the FOA deadline: In the event that an applicant experiences technical difficulties with a submission, the application should contact the EERE Exchange helpdesk for assistance (<u>EERE-ExchangeSupport@hg.doe.gov</u>). The EERE Exchange helpdesk and/or the EERE Exchange system administrators will assist applicants in resolving issues.

Applicants that experience issue with submissions that result in late submissions: In the event that an applicant experiences technical difficulties so severe that they are unable to submit their application by the deadline, the applicant should contact the EERE Exchange helpdesk for assistance (EERE-ExchangeSupport@hq.doe.gov). The EERE Exchange helpdesk and/or the EERE Exchange system administrators will assist the applicant in resolving all issues (including finalizing submission on behalf of and with the applicant's concurrence). PLEASE NOTE, however, those applicants who are

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unable to submit their application on time due to their waiting until the last minute when network traffic is at its heaviest to submit their materials will not be able to use this process.

B. Application Forms

The application forms and instructions are available on EERE Exchange. To access these materials, go to <u>https://eere-Exchange.energy.gov</u> and select the appropriate funding opportunity number.

Note: The maximum file size that can be uploaded to the EERE Exchange website is 10MB. Files in excess of 10MB cannot be uploaded, and hence cannot be submitted for review. If a file exceeds 10MB but is still within the maximum page limit specified in the FOA, it must be broken into parts and denoted to that effect. For example:

ControlNumber_LeadOrganization_Project_Part_1 ControlNumber_LeadOrganization_Project_Part_2, etc.

i. Content and Form of the Letter of Intent

To be eligible to submit a Full Application, applicants must submit a Letter of Intent by the specified due date and time, Letters of Intent will be used by EERE to plan for the merit review process. The letters should not contain any proprietary or sensitive business information. The letters will not be used for down-selection purposes, and do not commit an applicant to submit an application.

EERE will not review or consider ineligible Letters of Intent (see Section III of the FOA).

Each applicant must provide the following information as part of the Letter

- Project Title;
- Lead Organization;
- Organization Type (Business < 500 Employees; Business > 1000 Employees; Business 500-1000 Employees; Federally Funded Research and Development Center (FFRDC); Government-Owned, Government Operated; Non-Profit; University);
- Whether the Application has been previously submitted to EERE;
- % of effort contributed by the Lead Organization;
- The Project Team, including:

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- o The Principal Investigator for the Prime Recipient;
- o Team Members (i.e., Subrecipients); and
- Key Participants (i.e., individuals who contribute in a substantive, measureable way to the execution of the proposed project);
- The specific FOA subtopic area being addressed and the Project Focus Area(s): e.g., Photovoltaics, CdTe deposition, Reliability
 - Topic/subtopic identification will help sort applications and determine reviewer expertise areas needed for each application.
- Abstract The abstract provided should be not more than 200 words in length, and should provide a truncated explanation of the proposed project.

ii. Content and Form of the Full Application

Applicants must submit a Full Application by the specified due date and time to be considered for funding under this FOA. Applicants must complete the following application forms found on the EERE Exchange website at <u>https://eere-</u> Exchange.energy.gov/, in accordance with the Instructions.

All Full Application documents must be marked with the Control Number issued to the applicant.

iii. Full Application Content Requirements

EERE will not review or consider ineligible Full Applications (see Section III of the FOA).

Each Full Application shall be limited to a single concept or technology. Unrelated concepts and technologies shall not be consolidated in a single Full Application.

Full Applications must conform to the following requirements:

Submission	Components	File Name
Full	Technical Volume (See Chart in Section	ControlNumber_LeadOrganization_Technic
(PDF, unless	Statement of Project Objectives	ControlNumber_LeadOrganization_SOPO
stated	(Microsoft Word format) (10 page limit)	
otherwise)	SF-424 Application for Federal Assistance	ControlNumber_LeadOrganization_App424

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Budget Justification (EERE 335)	ControlNumber_LeadOrganization_Budget
(Microsoft Excel format. Applicants must	_Justification
use the template available in EERE	
Exchange)	
Summary for Public Release (1 page	ControlNumber_LeadOrganization_Summa
limit)	ry
Summary Slide (1 page limit, Microsoft	ControlNumber_LeadOrganization_Slide
PowerPoint format)	
Subrecipient Budget Justification, If	ControlNumber_LeadOrganization_Subreci
applicable (EERE 335) (Microsoft Excel	pient_Budget_Justification
format. Applicants must use the	
template available in EERE Exchange)	
Budget for FFRDC, if applicable	ControlNumber_LeadOrganization_FWP
Authorization from cognizant	ControlNumber_LeadOrganization_FFRDCA
Contracting Officer for FFRDC, If	uth
applicable	
SF-LLL Disclosure of Lobbying Activities	ControlNumber LeadOrganization_SF-LLL
Foreign Entity and Performance of Work	ControlNumber_LeadOrganization_Walver
in the United States walver requests, If	
applicable	
U.S. Manufacturing Plans	ControlNumber_LeadOrganization_USMP

Note: The maximum file size that can be uploaded to the EERE Exchange website is 10MB. Files in excess of 10MB cannot be uploaded, and hence cannot be submitted for review. If a file exceeds 10MB but is still within the maximum page limit specified in the FOA it must be broken into parts and denoted to that effect. For example:

ControlNumber_LeadOrganization_TechnicalVolume_Part_1 ControlNumber_LeadOrganization_TechnicalVolume_Part_2, etc.

EERE will not accept late submissions that resulted from technical difficulties due to uploading files that exceed 10MB.

EERE provides detailed guidance on the content and form of each component below.

ii. Technical Volume

The Technical Volume must be submitted in Adobe PDF format. The Technical Volume must conform to the following content and form requirements, including maximum page lengths. If applicants exceed the maximum page lengths indicated below, EERE will review only the authorized

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number of pages and disregard any additional pages. This volume must address the Merit Review Criteria as discussed in Section V.A.2 of the FOA. Save the Technical Volume in a single PDF file using the following convention for the title: "ControlNumber_LeadOrganization_TechnicalVolume".

Applicants must provide sufficient citations and references to the primary research literature to justify the claims and approaches made in the Technical Volume. However, EERE and reviewers are under no obligation to review cited sources.

The Technical Volume to the Full Application may not be more than 20 pages, including the cover page, table of contents, and all citations, charts, graphs, maps, photos, or other graphics, and must include all of the information in the table below. The applicant should consider the weighting of each of the evaluation criteria (see Section V,A.2 of the FOA) when preparing the Technical Volume.

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SECTION/PAGE LIMIT	DESCRIPTION
Cover Page	The cover page should include the project title, the specific FOA Topic Area being addressed (if applicable), both the technical and business points of contact, names of all team member organizations, and any statements regarding confidentiality.
Project Overview (This section should constitute approximately 10% of the Technical Volume)	 The Project Overview should contain the following information: Background: The applicant should discuss the background of their organization, including the history, successes, and current research and development status (i.e., the technical baseline) relevant to the technical topic being addressed in the Full Application. Project Goal: The applicant should explicitly identify the targeted improvements to the baseline technology and the critical success factors in achieving that goal. DOE Impact: The applicant should discuss the impact that DOE funding would have on the proposed project. Applicants should specifically explain how DOE funding, relative to prior, current, or anticipated funding from other public and private sources, is necessary to achieve the project objectives.

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subject line.

Technical Description.	The Technical Description should contain the following information:
Innovation and Impact	Relevance and Outcomes: The applicant should provide a detailed
(This soction should	 Relevance and Outcomes, The applicant should provide a decaded deconintion of the technology including the scientific and other
(THIS Section Should	description of the technology, fictualing the scientific and other
constitute	principies and objectives that will be pursued during the project.
approximately 30% of	This section should describe the relevance of the proposed project
the Technical Volume)	to the goals and objectives of the FOA, including the potential to
	meet specific DOE technical targets or other relevant performance
	targets. The applicant should clearly specify the expected
	outcomes of the project
	 Feasibility: The applicant should demonstrate the technical
	feasibility of the proposed technology and capability of achieving
	the anticipated performance targets including a description of
	proving work done and prior regulte
이 이번 수는 것 같아요. 문	Innovation and imposts. The explicant should describe the surrout
	 Innovation and impacts: The applicant should describe the current state of the second applicant should describe the current
	state-of-the-drug the applicable neith, the specific innovation of
	the proposed technology, the advantages of proposed technology
	over current and emerging technologies, and the overall impact on
	advancing the state of the art/technical baseline if the project is
	successful.
Workplan and Market	The Workplan should include a summary of the Project Objectives,
Transformation Plan	Technical Scope Work Breakdown Structure, Milestones, Go/No-Go
(This section should	Decision Points, and Project Schedule. A detailed Statement of Project
constitute	Objectives (SOPO) is separately requested. The Workplan should contain
approximately 40% of	the following information:
the Technical Volume)	Project Chierty as: The applicant should provide a clear and
	concise (high-level) statement of the goals and philectives of the
	project or well as the expected outcomes
	Direct as well as the expected outcomes,
	 recultical scope summary: The applicant should provide a
	summary description of the overall work scope and approach to
	achieve the objective(s). The overall work scope is to be divided by
	performance periods that are separated by discrete, approximately
	annual decision points (see below for more information on go/no-
	go decision points). The applicant should describe the specific
	expected end result of each performance period.
	 Work Breakdown Structure (WBS) and Task Description Summary:
	The Workplan should describe the work to be accomplished and
	how the applicant will achieve the milestones, will accomplish the
	final project goal(s), and will produce all deliverables. The
	Workplan is to be structured with a hierarchy of performance
	period (approximately annual), task and subtasks, which is typical
	of a standard work breakdown structure (WBS) for any project.
	The Workplan shall contain a concise description of the specific
	activities to be conducted over the life of the project. The
	description shall be a full explanation and disclosure of the project
	heing nronosed (i.e., a statement such as "we will then complete a
L	I being proposed file, a suttement such as we will their complete a

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- Attach letters of commitment from all Subrecipient/third party cost share providers as an appendix. Letters of commitment do not count towards the page limit.
- Attach any letters of commitment from partners/end users as an appendix (1 page maximum per letter). Letters of commitment do not count towards the page limit.
- For multi-organizational or multi-investigator projects, describe succinctly:
 - The roles and the work to be performed by each PI and Key Participant;
 - Business agreements between the applicant and each Pl and Key Participant;
 - o How the various efforts will be integrated and managed;
 - Process for making decisions on scientific/technical direction;
 - o Publication arrangements;
 - o Intellectual Property issues; and
 - o Communication plans

iii. Statement of Project Objectives

Applicants are required to complete a Statement of Project Objectives (SOPO): A SOPO template is available on EERE Exchange at <u>https://eere-</u> <u>Exchange.energy.gov/</u>. The SOPO including the Milestone Table, must not exceed 10 pages when printed using standard 8.5 x 11 paper with 1" margins (top, bottom, left, and right) with font not smaller than 12 point. Save the SOPO in a single Microsoft Word tile using the following convention for the title "ControlNumber_LeadOrganization_SOPO".

iv. SF-424: Application for Federal Assistance

Complete all required fields in accordance with the instructions on the form. The list of certifications and assurances in Field 21 can be found at <u>http://energy.gov/management/office-management/operational-management/financial-assistance/financial-assistance-forms</u>, under Certifications and Assurances. Note: The dates and dollar amounts on the SF-424 are for the complete project period and not just the first project year, first phase or other subset of the project period. Save the SF-424 in a single PDF file using the following convention for the title "ControlNumber LeadOrganization App424".

v. Budget Justification Workbook (EERE 335)

Applicants are required to complete the Budget Justification Workbook. This form is available on EERE Exchange at <u>https://eere-Exchange.energy.gov/</u>.

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Prime Recipients must complete each tab of the Budget Justification Workbook for the project as a whole, including all work to be performed by the Prime Recipient and its Subrecipients and Contractors, and provide all requested documentation (e.g., a Federally-approved rate agreement, vendor quotes). Applicants should include costs associated with required annual audits and incurred cost proposals in their proposed budget documents. The "Instructions and Summary" included with the Budget Justification Workbook will auto-populate as the applicant enters information into the Workbook. Applicants must carefully read the "Instructions and Summary" tab provided within the Budget Justification Workbook. Save the Budget Justification Workbook in a single Microsoft Excel file using the following convention for the title

"ControlNumber_LeadOrganization_Budget_Justification".

vi. Summary/Abstract for Public Release

Applicants are required to submit a one-page summary/abstract of their project. The project summary/abstract must contain a summary of the proposed activity suitable for dissemination to the public. It should be a self-contained document that identifies the name of the applicant, the project director/principal investigator(s), the project title, the objectives of the project, a description of the project, including methods to be employed, the potential impact of the project (e.g., benefits, outcomes), and major participants (for collaborative projects). This document must not include any proprietary or sensitive business information as DOE may make it available to the public after selections are made. The project summary must not exceed 1 page when printed using standard 8.5 x 11 paper with 1" margins (top, bottom, left, and right) with font not smaller than 12 point. Save the Summary for Public Release in a single PDF file using the following convention for the title "ControlNumber_LeadOrganization_Summary".

vii.Summary Slide

Applicants are required to provide a single PowerPoint slide summarizing the proposed project. The slide must be submitted in Microsoft PowerPoint format. This slide is used during the evaluation process. Save the Summary Slide in a single file using the following convention for the title "ControlNumber_LeadOrganization_Slide".

The Summary Slide template requires the following information:

- A technology Summary;
- A description of the technology's impact;

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- Proposed project goals;
- Any key graphics (illustrations, charts and/or tables);
- The project's key idea/takeaway;
- Project title, Prime Recipient, Principal Investigator, and Key Participant information; and
- Requested EERE funds and proposed applicant cost share.

viii. Subrecipient Budget Justification (EERE 335) (if applicable)

Applicants must provide a separate budget justification, EERE 335 (i.e., budget justification for each budget year and a cumulative budget) for each subrecipient that is expected to perform work estimated to be more than \$250,000 or 25 percent of the total work effort (whichever is less). The budget justification must include the same justification information described in the "Budget Justification" section above. Save each subrecipient budget justification in a Microsoft Excel file using the following convention for the title

"ControlNumber_LeadOrganization_Subrecipient_Budget_Justification".

ix. Budget for DOE/NNSA FFRDC (if applicable)

If a DOE/NNSA FFRDC contractor is to perform a portion of the work, the applicant must provide a DOE Field Work Proposal (FWP) in accordance with the requirements in DOE Order 412.1, Work Authorization System. DOE Order 412.1 and DOE O 412.1 (Field Work Proposal form) area available at the following link, under "DOE Budget Forms":

https://www.directives.doe.gov/directives-documents/400-series/0412.1-<u>BOrder-a-admchg1/@@images/file</u>. Save the FWP in a single PDF file using the following convention for the title

"ControlNumber_LeadOrganization_FWP".

x. Authorization for non-DOE/NNSA or DOE/NNSA FFRDCs (if applicable)

The Federal agency sponsoring the FFRDC must authorize in writing the use of the FFRDC on the proposed project and this authorization must be submitted with the application. The use of a FFRDC must be consistent with the contractor's authority under its award. Save the Authorization in a single PDF file using the following convention for the title "ControlNumber_LeadOrganization FFRDCAuth".

xi. SF-LLL: Disclosure of Lobbying Activities (required)

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Prime Recipients and Subrecipients may not use any Federal funds to influence or attempt to influence, directly or indirectly, congressional action on any legislative or appropriation matters.

Prime Recipients and Subrecipients are required to complete and submit SF-LLL, "Disclosure of Lobbying Activities"

(https://www.grants.gov/web/grants/forms/sf-424-individual-family.html) to ensure that non-Federal funds have not been paid and will not be paid to any person for influencing or attempting to influence any of the following in connection with your application:

- An officer or employee of any Federal agency;
- A Member of Congress;
- An officer or employee of Congress; or
- An employee of a Member of Congress.

Save the SF-LLL in a single PDF file using the following convention for the title "ControlNumber_LeadOrganization_SF-LLL".

xii. Waiver Requests: Foreign Entities and Performance of Work in the United States (if applicable)

1. Foreign Entity Participation:

As set forth in Section III.A.3, 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. To request a waiver of this requirement, the applicant must submit an explicit waiver request in the Full Application. <u>Appendix C lists the necessary information that must be</u> included in a request to waive this requirement.

2. Performance of Work in the United States

As set forth in Section IV.K.iii, all work under EERE funding agreements must be performed in the United States. This requirement does not apply to the purchase of supplies and equipment, so a waiver is not required for foreign purchases of these items. However, the Prime Recipient should make every effort to purchase supplies and equipment within the United States. <u>Appendix C lists the necessary information that must be</u> included in a request to waive the Performance of Work in the United States requirement.

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xiii. U.S. Manufacturing Commitments

As part of the application, applicants are required to submit a U.S. Manufacturing Plan. The U.S. Manufacturing Plan represents the applicant's measurable commitment to support U.S. manufacturing as a result of its award.

The weight given to the U.S. Manufacturing Plans during the review and selection process varies based on the particular EOA. Applicants should review Section V.A.2 of this FOA to determine the weight given to the U.S. Manufacturing Plans under this FOA.

A U.S. Manufacturing Plan should contain the following or similar preamble: "If selected for funding, the applicant agrees to the following commitments as a condition of that funding:" and, after the preamble, the plan should include one or more specific and measureable commitments. For example, an applicant may commit particular types of products to be manufactured in the U.S. In addition to or instead of making a commitment tied to a particular product, the applicant may make other types of commitments still beneficial to U.S. manufacturing. An applicant may commit to a particular investment in a new or existing U.S. manufacturing facility, keep certain activities based in the U.S. (i.e., final assembly) or support a certain number of jobs in the U.S. related to the technology and manufacturing. For an applicant which is likely to license the technology to others, especially universities for which licensing may be the exclusive means of commercialization the technology, the U.S. manufacturing plan may indicate the applicant's plan and commitment to use a licensing strategy that would likely support U.S. manufacturing.

When an applicant that is a domestic small business, domestic educational institution, or nonprofit organization is selected for an award, the U.S. Manufacturing Plan submitted by the applicant becomes part of the terms and conditions of the award. The applicant/awardee may request a waiver or modification of the U.S. Manufacturing Plan from DOE upon a showing that the original U.S. Manufacturing Plan is no longer economically feasible.

When an applicant that is a domestic large business is selected for an award, a class patent waiver applies as set forth in Section VIII. L. Under this class

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patent waiver, domestic large businesses may elect title to their subject inventions similar to the right provided to the domestic small businesses, educational institutions, and nonprofits by law. In order to avail itself of the class patent waiver, a domestic large business must agree that any products embodying or produced through the use of an invention conceived or first actually reduced to practice under the award will be substantially manufactured in the United States, unless DOE agrees that the commitments proposed in the U.S. Manufacturing Plan are sufficient.

For other entity types that are selected for award, please see Section VIII.L regarding U.S. manufacturing commitments.

xiv. Data Management Plan

Applicants whose Full Applications are selected for award negotiations will be required to submit a Data Management Plan during the award negotiations phase. The Data Management Plan is a document that outlines the proposed plan for data sharing or preservation. Submission of this plan is required, and failure to submit the plan may result in the termination of award negotiations. As a courtesy, guidance for preparing a Data Management Plan is provided in Appendix D of the FOA.

C. Content and Form of Replies to Reviewer Comments

EERE will provide applicants with reviewer comments following evaluation of all eligible Full Applications. Applicants will have a brief opportunity to review the comments and to prepare a short Reply to Reviewer Comments responding to comments however they desire or supplementing their Full Application. The Reply to Reviewer Comments is an optional submission; applicants are not required to submit a Reply to Reviewer Comments. EERE will post the Reviewer Comments in EERE Exchange. The expected submission deadline is on the cover page of the FOA; however, it is the applicant's responsibility to monitor EERE Exchange in the event that the expected date changes. The deadline will not be extended for applicants who are unable to timely submit their reply due to failure to check EERE Exchange or relying on the expected date alone. Applicants should anticipate having approximately three (3) business days to submit Replies to Reviewer Comments.

EERE will not review or consider ineligible Replies to Reviewer Comments (see Section III of the FOA). EERE will review and consider each eligible Full Application, even if no Reply is submitted or if the Reply is found to be ineligible.

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Replies to Reviewer Comments must conform to the following content and form requirements, including maximum page lengths, described below. If a Reply to Reviewer Comments is more than three pages in length, EERE will review only the first three (3) pages and disregard any additional pages.

SECTION		DESCRIPTION
Text	2 pages max	Applicants may respond to one or more reviewer comments or supplement their Full Application.
Optional	1 page max	Applicants may use this page however they wish; text, graphs, charts, or other data to respond to reviewer comments or supplement their Full Application are acceptable.

D. Post-Award Information Requests

If selected for award, EERE reserves the right to request additional or clarifying information for any reason deemed necessary, including but not limited to:

- Indirect cost information
- Other budget information
- Commitment Letters from Third Parties Contributing to Cost Share, if applicable
- Name and phone number of the Designated Responsible Employee for complying with national policies prohibiting discrimination (See 10 CFR

1040.5)

- Representation of Limited Rights Data and Restricted Software, if applicable
- Environmental Questionnaire

E. Dun and Bradstreet Universal Numbering System Number and System for Award Management

Each applicant (unless the applicant is an individual or Federal awarding agency that is excepted from those requirements under 2 CFR §25.110(b) or (c), or has an exception approved by the Federal awarding agency under 2 CFR §25.110(d)) is required to: (1) Be registered in the System for Award Management (SAM) at <u>https://www.sam.gov</u> before submitting its application; (2) provide a valid Dun and Bradstreet Universal Numbering System (DUNS) number in its application; and (3) continue to maintain an active SAM registration with current information at all times during which it has an active Federal award or an application or plan under consideration by a Federal awarding agency. DOE may not make a Federal award

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to an applicant until the applicant has complied with all applicable DUNS and SAM requirements and, if an applicant has not fully complied with the requirements by the time DOE is ready to make a Federal award, the DOE may determine that the applicant is not qualified to receive a Federal award and use that determination as a basis for making a Federal award to another applicant.

F. Submission Dates and Times

Full Applications, and Replies to Reviewer Comments must be submitted in EERE Exchange no later than 5 p.m. Eastern on the dates provided on the cover page of this FOA.

G. Intergovernmental Review

This FOA is not subject to Executive Order 12372 – Intergovernmental Review of Federal Programs.

H. Funding Restrictions

i. Allowable Costs

All expenditures must be allowable, allocable, and reasonable in accordance with the applicable Federal cost principles.

Refer to the following applicable Federal cost principles for more information:

FAR Part 31 for For Profit entities; and

 2 CFR Part 200 Subpart E - Cost Principles for all other non-federal entities.

Pre-Award Costs

Selectees must request prior written approval to charge pre-award costs. Pre-award costs are those incurred prior to the effective date of the Federal award directly pursuant to the negotiation and in anticipation of the Federal award where such costs are necessary for efficient and timely performance of the scope of work. Such costs are allowable only to the extent that they would have been allowable if incurred after the date of the Federal award and **only** with the written approval of the Federal awarding agency, through the Contracting Officer assigned to the award.

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Pre-award costs cannot be incurred prior to the Selection Official signing the Selection Statement and Analysis. Pre-award costs can only be incurred if such costs would be reimbursable under the agreement if incurred after award.

Pre-Award expenditures are made at the Selectee's risk; EERE is not obligated to reimburse costs: (1) in the absence of appropriations; (2) if an award is not made; or (3) if an award is made for a lesser amount than the Selectee anticipated.

1. Pre-Award Costs Related to National Environmental Policy Act (NEPA) Requirements

EERE's decision whether and how to distribute Federal funds under this FOA is subject to NEPA. Applicants should carefully consider and should seek legal counsel or other expert advice before taking any action related to the proposed project that would have an adverse effect on the environment or limit the choice of reasonable alternatives prior to EERE completing the NEPA review process

EERE does not guarantee or assume any obligation to reimburse costs where the Prime Recipient incurred the costs prior to receiving written authorization from the Contracting Officer. If the applicant elects to Undertake activities that may have an adverse effect on the environment or limit the choice of reasonable alternatives prior to receiving such written authorization from the Contracting Officer, the applicant is doing so at risk of not receiving Federal funding and such costs may not be recognized as allowable cost share. Likewise, if a project is selected for negotiation of award, and the Prime Recipient elects to undertake activities that are not authorized for Federal funding by the Contracting Officer in advance of EERE completing a NEPA review, the Prime Recipient is doing so at risk of not receiving Federal Funding and such costs may not be recognized as allowable cost share. Nothing contained in the pre-award cost reimbursement regulations or any pre-award costs approval letter from the Contracting Officer override these NEPA requirements to obtain the written authorization from the Contracting Officer prior to taking any action that may have an adverse effect on the environment or limit the choice of reasonable alternatives.

iii. Performance of Work in the United States

1. Requirement

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All work performed under EERE Awards must be performed in the United States. This requirement does not apply to the purchase of supplies and equipment; however, the Prime Recipient should make every effort to purchase supplies and equipment within the United States. The Prime Recipient must flow down this requirement to its Subrecipients.

2. Failure to Comply

If the Prime Recipient fails to comply with the Performance of Work in the United States requirement, EERE may deny reimbursement for the work conducted outside the United States and such costs may not be recognized as allowable recipient cost share. The Prime Recipient is responsible should any work under this Award be performed outside the United States, absent a waiver, regardless of if the work is performed by the Prime Recipient, Subrecipients, contractors on other project partners.

3. Waiver

There may be limited circumstances where it is in the interest of the project to perform a portion of the work outside the United States. To seek a waiver of the Performance of Work in the United States requirement, the applicant must submit a written waiver request to EERE. Appendix C lists the necessary information that must be included in a request to waive the Performance of Work in the United States requirement.

The applicant must demonstrate to the satisfaction of EERE that a waiver would further the purposes of the FOA and is in the economic interests of the United States. EERE may require additional information before considering a waiver request. Save the waiver request(s) in a single PDF file titled "ControlNumber_PerformanceofWork_Waiver". The applicant does not have the right to appeal EERE's decision concerning a waiver request.

iv. Construction

Recipients are required to obtain written authorization from the Contracting Officer before incurring any major construction costs.

v. Foreign Travel

If international travel is proposed for your project, please note that your organization must comply with the International Air Transportation Fair Competitive Practices Act of 1974 (49 USC 40118), commonly referred to as the "Fly America Act," and implementing regulations at 41 CFR 301-10.131

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through 301-10.143. The law and regulations require air transport of people or property to, from, between, or within a country other than the United States, the cost of which is supported under this award, to be performed by or under a cost-sharing arrangement with a U.S. flag carrier, if service is available. Foreign travel costs are allowable only with the written prior approval of the Contracting Officer assigned to the award.

vi. Equipment and Supplies

To the greatest extent practicable, all equipment and products purchased with funds made available under this FOA should be American-made. This requirement does not apply to used or leased equipment.

Property disposition will be required at the end of a project if the current fair market value of property exceeds \$5,000. The rules for property disposition are set forth in 2 CFR 200.310 - 200.316 as amended by 2 CFR 910.360.

vii.Lobbying

Recipients and Subjectipients may not use any Federal funds to influence or attempt to influence, directly or indirectly, congressional action on any legislative or appropriation matters.

Recipients and Subrecipients are required to complete and submit SF-LLL, "Disclosure of Lobbying Activities"

(https://www.grants.gov/web/grants/forms/sf-424-individual-family.html) to ensure that non-Federal funds have not been paid and will not be paid to any person for influencing or attempting to influence any of the following in connection with your application:

• An officer or employee of any Federal agency;

A Member of Congress;

An officer or employee of Congress; or

An employee of a Member of Congress.

viii. Risk Assessment

Prior to making a Federal award, the DOE is required by 31 U.S.C. 3321 and 41 U.S.C. 2313 to review information available through any OMB-designated repositories of government-wide eligibility qualification or financial integrity information, such as SAM Exclusions and "Do Not Pay."

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In addition, DOE evaluates the risk(s) posed by applicants before they receive Federal awards. This evaluation may consider: results of the evaluation of the applicant's eligibility; the quality of the application; financial stability; quality of management systems and ability to meet the management standards prescribed in this part; history of performance; reports and findings from audits; and the applicant's ability to effectively implement statutory, regulatory, or other requirements imposed on non-Federal entities.

In addition to this review, DOE must comply with the guidelines on government-wide suspension and debament in 2 CFR 180, and must require non-Federal entities to comply with these provisions. These provisions restrict Federal awards, subawards and contracts with certain parties that are debarred, suspended or otherwise excluded from or ineligible for participation in Federal programs or activities.

ix. Invoice Review and Approval

DOE employs a risk-based approach to determine the level of supporting documentation required for approving invoice payments. Recipients may be required to provide some or all of the following items with their requests for reimbursement:

- Summary of costs by cost categories
- Timesheets or personnel hours report
- Immesheets or personner nours report
- Involces/receipts for all travel, equipment, supplies, contractual, and other costs
- UCC filing proof for equipment acquired with project funds by for-profit recipients and subrecipients
- Explanation of cost share for invoicing period
- Analogous information for some subrecipients
- Other items as required by DOE

V. Application Review Information

A. Technical Review Criteria

i. Full Applications

Applications will be evaluated against the merit review criteria shown below. All sub-criteria are of equal weight.

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subject line.

Criterion 1: Innovation and Impact (Weight: 34%) – How innovative and impactful is the project, assuming the stated outcomes can be achieved as written?

- Innovative –Extent to which the proposed project or solution is well beyond the state of the art.
- Impactful Extent to which the proposed project or solution, if successful, impacts the core goals outlined in the FOA in Topics and Areas of Interest (FOA Section #...). Extent to which the claimed impacts are feasible and justified.
- Differentiated Extent of differentiation with respect to existing commercial products, solutions, programs, or technologies.
- Scalable Likelihood the proposed solution, if successful, could be scaled to have a broader impact or be maintained at a sufficiently large scale after project completion.

Criterion 2: Quality and Feasibility of the Project Plan (Weight: 33%) – Are the stated goals of the project SMART (Specific, Measurable, Aggressive (but achievable), Relevant, and Timely), are they likely to be accomplished within the scope of this project, and does the proposal show a clear path for growth and improvement over time?

- Measurable Extent to which the applicant shows a clear understanding of the importance of SMART verifiable milestones and proposes milestones that demonstrate clear progress, are aggressive but achievable, and are quantitative.
- **Risks mitigated** Extent to which the applicant understands and discusses the project risks and challenges the proposed work will face, and the soundness of the strategies and methods that will be used to mitigate risks.
- Validated Level of validation (letters of support/interest, partners, customer trials, data from prior work, report references, technical baselines established, etc.).
- Reasonable assumptions Reasonableness of the assumptions used to form the execution strategy, (e.g., market size, customer participation, costs, throughput at full scale, speed of proposed scaleup or adoption, and mode of funding).
- **Reasonable budget** The reasonableness of the overall funding requested to achieve the proposed project and objectives.

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Criterion 3: Capability and Resources of the Applicant/Project Team (Weight: 33%) – Is the team well qualified and positioned to successfully complete this project?

- **Capable** The training, capabilities, and experience of the assembled team to address all aspects of the proposed work with a high probability of success. Extent to which this team (including proposed Subrecipients) will be able to achieve the final results on time and to specification.
- Participation The level of participation by project participants as evidenced by letter(s) of commitment and how well they are integrated into the Team Qualifications and Resources section of the Technical Volume.
- **Commitment** Extent to which the final team required to complete this project is fully assembled and committed to the project (e.g., Are there any key members that are "to be hired at a later date")
- Past Performance Extent to which the assembled team has shown success in the past. DOE encourages new entrants and new ideas, but past successes and/or failures will be noted.
- Access Extent to which the team has access to facilities, equipment, people, expertise, data, knowledge, and any other resources required to complete the proposed project.

ii. Criteria for Replies to Reviewer Comments

EERE has not established separate criteria to evaluate Replies to Reviewer Comments Instead, Replies to Reviewer Comments are attached to the original applications and evaluated as an extension of the Full Application.

B. Standards for Application Evaluation

Applications that are determined to be eligible will be evaluated in accordance with this FOA, by the standards set forth in EERE's Notice of Objective Merit Review Procedure (76 Fed. Reg. 17846, March 31, 2011) and the guidance provided in the "Department of Energy Merit Review Guide for Financial Assistance," which is available at:

https://energy.gov/management/downloads/merit-review-guide-financialassistance-and-unsolicited-proposals-current.

C. Other Selection Factors

i. Program Policy Factors

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In addition to the above criteria, the Selection Official may consider the following program policy factors in determining which Full Applications to select for award negotiations:

- The degree to which the proposed project exhibits technological diversity when compared to the existing DOE project portfolio and other projects selected from the subject FOA;
- 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 accelerate commercialization and overcome key market barriers;
- The degree to which the proposed project is likely to lead to increased employment and manufacturing in the United States;
- The degree to which 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; and
- The degree to which the proposed project, or group of projects, represent a desired geographic distribution (considering past awards and current applications).

D. Evaluation and Selection Process

i. Overview

The evaluation process consists of multiple phases; each includes an initial eligibility review and a thorough technical review. Rigorous technical reviews of eligible submissions 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, in determining which applications to select.

ii. Pre-Selection Interviews

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.II of the FOA). The invited applicant(s) will meet with EERE representatives to provide clarification on the contents of the Full

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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.

iii. Pre-Selection Clarification

EERE may determine that pre-selection clarifications are necessary from one or more applicants. Pre-selection clarifications are distinct from and less formal than pre-selection interviews. These pre-selection clarifications will solely be for the purposes of clarifying the application, and will be limited to information already provided in the application documentation. The preselection clarifications may occur before, during or after the merit review evaluation process. Information provided by an applicant that is not necessary to address the pre-selection clarification question will not be reviewed or considered. Typically, a pre-selection clarification will be carried out through either written responses to EERE's written clarification questions or yideo or conference calls with EERE representatives.

The information provided by applicants to EERE through pre-selection clarifications is incorporated in their applications and contributes to the merit review evaluation and EERE's selection decisions. If EERE contacts an applicant for pre-selection clarification purposes, it does not signify that the applicant has been selected for negotiation of award or that the applicant is among the top ranked applications.

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EERE will not reimburse applicants for expenses relating to the pre-selection clarifications, nor will these costs be eligible for reimbursement as pre-award costs.

iv. Recipient Integrity and Performance Matters

DOE, prior to making a Federal award with a total amount of Federal share greater than the simplified acquisition threshold, is required to review and consider any information about the applicant that is in the designated integrity and performance system accessible through SAM (currently FAPIIS) (see 41 U.S.C. 2313).

The applicant, at its option, may review information in the designated integrity and performance systems accessible through SAM and comment on any information about itself that a Federal awarding agency previously entered and is currently in the designated integrity and performance system accessible through SAM.

DOE will consider any written comments by the applicant, in addition to the other information in the designated integrity and performance system, in making a judgment about the applicant's integrity, business ethics, and record of performance under Federal awards when completing the review of risk posed by applicants as described in 2 Cr. R. § 200.205.

v. Selection

The Selection Official may consider the technical merit, the Federal Consensus Board's recommendations, program policy factors, and the amount of funds available in arriving at selections for this FOA.

E. Anticipated Notice of Selection and Award Dates

EERE anticipates notifying applicants selected for negotiation of award by March 2019 and making awards by May 2019.

VI. Award Administration Information

A. Award Notices

i. Ineligible Submissions

Ineligible Letters of Intent, or Full Applications will not be further reviewed or considered for award. The Contracting Officer will send a notification letter by email to the technical and administrative points of contact designated by

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the applicant in EERE Exchange. The notification letter will state the basis upon which the the Full Application is ineligible and not considered for further review.

ii. Full Application Notifications

EERE will notify applicants of its determination via a notification letter by email to the technical and administrative points of contact designated by the applicant in EERE Exchange. The notification letter will inform the applicant whether or not its Full Application was selected for award negotiations. Alternatively, EERE may notify one or more applicants that a final selection determination on particular Full Applications will be made at a later date, subject to the availability of funds or other factors.

iii. Successful Applicants

Receipt of a notification letter selecting a Full Application for award negotiations does not authorize the applicant to commence performance of the project. If an application is selected for award negotiations, it is not a commitment by EERE to issue an award. Applicants do not receive an award until award negotiations are complete and the Contracting Officer executes the funding agreement, accessible by the Prime Recipient in FedConnect.

The award negotiation process will take approximately 60 days. Applicants must designate a primary and a backup point-of-contact in EERE Exchange with whom EERE will communicate to conduct award negotiations. The applicant must be responsive during award negotiations (i.e., provide requested documentation) and meet the negotiation deadlines. If the applicant fails to do so or if award negotiations are otherwise unsuccessful, EERE will cancel the award negotiations and rescind the Selection. EERE reserves the right to terminate award negotiations at any time for any reason.

Please refer to Section IV.H.ii of the FOA for guidance on pre-award costs.

iv. Alternate Selection Determinations

In some instances, an applicant may receive a notification that its application was not selected for award and EERE designated the application to be an alternate. As an alternate, EERE may consider the Full Application for Federal funding in the future. A notification letter stating the Full Application is designated as an alternate does not authorize the applicant to commence

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performance of the project. EERE may ultimately determine to select or not select the Full Application for award negotiations.

v. Unsuccessful Applicants

EERE shall promptly notify in writing each applicant whose application has not been selected for award or whose application cannot be funded because of the unavailability of appropriated funds.

B. Administrative and National Policy Requirements

i. 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. These requirements are as follows:

1. EERE Exchange

Register and create an account on EERE Exchange at https://eere-Exchange:energy.gov

This account will then allow the user to register for any open EERE FOAs that are currently in EERE Exchange. It is recommended that each organization or business unit, whether acting as a team or a single entity, use only one account as the contact point for each submission. Applicants should also designate backup points of contact so they may be easily contacted if deemed necessary. This step is required to apply to this FOA.

The EERE Exchange registration does not have a delay; however, the remaining registration requirements below could take several weeks to process and are necessary for a potential applicant to receive an award under this FOA.

2. DUNS Number

Obtain a Dun and Bradstreet Data Universal Numbering System (DUNS) number (including the plus 4 extension, if applicable) at http://fedgov.dnb.com/webform.

3. System for Award Management -

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Register with the System for Award Management (SAM) at <u>https://www.sam.gov</u>. 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.

4. FedConnect

Register in FedConnect at <u>https://www.fedconnect.net</u>. 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 <u>https://www.fedconnect.net/FedConnect/Marketing/Documents/FedConnect Ready Set Go.pdf</u>.

5. Grants.gov

Register in Grants.gov (<u>http://www.grants.gov</u>) to receive automatic updates when Amendments to this FOA are posted. However, please note that Full Applications will not be accepted through Grants.gov.

6. Electronic Authorization of Applications and Award Documents
 Submission of an application and supplemental information under this
 FOA through electronic systems used by the Department of Energy,
 Including EERE Exchange and FedConnectinet, constitutes the authorized
 representative's approval and electronic signature.

ii. Award Administrative Requirements

The administrative requirements for DOE grants and cooperative agreements are contained in 2 CER Part 200 as amended by 2 CFR Part 910.

iii. Foreign National Access to DOE Sites

All applicants that ultimately enter into an award resulting from this FOA will be subject to the following requirement concerning foreign national involvement. Upon DOE's request, Prime Recipients must provide information to facilitate DOE's responsibilities associated with foreign national access to DOE sites, information, technologies, and equipment. A foreign national is defined as any person who was born outside the jurisdiction of the United States, is a citizen of a foreign government, and has not been naturalized under U.S. law. If the Prime Recipient or Subrecipients, contractors or vendors under the award, anticipate utilizing a foreign national person in the performance of an award, the Prime Recipient is responsible for providing to the Contracting Officer specific information of

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the foreign national(s) to satisfy compliance with all of the requirements for access approval.

iv. Subaward and Executive Reporting

Additional administrative requirements necessary for DOE grants and cooperative agreements to comply with the Federal Funding and Transparency Act of 2006 (FFATA) are contained in 2 CFR Part 170. Prime Recipients must register with the new FFATA Subaward Reporting System database and report the required data on their first tier Subrecipients. Prime Recipients must report the executive compensation for their own executives as part of their registration profile in SAM

v. National Policy Requirements

The National Policy Assurances that are incorporated as a term and condition of award are located at: <u>http://www.nsf.gov/awards/managing/rtc.isp</u>.

vi. Environmental Review in Accordance with National Environmental Policy Act (NEPA)

EERE's decision whether and how to distribute federal funds under this FOA is subject to the National Environmental Policy Act (42 USC 4321, *et seq.*). NEPA requires Federal agencies to integrate environmental values into their decision-making processes by considering the potential environmental impacts of their proposed actions. For additional background on NEPA, please see DOE's NEPA website, at <u>http://nepa.energy.gov/</u>.

While NEPA compliance is a Federal agency responsibility and the ultimate decisions remain with the Federal agency, all recipients selected for an award will be required to assist in the timely and effective completion of the NEPA process in the manner most pertinent to their proposed project. If DOE determines certain records must be prepared to complete the NEPA review process (e.g., biological evaluations or environmental assessments), the costs to prepare the necessary records may be included as part of the project costs.

vii.Applicant Representations and Certifications

1, Lobbying Restrictions

By accepting funds under this award, the Prime Recipient agrees that none of the funds obligated on the award shall be expended, directly or indirectly, to influence Congressional action on any legislation or appropriation matters pending before Congress, other than to

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subject line.

communicate to Members of Congress as described in 18 U.S.C. §1913. This restriction is in addition to those prescribed elsewhere in statute and regulation.

- 2. Corporate Felony Conviction and Federal Tax Liability Representations In submitting an application in response to this FOA, the applicant represents that:
 - a. It is not a corporation that has been convicted of a felony criminal violation under any Federal law within the preceding 24 months, and
 - b. It is not a corporation that has any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability.

For purposes of these representations the following definitions apply:

A Corporation includes any entity that has filed articles of incorporation in any of the 50 states, the District of Columbia, or the various territories of the United States [but not foreign corporations]. It includes both forprofit and non-profit organizations.

3. Nondisclosure and Confidentiality Agreements Representations In submitting an application in response to this FOA the applicant represents that:

a. It does not and will not require its employees or contractors to sign internal nondisclosure or confidentiality agreements or statements prohibiting or otherwise restricting its employees or contactors from lawfully reporting waste, fraud, or abuse to a designated investigative or law enforcement representative of a Federal department or agency authorized to receive such information.

b. It **does not and will not** use any Federal funds to implement or enforce any nondisclosure and/or confidentiality policy, form, or agreement it uses unless it contains the following provisions:

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(1) "These provisions are consistent with and do not supersede, conflict with, or otherwise alter the employee obligations, rights, or liabilities created by existing statute or Executive order relating to (1) classified information, (2) communications to Congress, (3) the reporting to an Inspector General of a violation of any law, rule, or regulation, or mismanagement, a gross waste of funds, an abuse of authority, or a substantial and specific danger to public health or safety, or (4) any other whistleblower protection. The definitions, requirements, obligations, rights, sanctions, and liabilities created by controlling Executive orders and statutory provisions are incorporated into this agreement and are controlling."

(2) The limitation above shall not contravene requirements applicable to Standard Form 312, Form 4414, or any other form issued by a Federal department or agency governing the nondisclosure of classified information.

Notwithstanding the provision listed in paragraph (a), a nondisclosure or confidentiality policy form or agreement that is to be executed by a person connected with the conduct of an intelligence or intelligence-related activity, other than an employee or officer of the United States Government, may contain provisions appropriate to the particular activity for which such document is to be used. Such form or agreement shall, at a minimum, require that the person will not disclose any classified information received in the course of such activity unless specifically authorized to do so by the United States Government. Such nondisclosure or confidentiality forms shall also make it clear that they do not bar disclosures to Congress, or to an authorized official of an executive agency or the Department of Justice, that are essential to reporting a substantial violation of law.

vili. Statement of Federal Stewardship

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EERE will exercise normal Federal stewardship in overseeing the project activities performed under EERE Awards. Stewardship Activities include, but are not limited to, conducting site visits; reviewing performance and financial reports, providing assistance and/or temporary intervention in usual circumstances to correct deficiencies that develop during the project; assuring compliance with terms and conditions; and reviewing technical performance after project completion to ensure that the project objectives have been accomplished.

ix. Statement of Substantial Involvement.

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

- 1. EERE shares responsibility with the recipient for the management, control, direction, and performance of the Project.
- 2. EERE may intervene in the conduct or performance of work under this Award for programmatic reasons. Intervention includes the interruption or modification of the conduct or performance of project activities.
 - EERE may redirect or discontinue funding the Project based on the outcome of EERE's evaluation of the Project at that the Go/No Go decision point(s).
- 4. EERE participates in major project decision-making processes.

x. Subject Invention Utilization Reporting

In order to ensure that Prime Recipients and Subrecipients holding title to subject inventions are taking the appropriate steps to commercialize subject inventions, EERE may require that each Prime Recipient holding title to a subject invention submit annual reports for 10 years from the date the subject invention was disclosed to EERE on the utilization of the subject invention and efforts made by Prime Recipient or their licensees or assignees to stimulate such utilization. The reports must include information regarding the status of development, date of first commercial sale or use, gross

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royalties received by the Prime Recipient, and such other data and information as EERE may specify.

xi. Intellectual Property Provisions

The standard DOE financial assistance intellectual property provisions applicable to the various types of recipients are located at <u>http://www1.eere.energy.gov/financing/resources.htmlhttps://www.energy.gov/gc/standard-intellectual-property-ip-provisions-financial-assistance-awards</u>.

xii.Reporting

Reporting requirements are identified on the Federal Assistance Reporting Checklist, attached to the award agreement. The checklist can be accessed at <u>http://www1.eere.energy.gov/financing/resources.htmlhttps://www.energy.gov/eere/funding/eere-funding-application-and-management-forms.</u>

xiii. Go/No-Go <u>Revi</u>ew

Each project selected under this FOA will be subject to a periodic project evaluation referred to as a Go/No-Go Review. Federal funding beyond the Go/No Go decision point (continuation funding), is contingent on (1) the availability of funds appropriated by Congress for the purpose of this program and the availability of future-year budget authority; (2) meeting the objectives, milestones, deliverables, and decision point criteria of recipient's approved project and obtaining approval from EERE to continue work on the project; and (3) the submittal of required reports in accordance with the Statement of Project Objectives.

As a result of the Go/No Go Review, DOE may, at its discretion, authorize the following actions: (1) continue to fund the project, contingent upon the availability of funds appropriated by Congress for the purpose of this program and the availability of future-year budget authority; (2) recommend redirection of work under the project; (3) place a hold on federal funding for the project, pending further supporting data or funding; or (4) discontinue funding the project because of insufficient progress, change in strategic direction, or lack of funding.

The Go/No-Go decision is distinct from a non-compliance determination. In the event a recipient fails to comply with the requirements of an award, EERE may take appropriate action, including but not limited to, redirecting, suspending or terminating the award.

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xiv. Conference Spending

The recipient shall not expend any funds on a conference not directly and programmatically related to the purpose for which the grant or cooperative agreement was awarded that would defray the cost to the United States Government of a conference held by any Executive branch department, agency, board, commission, or office for which the cost to the United States Government would otherwise exceed \$20,000, thereby circumventing the required notification by the head of any such Executive Branch department, agency, board, commission, or office to the Inspector General (or senior ethics official for any entity without an Inspector General), of the date, location, and number of employees attending such conference.

xv. UCC Financing Statements

Per 2 CFR 910.360 (Real Property and Equipment) when a piece of equipment is purchased by a for-profit recipient or subrecipient with Federal Funds, and when the Federal share of the financial assistance agreement is more than \$1,000,000, the recipient or subrecipient must:

Properly record, and consent to the Department's ability to properly record if the recipient fails to do so, UCC financing statement(s) for all equipment in excess of \$5,000 purchased with project funds. These financing statement(s) must be approved in writing by the contracting officer prior to the recording, and they shall provide notice that the Recipient's title to all equipment (not real property) purchased with Federal funds under the financial assistance agreement is conditional pursuant to the terms of this section, and that the Government retains an undivided reversionary interest in the equipment. The UCC financing statement(s) must be filed before the Contracting Officer may reimburse the recipient for the Federal share of the equipment unless otherwise provided for in the relevant financial assistance agreement. The recipient shall further make any amendments to the financing statements, as necessary or as the contracting officer may direct.

VII. Questions/Agency Contacts

Upon the issuance of a FOA, EERE personnel are prohibited from communicating (in writing or otherwise) with applicants regarding the FOA except through the established question and answer process as described below. Specifically, questions regarding the content of this FOA must be submitted to: <u>SI.FOA.SETO@ee.doe.gov</u>. Questions must be submitted not later than 3 business days prior to the application due date and time.

Questions about this FOA? Email SI.FOA.SETO@ee.doe.gov
All questions and answers related to this FOA will be posted on EERE Exchange at: <u>https://eere-exchange.energy.gov</u>. **Please note that you must first select this specific FOA Number in order to view the questions and answers specific to this FOA**. EERE will attempt to respond to a question within 3 business days, unless a similar question and answer has already been posted on the website.

Questions related to the registration process and use of the EERE Exchange website should be submitted to: <u>EERE-ExchangeSupport@hq.doe.gov</u>.

VIII. Other Information

A. FOA Modifications

Amendments to this FOA will be posted on the EERE Exchange website and the Grants.gov system. However, you will only receive an email when an amendment or a FOA is posted on these sites if you register for email notifications for this FOA in Grants.gov. EERE recommends that you register as soon after the release of the FOA as possible to ensure you receive timely notice of any amendments or other FOAs.

B. Government Right to Reject or Negotiate

EERE reserves the right, without qualification, to reject any or all applications received in response to this FOA and to select any application, in whole or in part, as a basis for negotiation and/or award.

C. Commitment of Public Funds

The Contracting Officer is the only individual who can make awards or commit the Government to the expenditure of public funds. A commitment by anyone other than the Contracting Officer, either express or implied, is invalid.

D. Treatment of Application Information

In general, EERE will only use data and other information contained in applications for evaluation purposes, unless such information is generally available to the public or is already the property of the Government.

Applicants should not include trade secrets or commercial or financial information that is privileged or confidential in their application unless such information is necessary to convey an understanding of the proposed project or to comply with a requirement in the FOA.

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The use of protective markings such as "Do Not Publicly Release – Trade Secret" or "Do Not Publicly Release – Confidential Business Information" is encouraged. However, applicants should be aware that the use of protective markings is not dispositive as to whether information will be publicly released pursuant to the Freedom of Information Act, 5 U.S.C. §552, et. seq., as amended by the OPEN Government Act of 2007, Pub. L. No. 110-175. (See Section I of this document, "Notice of Potential Disclosure Under the Freedom of Information Act (FOIA)" for additional information regarding the public release of information under the Freedom of Information Act.

Applicants are encouraged to employ protective markings in the following manner:

The cover sheet of the application must be marked as follows and identify the specific pages containing trade secrets or commercial or financial information that is privileged or confidential:

Notice of Restriction on Disclosure and Use of Data: Pages [list applicable pages] of this document may contain trade secrets or commercial or financial information that is privileged or confidential, and is exempt from public disclosure. Such information shall be used or disclosed only for evaluation purposes or in accordance with a financial assistance or loan agreement between the submitter and the Government. The Government may use or disclose any information that is not appropriately marked or otherwise restricted, regardless of source. [End of Notice]

The header and footer of every page that contains trade secrets or commercial or financial information that is privileged must be marked as follows: "May contain trade secrets or commercial or financial information that is privileged or confidential and exempt from public disclosure."

In addition, each line or paragraph containing trade secrets or commercial or financial information that is privileged or confidential must be enclosed in brackets.

E. Evaluation and Administration by Non-Federal Personnel

In conducting the merit review evaluation, the Go/No-Go Review and Peer Review, the Government may seek the advice of qualified non Federal personnel as reviewers. The Government may also use non-Federal personnel to conduct routine, nondiscretionary administrative activities. The applicant, by submitting its application, consents to the use of non-Federal reviewers/administrators. Non-

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Federal reviewers must sign conflict of interest and non-disclosure agreements prior to reviewing an application. Non-Federal personnel conducting administrative activities must sign a non-disclosure agreement.

F. Notice Regarding Eligible/Ineligible Activities

Eligible activities under this FOA include those which describe and promote the understanding of scientific and technical aspects of specific energy technologies, but not those which encourage or support political activities such as the collection and dissemination of information related to potential, planned or pending legislation.

G. Notice of Right to Conduct a Review of Financial Capability

EERE reserves the right to conduct an independent third party review of financial capability for applicants that are selected for negotiation of award (including personal credit information of principal(s) of a small business if there is insufficient information to determine financial capability of the organization).

H. Notice of Potential Disclosure Under Freedom of Information Act (FOIA)

Under the Freedom of Information Act, (FOIA), 5 U.S.C. §552, et. seq., as amended by the OPEN Government Act of 2007, Pub. L. No. 110-175, any information received from the Applicant is considered to be an agency record, and as such, subject to public release under FOIA. The purpose of the FOIA is to afford the public the right to request and receive agency records unless those agency records are protected from disclosure under one or more of the nine FOIA exemptions. Decisions to disclose or withhold information received from the Applicant are based upon the applicability of one or more of the nine FOIA exemptions, not on the existence or nonexistence of protective markings or designations. Only the agency's designated FOIA Officer may determine if information received from the Applicant may be withheld pursuant to one of the nine FOIA exemptions. All FOIA requests received by DOE are processed in accordance with 10 C.F.R. Part 1004.

I. Requirement for Full and Complete Disclosure

Applicants are required to make a full and complete disclosure of all information requested. Any failure to make a full and complete disclosure of the requested information may result in:

- The termination of award negotiations;
- The modification, suspension, and/or termination of a funding agreement;

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- The initiation of debarment proceedings, debarment, and/or a declaration of ineligibility for receipt of Federal contracts, subcontracts, and financial assistance and benefits; and
- Civil and/or criminal penalties.

J. Retention of Submissions

EERE expects to retain copies of all Full Applications, Replies to Reviewer Comments, and other submissions. No submissions will be returned. By applying to EERE for funding, applicants consent to EERE's retention of their submissions.

K. Title to Subject Inventions

Ownership of subject inventions is governed pursuant to the authorities listed below.

- Domestic Small Businesses, Educational Institutions, and Nonprofits: Under the Bayh-Dole Act (35 U.S.C. § 200 et seq.), domestic small businesses, educational institutions, and nonprofits may elect to retain title to their subject inventions.
- All other parties: The Federal Non-Nuclear Energy Act of 1974, 42. U.S.C. 5908, provides that the Government obtains title to new inventions unless a waiver is granted (see below).
- Class Patent Waiver:

DOE has issued a class walver that applies to this FOA. Under this class walver, domestic large businesses may elect title to their subject inventions similar to the right provided to the domestic small businesses, educational institutions, and nonprofits by law. In order to avail itself of the class walver, a domestic large business must agree that any products embodying or produced through the use of a subject invention first created or reduced to practice under this program will be substantially manufactured in the United States, unless DOE agrees that the commitments proposed in the U.S. Manufacturing Plan are sufficient.

 Advance and Identified Waivers: Applicants may request a patent waiver that will cover subject inventions that may be invented under the award, in advance of or within 30 days after the effective date of the award. Even if an advance waiver is not requested or the request is denied, the recipient will have a continuing right under the award to request a waiver for identified inventions, i.e., individual subject inventions that are disclosed to EERE within the timeframes set forth in the award's intellectual property terms

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and conditions. Any patent waiver that may be granted is subject to certain terms and conditions in 10 CFR 784.

 Determination of Exceptional Circumstances (DEC): Each applicant is required to submit a U.S. Manufacturing Plan as part of its application. If selected, the U.S. Manufacturing Plan shall be incorporated into the award terms and conditions for domestic small businesses and nonprofit organizations. DOE has determined that exceptional circumstances exist that warrants the modification of the standard patent rights clause for small businesses and non-profit awardees under Bayh-Dole to the extent necessary to implement and enforce the U.S. Manufacturing Plan. For example, the commitments and enforcement of a U.S. Manufacturing Plan. For example, the commitments organization) affected by this DEC has the right to appeal it.

L. Government Rights in Subject Inventions

Where Prime Recipients and Subrecipients retain title to subject inventions, the U.S. Government retains certain rights.

i. Government Use License

The U.S. Government retains a nonexclusive, nontransferable, irrevocable, paid-up license to practice or have practiced for or on behalf of the United States any subject invention throughout the world. This license extends to contractors doing work on behalf of the Government.

March-In Rights

The U.S. Government retains march-in rights with respect to all subject inventions: Through "march-in rights," the Government may require a Prime Recipient of Subrecipient who has elected to retain title to a subject invention (or their assignees or exclusive licensees), to grant a license for use of the invention to a third party. In addition, the Government may grant licenses for use of the subject invention when a Prime Recipient, Subrecipient, or their assignees and exclusive licensees refuse to do so.

DOE may exercise its march-in rights only if it determines that such action is necessary under any of the four following conditions:

 The owner or licensee has not taken or is not expected to take effective steps to achieve practical application of the invention within a reasonable time;

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U.S. DEPARTMENT OF ENERGY

- Energy Efficiency & Renewable Energy
 - The owner or licensee has not taken action to alleviate health or safety needs in a reasonably satisfied manner;
 - The owner has not met public use requirements specified by Federal statutes in a reasonably satisfied manner; or
 - The U.S. Manufacturing requirement has not been met.

Any determination that march-in rights are warranted must follow a factfinding process in which the recipient has certain rights to present evidence and witnesses, confront witnesses and appear with counsel and appeal any adverse decision. To date, DOE has never exercised its march-in rights to any subject inventions.

Μ. **Rights in Technical Data**

Data rights differ based on whether data is first produced under an award or instead was developed at private expense outside the award.

"Limited Rights Data": The U.S. Government will not normally require delivery of confidential or trade secret-type technical data developed solely at private expense prior to issuance of an award, except as necessary to monitor technical progress and evaluate the potential of proposed technologies to reach specific technical and cost metrics.

Government rights in Technical Data Produced Under Awards: The U.S. Government normally retains unlimited rights in technical data produced under Government financial assistance awards, including the right to distribute to the public. However, pursuant to special statutory authority, certain categories of data generated under EERE awards may be protected from public disclosure for up to five years after the data is generated ("Protected Data"). For awards permitting Protected Data, the protected data must be marked as set forth in the awards intellectual property terms and conditions and a listing of unlimited rights data (i.e., non-protected data) must be inserted into the data clause in the award. In addition, invention disclosures may be protected from public disclosure for a reasonable time in order to allow for filing a patent application.

N. Copyright

The Prime Recipient and Subrecipients may assert copyright in copyrightable works, such as software, first produced under the award without EERE approval. When copyright is asserted, the Government retains a paid-up nonexclusive, irrevocable worldwide license to reproduce, prepare derivative works, distribute

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copies to the public, and to perform publicly and display publicly the copyrighted work. This license extends to contractors and others doing work on behalf of the Government.

O. Personally Identifiable Information (PII)

All information provided by the Applicant must to the greatest extent possible exclude Personally Identifiable Information (PII). The term "personally identifiable information" refers to information which can be used to distinguish or trace an individual's identity, such as their name, social security number, biometric records, etc. alone, or when combined with other personal or identifying information which is linked or linkable to a specific individual, such as date and place of birth, mother's maiden name, etc. (See OMB Memordum M-07-16 dated May 22, 2007, found at:

https://www.whitehouse.gov/sites/whitehouse.gov/files/omb/memoranda/2007/ m07-16.pdf

By way of example, Applicants must screen resumes to ensure that they do not contain PII such as personal addresses, phone/cell numbers, personal emails and/or SSNs. In short, if the PII is not essential to the application, it should not be in the application.

P. Annual Independent Audits

If a for-profit entity is a Prime Recipient and has expended \$750,000 or more of DOE awards during the entity's fiscal year, an annual Compliance Audit performed by an independent auditor is required. For additional information, please refer to 2 C.F.R. § 910.501 and Subpart F.

If an educational institution, non-profit organization, or state/local government is a Prime Recipient or Subrecipient and has expended \$750,000 or more of Federal awards during the non-Federal entity's fiscal year, then a Single or Program-Specific Audit is required. For additional information, please refer to 2 C.F.R. § 200.501 and Subpart/F.

Applicants and sub-recipients (if applicable) should propose sufficient costs in the project budget to cover the costs associated with the audit. EERE will share in the cost of the audit at its applicable cost share ratio.

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Appendix A – Cost Share Information

Cost Sharing or Cost Matching

The terms "cost sharing" and "cost matching" are often used synonymously. Even the DOE Financial Assistance Regulations, 2 CFR 200.306, use both of the terms in the titles specific to regulations applicable to cost sharing. EERE almost always uses the term "cost sharing," as it conveys the concept that non-federal share is calculated as a percentage of the Total Project Cost. An exception is the State Energy Program Regulation, 10 CFR 420.12, State Matching Contribution. Here "cost matching" for the non-federal share is calculated as a percentage of the Federal funds only, rather than the Total Project Cost.

How Cost Sharing Is Calculated

As stated above, cost sharing is calculated as a percentage of the Total Project Cost. FFRDC costs must be included in Total Project Costs. Following is an example of how to calculate cost sharing amounts for a project with \$1,000,000 in federal funds with a minimum 20% non-federal cost sharing requirement:

- Formula: Federal share (\$) divided by Federal share (%) = Total Project Cost Example: \$1,000,000 divided by 80% = \$1,250,000
- Formula: Total Project Cost (\$) minus Federal share (\$) = Non-federal share (\$) Example: \$1,250,000 minus \$1,000,000 = \$250,000
- Formula: Non-federal share (\$) divided by Total Project Cost (\$) = Non-federal share (%)
 Example: \$250,000 divided by \$1,250,000 = 20%

What Qualifies For Cost Sharing

While it is not possible to explain what specifically qualifies for cost sharing in one or even a couple of sentences, in general, if a cost is allowable under the cost principles applicable to the organization incurring the cost and is eligible for reimbursement under an EERE grant or cooperative agreement, then it is allowable as cost share. Conversely, if the cost is not allowable under the cost principles and not eligible for reimbursement, then it is not allowable as cost share. In addition, costs may not be counted as cost share if they are paid by the Federal Government under another award unless authorized by Federal statute to be used for cost sharing.

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The rules associated with what is allowable as cost share are specific to the type of organization that is receiving funds under the grant or cooperative agreement, though are generally the same for all types of entities. The specific rules applicable to:

- FAR Part 31 for For-Profit entities, (48 CFR Part 31); and
- 2 CFR Part 200 Subpart E Cost Principles for all other non-federal entities.

In addition to the regulations referenced above, other factors may also come into play such as timing of donations and length of the project period. For example, the value of ten years of donated maintenance on a project that has a project period of five years would not be fully allowable as cost share. Only the value for the five years of donated maintenance that corresponds to the project period is allowable and may be counted as cost share.

Additionally, EERE generally does not allow pre-award costs for either cost share or reimbursement when these costs precede the signing of the appropriation bill that funds the award. In the case of a competitive award, EERE generally does not allow pre-award costs prior to the signing of the Selection Statement by the EERE Selection Official.

General Cost Sharing Rules on a DOE award

- Cash Cost Share encompasses all contributions to the project made by the recipient or subrecipeint(s), for costs incurred and paid for during the project. This includes when an organization pays for personnel, supplies, equipment, etc. for their own company with organizational resources. If the item or service is reimbursed for, it is cash cost share. All cost share items must be necessary to the performance of the project.
- 2. In Kind Cost Share encompasses all contributions to the project made by the recipient or subrecipient(s) that do not involve a payment or reimbursement and represent donated items or services. In Kind cost share items include volunteer personnel hours, donated existing equipment, donated existing supplies, etc. The cash value and calculations thereof for all in Kind cost share items must be justified and explained in the Cost Share section of the project Budget Justification (EERE 335). All cost share items must be necessary to the performance of the project. If questions exist, consult your DOE contact before filling out the in Kind cost share section of the Budget Justification (EERE 335).
- 3. Funds from other Federal sources MAY NOT be counted as cost share. This prohibition includes FFRDC sub-recipients. Non-Federal sources include any source not originally derived from Federal funds. Cost sharing commitment letters from subrecipients must be provided with the original application.

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4. Fee or profit, including foregone fee or profit, are not allowable as project costs (including cost share) under any resulting award. The project may only incur those costs that are allowable and allocable to the project (including cost share) as determined in accordance with the applicable cost principles prescribed in FAR Part 31 for For-Profit entities and 2 CFR Part 200 Subpart E - Cost Principles for all other non-federal entities.

DOE Financial Assistance Rules 2 CFR Part 200 as amended by 2 CFR Part 910

As stated above, the rules associated with what is allowable cost share are generally the same for all types of organizations. Following are the rules found to be common, but again, the specifics are contained in the regulations and cost principles specific to the type of entity:

- (A) Acceptable contributions. All contributions, including cash contributions and third party in-kind contributions, must be accepted as part of the Prime Recipient's cost sharing if such contributions meet all of the following criteria:
 - (1) They are verifiable from the recipient's records.
 - (2) They are not included as contributions for any other federally-assisted project or program.
 - (3) They are necessary and reasonable for the proper and efficient accomplishment of project or program objectives.
 - (4) They are allowable under the cost principles applicable to the type of entity incurring the cost as follows:
 - a. For-profit organizations, Allowability of costs incurred by for-profit organizations and those nonprofit organizations listed in Attachment C to OMB Circular A–122 is determined in accordance with the for-profit cost principles in 48 CFR Part 31 in the Federal Acquisition Regulation, except that patent prosecution costs are not allowable unless specifically authorized in the award document. (v) Commercial Organizations. FAR Subpart 31.2—Contracts with Commercial Organizations.
 - b. Other types of organizations. For all other non-federal entities, allowability of costs is determined in accordance with 2 CFR Part 200 Subpart E.
 - (5) They are not paid by the Federal Government under another award unless authorized by Federal statute to be used for cost sharing or matching.
 - (6) They are provided for in the approved budget.

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(B) Valuing and documenting contributions

- (1) Valuing recipient's property or services of recipient's employees. Values are established in accordance with the applicable cost principles, which mean that amounts chargeable to the project are determined on the basis of costs incurred. For real property or equipment used on the project, the cost principles authorize depreciation or use charges. The full value of the item may be applied when the item will be consumed in the performance of the award or fully depreciated by the end of the award. In cases where the full value of a donated capital asset is to be applied as cost sharing or matching, that full value must be the lesser or the following:
 - a. The certified value of the remaining life of the property recorded in the recipient's accounting records at the time of donation; on
 - b. The current fair market value. If there is sufficient justification, the Contracting Officer may approve the use of the current fair market value of the donated property, even if it exceeds the certified value at the time of donation to the project. The Contracting Officer may accept the use of any reasonable basis for determining the fair market value of the property.
- (2) Valuing services of others' employees. If an employer other than the recipient furnishes the services of an employee, those services are valued at the employee's regular rate of pay, provided these services are for the same skill level for which the employee is normally paid.
- (3) Valuing volunteer services. Volunteer services furnished by professional and technical personnel, consultants, and other skilled and unskilled labor may be counted as cost sharing or matching if the service is an integral and necessary part of an approved project or program. Rates for volunteer services must be consistent with those paid for similar work in the recipient's organization. In those markets in which the required skills are not found in the recipient organization, rates must be consistent with those paid for similar work in the labor market in which the recipient competes for the kind of services involved. In either case, paid fringe benefits that are reasonable, allowable, and allocable may be included in the valuation.
- (4) Valuing property donated by third parties.
 - a. Donated supplies may include such items as office supplies or laboratory supplies. Value assessed to donated supplies included in the cost sharing or matching share must be reasonable and must not exceed the fair market value of the property at the time of the donation.

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- b. Normally only depreciation or use charges for equipment and buildings may be applied. However, the fair rental charges for land and the full value of equipment or other capital assets may be allowed, when they will be consumed in the performance of the award or fully depreciated by the end of the award, provided that the Contracting Officer has approved the charges. When use charges are applied, values must be determined in accordance with the usual accounting policies of the recipient, with the following qualifications:
 - i. The value of donated space must not exceed the fair rental value of comparable space as established by an independent appraisal of comparable space and facilities in a privately-owned building in the same locality.
 - ii. The value of loaned equipment must not exceed its fair rental value.
- (5) Documentation. The following requirements pertain to the recipient's supporting records for in-kind contributions from third parties:
 - a. Volunteer services must be documented and, to the extent feasible, supported by the same methods used by the recipient for its own employees.
 - b. The basis for determining the valuation for personal services and property must be documented.

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Renewable Energy

Appendix B – Sample Cost Share Calculation for Blended Cost **Share Percentage**

The following example shows the math for calculating required cost share for a project with \$2,000,000 in Federal funds with four tasks requiring different Non-federal cost share percentages:

Task	Proposed Federal Share	Federal Share %	Recipient Share %
Task 1 (R&D)	\$1,000,000	80%	20%
Task 2 (R&D)	\$500,000	80%	20%
Task 3 (Demonstration)	\$400,000	50%	50%
Task 4 (Outreach)	\$100,000	100%	0%

Federal share (\$) divided by Federal share (%) = Task Cost

Each task must be calculated individually as follows:

Task 1

\$1,000,000 divided by 80% = \$1,250,000 (Task 1 Cost) Task 1 Cost minus federal share = Non-federal share \$1,250,000 - \$1,000,000 = \$250,000 (Non-federal share)

Task 2

\$500,000 divided 80% = \$625,000 (Task 2 Cost). Task 2 Cost minus federal share = Non-federal share \$625,000 \$500,000 = \$125,000 (Non-federal share)

Task 3

\$400,000 / 50% = \$800,000 (Task 3 Cost) Task 3 Cost minus federal share Non-federal share \$800,000 - \$400,000 = \$400,000 (Non-federal share)

Task 4

Federal share = \$100,000Non-federal cost share is not mandated for outreach = \$0 (Non-federal share)

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The calculation may then be completed as follows:

Tasks	\$ Federal	% Federal	S-Non-Federal	% Non-Federal	Total Project
	Share	Share	Share	Share	Cost
Task 1	\$1,000,000	80%	\$250,000	20%	\$1,250,000
Task 2	\$500,000	80%	\$125,000	20%	\$625,000
Task 3	\$400,000	50%	\$400,000	50%	\$800,000
Task 4	\$100,000	100%	\$0	0%	\$100,000
Totals	\$2,000,000		\$775,000		\$2,775,000

Blended Cost Share %

Non-federal share (\$775,000) divided by Total Project Cost (\$2,775,000) = 27.9% (Non-federal) Federal share (\$2,000,000) divided by Total Project Cost (\$2,775,000) = 72.1% (Federal)

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Appendix C – Waiver Requests: Foreign Entity Participation as the Prime Recipient and Performance of Work in the United States

1. Waiver for Foreign Entity Participation as the Prime Recipient

As set forth in Section III.A.III, 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. To request a waiver of this requirement, an applicant must submit an explicit waiver request in the Full Application.

Overall, the applicant must demonstrate to the satisfaction of EERE that it would further the purposes of this FOA and is otherwise in the economic interests of the United States to have a foreign entity serve as the Prime Recipient. A request to waive the *Foreign Entity Participation* as the Prime Recipient must include the following:

- Entity name;
- The rationale for proposing a foreign entity to serve as the Prime Recipient;
- Country of incorporation;
- A description of the project's anticipated contributions to the US economy;
 - How the project will benefit U.S. research, development and manufacturing, including contributions to employment in the U.S. and growth in new markets and jobs in the U.S.;

o = How the project will promote domestic American manufacturing of products and/or services;

- A description of how the foreign entity's participation as the Prime Recipient is essential to the project;
- A description of the likelihood of Intellectual Property (IP) being created from the work and the treatment of any such IP;
- Countries where the work will be performed (Note: if any work is proposed to be conducted outside the U.S., the applicant must also complete a separate request for waiver of the Performance of Work in the United States requirement).

EERE may require additional information before considering the waiver request.

The applicant does not have the right to appeal EERE's decision concerning a waiver request.

2. Waiver for Performance of Work in the United States

Questions about this FOA? Email SI.FOA.SETO@ee.doe.gov

Problems with EERE Exchange? Email EERE- <u>EERE-ExchangeSupport@hg.doe.gov</u> Include FOA name and number in subject line.

As set forth in Section IV.H.iii, all work under EERE funding agreements must be performed in the United States. This requirement does not apply to the purchase of supplies and equipment, so a waiver is not required for foreign purchases of these items. However, the Prime Recipient should make every effort to purchase supplies and equipment within the United States. There may be limited circumstances where it is in the interest of the project to perform a portion of the work outside the United States. To seek a waiver of the Performance of Work in the United States requirement, the applicant must submit an explicit waiver request in the Full Application. A separate waiver request must be submitted for each entity proposing performance of work outside of the United States.

Overall, a waiver request must demonstrate to the satisfaction of EERE that it would further the purposes of this FOA and is otherwise in the economic interests of the United States to perform work outside of the United States. A request to waive the *Performance of Work in the United States* requirement must include the following:

- The rationale for performing the work outside the U(S) ("foreign work");
- A description of the work proposed to be performed outside the U.S.;
- An explanation as to how the foreign work is essential to the project;
- A description of the anticipated benefits to be realized by the proposed foreign work and the anticipated contributions to the US economy;
 - The associated benefits to be realized and the contribution to the project from the foreign work;
 - How the foreign work will benefit U.S. research, development and manufacturing, including contributions to employment in the U.S. and growth in new markets and jobs in the U.S.;

 How the foreign work will promote domestic American manufacturing of products and/or services;

- A description of the likelihood of Intellectual Property (IP) being created from the foreign work and the treatment of any such IP;
- The total estimated cost (DOE and Recipient cost share) of the proposed foreign work;
- The countries in which the foreign work is proposed to be performed; and
- The name of the entity that would perform the foreign work.

EERE may require additional information before considering the waiver request.

The applicant does not have the right to appeal EERE's decision concerning a waiver request.

Questions about this FOA? Email SI.FOA.SETO@ee.doe.gov

Problems with EERE Exchange? Email EERE- <u>EERE-ExchangeSupport@hq.doe.gov</u> Include FOA name and number in subject line.

Appendix D - Data Management Plan

A data management plan ("DMP") explains how data generated in the course of the work performed under an EERE award will be shared and preserved or, when justified, explains why data sharing or preservation is not possible or scientifically appropriate.

DMP Requirements

In order for a DMP to be considered acceptable, the DMP must address the following:

At a minimum, the DMP must describe how data sharing and preservation will enable validation of the results from the proposed work, or how results could be validated if data are not shared or preserved.

The DMP must provide a plan for making all research data displayed in publications resulting from the proposed work digitally accessible at the time of publication. This includes data that are displayed in charts, figures, images, etc. In addition, the underlying digital research data used to generate the displayed data should be made as accessible as possible in accordance with the principles stated above. This requirement could be met by including the data as supplementary information to the published article, or through other means. The published article should indicate how these data can be accessed.

The DMP should consult and reference available information about data management resources to be used in the course of the proposed work. In particular, a DMP that explicitly or implicitly commits data management resources at a facility beyond what is conventionally made available to approved users should be accompanied by written approval from that facility. In determining the resources available for data management at DOE User Facilities, researchers should consult the published description of data management resources at that facility and reference it in the DMP. Information about other DOE facilities can be found in the additional guidance from the sponsoring program.

The DMP must protect confidentiality, personal privacy, Personally Identifiable information, and U.S. national, homeland, and economic security; recognize proprietary interests, business confidential information, and intellectual property rights; avoid significant negative impact on innovation, and U.S. competitiveness; and otherwise be consistent with all laws (i.e., export control laws), and DOE regulations, orders, and policies.

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Data Determination for a DMP

The Principal Investigator should determine which data should be the subject of the DMP and, in the DMP, propose which data should be shared and/or preserved in accordance with the DMP Requirements noted above.

For data that will be generated through the course of the proposed work, the Principal Investigator should indicate what types of data should be protected from immediate public disclosure by DOE (referred to as "protected data") and what types of data that DOE should be able to release immediately. Similarly, for data developed outside of the proposed work at private expense that will be used in the course of the proposed work, the Principal Investigator should indicate whether that type of data will be subject to public release or kept confidential (referred to as "limited rights data"). Any use of limited rights data or labeling of data as "protected data" must be consistent with the DMP Requirements noted above.

Suggested Elements for a DMP

The following list of elements for a DMP provides suggestions regarding the data management planning process and the structure of the DMP:

Data Types and Sources: A brief, high-level description of the data to be generated or used through the course of the proposed work and which of these are considered digital research data necessary to validate the research findings or results.

Content and Format: A statement of plans for data and metadata content and format including, where applicable, a description of documentation plans, annotation of relevant software, and the rationale for the selection of appropriate standards. Existing, accepted community standards should be used where possible. Where community standards are missing or inadequate, the DMP could propose alternate strategies for facilitating sharing, and should advise the sponsoring program of any need to develop or generalize standards.

Sharing and Preservation A description of the plans for data sharing and preservation. This should include, when appropriate: the anticipated means for sharing and the rationale for any restrictions on who may access the data and under what conditions; a timeline for sharing and preservation that addresses both the minimum length of time the data will be available and any anticipated delay to data access after research findings are published; any special requirements for data sharing, for example, proprietary software needed to access or interpret data, applicable policies, provisions, and licenses for re-use and re-distribution, and for the production of derivatives, including guidance for how data and data products should be cited; any resources and capabilities (equipment, connections,

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systems, software, expertise, etc.) requested in the research proposal that are needed to meet the stated goals for sharing and preservation (this could reference the relevant section of the associated research proposal and budget request); and whether/where the data will be preserved after direct project funding ends and any plans for the transfer of responsibilities for sharing and preservation.

Protection: A statement of plans, where appropriate and necessary, to protect confidentiality, personal privacy, Personally Identifiable Information, and U.S. national, homeland, and economic security; recognize proprietary interests, business confidential information, and intellectual property rights; and avoid significant negative impact on innovation, and U.S. competitiveness.

Rationale: A discussion of the rationale or justification for the proposed data management plan including, for example, the potential impact of the data within the immediate field and in other fields, and any broader societal impact.

Additional Guidance

In determining which data should be shared and preserved, researchers must consider the data needed to validate research findings as described in the Requirements, and are encouraged to consider the potential benefits of their data to their own fields of research, fields other than their own, and society at large.

DMPs should reflect relevant standards and community best practices and make use of community accepted repositories whenever practicable.

Costs associated with the scope of work and resources articulated in a DMP may be included in the proposed research budget as permitted by the applicable cost principles.

To improve the discoverability of and attribution for datasets created and used in the course of research, EERE encourages the citation of publicly available datasets within the reference section of publications, and the identification of datasets with persistent identifiers such as Digital Object Identifiers (DOIs). In most cases, EERE can provide DOIs free of charge for data resulting from DOE-funded research through its Office of Scientific and Technical Information (OSTI) DataID Service.

EERE's Digital Data Management principles can be found at: <u>EERE Digital Data Management</u> | <u>Department of Energy</u>

Questions about this FOA? Email SI.FOA.SETO@ee.doe.gov

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Definitions

Data Preservation: Data preservation means providing for the usability of data beyond the lifetime of the research activity that generated them.

Data Sharing: Data sharing means making data available to people other than those who have generated them. Examples of data sharing range from bilateral communications with colleagues, to providing free, unrestricted access to anyone through, for example, a webbased platform.

Digital Research Data: The term digital data encompasses a wide variety of information stored in digital form including: experimental, observational, and simulation data; codes, software and algorithms; text; numeric information; images; video; audio; and associated metadata. It also encompasses information in a variety of different forms including raw, processed, and analyzed data, published and archived data.

Research Data: The recorded factual material commonly accepted in the scientific community as necessary to validate research findings -but not any of the following: preliminary analyses, drafts of scientific papers, plans for future research, peer reviews, or communications with colleagues. This 'recorded' material excludes physical objects (e.g., laboratory samples). Research data also do not include:

(A) Trade secrets, commercial information, materials necessary to be held confidential by a researcher until they are published, or similar information which is protected under law; and

(B) Personnel and medical information and similar information the disclosure of which would constitute a clearly unwarranted invasion of personal privacy, such as information that could be used to identify a particular person in a research study."

Validate: In the context of DMPs, validate means to support, corroborate, verify, or otherwise determine the legitimacy of the research findings. Validation of research findings could be accomplished by reproducing the original experiment or analyses; comparing and contrasting the results against those of a new experiment or analyses; or by some other means.

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Doc 16

Rodriguez, Susan (CONTR)

From: Sent:	Chalk, Steven Tuesday, September 18, 2018 6:04 PM
To:	Tripodi, Cathy;Jereza, Catherine
Cc:	Fitzsimmons, Alexander, Gay, Charlie; Hamos, Ian; Passarelli, Derek; Jacob, Bindu
Subject:	Pre-decisional: New Solar FOA
Attachments:	DRAFT DE-FOA-0001987 Advanced Solar Systems Integration Technologies.docx

Cathy and Katie - Attached is our FOA on Solar Situational Awareness and Resilient Solutions for Critical Infrastructure.

We have recast it to two main subtopics

1. R&D and Technology Transfer

2. R&D, Technology Transfer and Field Validation

Applicants would bid on 1 or 2, not both. We have strived to preserve all your previous language that you came up with previously. (b) (5)

I know that it will be hard to look at the whole document while on travel. (b) (5) . I will work with Derek to tighten up all the rest of the document. We have made it so labs cannot be prime but can be subs.

Let us know if you think this works. Compared to the original FOA, I think it is more strategic and better aligned with DOE policies/priorities.

Steven Chalk Deputy Assistant Secretary for Transportation Acting Deputy Assistant Secretary for Renewable Power Office of Energy Efficiency and Renewable Energy U.S. Department of Energy

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SETO FOA TOPIC AREA 1 NOTICE

On behalf of the Department of Energy (DOE), Office of Energy Efficiency and Renewable Energy (EERE), we would like to thank you for submitting an application in response to the Solar Energy Technology Office (SETO) FY18 Funding Opportunity Announcement (FOA) DE-FOA-0001840. We are writing to inform you of a change to Topic Area 1 of the FOA, Advanced Solar Systems Integration Technologies.

DOE is committed to improving the affordability of energy technologies and strengthening the Energy Sector's capability to withstand cyber and physical threats, including natural disasters. Improving the strategic location and situational awareness of solar systems can help ensure continuity of service in the face of widespread and coordinated threats. Developing innovative approaches to accelerate the transfer of solar system solutions that will improve Energy Sector resilience is also a priority.

In order to better align the FOA objectives to the mission objectives of DOE, EERE plans to revise Topic Area 1 and issue a new FOA. <u>Because a new FOA is planned, if you would like</u> to apply to the revised Topic Area 1, an application must be submitted under the new FOA in EERE Exchange by the deadline. Please carefully review the revised emphasis and program objectives when the new FOA is issued, and revise your application accordingly.

On behalf of EERE, we would like to express our sincere appreciation for the significant time and effort you and your team invested in preparing this application, and for your interest and participation in the EERE Solar Energy Technologies Office activities. We hope that you will continue to participate in future activities and programs with EERE.

The Notice of Intent to Issue Funding Opportunity Announcement No. DE-FOA-0001987 is provided below for your reference.



Notice of Intent No. DE-FOA-0001986

Notice of Intent to Issue Funding Opportunity Announcement No. DE-FOA-0001987

The Office of Energy Efficiency and Renewable Energy (EERE) intends to issue, on behalf of the Solar Energy Technology Office, a Funding Opportunity Announcement (FOA) entitled "Advanced Solar Systems Integration Technologies".

This FOA supports the mission of the Solar Energy Technologies Office (SETO) which is to support earlystage research and development to improve the performance and flexibility of solar technologies that contribute to a reliable and resilient U.S. electric grid. The office invests in innovative research efforts that securely integrate more solar energy into the grid, enhance the use, storage and dispatch of solar energy, and lower solar electricity costs.

DOE is committed to improving the affordability of energy technologies and strengthening the Energy Sector's capability to withstand cyber and physical threats, including natural disasters. Improving the strategic location and situational awareness of solar systems can help ensure continuity of service in the face of widespread and coordinated threats. Developing innovative approaches to accelerate the transfer of solar system solutions that will improve Energy Sector resilience is also a priority.

It is anticipated that the FOA may include the following Areas of Interest:

Topic 1.1 Solar Grid Integration

This topic will support applications to research and field validate unique and innovative solutions that will improve the resiliency of the Energy Sector's capability to withstand all hazards; focusing on cyber and physical vectors. Specifically, the solutions should identify the strategic location of solar photovoltaic (PV) systems that will ensure the Energy Sector provides continuity of service in the face of wide spread and coordinated threats. These solutions can be deployed throughout the bulk power systems or associated transmission to distribution substations. It is expected that the same design concepts will be applicable for energy storage and other distributed energy resources (DERs). The approaches will test the systems' ability to operate and adapt at both steady and degraded states. Applications must consider diverse DER options (e.g. photovoltaics, energy storage, and flexible load)

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Notice of Intent (NOI)

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available as well as power systems engineering alternatives, and demonstrate the benefits of the proposed solutions. It should also be shown in these solutions how a fleet of multiple photovoltaics systems from multiple locations will be able to respond to fast changing conditions under normal operations and provide power to critical loads during grid outages – with consideration of other DER options and distribution system constraints. Example projects may include, but are not limited to, new design and use-case concepts, essential reliability services, adaptive capabilities, voltage support, previously uncontemplated and unique capabilities and control hardware and software innovations for smart PV inverters and DER management systems. Applications must have an assessment of economic viability of the proposed system, activity or component in the respective part of the project.

Applicant's solar photovoltaic projects may require working with critical infrastructure owners and operators and state, local, tribal and territories entities to take proactive steps to manage risk and strengthen the security and resilience of the Nation's critical infrastructure, considering all hazards that could have a debilitating impact on national security, economic stability, public health and safety, or any combination thereof. These solar photovoltaic projects shall seek to reduce vulnerabilities, minimize consequences, identify and disrupt threats, and hasten response and recovery efforts related to critical infrastructure to ensure public health and safety while improving national security and economic security.

Topic 1.2 Solar Situational Awareness and Analysis

This Topic will support applications to research and field validate unique and innovative solutions that will improve the resiliency of the Energy Sector's capability to withstand all hazards; focusing on cyber and physical vectors. Specifically, the solutions should enhance operator capability to observe solar systems deployed throughout the bulk power systems or associated transmission to distribution substations or Behind-the-Meter (BTM) solar including but not limited to battery storage, systems controls, and demand response. Primary focus areas include solar photovoltaic integrated sensor technologies, secure and robust electricity supply delivery and communication tools, advanced data analytics including Artificial Intelligence and Machine to Machine capabilities, and voltage testing. Projects with secondary focus areas may also be considered which include the integration of observed data into planning, operations and business unit systems that would operate at both steady and degraded states. Applications must have an assessment of economic viability of the proposed system, activity or component in the respective part of the project.

Applicant's solar situational awareness and analysis projects may require working with critical infrastructure owners and operators and state, local, tribal and territories entities to take proactive steps to manage risk and strengthen the security and resilience of the Nation's critical infrastructure, considering all hazards that could have a debilitating impact on national security, economic stability, public health and safety, or any combination thereof. These projects shall seek to contribute to one or

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more risk components: reduce vulnerabilities, minimize consequences, identify and disrupt threats, and/or hasten response and recovery efforts related to critical infrastructure to ensure public health and safety while improving national security and economic security.

Topic 1.3 Solar Technology Transfer

This topic will explore unique and innovative approaches to accelerate the transfer of solar system solutions that will improve the resiliency of the Energy Sector's capability to withstand all hazards; focusing on cyber and physical vectors. Potential areas of interest include, but are not limited to, projects or models that deploy alternative capital, for technology R&D transfer, incentivize industry-researcher collaboration, leverage existing facilities or capabilities, data and build approaches and methods that serve to drive down the hardware cost and ensure solutions, validation, certifications, resilience and electricity supply to withstand wide spread and coordinated threats compatible with Topic 1.1 and Topic 1.2

Applicant's solar technology transfer projects may require working with critical infrastructure owners and operators and state, local, tribal and territories entities to take proactive steps to manage risk and strengthen the security and resilience of the Nation's critical infrastructure, considering all hazards that could have a debilitating impact on national security, economic stability, public health and safety, or any combination thereof. These projects shall seek to contribute to one or more risk components: reduce vulnerabilities, minimize consequences, identify and disrupt threats, and/or hasten response and recovery efforts related to critical infrastructure to ensure public health and safety while improving national security and economic security.

EERE envisions awarding multiple financial assistance awards in the form of cooperative agreements. The estimated period of performance for each award will be approximately 3 years.

This Notice is issued so that interested parties are aware of the EERE's intention to issue this FOA in the near term. All of the information contained in this Notice is subject to change. EERE will not respond to questions concerning this Notice. Once the FOA has been released, EERE will provide an avenue for potential Applicants to submit questions.

EERE plans to issue the FOA on or about September 15, 2018 via the EERE Exchange website <u>https://eere-exchange.energy.gov/</u>. If Applicants wish to receive official notifications and information from EERE regarding this FOA, they should register in EERE Exchange. When the FOA is released, applications will be accepted only through EERE Exchange.

This is a Notice of Intent (NOI) only. EERE may issue a FOA as described herein, may issue a FOA that is significantly different than the FOA described herein, or EERE may not issue a FOA at all.

In anticipation of the FOA being released, Applicants are advised to complete the following steps, which are **required** for application submission:

ENERGY Efficiency & Renewable Energy

Register and create an account in EERE Exchange at <u>https://eere-exchange.energy.gov/</u>. This
account will allow the user to register for any open EERE FOAs that are currently in EERE Exchange.
It is recommended that each organization or business unit, whether acting as a team or a single
entity, <u>use only</u> one account as the contact point for each submission.

Questions related to the registration process and use of the EERE Exchange website should be submitted to: <u>EERE-ExchangeSupport@hq.doe.gov</u>

- Obtain a Dun and Bradstreet Data Universal Numbering System (DUNS) number (including the plus 4 extension, if applicable) at http://fedgov.dnb.com/webform
- Register with the System for Award Management (SAM) at <u>https://www.sam.gov</u>. 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.
- Register in FedConnect at <u>https://www.fedconnect.net/</u>. 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, Gol Guide at https://www.fedconnect.net/FedConnect/Marketing/Documents/FedConnect_Ready_Set_Go.pdf
- Register in Grants.gov to receive automatic updates when Amendments to a FOA are
 posted. However, please note that applications <u>will not</u> be accepted through
 Grants.gov. <u>http://www.grants.gov/</u>. All applications must be submitted through EERE Exchange.

This is a Notice of Intent (NOI) only. EERE may issue a FOA as described herein, may issue a FOA that is significantly different than the FOA described herein, or EERE may not issue a FOA at all.



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

Advanced Solar Systems Integration Technologies

Funding Opportunity Announcement (FOA) Number: DE-FOA-0001987 FOA Type: Initial CFDA Number: 81.087

FOA Issue Date:		-	[[] (b) (5)
Letter of Intent Due Date	4.14		· · · · · · · · · · · · · · · · · · ·
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Expected Submission Deadline for Replies to	Reviewer Co	mments:	
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Expected Date for EERE Selection Notification	ins:		
Expected Timeframe for Award Negotiation	\$		60 days
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- To apply to this FOA, applicants must register with and submit application materials through EERE Exchange at <u>https://eere-Exchange.energy.gov</u>, EERE's online application portal.
- Applicants must designate primary and backup points-of-contact in EERE Exchange with whom EERE will communicate to conduct award negotiations, if an application is selected for award negotiations, it is not a commitment to issue an award. It is imperative that the applicant/selectee be responsive during award negotiations and meet negotiation deadlines. Failure to do so may result in cancelation of further award negotiations and rescission of the Selection.

Questions about this FOA? Email SI, FOA. SETO@ee.doe.gov.

Problems with EERE Exchange? Email EERE- <u>EERE-ExchangeSupport@hg.doe.gov</u> include FOA name and number in subject line.



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Application Process

IV.

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Commented [TEM1]: When you are finished making changes to the FOA, make sure you update the Table of Contents, Right click anywhere on the table below and select "Update Field." When the box comes up, choose the "Update entire table" option to ensure that any sections you added/removed are reflected in the table. Please review the updated table of contents to ensure it does not contain erroaeous information.

Questions about this FOA? Emai SI.FOA.SETO@ee.doe.gov

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I. Funding Opportunity Description

A. Description/Background

This Funding Opportunity Announcement (FOA) is being issued by the U.S. Department of Energy's (DOE), Office of Energy Efficiency and Renewable Energy (EERE), Solar Energy Technologies Office (SETO). This section describes the overall goals of SETO and the type of projects that are being solicited for funding support through this FOA.

In 2016, solar power surpassed 1% of annual electricity supply in the United States for the first time, and the Energy information Administration projects that solar will grow to 5% of U.S. electricity by 2030.¹ Further, if the price of solar electricity and/or energy storage declines more rapidly than projected, that percentage could be even higher.² But solar is more than just a source of affordable electricity; it also provides the potential to improve grid reliability and resilience, increase employment,³ create business opportunities, increase energy diversity, and provide environmental benefits.

The mission of the Solar Energy Technologies Office (SETO) is to support earlystage research and development to improve the performance and flexibility of solar technologies that contribute to a reliable and resilient U.S. electric grid. The office invests in innovative research efforts that securely integrate more solar energy into the grid, enhance the use, storage and dispatch of solar energy, and lower solar electricity costs.

SETO focuses on two different solar energy technologies: photovoltaic (PV) technologies that directly convert sunlight into electricity, typically via a semiconductor, and concentrating solar thermal power (CSP) technologies that convert sunlight to heat, which can be converted or stored until needed, and then used to generate electricity or provide other energy services. Because sunshine varies with the time of day, location, and season, solar power systems must be paired with adaptive loads, other sources of power, or energy storage to deliver electricity whenever it's needed. This dependency reduces the value of solar power systems once solar starts to supply a significant fraction of the electricity within a given region and highlights the need for a focus on addressing grid

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^L U.S. Department of Energy, Energy Information Administration, International Energy Outlook 2017, DDE/EIA-0484 (2017).

 ² P.A. Basore and W.J. Cole, "Comparing supply and demand models for future photovoltaic power generation in the USA," submitted to *Progress in Photovoltaics: Research and Applications*, 2017.
 ³ The Solar Foundation, National Solar Jobs Census, 2010 – 2016.

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integration challenges.

SETO, in partnership with other offices at DOE, launched the SunShot Initiative in February 2011 with the goal of solar electricity becoming price-competitive with conventional utility sources by 2020.4 The SunShot 2020 goal has already been achieved for utility-scale PV, and with continued effort, it is likely to be achieved for grid-tied solar applications. As a result of this tremendous progress and in response to the growing deployment of solar in the U.S., SETO is increasing its focus on addressing the challenges related to seamlessly integrating high penetrations of solar energy onto the nation's electricity grid. Additionally, SETO set 2030 cost targets to further reduce the cost of solar electricity across all market sectors, which would make solar one of the most affordable sources of electricity and enable a substantial fraction of U.S. electricity demand to be supplied by solar technology.⁵ The targets for the unsubsidized cost of electricity at the point of grid connection in a location with average U.S. solar resources are 3¢ per kllowatt-hour (kWh) for utility-scale photovoltaics, 4¢ per kWh for commercial rooftop photovoltaics, 5¢ per kWh for residential rooftop photovoltaics, and 5¢ per kWh for concentrating solar power with thermal energy storage.

By supporting early-stage research across the solar energy technology space through this FOA, SETO can foster innovation and enable integrated multitechnology solutions that can advance the widespread adoption of solar power while securely integrating it into the nation's energy grid.

DOE is committed to improving the affordability of energy technologies and strengthening the Energy Sector's capability to withstand cyber and physical threats, including natural disasters. Improving the strategic location and situational awareness of solar systems can help ensure continuity of service in the face of widespread and coordinated threats. Developing innovative approaches to accelerate the transfer of solar system solutions that will improve Energy Sector resilience is also a priority.

The Systems Integration (SI) subprogram supports early-stage research and development that advances the reliable, resilient, secure and affordable integration of solar energy onto the U.S. electric grid. For more in-depth discussion of solar grid integration, please visit "Solar Grid Integration" <u>https://energy.gov/eere/solar/downloads/technical-background-2018-seto-funding-opportunity-announcement</u>.

⁴ SunShot Vision Study, NREL Technical Report DOE/GO-102012-3037, 2012.

⁵ U.S. Dept. of Energy, The SunShot Initiative's 2030 Goal; 3¢ per Kilowatt Hour for Solar Electricity, 2016. Questions about this FOA? Emai <u>S1.FOA.SETO@ee.doe.gov</u>

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In 2011, solar power comprised less than 0.1% of the U.S. electricity supply with an installed capacity of just 1.2 gigawatts (GW). Solar now supplies nearly 2% of the annual U.S. electricity demand⁶ with an installed capacity of roughly 47 GWs⁷, and is continuing to grow. According to U.S. Energy Information Administration (EIA), in some states and regions, solar represents up to 15% of total annual electricity generation. Instantaneous solar generation can reach a much higher level, more than 40% in some cases.⁸

Monthly net electricity generation from selected fuels (Jan 2007 - Mar 2017) share of total electricity generation 12%



Figure 1: For the first time, in March 2017 solar supplied 2% of the U.S. electricity demand, while wind and solar combined accounted for 10% of the U.S. electricity generation. (Source: EIA)

As the penetration of solar energy on the grid continues to increase, it becomes imperative to identify the associated technical, economic and regulatory challenges, and to develop impactful solutions in order to ensure compatibility with the existing grid and a smooth transition to a secure, reliable and resilient grid of the future.

Traditional grld 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.

⁶ U.S. Energy Information Administration (EIA), Electric Power Monthly with Data for November 2017, published in January 2018. <u>https://www.ela.gov/electricity/monthly/current_month/epm.pdf</u>

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⁶ For example, in the California Independent System Operator (CAISO) Monthly Renewables Performance Report, the 5-minute market data shows that at the maximum solar served almost 45% of the load in September 2017. See http://www.caiso.com/Documents/MonthlyRenewablesPerformanceReport-Nov2017.html Questions about this FOA2 Emai <u>SI.FOA.SETO@ee.doe.gov</u>

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⁷ Source: Solar Energy Industries Association (SEIA), <u>http://www.sela.org/</u>

A modern grid must be 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 customers to manage their electricity use and participate in markets, and provide strong protection against physical and cyber risks.

The current business-as-usual trajectory for the electric industry will not result in a timely transition to a modernized grid⁹. Since large investments in the past and today in the nation's electric grid infrastructure will remain in service for decades, it is important that the U.S. make smart decisions to invest in enabling and forward-looking technologies that will support the creation of a modern grid infrastructure in the coming years. There is a critical need to foster innovations and new technology adoptions by decreasing regulatory, market and business model uncertainties, demonstrating technology maturity and reducing implementation risks.

The Department of Energy's Grid Modernization Initiative¹⁰, is a cross-cutting effort that aligns grid modernization efforts across the multiple DOE Program Offices. As part of the Grid Modernization Initiative (GMI), the SI subprogram supports targeted technology research and development (R&D) that addresses the technical challenges with achieving higher solar penetration, while supporting a safe, reliable, secure and cost-effective electric power system.

More broadly, the Grid Modernization initiative focuses on the development of holistic solutions for the grid of the future. Several key technology areas have been identified in the Grid Modernization Multi-Year Program Plan (MYPP)¹¹:

- Devices and integrated Systems Testing;
- Sensing and Measurements;
- Systems Operations, Power Flow and Control;
- Design and Planning Tools;
- Security and Resilience; and
- Institutional Support.

¹¹ Department of Energy Grid Modernization Multiyear Program Plan (MYPP), Accessed 01 November 2017, https://energy.gov/downloads/grid-modernization-multi-year-program-plan-mypp

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⁹ Department of Energy Grid Modernization Multiyear Program Plan (MYPP)

¹⁰ Accessed 01 November 2017, <u>https://energy.gov/under-secretary-science-and-energy/reid-modernization-initiative</u>



Progress in all of these areas is considered crucial for the effective grid integration of solar energy and modernization of the grid, as illustrated in Figure 2. A specific focus of the SETO Systems Integration subprogram includes understanding the impacts of increasing penetration of solar energy on grid reliability and power quality, developing best practices for interconnecting and integrating solar with energy storage and synergistic technologies, addressing the variability of solar generation, researching power electronic technologies for flexible power flow control, enhancing situational awareness of solar generation at the grid edge and informing the standardization of interconnection, interoperability, and cybersecurity for PV and other distributed energy resources (DER) systems. Taking these all together, the goal is to advance the knowledge-base and the ability to integrate solar generation, at scale, into electric transmission and distribution systems in a cost-effective, secure, and reliable manner.



Figure 2: Illustration of high level solar penetrotion in a modernized electricity power system.

B. Topic Areas/Technical Areas of Interest

Topic 1.1 R&D for solar situational awareness in strategic locations associated with critical infrastructure

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Enargy Efficiency & Renewable Energy

Situational awareness of solar photovoltaic (PV) systems in strategic locations is critical to managing risk and strengthening the security and resilience of the Nation's critical infrastructure (e.g., for safety, public health and national security). Further, the increasing deployment of utility-scale and distributed solar PV systems brings about challenges to electric power grid planning and operation. As more solar energy systems come online, grid operators across the country need new tools to ensure the secure and reliable operation of our nation's electric grid and delivery of energy services to our critical infrastructure.

This Topic will support research and development of unique and innovative solutions that will enhance grid operator's situational awareness of solar energy systems deployed throughout the bulk power system, associated substations, distribution system and/or Behind-the-Meter (BTM). Specifically, the solutions should focus on the situational awareness of solar photovoltaic (PV) systems in strategic locations with considerations of cyber and physical vectors to ensure the electric power grid provides continuity of service in the face of wide spread and coordinated threats.

Primary focus areas include solar photovoltale integrated sensor technologies, secure and robust communication tools, advanced data analytics including machine learning and artificial intelligence, machine to machine capabilities, and data visualization. Projects should consider the integration of observed data into planning, operations and business unit systems that would operate at both steady and degraded states. The research should leverage established industrial control and power system cyber security work to implement state-of-the-art cyber security best practices for solar PV systems. Applications must also have an assessment of economic viability of the proposed system, activity or component. The project results are expected to validate the situational awareness tools and improve resilience in strategic locations associated with the critical infrastructure.

In addition to technology solutions, applicants may also explore unique and innovative approaches to accelerate the transfer of solar technology solutions that improve the solar situation awareness. Potential areas of interest include, but are not limited to, projects or models that deploy alternative capital, for technology R&D transfer, incentivize industry-researcher collaboration, leverage existing facilities or capabilities, data and build approaches and methods that serve to drive down the hardware cost and ensure solutions, validation, certifications, resilience and electricity supply can withstand wide spread and coordinated threats.

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Applicants are encouraged to work with critical infrastructure owners and operators, industry, academia, and other stakeholders including state, local, tribal and territories entities to take proactive steps to manage risk and strengthen the security and resilience of the Nation's critical infrastructure, considering all hazards that could have a debilitating impact on national security, economic stability, public health and safety, or any combination thereof.

Topic 1.2 Validation of proactive resilience solutions based on solar energy systems.

This topic will support applications to research, develop, and field validate unique and innovative solutions to enhance the resilience of the bulk power system and/or distribution systems (including microgrids) with high penetrations of solar PV systems. Technological advancements include control/coordination strategies, real-time system monitoring, robust communication structures, grid planning and analytical platforms, and integration of multiple DER technologies. Projects must include field validation applicable to critical infrastructure that verifies the viability of system design, validates architecture relationships and interoperability, ensures protection of system networks and data against cyber threats, and informs functional requirements for bulk and distribution system planning platforms and decision support tools. Applicants are encouraged to work with critical infrastructure owners and operators, industry, academia, and other stakeholders.

In addition to technology solutions, applicants may also explore unique and innovative approaches to accelerate the transfer of solar technology solutions that improve resilience. Potential areas of interest include, but are not limited to, projects or models that deploy alternative capital, for technology R&D transfer, incentivize industry-researcher collaboration, leverage existing facilities or capabilities, data and build approaches and methods that serve to drive down the hardware cost and ensure solutions, validation, certifications, resilience and electricity supply can withstand wide spread and coordinated threats.

Applicants are encouraged to work with critical infrastructure owners and operators, industry, academia, and other stakeholders including state, local, tribal and territories entitles to take proactive steps to manage risk and strengthen the security and resilience of the Nation's critical infrastructure, considering all hazards that could have a debilitating impact on national security, economic stability, public health and safety, or any combination thereof.

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Cybersecurity and Interoperability: Applicants should describe their strategies and plans for establishing and maintaining interoperability, and the utilization of open standards whereverpossible. Applicants should consider interoperability within their solution (among devices and/or subsystems) and at the external interfaces with other utility and customer systems. Applicants shall indicate where they have chosen to utilize proprietary standards.

Applicants should also describe their approach to establishing and maintaining cybersecurity throughout their solution, and at the interfaces to external components and systems. In accordance with the cybersecurity technique of defense-in-depth, applicants shall not cede responsibility for cybersecurity to the external boundaries of their proposed solution, nor shall they propose that it be added on at some later stage,

Post award, Recipients will be required to submit an Interoperability Plan and a Cybersecurity Plan, detailing how they propose to implement and maintain these aspects of their solution.

Anticipated Phases and Cost Share Requirement by Topic

The following table Illustrates the anticipated focus and required cost share by phase for each topic, along with the anticipated timeframes for each phase: Ч.,

	Year 1 Year 2	Year 3
Topic 1.1: R&D for solar situational awareness	Phase 1: Research and development (20% cost share)	Phase 2: Field validation (50% cost share)
Topic 1.2: Validation of proactive resilience solutions	Phase 1: Research and development (20% cost share)	Phase 2; Field validation (50% cost share) (optional)

While the phases identify the type of activity and required cost share, each project will be divided into three one year budget periods, with go/no-go decision points between each budget period.

All work under EERE funding agreements must be performed in the United States. See Section IV.J.3 and Appendix C.

C. Applications Specifically Not of Interest

The following types of applications will be deemed nonresponsive and will not be reviewed or considered (See Section III.D of the FOA):

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- Applications that fall outside the technical parameters specified in Section I.B of the FOA.
- Applications for proposed technologies that are not based on sound scientific principles (e.g., violates the laws of thermodynamics).
- Undifferentiated research, products, and/or solutions: This FOA seeks innovative solutions that help achieve SETO goals, incremental advancement of undifferentiated or duplicative efforts is insufficient to meet SETO goals and is not of interest to this FOA.
- Projects lacking influential impact from Federal funds: This FOA intends to fund projects where Federal funds will provide a clear and measurable impact, (e.g. retiring risk sufficiently for follow-on investment or catalyzing development.) Projects that have sufficient monies and resources to be executed regardless of federal funds are not of interest.
- Re-funding the same idea at the same technology readiness level: This FOA does not intend to re-fund prior SETO awardees for the same idea at the same technology readiness level.
- Products or solutions for systems which do not tie to a grid or micro-grid (i.e. wholly off-grid applications and portable power).
- Generic technologies of solutions that are not integrated with solar PV.
 These include sensor and measurement, communications, and cyber security

D. Authorizing Statutes

The programmatic authorizing statute is EPACT 2005, Section 931 (a)(2).

Awards made under this announcement will fall under the purview of 2 CFR Part 200 as amended by 2 CFR Part 910.

II. Award Information

A. Award Overview

1. Estimated Funding

EERE expects to make approximately \$46M of Federal funding available for new awards under this FOA, subject to the availability of appropriated funds. EERE anticipates making (b) (5) awards under this FOA. EERE may issue one, multiple, or no awards. Individual awards may vary between (b)

(5)

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EERE may issue awards in one, multiple, or none of the topic areas.

EERE may establish more than one budget period for each award and fund only the initial budget period(s). Funding for all budget periods, including the initial budget period, is not guaranteed. Before the expiration of the initial budget period(s), EERE may perform a down-select among different recipients and provide additional funding only to a subset of recipients.

ii. Period of Performance

EERE anticipates making awards that will run up to 36 months in length, comprised of one or more budget periods. Project continuation will be contingent upon satisfactory performance and go/no-go decision review. At the go/no-go decision points, EERE will evaluate project performance, project schedule adherence, meeting milestone objectives, compliance with reporting requirements, and overall contribution to the program goals and objectives. As a result of this evaluation, EERE will make a determination to continue the project, re-direct the project, or discontinue funding the project.

iii. New Applications Only

EERE will accept only new applications under this FOA. EERE will not consider applications for renewals of existing EERE-funded awards through this FOA.

B. EERE Funding Agreements

Through Cooperative Agreements and other similar agreements, EERE provides financial and other support to projects that have the potential to realize the FOA objectives, EERE does not use such agreements to acquire property or services for the direct benefit or use of the United States Government.

- · _ · · ·
- i. Cooperative Agreements

EERE generally uses Cooperative Agreements to provide financial and other support to Prime Recipients.

Through Cooperative Agreements, EERE provides financial or other support to accomplish a public purpose of support or stimulation authorized by Federal statute. Under Cooperative Agreements, the Government and Prime Recipients share responsibility for the direction of projects.

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EERE has substantial involvement in all projects funded via Cooperative Agreement. See Section VI.B.9 of the FOA for more information on what substantial involvement may involve.

II. Funding Agreements with FFRDCs

In most cases, Federally Funded Research and Development Centers (FFRDC) are funded independently of the remainder of the Project Team. The FFRDC then executes an agreement with any non-FFRDC Project Team members to arrange work structure, project execution, and any other matters. Regardless of these arrangements, the entity that applied as the Prime Recipient for the project will remain the Prime Recipient for the project.

iii. Grants

Although EERE has the authority to provide financial support to Prime Recipients through Grants, EERE generally does not fund projects through Grants. EERE may fund a limited number of projects through Grants, as appropriate.

iv. Technology Investment Agreements

In rare cases and if determined appropriate, EERE will consider awarding a Technology Investment Agreement (TIA) to a non-FFRDC applicant. TIAs, governed by 10 CFR Part 603, are assistance instruments used to increase the involvement of commercial entities in the Department's research, development, and demonstration programs. A TIA may be either a type of cooperative agreement or an assistance transaction other than a cooperative agreement, depending on the intellectual property provisions. In both cases, TIAs are not necessarily subject to all of the requirements of 2 CFR Part 200 as amended by 2 CFR Part 910.

In a TIA, EERE may modify the standard Government terms and conditions, including but not limited to:

- Intellectual Property Provisions; EERE may negotiate special arrangements with recipients to avoid the encumbrance of existing intellectual property rights or to facilitate the commercial deployment of inventions conceived or first actually reduced to practice under the EERE funding agreement.
- Accounting Provisions: EERE may authorize the use of generally accepted accounting principles (GAAP) where recipients do not have

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accounting systems that comply with Government recordkeeping and reporting requirements.

EERE will be more amenable to awarding a TIA In support of an application from a consortium or a team arrangement that includes cost sharing with the private sector, as opposed to an application from a single organization. Such a consortium or tearning arrangement could include a FFRDC. If a DOE/NNSA FFRDC is a part of the consortium or teaming arrangement, the value of, and funding for the DOE/NNSA FFRDC portion of the work will be authorized and funded under the DOE field work authorization system and performed under the laboratory's Management and Operating contract. Funding for a non-DOE/NNSA FFRDC would be through an interagency agreement under the Economy Act or other statutory authority. Other appropriate contractual accommodations, such as those involving intellectual property, may be made through a "funds in" agreement to facilitate the FFRDCs participation in the consortium or teaming arrangement. If a TIA is awarded, certain types of information described in 10 CFR 603.420(b) are exempt from disclosure under the Freedom of Information Act for five years after DOE receives the Information.

An applicant may request a TIA if it believes that using a TIA could benefit the RD&D objectives of the program (see section 603,225) and can document these benefits. If an applicant is seeking to negotiate a TIA, the applicant must include an explicit request in its Full Application. After an applicant is selected for award negotiation, the Contracting Officer will determine if awarding a TIA would benefit the RD&D objectives of the program in ways that likely would not happen if another type of assistance agreement (e.g., cooperative agreement subject to the requirements of 2 CFR Part 200 as amended by 2 CFR Part 910). The Contracting Officer will use the criteria in 10 CFR 603, Subpart B, to make this determination.

III. Eligibility Information

To be considered for substantive evaluation, an applicant's submission must meet the criteria set forth below. If the application does not meet these initial requirements, it will be considered non-responsive, removed from further evaluation, and ineligible for any award.

A. Eligible Applicants

i. Individuals

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U.S. citizens and lawful permanent residents are eligible to apply for funding as a Prime Recipient or Subrecipient.

ii. Domestic Entities

For-profit entities, educational institutions, and nonprofits that are incorporated (or otherwise formed) under the laws of a particular State or territory of the United States are eligible to apply for funding as a Prime Recipient or Subrecipient. 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.

State, local, and tribal government entities are eligible to apply for funding as a Prime Recipient or Subrecipient.

DOE/NNSA Federally Funded Research and Development Centers (FFRDCs) are eligible to apply for funding as a Subrecipient, but are not eligible to apply as a Prime Recipient.

Non-DOE/NNSA FFRDCs are eligible to apply for funding as a Subrecipient, but are not eligible to apply as a Prime Recipient.

Federal agencies and instrumentalities (other than DOE) are eligible to apply for funding as a Subrecipient, but are not eligible to apply as a Prime Recipient.

ili. Foreign Entities

Foreign entities, whether for profit or otherwise, are eligible to apply for funding under this FOA. Other than as provided in the "Individuals" or "Domestic Entities" sections above, 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.

Foreign entities may request a waiver of the requirement to designate a subsidiary in the United States as the Prime Recipient in the Full Application (i.e., a foreign entity may request that it remains the Prime Recipient on an award). To do so, the Applicant must submit an explicit written waiver

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request in the Full Application. Appendix Clists the necessary information that must be included in a request to waive this requirement. The applicant does not have the right to appeal EERE's decision concerning a waiver request.

In the waiver request, the applicant must demonstrate to the satisfaction of EERE that it would further the purposes of this FOA and is otherwise in the economic interests of the United States to have a foreign entity serve as the Prime Recipient. EERE may require additional information before considering the waiver request,

A foreign entity may receive funding as a Subrecipient.

iv. Incorporated Consortia

Incorporated consortia, which may include domestic and/or foreign entities, are eligible to apply for funding as a Prime Recipient or Subrecipient. For consortia incorporated (or otherwise formed) under the laws of a State or territory of the United States, please refer to "Domestic Entities" above. For consortia incorporated in foreign countries, please refer to the requirements In "Foreign Entities" above.

• • • Each incorporated consortium must have an internal governance structure and a written set of internal rules. Upon request, the consortium must provide a written description of its internal governance structure and its internal rules to the EERE Contracting Officer.

4.8

Unincorporated Consortia

Unincorporated Consortia, which may include domestic and foreign entities, must designate one member of the consortlum to serve as the Prime Recipient/consortium representative. The Prime Recipient/consortium representative must be incorporated (or otherwise formed) under the laws of a State or territory of the United States. The eligibility of the consortium will be determined by the eligibility of the Prime Recipient/consortlum representative under Section III.A of the FOA.

Upon request, unincorporated consortia must provide the EERE Contracting Officer with a collaboration agreement, commonly referred to as the articles of collaboration, which sets out the rights and responsibilities of each consortium member. This agreement binds the individual consortium members together and should discuss, among other things, the consortium's:

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- Management structure;
- Method of making payments to consortium members;
- Means of ensuring and overseeing members' efforts on the project;
- Provisions for members' cost sharing contributions; and
- Provisions for ownership and rights in intellectual property developed previously or under the agreement.

B. Cost Sharing

Cost Share 20%

For Topic 1.1, the cost share must be at least 20% of the total allowable costs for research and development projects (i.e., 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) and must come from non-Federal sources unless otherwise allowed by law. (See 2 CFR 200.306 and 2 CFR 910.130 for the applicable cost sharing requirements.)

Cost Share 50%

For Topic 1.2 and 1.3, the cost share must be at least 20% of the total allowable costs for Phase 1; research and development, and at least 50% for Phase 2; field validation.

To assist applicants in calculating proper cost share amounts, EERE has included a cost share information sheet and sample cost share calculation as Appendices B and C to this FOA.

i. Legal Responsibility

Although the cost share requirement applies to the project as a whole, including work performed by members of the project team other than the Prime Recipient, the Prime Recipient is legally responsible for paying the entire cost share. The Prime Recipient's cost share obligation is expressed in the Assistance Agreement as a static amount in U.S. dollars (cost share amount) and as a percentage of the Total Project Cost (cost share percentage). If the funding agreement is terminated prior to the end of the project period, the Prime Recipient is required to contribute at least the cost share percentage of total expenditures incurred through the date of termination.

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The Prime Recipient is solely responsible for managing cost share contributions by the Project Team and enforcing cost share obligation assumed by Project Team members in subawards or related agreements.

ii. Cost Share Allocation

Each Project Team is free to determine how best to allocate the cost share requirement among the team members. The amount contributed by individual Project Team members may vary, as long as the cost share requirement for the project as a whole is met.

iii. Cost Share Types and Allowability

Every cost share contribution must be allowable under the applicable Federal cost principles, as described in Section IV.J.1 of the EQA. In addition, cost share must be verifiable upon submission of the Full Application.

Project Teams may provide cost share in the form of cash or in-kind contributions. Cost share may be provided by the Prime Recipient, Subrecipients, or third parties (entities that do not have a role in performing the scope of work). Vendors/Contractors may not provide cost share. Any partial donation of goods or services is considered a discount and is not allowable.

Cash contributions include, but are not limited to: personnel costs, fringe costs, supply and equipment costs, indirect costs and other direct costs.

In-kind contributions are those where a value of the contribution can be readily determined, verified and justified but where no actual cash is transacted in securing the good or service comprising the contribution. Allowable in-kind contributions include, but are not limited to: the donation of volunteer time or the donation of space or use of equipment,

Project teams may use funding or property received from state or local governments to meet the cost share requirement, so long as the funding was not provided to the state or local government by the Federal Government.

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

 Revenues or royaltles from the prospective operation of an activity beyond the project period;

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Energy Efficiency & Renewable Energy

- Proceeds from the prospective sale of an asset of an activity;
- Federal funding or property (e.g., Federal grants, equipment owned by the Federal Government); or
- Expenditures that were reimbursed under a separate Federal Program.

Project Teams may not use the same cash or in-kind contributions to meet cost share requirements for more than one project or program.

Cost share contributions must be specified in the project budget, verifiable from the Prime Recipient's records, and necessary and reasonable for proper and efficient accomplishment of the project. As all sources of cost share are considered part of total project cost, the cost share dollars will be scrutinized under the same Federal regulations as Federal dollars to the project. Every cost share contribution must be reviewed and approved in advance by the Contracting Officer and incorporated into the project budget before the expenditures are incurred.

Applicants are encouraged to refer to 2 CFR 200.306 as amended by 2 CFR 910.130 & 10 CFR 603.525-555 for additional guidance on cost sharing.

iv. Cost Share Contributions by FFRDCs

Because FFRDCs are funded by the Federal Government, costs incurred by FFRDCs generally may not be used to meet the cost share requirement. FFRDCs may contribute cost share only if the contributions are paid directly from the contractor's Management Fee or another non-Federal source.

v. Cost Share Verification

Applicants are required to provide written assurance of their proposed cost share contributions in their Full Applications.

Upon selection for award negotiations, applicants are required to provide additional information and documentation regarding their cost share contributions. Please refer to Appendix A of the FOA.

vi. Cost Share Payment

EERE requires Prime Recipients to contribute the cost share amount Incrementally over the life of the award. Specifically, the Prime Recipient's cost share for each billing period must always reflect the overall cost share ratio negotiated by the parties (i.e., the total amount of cost sharing on each

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invoice when considered cumulatively with previous invoices must reflect, at a minimum, the cost sharing percentage negotiated). As FFRDC funding will be provided directly to the FFRDC(s) by DOE, Prime Recipients will be required to provide project cost share at a percentage commensurate with the FFRDC costs, on a budget period basis, resulting in a higher interim involcing cost share ratio than the total award ratio.

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. Regardless of the interval requested, the Prime Recipient must be up-to-date on cost share at each interval. Such requests must be sent to the Contracting Officer during award negotiations and include the following information: (1) a detailed justification for the request; (2) a proposed schedule of payments, including amounts and dates; (3) a written commitment to meet that schedule; and (4) such evidence as necessary to demonstrate that the Prime Recipient has complied with its cost share obligations to date. The Contracting Officer must approve all such requests before they go into effect.

C. Compliance Criteria

<u>Full Applications must meet all Compliance criteria listed below or they will be</u> <u>considered noncompliant. EERE will not review or consider noncompliant</u> <u>submissions</u>, including Full Applications, and Replies to Reviewer Comments that were: submitted through means other than EERE Exchange; submitted after the applicable deadline; and/or submitted incomplete. EERE will not extend the submission deadline for applicants that fail to submit required information due to server/connection congestion.

i. Compliance Criteria

1. Full Applications

Full Applications are deemed compliant If:

- The Full Application complies with the content and form requirements in Section IV.D of the FOA; and
- The applicant successfully uploaded all required documents and clicked the "Submit" button in EERE Exchange by the deadline stated in the FOA.

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2. Replies to Reviewer Comments

Replies to Reviewer Comments are deemed compliant if:

- The Reply to Reviewer Comments complies with the content and form requirements in Section IV.E of the FOA; and
- The applicant successfully uploaded all required documents to EERE Exchange by the deadline stated in the FOA.

D. Responsiveness Criteria

All "Applications Specifically Not of Interest," as described in Section 1.C of the FOA, are deemed nonresponsive and are not reviewed or considered.

E. Other Eligibility Requirements

i. Requirements for DOE/NNSA Federally Funded Research and Development Centers (FFRDC) Listed as the Applicant A DOE/NNSA FFRDC is eligible to apply for funding under this FOA if its cognizant Contracting Officer provides written authorization and this authorization is submitted with the application. If a DOE/NNSA FFRDC is selected for award negotiation, the proposed work will be authorized under the DOE work authorization process and performed under the laboratory's Management and Operating (M&O) contract.

The following wording is acceptable for the authorization:

Authorization is granted for the [Enternaboratory Name] Laboratory to participate in the proposed project. The work proposed for the laboratory is consistent with or complementary to the missions of the laboratory, and will not adversely impact execution of the DOE assigned programs at the laboratory.

ii. Requirements for DOE/NNSA and non-DOE/NNSA Federally Funded Research and Development Centers Included as a Subrecipient

DOE/NNSA and non-DOE/NNSA FFRDCs may be proposed as a Subrecipient on another entity's application subject to the following guidelines:

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1. Authorization for non-DOE/NNSA FFRDCs

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The Federal agency sponsoring the FFRDC must authorize in writing the use of the FFRDC on the proposed project and this authorization must be submitted with the application. The use of a FFRDC must be consistent with its authority under its award.

2. Authorization for DOE/NNSA FFRDCs

The cognizant Contracting Officer for the FFRDC must authorize in writing the use of the FFRDC on the proposed project and this authorization must be submitted with the application. The following wording is acceptable for this authorization:

Authorization is granted for the [Enter Laboratory Name] Laboratory to participate in the proposed project. The work proposed for the laboratory is consistent with or complementary to the missions of the laboratory, and will not adversely impact execution of the DOE assigned programs at the laboratory,

3. Value/Funding

The value of and funding for the FFRDC portion of the work will not normally be included in the award to a successful applicant. Usually, DOE will fund a DOE/NNSA FFRDC contractor through the DOE field work proposal system and non-DOE/NNSA FFRDC through an interagency agreement with the sponsoring agency.

Cost Share

Although the FFRDC portion of the work is usually excluded from the award to a successful applicant, the applicant's cost share requirement will be based on the total cost of the project, including the applicant's and the FFRDC's portions of the project.

. Responsibility

The Prime Recipient will be the responsible authority regarding the settlement and satisfaction of all contractual and administrative issues including, but not limited to disputes and claims arising out of any agreement between the Prime Recipient and the FFRDC contractor.

6. Limit on FFRDC Effort

The FFRDC effort, in aggregate, shall not exceed 50% of the total estimated cost of the project, including the applicant's and the FFRDC's portions of the effort.

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

Advanced Solar Systems Integration Technologies

Funding Opportunity Announcement (FOA) Number: DE-FOA-0001987 FOA Type: Initial CFDA Number: 81.087

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FOA issue Date:			(b) (5)
Letter of Intent Due Date			
Submission Deadline for Full Applications:		nix.	
Expected Submission Deadline for Replics to	o Reviewer Co	omments:	
Expected Date for EERE Selection Notification	ons:		
Expected Timeframe for Award Negotiation	15		60 days
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- To apply to this FOA, applicants must register with and submit application materials through EERE Exchange at <u>https://eere-Exchange.energy.gov</u>, EERE's online application portal.
- Applicants must designate primary and backup points-of-contact in EERE Exchange with whom EERE will communicate to conduct award negotiations, if an application is selected for award negotiations, it is not a commitment to issue an award. It is imperative that the applicant/selectee be responsive during award negotiations and meet negotiation deadlines. Failure to do so may result in cancelation of further award negotiations and rescission of the Selection.

Questions about this FOA? Email SI.FOA.SETO@ee.doe.gov.

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I. Funding Opportunity Description

A. Description/Background

This Funding Opportunity Announcement (FOA) is being issued by the U.S. Department of Energy's (DOE), Office of Energy Efficiency and Renewable Energy (EERE), Solar Energy Technologies Office (SETO). This section describes the overall goals of SETO and the type of projects that are being solicited for funding support through this FOA.

In 2016, solar power surpassed 1% of annual electricity supply in the United States for the first time, and the Energy Information Administration projects that solar will grow to 5% of U.S. electricity by 2030.¹ Further, if the price of solar electricity and/or energy storage declines more rapidly than projected, that percentage could be even higher.² But solar is more than just a source of affordable electricity; it also provides the potential to improve grid reliability and resilience, increase employment, ³ create business opportunities, increase energy diversity, and provide environmental benefits.

The mission of the Solar Energy Technologies Office (SETO) is to support earlystage research and development to improve the performance and flexibility of solar technologies that contribute to a reliable and resilient U.S. electric grid. The office invests in innovative research efforts that securely integrate more solar energy into the grid, enhance the use, storage and dispatch of solar energy, and lower solar electricity costs.

SETO focuses on two different solar energy technologies; photovoltaic (PV) technologies that directly convert sunlight into electricity, typically via a semiconductor, and concentrating solar thermal power (CSP) technologies that convert sunlight to heat, which can be converted or stored until needed, and then used to generate electricity or provide other energy services. Because sunshine varies with the time of day, location, and season, solar power systems must be paired with adaptive loads, other sources of power, or energy storage to deliver electricity whenever it's needed. This dependency reduces the value of solar power systems once solar starts to supply a significant fraction of the electricity within a given region and highlights the need for a focus on addressing grid

³ The Solar Foundation, National Solar Jobs Census, 2010 – 2016.

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¹ U.S. Department of Energy, Energy Information Administration, International Energy Outlook 2017, DOE/EIA-0484 (2017).

² P.A. Basore and W.J. Cole, "Comparing supply and demand models for future photovoltaic power generation in the USA," submitted to *Progress in Photovoltaics: Research and Applications*, 2017.

ENERGY Energy Efficiency & Energy Efficiency & Energy

integration challenges.

SETO, in partnership with other offices at DOE, launched the SunShot Initiative in February 2011 with the goal of solar electricity becoming price-competitive with conventional utility sources by 2020.4 The SunShot 2020 goal has already been achieved for utility-scale PV, and with continued effort, it is likely to be achieved for grid-tied solar applications. As a result of this tremendous progress and in response to the growing deployment of solar in the U.S., SETO is increasing its focus on addressing the challenges related to seamlessly integrating high penetrations of solar energy onto the nation's electricity grid. Additionally, SETO set 2030 cost targets to further reduce the cost of solar electricity across all market sectors, which would make solar one of the most affordable sources of electricity and enable a substantial fraction of U.S. electricity demand to be supplied by solar technology.⁵ The targets for the unsubsidized cost of electricity at the point of grid connection in a location with average U.S. solar resources are 3¢ per kllowatt-hour (kWh) for utility-scale photovoltaics, 4¢ per kWh for commercial rooftop photovoltaics, 5¢ per kWh for residential rooftop photovoltaics, and 5¢ per kWh for concentrating solar power with thermal energy storage.

By supporting early-stage research across the solar energy technology space through this FOA, SETO can foster innovation and enable integrated multitechnology solutions that can advance the widespread adoption of solar power while securely integrating it into the nation's energy grid.

DOE is committed to improving the affordability of energy technologies and strengthening the Energy Sector's capability to withstand cyber and physical threats, including natural disasters. Improving the strategic location and situational awareness of solar systems can help ensure continuity of service in the face of widespread and coordinated threats. Developing innovative approaches to accelerate the transfer of solar system solutions that will improve Energy Sector resilience is also a priority.

The Systems Integration (SI) subprogram supports early-stage research and development that advances the reliable, resillent, secure and affordable integration of solar energy onto the U.S. electric grid. For more in-depth discussion of solar grid integration, please visit "Solar Grid Integration" <u>https://energy.gov/eere/solar/downloads/technical-background-2018-seto-funding-opportunity-announcement</u>.

⁶ U.S. Dept. of Energy, The SunShot Initiative's 2030 Goal: 3¢ per Kilowatt Hour for Solar Electricity, 2016. Questions about this FOA? Emai <u>SI.FOA.SETO@ee.doe.gov</u>

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⁴ SunShot Vision Study, NREL Technical Report DOE/GO-102012-3037, 2012.

In 2011, solar power comprised less than 0.1% of the U.S. electricity supply with an installed capacity of just 1.2 gigawatts (GW). Solar now supplies nearly 2% of the annual U.S. electricity demand⁶ with an installed capacity of roughly 47 GWs⁷, and is continuing to grow. According to U.S. Energy Information Administration (EIA), in some states and regions, solar represents up to 15% of total annual electricity generation. Instantaneous solar generation can reach a much higher level, more than 40% in some cases.⁸

Monthly net electricity generation from selected fuels (Jan 2007 - Mar 2017) share of total electricity generation 12%



Figure 1: For the first time, in March 2017 solar supplied 2% of the U.S. electricity demand, while wind and solar combined accounted for 10% of the U.S. electricity generation. (Source: EIA)

As the penetration of solar energy on the grid continues to increase, it becomes imperative to identify the associated technical, economic and regulatory challenges, and to develop impactful solutions in order to ensure compatibility with the existing grid and a smooth transition to a secure, reliable and resilient grid of the future.

Traditional grid 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.

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⁶ U.S. Energy Information Administration (EIA), Electric Power Monthly with Data for November 2017, published in January 2018. <u>https://www.ela.gov/electricity/monthly/current_month/epm.pdf</u>

⁷ Source: Solar Energy Industries Association (SEIA), <u>http://www.sela.org/</u>

⁸ For example, in the California Independent System Operator (CAISO) Monthly Renewables Performance Report, the 5-minute market data shows that at the maximum solar served almost 45% of the Ioad in September 2017. See http://www.caiso.com/Documents/MonthlyRenewablesPerformanceReport-Nov2017.html Questions about this FOA2 Emai <u>SI,FOA.SETO@ee.doe.gov</u>

A modern grid must be 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 customers to manage their electricity use and participate in markets, and provide strong protection against physical and cyber risks.

The current business-as-usual trajectory for the electric industry will not result in a timely transition to a modernized grid⁹. Since large investments in the past and today in the nation's electric grid infrastructure will remain in service for decades, it is important that the U.S. make smart decisions to invest in enabling and forward-looking technologies that will support the creation of a modern grid infrastructure in the coming years. There is a critical need to foster innovations and new technology adoptions by decreasing regulatory, market and business model uncertainties, demonstrating technology maturity and reducing implementation risks.

The Department of Energy's Grid Modernization Initiative¹⁰, is a cross-cutting effort that aligns grid modernization efforts across the multiple DOE Program Offices. As part of the Grid Modernization Initiative (GMI), the SI subprogram supports targeted technology research and development (R&D) that addresses the technical challenges with achieving higher solar penetration, while supporting a safe, reliable, secure and cost-effective electric power system.

More broadly, the Grid Modernization Initiative focuses on the development of holistic solutions for the grid of the future. Several key technology areas have been identified in the Grid Modernization Multi-Year Program Plan (MYPP)¹¹:

- Devices and integrated Systems Testing;
- Sensing and Measurements;
- Systems Operations, Power Flow and Control;
- Design and Planning Tools;
- Security and Resilience; and
- Institutional Support.

¹¹ Department of Energy Grid Modernization Multivear Program Plan (MYPP), Accessed 01 November 2017, <u>https://energy.gov/downloads/grid-modernization-multi-year-program-plan-mypp</u>

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⁹ Department of Energy Grid Modernization Multiyear Program Plan (MYPP)

Accessed 01 November 2017, <u>https://energy.gov/under-secretary-science-and-energy/grid-modernlzation-initiative</u>



Progress in all of these areas is considered crucial for the effective grid integration of solar energy and modernization of the grid, as illustrated in Figure 2. A specific focus of the SETO Systems Integration subprogram includes understanding the impacts of increasing penetration of solar energy on grid reliability and power quality, developing best practices for interconnecting and integrating solar with energy storage and synergistic technologies, addressing the variability of solar generation, researching power electronic technologies for flexible power flow control, enhancing situational awareness of solar generation at the grid edge and informing the standardization of interconnection, interoperability, and cybersecurity for PV and other distributed energy resources (DER) systems. Taking these all together, the goal is to advance the knowledge-base and the ability to integrate solar generation, at scale, into electric transmission and distribution systems in a cost-effective, secure, and reliable manner.



Figure 2: Illustration of high level solar penetration in a madernized electricity power system.

B. Topic Areas/Technical Areas of Interest

Topic 1.1 R&D for solar situational awareness in strategic locations associated with critical infrastructure

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Situational awareness of solar photovoltaic (PV) systems in strategic locations is critical to managing risk and strengthening the security and resilience of the Nation's critical infrastructure (e.g., for safety, public health and national security). Further, the increasing deployment of utility-scale and distributed solar PV systems brings about challenges to electric power grid planning and operation. As more solar energy systems come online, grid operators across the country need new tools to ensure the secure and reliable operation of our nation's electric grid and delivery of energy services to our critical infrastructure.

This Topic will support research and development of unique and innovative solutions that will enhance grid operator's situational awareness of solar energy systems deployed throughout the bulk power system, associated substations, distribution system and/or Behind-the-Meter (BTM). Specifically, the solutions should focus on the situational awareness of solar photovoltaic (PV) systems in strategic locations with considerations of cyber and physical vectors to ensure the electric power grid provides continuity of service in the face of wide spread and coordinated threats.

Primary focus areas include solar photovoltaic integrated sensor technologies, secure and robust communication tools, advanced data analytics including machine learning and artificial intelligence, machine to machine capabilities, and data visualization. Projects should consider the integration of observed data into planning, operations and business unit systems that would operate at both steady and degraded states. The research should leverage established industrial control and power system cyber security work to implement state-of-the-art cyber security best practices for solar PV systems. Applications must also have an assessment of economic viability of the proposed system, activity or component. The project results are expected to validate the situational awareness tools and improve resilience in strategic locations associated with the critical infrastructure.

In addition to technology solutions, applicants may also explore unique and innovative approaches to accelerate the transfer of solar technology solutions that improve the solar situation awareness. Potential areas of interest include, but are not limited to, projects or models that deploy alternative capital, for technology R&D transfer, incentivize industry-researcher collaboration, leverage existing facilities or capabilities, data and build approaches and methods that serve to drive down the hardware cost and ensure solutions, validation, certifications, resilience and electricity supply can withstand wide spread and coordinated threats.

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Applicants are encouraged to work with critical infrastructure owners and operators, industry, academia, and other stakeholders including state, local, tribal and territories entities to take proactive steps to manage risk and strengthen the security and resillence of the Nation's critical infrastructure, considering all hazards that could have a debilitating impact on national security, economic stability, public health and safety, or any combination thereof.

Topic 1.2 Validation of proactive resilience solutions based on solar energy systems.

This topic will support applications to research, develop, and field validate unique and innovative solutions to enhance the resilience of the bulk power system and/or distribution systems (including microgrids) with high penetrations of solar PV systems. Technological advancements include control/coordination strategies, real-time system monitoring, robust communication structures, grid planning and analytical platforms, and integration of multiple DER technologies. Projects must include field validation applicable to critical infrastructure that verifies the viability of system design, validates architecture relationships and interoperability, ensures protection of system networks and data against cyber threats, and informs functional requirements for bulk and distribution system planning platforms and decision support tools. Applicants are encouraged to work with critical infrastructure owners and operators, industry, academia, and other stakeholders.

In addition to technology solutions, applicants may also explore unique and innovative approaches to accelerate the transfer of solar technology solutions that improve resilience. Potential areas of interest include, but are not limited to, projects or models that deploy alternative capital, for technology R&D transfer, incentivize industry-researcher collaboration, leverage existing facilities or capabilities, data and build approaches and methods that serve to drive down the hardware cost and ensure solutions, validation, certifications, resilience and electricity supply can withstand wide spread and coordinated threats.

Applicants are encouraged to work with critical infrastructure owners and operators, industry, academia, and other stakeholders including state, local, tribal and territories entities to take proactive steps to manage risk and strengthen the security and resilience of the Nation's critical infrastructure, considering all hazards that could have a debilitating impact on national security, economic stability, public health and safety, or any combination thereof.

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Cybersecurity and Interoperability: Applicants should describe their strategies and plans for establishing and maintaining interoperability, and the utilization of open standards whereverpossible. Applicants should consider interoperability within their solution (among devices and/or subsystems) and at the external interfaces with other utility and customer systems. Applicants shall indicate where they have chosen to utilize proprietary standards.

Applicants should also describe their approach to establishing and maintaining cybersecurity throughout their solution, and at the interfaces to external components and systems. In accordance with the cybersecurity technique of defense-in-depth, applicants shall not cede responsibility for cybersecurity to the external boundaries of their proposed solution, nor shall they propose that it be added on at some later stage.

Post award, Recipients will be required to submit an Interoperability Plan and a Cybersecurity Plan, detailing how they propose to implement and maintain these aspects of their solution.

Anticipated Phases and Cost Share Requirement by Topic

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The following table Illustrates the anticipated focus and required cost share by phase for each topic, along with the anticipated timeframes for each phase:

	Year 1 Year 2	Year 3
Topic 1.1: R&D for solar situational awareness	Phase 1: Research and development (20% cost share)	Phase 2: Field validation (50% cost share)
Topic 1.2: Validation of proactive resilience solutions	Phase 1: Research and development (20% cost share)	Phase 2; Field validation (50% cost share) (optional)

While the phases identify the type of activity and required cost share, each project will be divided into three one year budget periods, with go/no-go decision points between each budget period.

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All work under EERE funding agreements must be performed in the United States. See Section IV.J.3 and Appendix C.

C. Applications Specifically Not of Interest

The following types of applications will be deemed nonresponsive and will not be reviewed or considered (See Section III.D of the FOA):

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- Applications that fall outside the technical parameters specified in Section i.B of the FOA.
- Applications for proposed technologies that are not based on sound scientific principles (e.g., violates the laws of thermodynamics).
- Undifferentiated research, products, and/or solutions: This FOA seeks innovative solutions that help achieve SETO goals. Incremental advancement of undifferentiated or duplicative efforts is insufficient to meet SETO goals and is not of interest to this FOA.
- Projects lacking influential impact from Federal funds: This FOA intends to fund projects where Federal funds will provide a clear and measurable impact, (e.g. retiring risk sufficiently for follow-on investment or catalyzing development.) Projects that have sufficient monies and resources to be executed regardless of federal funds are not of interest.
- Re-funding the same idea at the same technology readiness level: This FOA does not intend to re-fund prior SETO awardees for the same idea at the same technology readiness level.
- Products or solutions for systems which do not tie to a grid or micro-grid (i.e. wholly off-grid applications and portable power).
- Generic technologies of solutions that are not integrated with solar PV.
 These include sensor and measurement, communications, and cyber security

D. Authorizing Statutes

The programmatic authorizing statute is EPACT 2005, Section 931 (a)(2).

- Awards made under this announcement will fail under the purview of 2 CFR Part
- 200 as amended by 2 CFR Part 910.

II. Award Information

A. Award Overview

i. Estimated Funding

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EERE may issue awards in one, multiple, or none of the topic areas.

EERE may establish more than one budget period for each award and fund only the initial budget period(s). Funding for all budget periods, including the initial budget period, is not guaranteed. Before the expiration of the initial budget period(s), EERE may perform a down-select among different recipients and provide additional funding only to a subset of recipients.

ii. Period of Performance

EERE anticipates making awards that will run up to 36 months in length, comprised of one or more budget periods. Project continuation will be contingent upon satisfactory performance and go/no-go decision review. At the go/no-go decision points, EERE will evaluate project performance, project schedule adherence, meeting milestone objectives, compliance with reporting requirements, and overall contribution to the program goals and objectives. As a result of this evaluation, EERE will make a determination to continue the project, re-direct the project, or discontinue funding the project,

iii. New Applications Only

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New Applications Only EERE will accept only new applications under this FOA. EERE will not consider applications for renewals of existing EERE-funded awards through this FOA.

B. EERE Funding Agreements

Through Cooperative Agreements and other similar agreements, EERE provides financial and other support to projects that have the potential to realize the FOA objectives. EERE does not use such agreements to acquire property or services for the direct benefit or use of the United States Government.

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i. Cooperative Agreements

EERE generally uses Cooperative Agreements to provide financial and other support to Prime Recipients.

Through Cooperative Agreements, EERE provides financial or other support to accomplish a public purpose of support or stimulation authorized by Federal statute. Under Cooperative Agreements, the Government and Prime Recipients share responsibility for the direction of projects.

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accounting systems that comply with Government recordkeeping and reporting requirements.

EERE will be more amenable to awarding a TIA in support of an application from a consortium or a team arrangement that includes cost sharing with the private sector, as opposed to an application from a single organization. Such a consortium or teaming arrangement could include a FFRDC. If a DOE/NNSA FFRDC is a part of the consortium or teaming arrangement, the value of, and funding for the DOE/NNSA FFRDC portion of the work will be authorized and funded under the DOE field work authorization system and performed under the laboratory's Management and Operating contract. Funding for a non-DOE/NNSA FFRDC would be through an interagency agreement under the Economy Act or other statutory authority. Other appropriate contractual accommodations, such as those involving intellectual property, may be made through a "funds in" agreement to facilitate the FFRDCs participation in the consortium or teaming arrangement, If a TIA is awarded, certain types of information described in 10 CFR 603.420(b) are exempt from disclosure under the Freedom of Information Act for five years after DOE receives the information.

An applicant may request a TIA if it believes that using a TIA could benefit the RD&D objectives of the program (see section 603.225) and can document these benefits. If an applicant is seeking to negotiate a TIA, the applicant must include an explicit request in its Full Application. After an applicant is selected for award negotiation, the Contracting Officer will determine if awarding a TIA would benefit the RD&D objectives of the program in ways that likely would not happen if another type of assistance agreement (e.g., cooperative agreement subject to the requirements of 2 CFR Part 200 as amended by 2 CFR Part 910). The Contracting Officer will use the criteria in 10 CFR 603, Subpart B, to make this determination.

III. Eligibility Information

To be considered for substantive evaluation, an applicant's submission must meet the criteria set forth below. If the application does not meet these initial requirements, it will be considered non-responsive, removed from further evaluation, and ineligible for any award.

A. Eligible Applicants

i. Individuals

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request in the Full Application. Appendix Clists the necessary information that must be included in a request to waive this requirement. The applicant does not have the right to appeal EERE's decision concerning a waiver request.

In the waiver request, the applicant must demonstrate to the satisfaction of EERE that it would further the purposes of this FOA and is otherwise in the economic interests of the United States to have a foreign entity serve as the Prime Recipient. EERE may require additional information before considering the waiver request.

A foreign entity may receive funding as a Subrecipient.

iv. Incorporated Consortia

Incorporated consortia, which may include domestic and/or foreign entities, are eligible to apply for funding as a Prime Recipient or Subrecipient. For consortia incorporated (or otherwise formed) under the laws of a State or territory of the United States, please refer to "Domestic Entities" above. For consortia incorporated in foreign countries, please refer to the requirements In "Foreign Entitles" above.

Each incorporated consortium must have an internal governance structure and a written set of internal rules. Upon request, the consortium must provide a written description of its internal governance structure and its Internal rules to the EERE Contracting Officer.

Unincorporated Consortia

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Unincorporated Consortia, which may include domestic and foreign entities, must designate one member of the consortium to serve as the Prime Recipient/consortium representative. The Prime Recipient/consortium representative must be incorporated (or otherwise formed) under the laws of a State or territory of the United States. The eligibility of the consortium will be determined by the eligibility of the Prime Recipient/consortlum representative under Section III.A of the FOA.

Upon request, unincorporated consortia must provide the EERE Contracting Officer with a collaboration agreement, commonly referred to as the articles of collaboration, which sets out the rights and responsibilities of each consortium member. This agreement binds the individual consortium members together and should discuss, among other things, the consortium's;

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Management structure;

- Method of making payments to consortium members;
- Means of ensuring and overseeing members' efforts on the project;
- Provisions for members' cost sharing contributions; and
- Provisions for ownership and rights in intellectual property developed previously or under the agreement.

B. Cost Sharing

Cost Share 20%

For Topic 1.1, the cost share must be at least 20% of the total allowable costs for research and development projects (i.e., 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) and must come from non-Federal sources unless otherwise allowed by law. (See 2 CFR 200.306 and 2 CFR 910.130 for the applicable cost sharing requirements.)

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Cost Share 50%

For Topic 1.2 and 1.3, the cost share must be at least 20% of the total allowable costs for Phase 1: research and development, and at least 50% for Phase 2: field validation.

To assist applicants in calculating proper cost share amounts, EERE has included a cost share information sheet and sample cost share calculation as Appendices B and C to this FOA.

i. Legal Responsibility

Although the cost share requirement applies to the project as a whole, including work performed by members of the project team other than the Prime Recipient, the Prime Recipient is legally responsible for paying the entire cost share. The Prime Recipient's cost share obligation is expressed in the Assistance Agreement as a static amount in U.S. dollars (cost share amount) and as a percentage of the Total Project Cost (cost share percentage). If the funding agreement is terminated prior to the end of the project period, the Prime Recipient is required to contribute at least the cost share percentage of total expenditures incurred through the date of termination.

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The Prime Recipient is solely responsible for managing cost share contributions by the Project Team and enforcing cost share obligation assumed by Project Team members in subawards or related agreements.

ii. Cost Share Allocation

Each Project Team is free to determine how best to allocate the cost share requirement among the team members. The amount contributed by individual Project Team members may vary, as long as the cost share requirement for the project as a whole is met.

iii. Cost Share Types and Allowability

Every cost share contribution must be allowable under the applicable Federal cost principles, as described in Section IV.J.1 of the EOA. In addition, cost share must be verifiable upon submission of the Full Application.

Project Teams may provide cost share in the form of cash or in-kind contributions. Cost share may be provided by the Prime Recipient, Subrecipients, or third partles (entities that do not have a role in performing the scope of work). Vendors/Contractors may not provide cost share. Any partial donation of goods or services is considered a discount and is not allowable.

Cash contributions include, but are not limited to: personnel costs, fringe costs, supply and equipment costs, indirect costs and other direct costs.

In-kind contributions are those where a value of the contribution can be readily determined, verified and justified but where no actual cash is transacted in securing the good or service comprising the

contribution: Allowable in-kind contributions include, but are not limited to: the donation of volunteer time or the donation of space or use of equipment.

Project teams may use funding or property received from state or local governments to meet the cost share requirement, so long as the funding was not provided to the state or local government by the Federal Government.

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;

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invoice when considered cumulatively with previous invoices must reflect, at a minimum, the cost sharing percentage negotiated). As FFRDC funding will be provided directly to the FFRDC(s) by DOE, Prime Recipients will be required to provide project cost share at a percentage commensurate with the FFRDC costs, on a budget period basis, resulting in a higher interim involcing cost share ratio than the total award ratio.

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. Regardless of the interval requested, the Prime Recipient must be up-to-date on cost share at each interval. Such requests must be sent to the Contracting Officer during award negotiations and include the following information: (1) a detailed justification for the request; (2) a proposed schedule of payments, including amounts and dates; (3) a written commitment to meet that schedule; and (4) such evidence as necessary to demonstrate that the Prime Recipient has complied with its cost share obligations to date. The Contracting Officer must approve all such requests before they go into effect.

C. Compliance Criteria

Full Applications must meet all Compliance criteria listed below or they will be considered noncompliant. EERE will not review or consider noncompliant submissions, including Full Applications, and Replies to Reviewer Comments that were: submitted through means other than EERE Exchange; submitted after the applicable deadline; and/or submitted incomplete. EERE will not extend the submission deadline for applicants that fail to submit required information due to server/connection congestion.

- i. Compliance Criteria
 - 1. Full Applications

Full Applications are deemed compliant if:

- The Full Application complies with the content and form ٠ requirements in Section IV.D of the FOA; and
- The applicant successfully uploaded all required documents and clicked the "Submit" button in EERE Exchange by the deadline stated in the FOA.

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The Federal agency sponsoring the FFRDC must authorize in writing the use of the FFRDC on the proposed project and this authorization must be submitted with the application. The use of a FFRDC must be consistent with its authority under its award.

2. Authorization for DOE/NNSA FFRDCs

The cognizant Contracting Officer for the FFRDC must authorize in writing the use of the FFRDC on the proposed project and this authorization must be submitted with the application. The following wording is acceptable for this authorization:

Authorization is granted for the [Enter Laboratory Name] Laboratory to participate in the proposed project. The work proposed for the laboratory is consistent with or complementary to the missions of the laboratory, and will not adversely impact execution of the DOE assigned programs at the laboratory.

3. Value/Funding

The value of and funding for the FFRDC portion of the work will not normally be included in the award to a successful applicant. Usually, DOE will fund a DOE/NNSA FFRDC contractor through the DOE field work proposal system and non-DOE/NNSA FFRDC through an interagency agreement with the sponsoring agency.

Cost Share

Although the FFRDC portion of the work is usually excluded from the award to a successful applicant, the applicant's cost share requirement will be based on the total cost of the project, including the applicant's and the FFRDC's portions of the project.

5. Responsibility

The Prime Recipient will be the responsible authority regarding the settlement and satisfaction of all contractual and administrative issues including, but not limited to disputes and claims arising out of any agreement between the Prime Recipient and the FFRDC contractor.

6. Limit on FFRDC Effort

The FFRDC effort, in aggregate, shall not exceed 50% of the total estimated cost of the project, including the applicant's and the FFRDC's portions of the effort.

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F. Limitation on Number of Full Applications Eligible for Review

Applicants may submit more than one Full Application to this FOA, provided that each application describes a unique, scientifically distinct project.

G. Questions Regarding Eligibility

EERE will not make eligibility determinations for potential applicants prior to the date on which applications to this FOA must be submitted. The decision whether to submit an application in response to this FOA lies solely with the applicant.

IV. Application and Submission Information

A. Application Process

The application process will include one phase: a Full Application phase. At each phase, EERE performs an initial eligibility review of the applicant submissions to determine whether they meet the eligibility requirements of Section III of the FOA. EERE will not review or consider submissions that do not meet the eligibility requirements of Section III. All submissions must conform to the following form and content requirements, including maximum page lengths (described below) and must be submitted via EERE Exchange at https://eere-exchange.energy.gov/, unless specifically stated otherwise. <u>EERE will not review or consider submissions submitted through means other than EERE Exchange, submissions submitted after the applicable deadline, and incomplete submissions. EERE will not extend deadlines for applicants who fail to submit required information and documents due to server/connection congestion. A control number will be issued when an applicant begins the EERE Exchange application process. This control number must be included with all Application documents, as described below.</u>

The Full Application, and Reply to Reviewer Comments must conform to the following requirements:

- Each must be submitted in Adobe PDF format unless stated otherwise.
- Each must be written in English.
- All pages must be formatted to fit on 8.5 x 11 inch paper with margins not less than one inch on every side. Use Times New Roman typeface, a black font color, and a font size of 12 point or larger (except in figures or tables, which may be 10 point font). A symbol font may be used to insert Greek

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letters or special characters, but the font size requirement still applies. References must be included as footnotes or endnotes in a font size of 10 or larger. Footnotes and endnotes are counted toward the maximum page requirement.

- The Control Number must be prominently displayed on the upper right corner of the header of every page. Page numbers must be included in the footer of every page.
- Each submission must not exceed the specified maximum page limit, including cover page, charts, graphs, maps, and photographs when printed using the formatting requirements set forth above and single spaced. If applicants exceed the maximum page lengths indicated below, EERE will review only the authorized number of pages and disregard any additional pages.

Applicants are responsible for meeting each submission deadline. <u>Applicants are</u> <u>strongly encouraged to submit their Full Applications at least 48 hours in</u> <u>advance of the submission deadline</u>. Under normal conditions (i.e., at least 48 hours in advance of the submission deadline), applicants should allow at least 1 hour to submit a Full Application or Reply to Reviewer Comments. Once the Full Application or Reply to Reviewer Comments is submitted in EERE Exchange, applicants may revise or update that submission until the expiration of the applicable deadline. If changes are made, the applicant must resubmit the Full Application or Reply to Reviewer Comments before the applicable deadline.

EERE urges applicants to carefully review their Full Applications and to allow sufficient time for the submission of required information and documents. All Full Applications that pass the initial eligibility review will undergo comprehensive technical merit review according to the criteria identified in Section V.A.2 of the FOA.

i. Additional Information on EERE Exchange

EERE Exchange is designed to enforce the deadlines specified in this FOA. The "Apply" and "Submit" buttons will automatically disable at the defined submission deadlines. Should applicants experience problems with EERE Exchange, the following information may be helpful.

Applicants that experience issues with submission <u>PRIOR</u> to the FOA deadline: In the event that an applicant experiences technical difficulties with a submission, the Application should contact the EERE Exchange helpdesk for assistance (<u>EERE-ExchangeSupport@hq.doe.gov</u>). The EERE Exchange

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helpdesk and/or the EERE Exchange system administrators will assist Applicants in resolving issues.

Applicants that experience issue with submissions that result in late submissions: In the event that an applicant experiences technical difficulties so severe that they are unable to submit their application by the deadline, the applicant should contact the EERE Exchange helpdesk for assistance (<u>EERE-ExchangeSupport@hg.doe.gov</u>). The EERE Exchange helpdesk and/or the EERE Exchange system administrators will assist the applicant in resolving all issues (including finalizing submission on behalf of and with the applicant's concurrence). PLEASE NOTE, however, those applicants who are unable to submit their application on time due to their waiting until the last minute when network traffic is at its heaviest to submit their materials will not be able to use this process.

B. Application Forms

The application forms and instructions are available on EERE Exchange. To access these materials, go to <u>https://eere-Exchange.energy.gov</u> and select the appropriate funding opportunity number.

Note: The maximum file size that can be uploaded to the EERE Exchange website is 10MB. Files in excess of 10MB cannot be uploaded, and hence cannot be submitted for review. If a file exceeds 10MB but is still within the maximum page limit specified in the FOA, it must be broken into parts and denoted to that effect. For example:

ControlNumber_LeadOrganization_Project_Part_1 ControlNumber_LeadOrganization_Project_Part_2, etc.

i. Content and Form of the Full Application

Applicants must submit a Full Application by the specified due date and time to be considered for funding under this FOA. Applicants must complete the following application forms found on the EERE Exchange website at <u>https://eere-</u> Exchange.energy.gov/, in accordance with the instructions.

All Full Application documents must be marked with the Control Number issued to _ the applicant.

ii. Full Application Content Requirements

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F. Limitation on Number of Full Applications Eligible for Review

Applicants may submit more than one Full Application to this FOA, provided that each application describes a unique, scientifically distinct project.

G. Questions Regarding Eligibility

EERE will not make eligibility determinations for potential applicants prior to the date on which applications to this FOA must be submitted. The decision whether to submit an application in response to this FOA lies solely with the applicant.

IV. Application and Submission Information

A. Application Process

The application process will include one phase: a Full Application phase. At each phase, EERE performs an initial eligibility review of the applicant submissions to determine whether they meet the eligibility requirements of Section III of the FOA. EERE will not review or consider submissions that do not meet the eligibility requirements of Section III. All submissions must conform to the following form and content requirements, including maximum page lengths (described below) and must be submitted via EERE Exchange at https://eere-exchange.energy.gov/, unless specifically stated otherwise. EERE will not review or consider submissions submitted through means other than EERE Exchange, submissions submitted after the applicable deadline, and incomplete submissions. EERE will not extend deadlines for applicants who fail to submit required information and documents due to server/connection congestion. A control number will be issued when an applicant begins the EERE Exchange application process. This control number must be included with all Application documents, as described below.

The Full Application, and Reply to Reviewer Comments must conform to the following requirements:

- Each must be submitted in Adobe PDF format unless stated otherwise.
- Each must be written in English.
- All pages must be formatted to fit on 8.5 x 11 inch paper with margins not less than one inch on every side. Use Times New Roman typeface, a black font color, and a font size of 12 point or larger (except in figures or tables, which may be 10 point font). A symbol font may be used to insert Greek

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letters or special characters, but the font size requirement still applies. References must be included as footnotes or endnotes in a font size of 10 or larger. Footnotes and endnotes are counted toward the maximum page requirement.

- The Control Number must be prominently displayed on the upper right corner of the header of every page. Page numbers must be included in the footer of every page.
- Each submission must not exceed the specified maximum page limit, including cover page, charts, graphs, maps, and photographs when printed using the formatting requirements set forth above and single spaced. If applicants exceed the maximum page lengths indicated below, EERE will review only the authorized number of pages and disregard any additional pages.

Applicants are responsible for meeting each submission deadline. <u>Applicants are</u> <u>strongly encouraged to submit their Full Applications at least 48 hours in</u> <u>advance of the submission deadline</u>. Under normal conditions (i.e., at least 48 hours in advance of the submission deadline), applicants should allow at least 1 hour to submit a Full Application or Reply to Reviewer Comments. Once the Full Application or Reply to Reviewer Comments is submitted in EERE Exchange, applicants may revise or update that submission until the expiration of the applicable deadline. If changes are made, the applicant must resubmit the Full Application or Reply to Reviewer Comments before the applicable deadline.

EERE urges applicants to carefully review their Full Applications and to allow sufficient time for the submission of required information and documents. All Full Applications that pass the initial eligibility review will undergo comprehensive technical merit review according to the criteria identified in Section V.A.2 of the FOA.

i. Additional Information on EERE Exchange

EERE Exchange is designed to enforce the deadlines specified in this FOA. The "Apply" and "Submit" buttons will automatically disable at the defined submission deadlines. Should applicants experience problems with EERE Exchange, the following information may be helpful.

Applicants that experience issues with submission <u>PRIOR</u> to the FOA deadline: In the event that an applicant experiences technical difficulties with a submission, the Application should contact the EERE Exchange helpdesk for assistance (<u>EERE-ExchangeSupport@hq.doe.gov</u>). The EERE Exchange

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helpdesk and/or the EERE Exchange system administrators will assist Applicants in resolving issues.

Applicants that experience issue with submissions that result in late submissions: In the event that an applicant experiences technical difficulties so severe that they are unable to submit their application by the deadline, the applicant should contact the EERE Exchange helpdesk for assistance (EERE-ExchangeSupport@hg.doe.gov). The EERE Exchange helpdesk and/or the EERE Exchange system administrators will assist the applicant in resolving all issues (including finalizing submission on behalf of and with the applicant's concurrence). PLEASE NOTE, however, those applicants who are unable to submit their application on time due to their waiting until the last minute when network traffic is at its heaviest to submit their materials will not be able to use this process.

B. Application Forms

The application forms and instructions are available on EERE Exchange. To access these materials, go to https://eere-Exchange.energy.gov and select the appropriate funding opportunity number.

Note: The maximum file size that can be uploaded to the EERE Exchange website is 10MB. Files in excess of 10MB cannot be uploaded, and hence cannot be submitted for review. If a file exceeds 10MB but is still within the maximum page limit specified in the FOA, it must be broken into parts and denoted to that effect. For example:

ControlNumber_LeadOrganization_Project_Part_1

. .

ControlNumber_LeadOrganization_Project_Part_2, etc. Т. ș.

i. Content and Form of the Full Application

Applicants must submit a Full Application by the specified due date and time to be considered for funding under this FOA. Applicants must complete the following application forms found on the EERE Exchange website at https://eere-Exchange energy gov/, in accordance with the instructions.

All Full Application documents must be marked with the Control Number issued to the applicant.

ii. Full Application Content Requirements

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EERE will not review or consider ineligible Full Applications (see Section III of the FOA).

Each Full Application shall be limited to a single concept or technology. Unrelated concepts and technologies shall not be consolidated in a single Full Application.

Full Applications must conform to the following requirements:

Submission	Components	File Name
Full Application	Technical Volume (See Chart in Section	ControlNumber_LeadOrganization_Technic alVolume
(PDF, unless stated otherwise)	Statement of Project Objectives (Microsoft Word format) (10 page limit)	ControlNumber_LeadOrganization_SOPO
	SF-424 Application for Federal	ControlNumber_LeadOrganization_App424
	Budget Justification (EERE 335) (Microsoft Excel format, Applicants must	ControlNumber_LeadOrganization_Budget _Justification
	use the template available in EERE Exchange)	
	Summary for Public Release (1 page limit)	ControlNumber_LeadOrganization_Summa
	Summary Slide (1 page limit, Microsoft PowerPoint format)	ControlNumber_LeadOrganization_Slide
	Subrecipient Budget Justification, If applicable (EERE 335) (Microsoft Excel	ControlNumber_LeadOrganization_Subreci plent_Budget_Justification
	template available in EERE Exchange)	
	Authorization from Cognizant	ControlNumber_LeadOrganization_FWP ControlNumber_LeadOrganization_FFRDCA
	applicable ¹	ControlNumber LondOrganitation SE LU
	Foreign Entity and Performance of Work	ControlNumber_LeadOrganization_Sr-Lt.
	applicable	
	U.S. Manufacturing Plans	Lontrollnumber_LeadOrganization_USMP
	Data Management Plan	ControlNumber_LeadOrganization_DMP

Note: The maximum file size that can be uploaded to the EERE Exchange website Is 10MB. Files in excess of 10MB cannot be uploaded, and hence cannot be submitted for review. If a file exceeds 10MB but is still within the

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maximum page limit specified in the FOA it must be broken into parts and denoted to that effect, For example;

ControlNumber_LeadOrganization_TechnicalVolume_Part_1 ControlNumber_LeadOrganization_TechnicalVolume_Part_2, etc.

EERE will not accept late submissions that resulted from technical difficulties due to uploading files that exceed 10MB.

EERE provides detailed guidance on the content and form of each component below.

iii. Technical Volume

The Technical Volume must be submitted in Adobe PDF format. The Technical Volume must conform to the following content and form requirements, including maximum page lengths. If applicants exceed the maximum page lengths indicated below, EERE will review only the authorized number of pages and disregard any additional pages. This volume must address the Merit Review Criteria as discussed in Section V.A.2 of the FOA. Save the Technical Volume in a single PDF file using the following convention for the title: "ControlNumber_LeadOrganization_TechnicalVolume".

Applicants must provide sufficient citations and references to the primary research literature to justify the claims and approaches made in the Technical Volume. However, EERE and reviewers are under no obligation to review cited sources.

The Technical Volume to the Full Application may not be more than 20 pages, including the cover page, table of contents, and all citations, charts, graphs, maps, photos, or other graphics, and must include all of the information in the table below. The applicant should consider the weighting of each of the evaluation criteria (see Section V.A.2 of the FOA) when preparing the Technical Volume.

SECTION/PAGE LIMIT	DESCRIPTION
Cover Page	The cover page should include the project title, the specific FOA Topic Area being addressed (if applicable), both the technical and business points of contact, names of all team member organizations, and any statements regarding confidentiality.

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Objectives (SOPO) is separately requested. The Workplan should contain	
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	approximately annual decision points (see below for more
	Information on go/no-go decision points). The applicant should
	describe the specific expected end result of each performance
	period.
	 Work Breakdown Structure (WBS) and Task Description Summary:
	The Workplan should describe the work to be accomplished and
	how the applicant will achieve the milestones, will accomplish the
	final project goal(s), and will produce all deliverables. The
	Workplan is to be structured with a hierarchy of performance
]	period (approximately annual), task and subtasks, which is typical
J	of a standard work breakdown structure (WBS) for any project.
	The Workplan shall contain a concise description of the specific
	activities to be conducted over the life of the project. The
1	description shall be a full explanation and disclosure of the project
	being proposed (i.e., a statement such as "we will then complete a
}	proprietary process" is unacceptable). It is the applicant's
	responsibility to prepare an adequately detailed task plan to
	describe the proposed project and the plan for addressing the
	objectives of this FOA. The summary provided should be
1	consistent with the SOPO. The SOPO will contain a more detailed
1	description of the WBS and tasks.
	Milestone Summary: The applicant should provide a summary of
	appropriate milestones throughout the project to demonstrate
	success. A milestone may be either a progress measure (which
J	can be activity based) or a SMART technical milestone. SMART
	milestones should be Specific, Measurable, Achievable, Relevant,
	and Timely, and must demonstrate a technical achievement rather
1	than simply completing a task. Unless otherwise specified in the
	FOA, the minimum requirement is that each project must have at
	least one milestone per quarter for the duration of the project
	with at least one SMART technical milestone per year (depending
	on the project, more milestones may be necessary to
	comprehensively demonstrate progress). The applicant should
	also provide the means by which the milestone will be verified.
[The summary provided should be consistent with the Milestone
	Summary Table in the SOPO.
	Go/No-Go Decision Points: The applicant should provide a
	summary of project-wide go/no-go decision points at appropriate
]	points in the Workplan. A go/no-go decision point is a risk
	management tool and a project management best practice to
	ensure that, for the current phase or period of performance,
	technical success is definitively achieved and potential for success
	in future phases or periods of performance is evaluated, prior to
1	actually beginning the execution of future phases. Unless
	otherwise specified in the FOA, the minimum requirement is that
	each project must have at least one project-wide go/no-go
	decision point for each budget period (12 to 18-month period) of

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	 the project. The Applicant should also provide the specific technical criteria to be used to make the go/no-go decision. The summary provided should be consistent with the SOPO. Go/no-go decision points are considered "SMART" and can fulfill the requirement for an annual SMART milestone. End of Project Goal: The applicant should provide a summary of the end of project goal. Unless otherwise specified in the FOA, the minimum requirement is that each project must have one SMART end of project goal. The summary provided should be consistent with the SOPO. Project Schedule (Gantt Chart or similar): The applicant should provide a schedule for the entire project, including task and subtask durations, milestones, and go/no-go decision points. Project Management: The applicant should discuss the team's proposed management plan, including the following: The overall approach to and organization for managing the work The roles of each Project Team member Any critical handoffs/interdependencies among Project Team members The approach to project management practices, such as financial and project management practices The approach to project changes will be handled If applicable, the approach to Quality Assurance/Control How communications will be maintained among Project Team members Market Transformation Plan: The applicant should provide a market transformation plan, including the following: Identification of target market, competitors, and distribution channels for proposed technology along with known or perceived barriers to market penetration, including a mitigation plan Identification of a product development and/or service plan, commercialization plan etc., and product marketing, legal/regulatory considerations, and distribution channels for proposed technology along with known or perceived barriers to market penetration, including a mitigation plan
Technical Qualifications and Resources (Approximately 20% of the Technical Volume)	The Technical Qualifications and Resources should contain the following Information: • Describe the Project Team's unique qualifications and expertise,

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 will facilitate the successful completion of the proposed project; include a justification of any new equipment or facilities requested as part of the project. This section should also include relevant, previous work efforts, demonstrated innovations, and how these enable the applicant to a chieve the project objectives. Describe the time commitment of the key team members to support the project. Attach one-page resumes for key participating team members as an appendix. Resumes do not count towards the page limit. Multi-page resumes are not allowed. Describe the technical services to be provided by DDE/NNSA FFRDCs, if applicable. Attach letters of commitment from all Subrecipient/third party cost share providers as an appendix. Letters of commitment do not count towards the page limit. Attach any letters of commitment from partners/end users as an appendix (1 page maximum per letter). Letters of commitment do not count towards the page limit. For multi-organizational or multi-investigator projects, describe succincity: o The roles and the work to be performed by each PI and Key Participant; o Business agreements between the applicant and each PI and Key Participant; o How the various efforts will be integrated and managed; o Process for making decisions on scientific/technical

iv. Statement of Project Objectives

Applicants are required to complete a Statement of Project Objectives (SOPO). A SOPO template is available on EERE Exchange at <u>https://eere-Exchange.energv.gov/</u>. The SOPO, including the Milestone Table, must not exceed 10 pages when printed using standard 8.5 x 11 paper with 1" margins (top, bottom, left, and right) with font not smaller than 12 point. Save the SOPO in a single Microsoft Word file using the following convention for the title "ControlNumber_LeadOrganization_SOPO".

Questions about this FOA? Emai <u>SI.FOA.SETO@ee.doe.gov</u> Problems with EERE Exchange? Email EERE- <u>EFRE-ExchangeSupport@ba.doe.gov</u> include FOA name and number in subject line. Commented [TEM2]: TEM: Use this row to wild any specific requirements (documents, data) you want the Applicants to submit, Chanser FDA Specific requirements" to whatever this you think is appropriate. ENERGY RI

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v. SF-424: Application for Federal Assistance

Complete all required fields in accordance with the instructions on the form. The list of certifications and assurances in Field 21 can be found at <u>http://energy.gov/management/office-management/operational-management/financial-assistance/financial-assistance-forms</u>, under Certifications and Assurances. Note: The dates and dollar amounts on the SF-424 are for the complete project period and not Just the first project year, first phase or other subset of the project period. Save the SF-424 in a single PDF file using the following convention for the title "ControlNumber LeadOrganization App424".

vi. Budget Justification Workbook (EERE 335)

Applicants are required to complete the Budget Justification Workbook. This form is available on EERE Exchange at <u>https://eere-Exchange.energy.gov/</u>. Prime Recipients must complete each tab of the Budget Justification Workbook for the project as a whole, including all work to be performed by the Prime Recipient and its Subrecipients and Contractors, and provide all requested documentation (e.g., a Federally-approved rate agreement, vendor quotes). Applicants should include costs associated with required annual audits and incurred cost proposals in their proposed budget documents. The "Instructions and Summary" included with the Budget Justification Workbook will auto-populate as the applicant enters information into the Workbook. Applicants must carefully read the "Instructions and Summary" tab provided within the Budget Justification Workbook. Save the Budget Justification Workbook in a single Microsoft Excel file using the following convention for the title "ControlNumber LeadOrganization_Budget_Justification".

vii.Summary/Abstract for Public Release

Applicants are required to submit a one-page summary/abstract of their project. The project summary/abstract must contain a summary of the proposed activity suitable for dissemination to the public. It should be a selfcontained document that identifies the name of the applicant, the project director/principal investigator(s), the project title, the objectives of the project, a description of the project, including methods to be employed, the potential impact of the project (e.g., benefits, outcomes), and major participants (for collaborative projects). This document must not include any proprietary or sensitive business information as DOE may make it available to the public after selections are made. The project summary must not exceed 1 page when printed using standard 8.5 x 11 paper with 1" margins (top,

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subject line.



bottom, left, and right) with font not smaller than 12 point. Save the Summary for Public Release in a single PDF file using the following convention for the title "ControlNumber_LeadOrganization_Summary".

viii. Summary Slide

Applicants are required to provide a single PowerPoint slide summarizing the proposed project. The slide must be submitted in Microsoft PowerPoint format. This slide is used during the evaluation process. Save the Summary Slide in a single file using the following convention for the title "ControlNumber_LeadOrganization_Slide".

The Summary Slide template requires the following information:

- A technology Summary;
- A description of the technology's impact;
- Proposed project goals;
- Any key graphics (illustrations, charts and/or tables);
- The project's key idea/takeaway;
- Project title, Prime Recipient, Principal Investigator, and Key
 Participant Information; and
- Requested EERE funds and proposed applicant cost share.

Ix. Subrecipient Budget Justification (EERE 335) (if applicable) Applicants must provide a separate budget justification, EERE 335 (i.e., budget justification for each budget year and a cumulative budget) for each subrecipient that is expected to perform work estimated to be more than \$250,000 or 25 percent of the total work effort (whichever is less). The budget justification must include the same justification information described in the "Budget Justification" section above. Save each subrecipient budget justification in a Microsoft Excel file using the following convention for the title

"ControlNumber_LeadOrganization_Subrecipient_Budget_JustIfication".

x. Budget for DOE/NNSA FFRDC (if applicable)

If a DOE/NNSA FFRDC contractor is to perform a portion of the work, the applicant must provide a DOE Field Work Proposal (FWP) in accordance with the requirements in DOE Order 412.1, Work Authorization System. DOE Order 412.1 and DOE O 412.1 (Field Work Proposal form) area available at the following link, under "DOE Budget Forms":

https://www.directives.doe.gov/directives-documents/400-series/0412.1-BOrder-a-admchg1/@@images/file. Save the FWP in a single PDF file using

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the following convention for the title "ControlNumber_LeadOrganization_FWP".

xi. Authorization for non-DOE/NNSA or DOE/NNSA FFRDCs (if applicable)

The Federal agency sponsoring the FFRDC must authorize in writing the use of the FFRDC on the proposed project and this authorization must be submitted with the application. The use of a FFRDC must be consistent with the contractor's authority under its award. Save the Authorization in a single PDF file using the following convention for the title "ControlNumber_LeadOrganization_FFRDCAuth".

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xii. SF-LLL: Disclosure of Lobbying Activities (required)

Prime Recipients and Subrecipients may not use any Federal funds to influence or attempt to influence, directly or indirectly, congressional action on any legislative or appropriation matters

Prime Recipients and Subrecipients are required to complete and submit SF-LLL, "Disclosure of Lobbying Activities"

(https://www.grants.gov/web/grants/forms/sf-424-individual-family.html) to ensure that non-Federal funds have not been paid and will not be paid to any person for influencing or attempting to influence any of the following in connection with your application:

An officer or employee of any Federal agency;

A Member of Congress;

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a.,

- An officer or employee of Congress; or
- An employee of a Member of Congress,

Save the SF-LLL in a single PDF file using the following convention for the title "ControlNumber_LeadOrganization_SF-LLL".

xili. Waiver Requests: Foreign Entities and Performance of Work in the United States (if applicable)

1. Foreign Entity Participation:

As set forth in Section III.A.3, 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. To request a waiver of this requirement, the applicant must submit an explicit waiver request in the

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> Full Application. <u>Appendix C lists the necessary information that must be</u> included in a request to waive this requirement.

2. Performance of Work in the United States

As set forth in Section IV.K.III, all work under EERE funding agreements must be performed in the United States. This requirement does not apply to the purchase of supplies and equipment, so a waiver is not required for foreign purchases of these items. However, the Prime Recipient should make every effort to purchase supplies and equipment within the United States. <u>Appendix C lists the necessary information that must be included in a request to waive the Performance of Work in the United States requirement</u>.

xiv. U.S. Manufacturing Commitments

Option 1: With U.S. Manufacturing Plans

As part of the application, applicants are required to submit a U.S. Manufacturing Plan. The U.S. Manufacturing Plan represents the applicant's measurable commitment to support U.S. manufacturing as a result of its award.

The weight given to the U.S. Manufacturing Plans during the review and selection process varies based on the particular FOA. Applicants should review Section V.A.2 of this FOA to determine the weight given to the U.S. Manufacturing Plans under this FOA.

A U.S. Manufacturing Plan should contain the following or similar preamble: "If selected for funding, the applicant agrees to the following commitments as a condition of that funding:" and, after the preamble, the plan should include one of more specific and measureable commitments. For example, an applicant may commit particular types of products to be manufactured in the U.S. In addition to or instead of making a commitment tied to a particular product, the applicant may make other types of commitments still beneficial to U.S. manufacturing. An applicant may commit to a particular investment in a new or existing U.S. manufacturing facility, keep certain activities based in the U.S. (i.e., final assembly) or support a certain number of jobs in the U.S. related to the technology and manufacturing. For an applicant which is likely to license the technology to others, especially universities for which licensing may be the exclusive means of commercialization the technology, the U.S. manufacturing plan may indicate

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the applicant's plan and commitment to use a licensing strategy that would likely support U.S. manufacturing.

When an applicant that is a domestic small business, domestic educational institution, or nonprofit organization is selected for an award, the U.S. Manufacturing Plan submitted by the applicant becomes part of the terms and conditions of the award. The applicant/awardee may request a waiver or modification of the U.S. Manufacturing Plan from DOE upon a showing that the original U.S. Manufacturing Plan is no longer economically feasible.

When an applicant that is a domestic large business is selected for an award, a class patent waiver applies as set forth in Section VIII. L. Under this class patent waiver, domestic large businesses may elect title to their subject inventions similar to the right provided to the domestic small businesses, educational institutions, and nonprofits by law. In order to avail itself of the class patent waiver, a domestic large business must agree that any products embodying or produced through the use of an invention conceived or first actually reduced to practice under the award will be substantially manufactured in the United States, unless DOE agrees that the commitments proposed in the U.S. Manufacturing Plan are sufficient,

For other entity types that are selected for award, please see Section VIII.L regarding U.S. manufacturing commitments.

Option 2: Without U.S. Manufacturing Plans

EERE requires subject inventions (i.e., inventions conceived or first actually reduced to practice under EERE awards) to be substantially manufactured in the United States by Project Teams and their licensees, as described below. The applicant may request a modification or waiver of the U.S. Manufacturing Requirement.

Domestic Small Businesses, Educational Institutions and Nonprofits
 Domestic Small businesses (including Small Business concerns),
 domestic educational institutions, and nonprofits that are Recipients
 or Subrecipients under EERE funding agreements must require their
 exclusive licensees to substantially manufacture the following
 products in the United States for any use or sale in the United States:
 (1) articles embodying subject inventions, and (2) articles produced
 through the use of subject inventions. This requirement does not
 apply to articles that are manufactured for use or sale overseas.

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Domestic small businesses, domestic educational institutions and nonprofits must require their assignees to apply the same U.S. Manufacturing requirements to their exclusive licensees.

These U.S. Manufacturing requirements do not apply to nonexclusive licensees.

2. Large Businesses, Foreign Entities, and State and Local Government Entities

Large businesses and foreign entities that are Recipients or Subrecipients under EERE funding agreements that take title to subject inventions through a patent waiver are required to substantially manufacture the following products in the United States: (1) products embodying subject inventions, and (2) products produced through the use of subject invention(s). This requirement applies to products that are manufactured for use or sale in the United States or overseas.

Large businesses and foreign entities must apply the same U.S. Manufacturing requirements to their assignees, licensees, and entities acquiring a controlling interest in the large business or foreign entity. Large businesses and foreign entities must require their assignees and entitles acquiring a controlling interest in the large business or foreign entity to apply the same U.S. Manufacturing requirements to their licensees.

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3. FFRDCs

DOE FFRDCs are subject to the U.S. Manufacturing requirements set forth in their Management and Operating Contracts. All other FFRDCs are subject to the U.S. Manufacturing requirements as set forth above, based on their size and for-profit status.

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xv. Data Management Plan

Applicants whose Full Applications are selected for award negotiations will be required to submit a Data Management Plan during the award negotiations phase. The Data Management Plan is a document that outlines the proposed plan for data sharing or preservation. Submission of this plan is required, and failure to submit the plan may result in the termination of

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award negotlations. As a courtesy, guidance for preparing a Data Management Plan is provided in Appendix D of the FOA.

C. Content and Form of Replies to Reviewer Comments

EERE will provide applicants with reviewer comments following evaluation of all eligible Full Applications. Applicants will have a brief opportunity to review the comments and to prepare a short Reply to Reviewer Comments responding to comments however they desire or supplementing their Full Application. The Reply to Reviewer Comments is an optional submission; applicants are not required to submit a Reply to Reviewer Comments. EERE will post the Reviewer Comments in EERE Exchange. The expected submission deadline is on the cover page of the FOA; however, it is the applicant's responsibility to monitor EERE Exchange in the event that the expected date changes. The deadline will not be extended for applicants who are unable to timely submit their reply due to failure to check EERE Exchange or relying on the expected date alone. Applicants should anticipate having approximately three (3) business days to submit Replies to Reviewer Comments.

EERE will not review or consider ineligible Replies to Reviewer Comments (see Section III of the FOA). EERE will review and consider each eligible Full Application, even if no Reply is submitted or if the Reply is found to be ineligible.

Replies to Reviewer Comments must conform to the following content and form requirements, including maximum page lengths, described below. If a Reply to Reviewer Comments is more than three pages in length, EERE will review only the first three (3) pages and disregard any additional pages.

SECTION	PAGELIMIT	DESCRIPTION
Text	2 pages max	Applicants may respond to one or more reviewer comments or supplement their Full Application.
Optional	1 page max	Applicants may use this page however they wish; text, graphs, charts, or other data to respond to reviewer comments or supplement their Full Application are acceptable.

D. Post-Award Information Requests

If selected for award, EERE reserves the right to request additional or clarifying information for any reason deemed necessary, including but not limited to:

Indirect cost information

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- Other budget information
- Commitment Letters from Third Partles Contributing to Cost Share, if applicable
- Name and phone number of the Designated Responsible Employee for complying with national policies prohibiting discrimination (See 10 CFR 1040.5)
- Representation of Limited Rights Data and Restricted Software, if applicable
- Environmental Questionnaire

E. Dun and Bradstreet Universal Numbering System Number and System for Award Management

Each applicant (unless the applicant is an individual or Federal awarding agency that is excepted from those requirements under 2 CFR §25,110(b) or (c), or has an exception approved by the Federal awarding agency under 2 CFR §25,110(d)) is required to: (1) Be registered in the System for Award Management (SAM) at <u>https://www.sam.gov</u> before submitting its application; (2) provide a valid Dun and Bradstreet Universal Numbering System (DUNS) number in its application; and (3) continue to maintain an active Federal award or an application or plan under consideration by a Federal awarding agency; DOE may not make a Federal award to an applicant until the applicant has complied with all applicable DUNS and SAM requirements and, if an applicant has not fully complied with the requirements by the time DOE is ready to make a Federal award, the DOE may determine that the applicant is not qualified to receive a Federal award and use that determination as a basis for making a Federal award to another applicant.

F. Submission Dates and Times

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Full Applications, and Replies to Reviewer Comments must be submitted in EERE Exchange no later than 5 p.m. Eastern on the dates provided on the cover page of this FOA.

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G. Intergovernmental Review

This FOA is not subject to Executive Order 12372 – Intergovernmental Review of Federal Programs.

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H. Funding Restrictions

i. Allowable Costs

All expenditures must be allowable, allocable, and reasonable in accordance with the applicable Federal cost principles.

Refer to the following applicable Federal cost principles for more information:

- FAR Part 31 for For-Profit entities; and
- 2 CFR Part 200 Subpart E Cost Principles for all other non-federal entities.

ii. Pre-Award Costs

Selectees must request prior written approval to charge pre-award costs. Pre-award costs are those incurred prior to the effective date of the Federal award directly pursuant to the negotiation and in anticipation of the Federal award where such costs are necessary for efficient and timely performance of the scope of work. Such costs are allowable only to the extent that they would have been allowable if incurred after the date of the Federal award and only with the written approval of the Federal awarding agency, through the Contracting Officer assigned to the award.

Pre-award costs cannot be incurred prior to the Selection Official signing the Selection Statement and Analysis, Pre-award costs can only be incurred if such costs would be reimbursable under the agreement if incurred after award.

Pre-Award expenditures are made at the Selectee's risk; EERE is not obligated to reimburse costs: (1) in the absence of appropriations; (2) if an award is not made; or (3) if an award is made for a lesser amount than the Selectee anticipated.

1. Pre-Award Costs Related to National Environmental Policy Act (NEPA) Requirements

EERE's decision whether and how to distribute Federal funds under this FOA is subject to NEPA. Applicants should carefully consider and should seek legal counsel or other expert advice before taking any action related to the proposed project that would have an adverse effect on the

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environment or limit the choice of reasonable alternatives prior to EERE completing the NEPA review process.

EERE does not guarantee or assume any obligation to reimburse costs where the Prime Recipient incurred the costs prior to receiving written authorization from the Contracting Officer. If the applicant elects to undertake activities that may have an adverse effect on the environment or limit the choice of reasonable alternatives prior to receiving such written authorization from the Contracting Officer, the applicant is doing so at risk of not receiving Federal funding and such costs may not be recognized as allowable cost share. Likewise, if a project is selected for negotiation of award, and the Prime Recipient elects to undertake activities that are not authorized for Federal funding by the Contracting Officer in advance of EERE completing a NEPA review, the Prime Recipient is doing so at risk of not receiving Federal Funding and such costs may not be recognized as allowable cost share. Nothing contained in the pre-award cost reimbursement regulations or any pre-award costs approval letter from the Contracting Officer override these NEPA requirements to obtain the written authorization from the Contracting Officer prior to taking any action that may have an adverse effect on the environment or limit the choice of reasonable alternatives.

III. Performance of Work in the United States

1. Requirement

All work performed under EERE Awards must be performed in the United States, This requirement does not apply to the purchase of supplies and equipment; however, the Prime Recipient should make every effort to purchase supplies and equipment within the United States. The Prime Recipient must flow down this requirement to its Subrecipients.

2. Failure to Comply

If the Prime Recipient fails to comply with the Performance of Work in the United States requirement, EERE may deny reimbursement for the work conducted outside the United States and such costs may not be recognized as allowable recipient cost share. The Prime Recipient is responsible should any work under this Award be performed outside the United States, absent a waiver, regardless of if the work is performed by the Prime Recipient, Subrecipients, contractors or other project partners.

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3. Waiver

There may be limited circumstances where it is in the interest of the project to perform a portion of the work outside the United States. To seek a waiver of the Performance of Work in the United States requirement, the applicant must submit a written waiver request to EERE. Appendix C lists the necessary information that must be included in a request to waive the Performance of Work in the United States requirement.

The applicant must demonstrate to the satisfaction of EERE that a waiver would further the purposes of the FOA and is in the economic interests of the United States. EERE may require additional Information before considering a waiver request, Save the waiver request(s) in a single PDF file titled "ControlNumber_PerformanceofWork_Waiver". The applicant does not have the right to appeal EERE's decision concerning a waiver request,

iv. Construction

Recipients are required to obtain written authorization from the Contracting Officer before incurring any major construction costs.

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v. Foreign Travel

If international travel is proposed for your project, please note that your organization must comply with the International Air Transportation Fair Competitive Practices Act of 1974 (49 USC 40118), commonly referred to as the "Fly America Act," and implementing regulations at 41 CFR 301-10.131 through 301-10,143. The law and regulations require air transport of people or property to, from, between, or within a country other than the United States, the cost of which is supported under this award, to be performed by or under a cost-sharing arrangement with a U.S. flag carrier, if service is available. Foreign travel costs are allowable only with the written prior approval of the Contracting Officer assigned to the award.

vi. Equipment and Supplies

To the greatest extent practicable, all equipment and products purchased with funds made available under this FOA should be American-made, This requirement does not apply to used or leased equipment.

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Property disposition will be required at the end of a project if the current fair market value of property exceeds \$5,000. The rules for property disposition are set forth in 2 CFR 200,310 - 200,316 as amended by 2 CFR 910.360.

vii, Lobbying

Recipients and Subrecipients may not use any Federal funds to influence or attempt to influence, directly or indirectly, congressional action on any legislative or appropriation matters.

Recipients and Subrecipients are required to complete and submit SF-LLL, "Disclosure of Lobbying Activities"

(<u>https://www.grants.gov/web/grants/forms/sf-424-individual-family.html</u>) to ensure that non-Federal funds have not been paid and will not be paid to any person for influencing or attempting to influence any of the following in connection with your application;

- An officer or employee of any Federal agency;
- A Member of Congress;
- An officer or employee of Congress; or
- An employee of a Member of Congress,

viji. Risk Assessment

Prior to making a Federal award, the DOE is required by 31 U.S.C. 3321 and 41 U.S.C. 2313 to review information available through any OMB-designated repositories of government-wide eligibility qualification or financial integrity information, such as SAM Exclusions and "Do Not Pay."

In addition, DOE evaluates the risk(s) posed by applicants before they receive Federal awards. This evaluation may consider: results of the evaluation of the applicant's eligibility; the quality of the application; financial stability; quality of management systems and ability to meet the management standards prescribed in this part; history of performance; reports and findings from audits; and the applicant's ability to effectively implement statutory, regulatory, or other requirements imposed on non-Federal entities.

In addition to this review, DOE must comply with the guidelines on government-wide suspension and debarment in 2 CFR 180, and must require non-Federal entities to comply with these provisions. These provisions restrict Federal awards, subawards and contracts with certain parties that

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are debarred, suspended or otherwise excluded from or ineligible for participation in Federal programs or activities.

ix. Invoice Review and Approval

DOE employs a risk-based approach to determine the level of supporting documentation required for approving invoice payments. Recipients may be required to provide some or all of the following items with their requests for reimbursement:

- Summary of costs by cost categories 1.
- Timesheets or personnel hours report
- Invoices/receipts for all travel, equipment, supplies, contractual, and other costs
- UCC filing proof for equipment acquired with project funds by for-profit recipients and subrecipients
- Explanation of cost share for invoicing period
- Analogous information for some subrecipients
- Other items as required by DOE

V. Application Review Information

A. Technical Review Criteria

i. Full Applications

Applications will be evaluated against the merit review criteria shown below. All sub-criteria are of equal weight,

Criterion 1: Technical Merit, Innovation, and Impact (50%) Technical Merit and Innovation

- Extent to which the proposed technology or process is innovative;
- 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,

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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 Market Transformation Plan (30%) Research Approach, Workplan and SOPO

- 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 and SOPO 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.

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 market transformation 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 U.S. manufacturing plan etc., and product distribution.

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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 high probability of success. The qualifications, relevant expertise, and time commitment of the individuals on the team;
- The sufficiency of the facilities to support the work;
- The degree to which the proposed consortia/team demonstrates the ability to facilitate and expedite further development and commercial deployment of the proposed technologies;
- The level of participation by project participants as evidenced by letter(s) of commitment and how well they are integrated into the Workplan; and
- The reasonableness of the budget and spend plan for the proposed project and objectives.

ii. Criteria for Replies to Reviewer Comments

EERE has not established separate criteria to evaluate Replies to Reviewer Comments. Instead, Replies to Reviewer Comments are attached to the original applications and evaluated as an extension of the Full Application.

B. Standards for Application Evaluation

Applications that are determined to be eligible will be evaluated in accordance with this FOA, by the standards set forth in EERE's Notice of Objective Merit Review Procedure (76 Fed. Reg. 17846, March 31, 2011) and the guidance provided in the "Department of Energy Merit Review Guide for Financial

See provided in the "Department of Energy Ment Neview Golde for Financia See Assistance," which is available at:

https://energy.gov/management/downloads/merit-review-guide-financialassistance-and-unsolicited-proposals-current.

C. Other Selection Factors

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i. Program Policy Factors

In addition to the above criteria, the Selection Official may consider the following program policy factors in determining which Full Applications to select for award negotiations:

 The degree to which the proposed project exhibits technological diversity when compared to the existing DOE project portfolio and other projects selected from the subject FOA;

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- 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 accelerate commercialization and overcome key market barriers;
- The degree to which the proposed project is likely to lead to increased employment and manufacturing in the United States;
- The degree to which 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; and
- The degree to which the proposed project, or group of projects, represent a desired geographic distribution (considering past awards and current applications).

D. Evaluation and Selection Process

i. Overview

The evaluation process consists of multiple phases; each includes an initial eligibility review and a thorough technical review. Rigorous technical reviews of eligible submissions 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, in determining which applications to select.

ii. Pre-Selection Interviews

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

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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.

iii. Pre-Selection Clarification

EERE may determine that pre-selection clarifications are necessary from one or more applicants. Pre-selection clarifications are distinct from and less formal than pre-selection interviews. These pre-selection clarifications will solely be for the purposes of clarifying the application, and will be limited to information already provided in the application documentation. The preselection clarifications may occur before, during or after the merit review evaluation process. Information provided by an applicant that is not necessary to address the pre-selection clarification question will not be reviewed or considered. Typically, a pre-selection clarification will be carried out through either written responses to EERE's written clarification questions or video or conference calls with EERE representatives.

The information provided by applicants to EERE through pre-selection clarifications is incorporated in their applications and contributes to the merit review evaluation and EERE's selection decisions. If EERE contacts an applicant for pre-selection clarification purposes, it does not signify that the applicant has been selected for negotiation of award or that the applicant is among the top ranked applications.

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EERE will not reimburse applicants for expenses relating to the pre-selection clarifications, nor will these costs be eligible for reimbursement as pre-award costs.

iv. Recipient integrity and Performance Matters

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DOE, prior to making a Federal award with a total amount of Federal share greater than the simplified acquisition threshold, is required to review and consider any information about the applicant that is in the designated

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integrity and performance system accessible through SAM (currently FAPIIS) (see 41 U.S.C. 2313).

The applicant, at its option, may review information in the designated integrity and performance systems accessible through SAM and comment on any information about itself that a Federal awarding agency previously entered and is currently in the designated integrity and performance system accessible through SAM.

DOE will consider any written comments by the applicant, in addition to the other information in the designated integrity and performance system, in making a judgment about the applicant's integrity, business ethics, and record of performance under Federal awards when completing the review of risk posed by applicants as described in 2 C.F.R. § 200,205,

v. Selection

The Selection Official may consider the technical merit, the Federal Consensus Board's recommendations, program policy factors, and the amount of funds available in arriving at selections for this FOA.

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E. Anticipated Notice of Selection and Award Dates

EERE anticipates notifying applicants selected for negotiation of award by (b) (5) and making awards by(b) (5)

VI. Award Administration Information

A. Award Notices

i. Ineligible Submissions

Ineligible Full Applications will not be further reviewed or considered for award. The Contracting Officer will send a notification letter by email to the technical and administrative points of contact designated by the applicant in EERE Exchange. The notification letter will state the basis upon which the the Full Application is ineligible and not considered for further review.

ii. Full Application Notifications

EERE will notify applicants of its determination via a notification letter by email to the technical and administrative points of contact designated by the applicant in EERE Exchange. The notification letter will inform the applicant

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> whether or not its Full Application was selected for award negotiations. Alternatively, EERE may notify one or more applicants that a final selection determination on particular Full Applications will be made at a later date, subject to the availability of funds or other factors.

iii. Successful Applicants

Receipt of a notification letter selecting a Full Application for award negotiations does not authorize the applicant to commence performance of the project. If an application is selected for award negotiations, it is not a commitment by EERE to issue an award. Applicants do not receive an award until award negotiations are complete and the Contracting Officer executes the funding agreement, accessible by the Prime Recipient in FedConnect.

The award negotiation process will take approximately 60 days. Applicants must designate a primary and a backup point-of-contact in EERE Exchange with whom EERE will communicate to conduct award negotiations. The applicant must be responsive during award negotiations (i.e., provide requested documentation) and meet the negotiation deadlines. If the applicant falls to do so or if award negotiations are otherwise unsuccessful, EERE will cancel the award negotiations and rescind the Selection. EERE reserves the right to terminate award negotiations at any time for any reason.

Please refer to Section IV.J.2 of the FOA for guidance on pre-award costs.

iv. Alternate Selection Determinations

In some instances, an applicant may receive a notification that its application was not selected for award and EERE designated the application to be an alternate. As an alternate, EERE may consider the Full Application for Federal funding in the future. A notification letter stating the Full Application is designated as an alternate does not authorize the applicant to commence performance of the project. EERE may ultimately determine to select or not select the Full Application for award negotiations.

v. Unsuccessful Applicants

EERE shall promptly notify in writing each applicant whose application has not been selected for award or whose application cannot be funded because of the unavailability of appropriated funds.

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B. Administrative and National Policy Requirements

i. 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. These requirements are as follows:

1. EERE Exchange

Register and create an account on EERE Exchange at <u>https://eere-</u> Exchange.energy.gov.

This account will then allow the user to register for any open EERE FOAs that are currently in EERE Exchange. It is recommended that each organization or business unit, whether acting as a team or a single entity, use only one account as the contact point for each submission. Applicants should also designate backup points of contact so they may be easily contacted if deemed necessary. This step is required to apply to this FOA.

The EERE Exchange registration does not have a delay; however, <u>the</u> remaining registration requirements below could take several weeks to process and are necessary for a potential applicant to receive an award under this FOA.

2. DUNS Number

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Obtain a Dun and Bradstreet Data Universal Numbering System (DUNS) number (including the plus 4 extension, if applicable) at <u>http://fedgov.dnb.com/webform</u>.

3. System for Award Management

Register with the System for Award Management (SAM) at <u>https://www.sam.gov</u>. 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.

4. FedConnect

Register in FedConnect at <u>https://www.fedconnect.net</u>. To create an organization account, your organization's SAM MPIN is required. For

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more information about the SAM MPIN or other registration requirements, review the FedConnect Ready, Set, Gol Guide at <u>https://www.fedconnect.net/FedConnect/Marketing/Documents/FedConnect_Ready_Set_Go.pdf</u>.

5. Grants.gov

Register in Grants.gov (<u>http://www.grants.gov</u>) to receive automatic updates when Amendments to this FOA are posted. However, please note that Full Applications will not be accepted through Grants.gov.

6. Electronic Authorization of Applications and Award Documents Submission of an application and supplemental information under this FOA through electronic systems used by the Department of Energy, Including EERE Exchange and FedConnect.net, constitutes the authorized representative's approval and electronic signature.

ii. Award Administrative Requirements

The administrative requirements for DOE grants and cooperative agreements are contained in 2 CFR Part 200 as amended by 2 CFR Part 910.

iii. Foreign National Access to DOE Sites

All applicants that ultimately enter into an award resulting from this FOA will be subject to the following requirement concerning foreign national involvement. Upon DOE's request, Prime Recipients must provide information to facilitate DOE's responsibilities associated with foreign national access to DOE sites, information, technologies, and equipment. A foreign national is defined as any person who was born outside the jurisdiction of the United States, is a citizen of a foreign government, and has not been naturalized under U.S. law. If the Prime Recipient or Subrecipients,

contractors or vendors under the award, anticipate utilizing a foreign national person in the performance of an award, the Prime Recipient is responsible for providing to the Contracting Officer specific information of the foreign national(s) to satisfy compliance with all of the requirements for access approval.

iv. Subaward and Executive Reporting

Additional administrative requirements necessary for DOE grants and cooperative agreements to comply with the Federal Funding and Transparency Act of 2006 (FFATA) are contained in 2 CFR Part 170. Prime Recipients must register with the new FFATA Subaward Reporting System database and report the required data on their first tier Subrecipients. Prime

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Recipients must report the executive compensation for their own executives as part of their registration profile in SAM.

v. National Policy Requirements

The National Policy Assurances that are Incorporated as a term and condition of award are located at: <u>http://www.nsf.gov/awards/managing/rtc.jsp</u>.

vi. Environmental Review in Accordance with National

Environmental Policy Act (NEPA)

EERE's decision whether and how to distribute federal funds under this FOA is subject to the National Environmental Policy Act (42 USC 4321, *et seq.*). NEPA requires Federal agencies to integrate environmental values into their decision-making processes by considering the potential environmental impacts of their proposed actions. For additional background on NEPA, please see DOE's NEPA website, at <u>http://nepa.energy.gov/</u>.

While NEPA compliance is a Federal agency responsibility and the ultimate decisions remain with the Federal agency, all recipients selected for an award will be required to assist in the timely and effective completion of the NEPA process in the manner most pertinent to their proposed project. If DOE determines certain records must be prepared to complete the NEPA review process (e.g., biological evaluations or environmental assessments), the costs to prepare the necessary records may be included as part of the project costs.

vii.Applicant Representations and Certifications

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1. Lobbying Restrictions

By accepting funds under this award, the Prime Recipient agrees that none of the funds obligated on the award shall be expended, directly or indirectly, to influence Congressional action on any legislation or appropriation matters pending before Congress, other than to communicate to Members of Congress as described in 18 U.S.C. §1913. This restriction is in addition to those prescribed elsewhere in statute and regulation.

2. Corporate Felony Conviction and Federal Tax Liability Representations In submitting an application in response to this FOA, the applicant represents that:

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- It is not a corporation that has been convicted of a felony criminal violation under any Federal law within the preceding 24 months, and
- b. It is not a corporation that has any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability.

For purposes of these representations the following definitions apply:

A Corporation includes any entity that has filed articles of incorporation in any of the 50 states, the District of Columbia, or the various territories of the United States [but not foreign corporations]. It includes both forprofit and non-profit organizations.

- 3. Nondisclosure and Confidentiality Agreements Representations In submitting an application in response to this FOA the applicant represents that:
 - a. It does not and will not require its employees or contractors to sign internal nondisclosure or confidentiality agreements or statements prohibiting or otherwise restricting its employees or contactors from lawfully reporting waste, fraud, or abuse to a designated investigative or law enforcement representative of a Federal department or agency authorized to receive such information.
 - It does not and will not use any Federal funds to implement or enforce any nondisclosure and/or confidentiality policy, form, or agreement it uses unless it contains the following provisions:
 - (1) "These provisions are consistent with and do not supersede, conflict with, or otherwise alter the employee obligations, rights, or liabilities created by existing statute or Executive order relating to (1) classified information, (2) communications to Congress, (3) the reporting to an inspector General of a violation of any law, rule, or regulation, or mismanagement, a gross waste of funds, an abuse of authority, or a substantial and specific danger to

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public health or safety, or (4) any other whistleblower protection. The definitions, requirements, obligations, rights, sanctions, and liabilities created by controlling Executive orders and statutory provisions are incorporated into this agreement and are controlling."

- (2) The limitation above shall not contravene requirements applicable to Standard Form 312, Form 4414, or any other form issued by a Federal department or agency governing the nondisclosure of classified information.
- (3) Notwithstanding the provision listed in paragraph (a), a nondisclosure or confidentiality policy form or agreement that is to be executed by a person connected with the conduct of an Intelligence or Intelligence-related activity, other than an employee or officer of the United States Government, may contain provisions appropriate to the particular activity for which such document is to be used. Such form or agreement shall, at a minimum, require that the person will not disclose any classified information received in the course of such activity unless specifically authorized to do so by the United States Government. Such nondisclosure or confidentiality forms shall also make it clear that they do not bar disclosures to Congress, or to an authorized official of an executive agency or the Department of Justice, that are essential to reporting a substantial violation of law.

vili, ... Statement of Federal Stewardship

EERE will exercise normal Federal stewardship in overseeing the project activities performed under EERE Awards. Stewardship Activities include, but are not limited to, conducting site visits; reviewing performance and financial reports, providing assistance and/or temporary intervention in usual circumstances to correct deficiencies that develop during the project; assuring compliance with terms and conditions; and reviewing technical performance after project completion to ensure that the project objectives have been accomplished.

Questions about this FOA? Email <u>SI.FOA.SETO@ee.doe.gov</u> Problems with EERE Exchange? Email EERE- <u>EERE-ExchangeSupport@ha.doe.gov</u> Include FOA name and number in subject line.


ix. Statement of Substantial Involvement

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

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

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

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- 3. EERE may redirect or discontinue funding the Project based on the outcome of EERE's evaluation of the Project at that the Go/No Go decision point(s).
- 4. EERE participates in major project decision-making processes.

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x. Subject Invention Utilization Reporting

In order to ensure that Prime Recipients and Subrecipients holding title to subject inventions are taking the appropriate steps to commercialize subject inventions, EERE may require that each Prime Recipient holding title to a subject invention submit annual reports for 10 years from the date the subject invention was disclosed to EERE on the utilization of the subject invention and efforts made by Prime Recipient or their licensees or assignees to stimulate such utilization. The reports must include information regarding the status of development, date of first commercial sale or use, gross royalties received by the Prime Recipient, and such other data and information as EERE may specify.

xi. Intellectual Property Provisions

The standard DOE financial assistance intellectual property provisions applicable to the various types of recipients are located at http://www1.eere.energy.gov/financing/resources.html.

Questions about this FOA? Email <u>SI.FOA.SETO@ee.doe.gov</u> Problems with EERE Exchange? Email EERE- <u>EERE-ExchangeSupport@hg.doe.gov</u> Include FOA name and number in subject line.



xii.Reporting

Reporting requirements are identified on the Federal Assistance Reporting Checklist, attached to the award agreement. The checklist can be accessed at http://www1.eere.energy.gov/financing/resources.html.

xili. Go/No-Go Review

Each project selected under this FOA will be subject to a periodic project evaluation referred to as a Go/No-Go Review. Federal funding beyond the Go/No Go decision point (continuation funding), is contingent on (1) the availability of funds appropriated by Congress for the purpose of this program and the availability of future year budget authority; (2) meeting the objectives, milestones, deliverables, and decision point criteria of recipient's approved project and obtaining approval from EERE to continue work on the project; and (3) the submittal of required reports in accordance with the Statement of Project Objectives.

As a result of the Go/No Go Review, DOE may, at its discretion, authorize the following actions: (1) continue to fund the project, contingent upon the availability of funds appropriated by Congress for the purpose of this program and the availability of future-year budget authority; (2) recommend redirection of work under the project; (3) place a hold on federal funding for the project, pending further supporting data or funding; or (4) discontinue funding the project because of insufficient progress, change in strategic direction, or lack of funding.

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The Go/No-Go decision is distinct from a non-compliance determination. In the event a recipient fails to comply with the requirements of an award, EERE may take appropriate action, including but not limited to, redirecting, suspending or terminating the award.

xiv: Conference Spending

The recipient shall not expend any funds on a conference not directly and programmatically related to the purpose for which the grant or cooperative agreement was awarded that would defray the cost to the United States Government of a conference held by any Executive branch department, agency, board, commission, or office for which the cost to the United States Government would otherwise exceed \$20,000, thereby circumventing the required notification by the head of any such Executive Branch department, agency, board, commission, or office to the Inspector General (or senior ethics official for any entity without an Inspector General), of the date, location, and number of employees attending such conference.

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xv. UCC Financing Statements

Per 2 CFR 910.360 (Real Property and Equipment) when a piece of equipment is purchased by a for-profit recipient or subrecipient with Federal Funds, and when the Federal share of the financial assistance agreement is more than \$1,000,000, the recipient or subrecipient must:

Properly record, and consent to the Department's ability to properly record if the recipient fails to do so, UCC financing statement(s) for all equipment in excess of \$5,000 purchased with project funds. These financing statement(s) must be approved in writing by the contracting officer prior to the recording, and they shall provide notice that the Recipient's title to all equipment (not real property) purchased with Federal funds under the financial assistance agreement is conditional pursuant to the terms of this section, and that the Government retains an undivided reversionary interest in the equipment. The UCC financing statement(s) must be filed before the Contracting Officer may reimburse the recipient for the Federal share of the equipment unless otherwise provided for in the relevant financial assistance agreement. The recipient shall further make any amendments to the financing statements or additional recordings, including appropriate continuation statements, as necessary or as the contracting officer may direct.

VII. Questions/Agency Contacts

Upon the issuance of a FOA, EERE personnel are prohibited from communicating (in writing or otherwise) with applicants regarding the FOA except through the established question and answer process as described below. Specifically, questions regarding the content of this FOA must be submitted to: <u>SI_FOA_SETO@ee.doe.gov</u>. Questions must be submitted not later than 3 business days prior to the application due date and time.

All questions and answers related to this FOA will be posted on EERE Exchange at: <u>https://eere-exchange.energy.gov</u>, Please note that you must first select this specific FOA Number in order to view the questions and answers specific to this FOA. EERE will attempt to respond to a question within 3 business days, unless a similar question and answer has already been posted on the website.

Questions related to the registration process and use of the EERE Exchange website should be submitted to: <u>EERE-ExchangeSupport@hg.doe.gov</u>.

Questions about this FOA? Email <u>\$1,FOA.SETO@ee.doe.gov</u> Problems with FERE Exchange? Email EERE-<u>EERE-ExchangeSupport@hg.doe.gov</u> Include FOA name and number in subject line.



VIII. Other Information

A. FOA Modifications

Amendments to this FOA will be posted on the EERE Exchange website and the Grants.gov system. However, you will only receive an email when an amendment or a FOA is posted on these sites if you register for email notifications for this FOA in Grants.gov. EERE recommends that you register as soon after the release of the FOA as possible to ensure you receive timely notice of any amendments or other FOAs.

B. Informational Webinar

EERE will conduct one informational webinar during the FOA process. It will be held after the initial FOA release but before the due date for Full Applications.

Attendance is not mandatory and will not positively or negatively impact the overall review of any applicant submissions. As the webinar will be open to all applicants who wish to participate, applicants should refrain from asking questions or communicating information that would reveal confidential and/or proprietary information specific to their project. Specific dates for the webinar can be found on the cover page of the FOA

C. Government Right to Reject or Negotiate

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EERE reserves the right, without qualification, to reject any or all applications received in response to this FOA and to select any application, in whole or in part, as a basis for negotilation and/or award.

D. Commitment of Public Funds

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The Contracting Officer is the only individual who can make awards or commit the Government to the expenditure of public funds. A commitment by anyone other than the Contracting Officer, either express or implied, is invalid.

E. Treatment of Application Information

In general, EERE will only use data and other information contained in applications for evaluation purposes, unless such information is generally available to the public or is already the property of the Government.

Applicants should not include trade secrets or commercial or financial information that is privileged or confidential in their application unless such information is necessary to convey an understanding of the proposed project or to comply with a requirement in the FOA.

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The use of protective markings such as "Do Not Publicly Release – Trade Secret" or "Do Not Publicly Release – Confidential Business Information" is encouraged. However, applicants should be aware that the use of protective markings is not dispositive as to whether information will be publicly released pursuant to the Freedom of Information Act, 5 U.S.C. §552, et. seq., as amended by the OPEN Government Act of 2007, Pub. L. No. 110-175. (See Section I of this document, "Notice of Potential Disclosure Under the Freedom of Information Act (FOIA)" for additional information regarding the public release of Information under the Freedom of Information Act.

Applicants are encouraged to employ protective markings in the following manner:

The cover sheet of the application must be marked as follows and identify the specific pages containing trade secrets or commercial or financial information that is privileged or confidential:

Notice of Restriction on Disclosure and Use of Data: Pages [list applicable pages] of this document may contain trade secrets or commercial or financial information that is privileged or confidential, and is exempt from public disclosure. Such information shall be used or disclosed only for evaluation purposes or in accordance with a financial assistance or loan agreement between the submitter and the Government. The Government may use or disclose any information that is not appropriately marked or otherwise restricted, regardless of source. [End of Notice]

The header and footer of every page that contains trade secrets or commercial or financial information that is privileged must be marked as follows: "May contain trade secrets or commercial or financial information that is privileged or confidential and exempt from public disclosure."

In addition, each line or paragraph containing trade secrets or commercial or financial information that is privileged or confidential must be enclosed in brackets.

F. Evaluation and Administration by Non-Federal Personnel

In conducting the merit review evaluation, the Go/No-Go Review and Peer Review, the Government may seek the advice of qualified non Federal personnel as reviewers. The Government may also use non-Federal personnel to conduct routine, nondiscretionary administrative activities. The applicant, by submitting its

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application, consents to the use of non-Federal reviewers/administrators. Non-Federal reviewers must sign conflict of interest and non-disclosure agreements prior to reviewing an application. Non-Federal personnel conducting administrative activities must sign a non-disclosure agreement.

G. Notice Regarding Eligible/Ineligible Activities

Eligible activities under this FOA include those which describe and promote the understanding of scientific and technical aspects of specific energy technologies, but not those which encourage or support political activities such as the collection and dissemination of information related to potential, planned or pending legislation.

H. Notice of Right to Conduct a Review of Financial Capability

EERE reserves the right to conduct an independent third party review of financial capability for applicants that are selected for negotiation of award (including personal credit information of principal(s) of a small business if there is insufficient information to determine financial capability of the organization).

I. Notice of Potential Disclosure Under Freedom of Information Act (FOIA)

Under the Freedom of Information Act, (FOIA), 5 U.S.C. §552, et. seq., as amended by the OPEN Government Act of 2007, Pub. L. No. 110-175, any information received from the Applicant is considered to be an agency record, and as such, subject to public release under FOIA. The purpose of the FOIA is to afford the public the right to request and receive agency records unless those agency records are protected from disclosure under one or more of the nine FOIA exemptions.

Decisions to disclose or withhold information received from the Applicant are based upon the applicability of one or more of the nine FOIA exemptions, not on the existence or nonexistence of protective markings or designations. Only the agency's designated FOIA Officer may determine if information received from the Applicant may be withheld pursuant to one of the nine FOIA exemptions. All FOIA requests received by DOE are processed in accordance with 10 C.F.R. Part 1004.

J. Requirement for Full and Complete Disclosure

Applicants are required to make a full and complete disclosure of all information requested. Any failure to make a full and complete disclosure of the requested information may result in:

- The termination of award negotiations;
- · The modification, suspension, and/or termination of a funding agreement;

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- The initiation of debarment proceedings, debarment, and/or a declaration of ineligibility for receipt of Federal contracts, subcontracts, and financial assistance and benefits; and
- Civil and/or criminal penalties.

K. Retention of Submissions

EERE expects to retain copies of all Full Applications, Replies to Reviewer Comments, and other submissions. No submissions will be returned. By applying to EERE for funding, applicants consent to EERE's retention of their submissions.

L. Title to Subject Inventions

Ownership of subject inventions is governed pursuant to the authorities listed below.

- Domestic Small Businesses, Educational Institutions, and Nonprofits: Under the Bayh-Dole Act (35 U.S.C. § 200 et seq.), domestic small businesses, educational institutions, and nonprofits may elect to retain title to their subject inventions.
- All other parties: The Federal Non-Nuclear Energy Act of 1974, 42. U.S.C. 5908, provides that the Government obtains title to new inventions unless a waiver is granted (see below).
- Class Patent Walver:

Option 1 (with granted class waiver in place)

DOE has issued a class waiver that applies to this FOA. Under this class waiver, domestic large businesses may elect title to their subject inventions similar to the right provided to the domestic small businesses, educational institutions, and nonprofits by law. In order to avail itself of the class waiver, a domestic large business must agree that any products embodying or produced through the use of a subject invention first created or reduced to practice under this program will be substantially manufactured in the United States, unless DOE agrees that the commitments proposed in the U.S. Manufacturing Plan are sufficient.

Option 2 (without granted class waiver in place)

Under 42 U.S.C. § 5908, title to subject inventions vests in the U.S. Government and large businesses and foreign entities do not have the automatic right to elect to retain title to subject inventions. However, EERE may issue "class patent waivers" under which large businesses and foreign entitles that meet certain stated requirements may elect to retain title to their subject inventions.

Commented [TEM5]: choose the option that is appropriate for your FOA, and delete the other. If you are unsure which option is applicable to your FOA, consult with your IP Counsel.

Questions about this FOA? Email <u>SI.FOA.SETO@ee.doe.gov</u> Problems with EERE Exchange? Email EERE-<u>EERE-ExchangeSupport@hg.doe.gov</u> Include FOA name and number in

subject line.

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- Advance and Identified Walvers: Applicants may request a patent waiver that will cover subject inventions that may be invented under the award, in advance of or within 30 days after the effective date of the award. Even if an advance waiver is not requested or the request is denied, the recipient will have a continuing right under the award to request a waiver for identified inventions, i.e., individual subject inventions that are disclosed to EERE within the timeframes set forth in the award's intellectual property terms and conditions. Any patent waiver that may be granted is subject to certain terms and conditions in 10 CFR 784.
- Optional Determination of Exceptional Circumstances (DEC): Each applicant is required to submit a U.S. Manufacturing Plan as part of its application. If selected, the U.S. Manufacturing Plan shall be incorporated into the award terms and conditions for domestic small businesses and nonprofit organizations. DOE has determined that exceptional circumstances exist that warrants the modification of the standard patent rights clause for small businesses and non-profit awardees under Bayh-Dole to the extent necessary to implement and enforce the U.S. Manufacturing Plan. For example, the commitments and enforcement of a U.S. Manufacturing Plan may be tied to subject inventions. Any Bayh-Dole entity (domestic small business or nonprofit organization) affected by this DEC has the right to appeal it.

M. Government Rights in Subject Inventions

Where Prime Recipients and Subrecipients retain title to subject inventions, the U.S. Government retains certain rights.

I. Government Use License

The U.S. Government retains a nonexclusive, nontransferable, irrevocable, paid-up license to practice or have practiced for or on behalf of the United States any subject invention throughout the world. This license extends to contractors doing work on behalf of the Government.

ii. March-In Rights

The U.S. Government retains march-in rights with respect to all subject inventions. Through "march-in rights," the Government may require a Prime Recipient or Subrecipient who has elected to retain title to a subject invention (or their assignees or exclusive licensees), to grant a license for use of the invention to a third party. In addition, the Government may grant licenses for use of the subject invention when a Prime Recipient, Subrecipient, or their assignees and exclusive licensees refuse to do so.

Questions about this FOA? Email <u>SI.FOA.SETO@ee.doe.gov</u> Problems with EERE Exchange? Email EERE-<u>EERE-ExchangeSupport@ha.doe.gov</u> Include FOA name and number in

subject line.

Commented [TEM6]: This language should only be used when U.S. Manufacturing Plans required submissions to the Full Application.



DOE may exercise its march-in rights only if it determines that such action is necessary under any of the four following conditions:

- The owner or licensee has not taken or is not expected to take effective steps to achieve practical application of the invention within a reasonable time;
- The owner or licensee has not taken action to alleviate health or safety needs in a reasonably satisfied manner;
- The owner has not met public use requirements specified by Federal statutes in a reasonably satisfied manner; or
- The U.S. Manufacturing requirement has not been met.

Any determination that march-in rights are warranted must follow a factfinding process in which the recipient has certain rights to present evidence and witnesses, confront witnesses and appear with counsel and appeal any adverse decision. To date, DOE has never exercised its march-in rights to any subject inventions.

N. Rights in Technical Data

Data rights differ based on whether data is first produced under an award or instead was developed at private expense outside the award.

"Limited Rights Data": The U.S. Government will not normally require delivery of confidential or trade secret-type technical data developed solely at private expense prior to issuance of an award, except as necessary to monitor technical progress and evaluate the potential of proposed technologies to reach specific technical and cost metrics.

Option 1: (with data protection)

Government rights in Technical Data Produced Under Awards: The U.S. Government normally retains unlimited rights In technical data produced under Government financial assistance awards, including the right to distribute to the public. However, pursuant to special statutory authority, certain categories of data generated under EERE awards may be protected from public disclosure for up to five years after the data is generated ("Protected Data"). For awards permitting Protected Data, the protected data must be marked as set forth in the awards intellectual property terms and conditions and a listing of unlimited rights data (i.e., non-protected data) must be inserted into the data clause in the award. In addition, invention disclosures may be protected from public disclosure for a reasonable time in order to allow for filing a patent application.

Questions about this FOA? Email <u>SLFOA.SETO@ee.doe.gov</u> Problems with EERE Exchange? Email EERE-<u>EERE-ExchangeSupport@hg.doe.gov</u> include FOA name and number in subject line. Commented [TEM7]: Select the option that is most applicable to your FOA, and delete the rest.



Option 2: (without data protection)

Government Rights in Technical Data Produced Under Awards: The U.S. Government retains unlimited rights in technical data produced under Government financial assistance awards, including the right to distribute to the public. One exception to the foregoing is that invention disclosures may be protected from public disclosure for a reasonable time in order to allow for filing a patent application.

O. Copyright

The Prime Recipient and Subrecipients may assert copyright in copyrightable works, such as software, first produced under the award without EERE approval. When copyright is asserted, the Government retains a paid-up nonexclusive, Irrevocable worldwide license to reproduce, prepare derivative works, distribute copies to the public, and to perform publicly and display publicly the copyrighted work. This license extends to contractors and others doing work on behalf of the Government.

P. Personally Identifiable Information (PII)

All information provided by the Applicant must to the greatest extent possible exclude Personally Identifiable Information (PII). The term "personally identifiable information" refers to information which can be used to distinguish or trace an individual's identity, such as their name, social security number, biometric records, etc. alone, or when combined with other personal or identifying information which

is linked or linkable to a specific individual, such as date and place of birth,

mother's malden name, etc. (See OMB Memordum M-07-16 dated May 22, 2007, found at:

https://www.whitehouse.gov/sites/whitehouse.gov/files/omb/memoranda/2007/ m07-16.pdf

By way of example, Applicants must screen resumes to ensure that they do not contain PII such as personal addresses, phone/cell numbers, personal emails and/or SSNs. In short, if the PII is not essential to the application, it should not be in the application.

Q. Annual Independent Audits

If a for-profit entity is a Prime Recipient and has expended \$750,000 or more of DOE awards during the entity's fiscal year, an annual Compliance Audit performed by an independent auditor is required. For additional information, please refer to 2 C.F.R. § 910.501 and Subpart F.

Questions about this FOA? Email <u>SI.FOA.SETO@ee.doe.gov</u> Problems with EERE Exchange? Email EERE- <u>EERE-ExchangeSupport@ha.doe.aov</u> Include FOA name and number in sublect line. U.S. DEPARTMENT OF

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> If an educational institution, non-profit organization, or state/local government is a Prime Recipient or Subrecipient and has expended \$750,000 or more of Federal awards during the non-Federal entity's fiscal year, then a Single or Program-Specific Audit is required. For additional information, please refer to 2 C.F.R. § 200.501 and Subpart F.

> Applicants and sub-recipients (if applicable) should propose sufficient costs in the project budget to cover the costs associated with the audit. EERE will share in the cost of the audit at its applicable cost share ratio.

Questions about this FOA? Email <u>SI.FQA.SETO@ee.doe.gov</u> Problems with EERE Exchange? Email EERE- <u>EERE-ExchangeSupport@ha.doe.gov</u> Include FOA name and number in subject line.



Appendix A – Cost Share Information

Cost Sharing or Cost Matching

The terms "cost sharing" and "cost matching" are often used synonymously. Even the DOE Financial Assistance Regulations, 2 CFR 200.306, use both of the terms in the titles specific to regulations applicable to cost sharing, EERE almost always uses the term "cost sharing," as it conveys the concept that non-federal share is calculated as a percentage of the Total Project Cost. An exception is the State Energy Program Regulation, 10 CFR 420.12, State Matching Contribution. Here "cost matching" for the non-federal share is calculated as a percentage of the Federal funds only, rather than the Total Project Cost.

How Cost Sharing is Calculated

As stated above, cost sharing is calculated as a percentage of the Total Project Cost. FFRDC costs must be included in Total Project Costs. Following is an example of how to calculate cost sharing amounts for a project with \$1,000,000 in federal funds with a minimum 20% non-federal cost sharing requirement:

- Formula: Federal share (\$) divided by Federal share (%) = Total Project Cost Example: \$1,000,000 divided by 80% = \$1,250,000
- Formula: Total Project Cost (\$) minus Federal share (\$) = Non-federal share (\$) Example: \$1,250,000 minus \$1,000,000 = \$250,000
- Formula: Non-federal share (\$) divided by Total Project Cost (\$) = Non-federal share (%) Example: \$250,000 divided by \$1,250,000 = 20%

What Qualifies For Cost Sharing

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While it is not possible to explain what specifically qualifies for cost sharing in one or even a couple of sentences, in general, if a cost is allowable under the cost principles applicable to the organization incurring the cost and is eligible for reimbursement under an EERE grant or cooperative agreement, then it is allowable as cost share. Conversely, if the cost is not allowable under the cost principles and not eligible for reimbursement, then it is not allowable as cost share. In addition, costs may not be counted as cost share if they are paid by the Federal Government under another award unless authorized by Federal statute to be used for cost sharing.

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The rules associated with what is allowable as cost share are specific to the type of organization that is receiving funds under the grant or cooperative agreement, though are generally the same for all types of entitles. The specific rules applicable to:

- FAR Part 31 for For-Profit entities, (48 CFR Part 31); and
- 2 CFR Part 200 Subpart E Cost Principles for all other non-federal entities.

In addition to the regulations referenced above, other factors may also come into play such as timing of donations and length of the project period. For example, the value of ten years of donated maintenance on a project that has a project period of five years would not be fully allowable as cost share. Only the value for the five years of donated maintenance that corresponds to the project period is allowable and may be counted as cost share.

Additionally, EERE generally does not allow pre-award costs for either cost share or reimbursement when these costs precede the signing of the appropriation bill that funds the award. In the case of a competitive award, EERE generally does not allow pre-award costs prior to the signing of the Selection Statement by the EERE Selection Official.

General Cost Sharing Rules on a DOE award

- Cash Cost Share encompasses all contributions to the project made by the recipient or subrecipeint(s), for costs incurred and paid for during the project. This includes when an organization pays for personnel, supplies, equipment, etc. for their own company with organizational resources. If the item or service is reimbursed for, it is cash cost share. All cost share items must be necessary to the performance of the project.
- 2. In Kind Cost Share encompasses all contributions to the project made by the recipient or subrecipient(s) that do not involve a payment or reimbursement and represent donated items or services. In Kind cost share items include volunteer personnel hours, donated existing equipment, donated existing supplies, etc. The cash value and calculations thereof for all in Kind cost share items must be justified and explained in the Cost Share section of the project Budget Justification (EERE 335). All cost share items must be necessary to the performance of the project. If questions exist, consult your DOE contact before filling out the In Kind cost share section of the Budget Justification (EERE 335).
- 3. Funds from other Federal sources MAY NOT be counted as cost share. This prohibition includes FFRDC sub-recipients. Non-Federal sources include any source not originally derived from Federal funds. Cost sharing commitment letters from subrecipients must be provided with the original application.

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4. Fee or profit, including foregone fee or profit, are not allowable as project costs (including cost share) under any resulting award. The project may only incur those costs that are allowable and allocable to the project (including cost share) as determined in accordance with the applicable cost principles prescribed in FAR Part 31 for For-Profit entities and 2 CFR Part 200 Subpart E - Cost Principles for all other non-federal entities.

DOE Financial Assistance Rules 2 CFR Part 200 as amended by 2 CFR Part 910

As stated above, the rules associated with what is allowable cost share are generally the same for all types of organizations. Following are the rules found to be common, but again, the specifics are contained in the regulations and cost principles specific to the type of entity:

- (A) Acceptable contributions. All contributions, including cash contributions and third party in-kind contributions, must be accepted as part of the Prime Recipient's cost sharing if such contributions meet all of the following criteria:
 - (1) They are verifiable from the recipient's records.
 - (2) They are not included as contributions for any other federally-assisted project or program.
 - (3) They are necessary and reasonable for the proper and efficient accomplishment of project or program objectives.
 - (4) They are allowable under the cost principles applicable to the type of entity incurring the cost as follows:
 - a. For-profit organizations. Allowability of costs incurred by for-profit organizations and those nonprofit organizations listed in Attachment C to OMB Circular A–122 is determined in accordance with the for-profit cost principles in 48 CFR Part 31 in the Federal Acquisition Regulation, except that patent prosecution costs are not allowable unless specifically authorized in the award document. (v) Commercial Organizations. FAR Subpart 31.2—Contracts with Commercial Organizations
 - b. Other types of organizations. For all other non-federal entitles, allowability of costs is determined in accordance with 2 CFR Part 200 Subpart E.
 - (5) They are not paid by the Federal Government under another award unless authorized by Federal statute to be used for cost sharing or matching.
 - (6) They are provided for in the approved budget.

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(B) Valuing and documenting contributions

- (1) Valuing recipient's property or services of recipient's employees. Values are established in accordance with the applicable cost principles, which mean that amounts chargeable to the project are determined on the basis of costs incurred. For real property or equipment used on the project, the cost principles authorize depreciation or use charges. The full value of the item may be applied when the item will be consumed in the performance of the award or fully depreciated by the end of the award. In cases where the full value of a donated capital asset is to be applied as cost sharing or matching, that full value must be the lesser or the following:
 - a. The certified value of the remaining life of the property recorded in the recipient's accounting records at the time of donation; or
 - b. The current fair market value, if there is sufficient Justification, the Contracting Officer may approve the use of the current fair market value of the donated property, even if it exceeds the certified value at the time of donation to the project. The Contracting Officer may accept the use of any reasonable basis for determining the fair market value of the property.
- (2) Valuing services of others' employees. If an employer other than the recipient furnishes the services of an employee, those services are valued at the employee's regular rate of pay, provided these services are for the same skill level for which the employee is normally paid.
- (3) Valuing volunteer services. Volunteer services furnished by professional and technical personnel, consultants, and other skilled and unskilled labor may be counted as cost sharing or matching if the service is an integral and necessary part of an approved project or program. Rates for volunteer services must be consistent with those paid for similar work in the recipient's organization. In those markets in which the required skills are not found in the recipient organization, rates must be consistent with those paid for similar work in the labor market in which the recipient competes for the kind of services involved. In either case, paid fringe benefits that are reasonable, allowable, and allocable may be included in the valuation.
- (4) Valuing property donated by third parties.
 - a. Donated supplies may include such items as office supplies or laboratory supplies. Value assessed to donated supplies included in the cost sharing or matching share must be reasonable and must not exceed the fair market value of the property at the time of the donation.

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b. Normally only depreciation or use charges for equipment and buildings may be applied. However, the fair rental charges for land and the full value of equipment or other capital assets may be allowed, when they will be consumed in the performance of the award or fully depreciated by the end of the award, provided that the Contracting Officer has approved the charges. When use charges are applied, values must be determined in accordance with the usual accounting policies of the recipient, with the following qualifications: i. The value of donated space must not exceed the fair rental value of comparable space as established by an independent appraisal of comparable space and facilities in a privately-owned building in the same locality. The value of loaned equipment must not exceed its fair rental value. 11. (5) Documentation. The following requirements pertain to the recipient's supporting records for in-kind contributions from third parties: 2. . . a. Volunteer services must be documented and, to the extent feasible, supported by the same methods used by the recipient for its own employees. b. The basis for determining the valuation for personal services and property must be documented.

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Appendix B – Sample Cost Share Calculation for Blended Cost Share Percentage

The following example shows the math for calculating required cost share for a project with \$2,000,000 in Federal funds with four tasks requiring different Non-federal cost share percentages:

Task	Proposed Federal Share	Federal Share %	Recipient Share %
Task 1 (R&D)	\$1,000,000	80%	20%
Task 2 (R&D)	\$500,000	80%	20%
Task 3 (Demonstration)	\$400,000	50%	50%
Task 4 (Outreach)	\$100,000	100%	0%

Federal share (\$) divided by Federal share (%) = Task Cost

Each task must be calculated individually as follows:

Task 1

\$1,000,000 divided by 80% = \$1,250,000 (Task 1 Cost) Task 1 Cost minus federal share = Non-federal share \$1,250,000 - \$1,000,000 = \$250,000 (Non-federal share)

Task 2

\$500,000 divided 80% = \$625,000 (Task 2 Cost) Task 2 Cost minus federal share = Non-federal share \$625,000 - \$500,000 = \$125,000 (Non-federal share)

.

Task 3 \$400,000 / 50% = \$800,000 (Task 3 Cost) Task 3 Cost minus federal share = Non-federal share \$800,000 - \$400,000 = \$400,000 (Non-federal share)

Task 4

Federal share = \$100,000 Non-federal cost share is not mandated for outreach = \$0 (Non-federal share)

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The calculation may then be completed as follows:

Tasks	\$ Federal	% Federal	\$ Non-Federal	% Non-Federal	Total Project
	Share	Share	Share	Share	Cost
Task 1	\$1,000,000	80%	\$250,000	20%	\$1,250,000
Task 2	\$500,000	80%	\$125,000	20%	\$625,000
Task 3	\$400,000	50%	\$400,000	50%	\$800,000
Task 4	\$100,000	100%	\$0	0%	\$100,000
Totals	\$2,000,000		\$775,000		\$2,775,000

1

Blended Cost Share %

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 $\{ \cdot \}_{i,j}^{i}$ Non-federal share (\$775,000) divided by Total Project Cost (\$2,775,000) = 27.9% (Non-federal) Federal share (\$2,000,000) divided by Total Project Cost (\$2,775,000) = 72.1% (Federal)



Appendix C – Waiver Requests: Foreign Entity Participation as the Prime Recipient and Performance of Work in the United States

1. Waiver for Foreign Entity Participation as the Prime Recipient As set forth in Section III.A.3, 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. To request a waiver of this requirement, an applicant must submit an explicit waiver request in the Full Application.

Overall, the applicant must demonstrate to the satisfaction of EERE that it would further the purposes of this FOA and is otherwise in the economic interests of the United States to have a foreign entity serve as the Prime Recipient. A request to waive the *Foreign Entity Participation as the Prime Recipient* requirement must include the following:

- Entity name;
- The rationale for proposing a foreign entity to serve as the Prime Recipient;
- Country of incorporation;
- A description of the project's anticipated contributions to the US economy;
 - How the project will benefit U.S. research, development and manufacturing, including contributions to employment in the U.S. and growth in new markets and jobs in the U.S.
 - o How the project will promote domestic American manufacturing of products and/or services
- A description of how the foreign entity's participation as the Prime Recipient is essential to the project;
- A description of the likelihood of Intellectual Property (IP) being created from the work and the treatment of any such IP;
- Countries where the work will be performed (Note: if any work is proposed to be conducted outside the U.S., the applicant must also complete a separate request for walver of the Performance of Work in the United States requirement).

EERE may require additional Information before considering the walver request.

The applicant does not have the right to appeal EERE's decision concerning a walver request.

2. Waiver for Performance of Work in the United States

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subject line.
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As set forth in Section IV.J.3, all work under EERE funding agreements must be performed in the United States. This requirement does not apply to the purchase of supplies and equipment, so a waiver is not required for foreign purchases of these items. However, the Prime Recipient should make every effort to purchase supplies and equipment within the United States. There may be limited circumstances where it is in the interest of the project to perform a portion of the work outside the United States. To seek a waiver of the Performance of Work in the United States requirement, the applicant must submit an explicit waiver request in the Full Application. A separate waiver request must be submitted for each entity proposing performance of work outside of the United States.

Overall, a waiver request must demonstrate to the satisfaction of EERE that it would further the purposes of this FOA and is otherwise in the economic interests of the United States to perform work outside of the United States. A request to waive the *Performance of Work in the United States* requirement must include the following

- The rationale for performing the work outside the U.S. ("foreign work");
- A description of the work proposed to be performed outside the U.S.;
- An explanation as to how the foreign work is essential to the project;
- A description of the anticipated benefits to be realized by the proposed foreign work and the anticipated contributions to the US economy;
 - The associated benefits to be realized and the contribution to the project from the foreign work;
 - How the foreign work will benefit U.S. research, development and manufacturing, including contributions to employment in the U.S. and growth in new markets and jobs in the U.S.;
 - How the foreign work will promote domestic American manufacturing of products and/or services;
- A description of the likelihood of Intellectual Property (IP) being created from the foreign work and the treatment of any such IP;
- The total estimated cost (DOE and Recipient cost share) of the proposed foreign work;
- The countries in which the foreign work is proposed to be performed; and
- The name of the entity that would perform the foreign work.

EERE may require additional information before considering the waiver request.

The applicant does not have the right to appeal EERE's decision concerning a waiver request.

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Appendix D - Data Management Plan

A data management plan ("DMP") explains how data generated in the course of the work performed under an EERE award will be shared and preserved or, when justified, explains why data sharing or preservation is not possible or scientifically appropriate.

DMP Requirements

In order for a DMP to be considered acceptable, the DMP must address the following:

At a minimum, the DMP must describe how data sharing and preservation will enable validation of the results from the proposed work, or how results could be validated if data are not shared or preserved.

The DMP must provide a plan for making all research data displayed in publications resulting from the proposed work digitally accessible at the time of publication. This includes data that are displayed in charts, figures, images, etc. In addition, the underlying digital research data used to generate the displayed data should be made as accessible as possible in accordance with the principles stated above. This requirement could be met by including the data as supplementary information to the published article, or through other means. The published article should indicate how these data can be accessed.

The DMP should consult and reference available information about data management resources to be used in the course of the proposed work. In particular, a DMP that explicitly or implicitly commits data management resources at a facility beyond what is conventionally made available to approved users should be accompanied by written approval from that facility. In determining the resources available for data management at DOE User Facilities, researchers should consult the published description of data management resources and practices at that facility and reference it in the DMP. Information about other DOE facilities can be found in the additional guidance from the sponsoring program.

The DMP must protect confidentiality, personal privacy, Personally identifiable information, and U.S. national, homeland, and economic security; recognize proprietary interests, business confidential information, and intellectual property rights; avoid significant negative impact on innovation, and U.S. competitiveness; and otherwise be consistent with all laws (i.e., export control laws), and DOE regulations, orders, and policies.

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Data Determination for a DMP

The Principal investigator should determine which data should be the subject of the DMP and, in the DMP, propose which data should be shared and/or preserved in accordance with the DMP Requirements noted above.

For data that will be generated through the course of the proposed work, the Principal Investigator should indicate what types of data should be protected from immediate public disclosure by DOE (referred to as "protected data") and what types of data that DOE should be able to release immediately. Similarly, for data developed outside of the proposed work at private expense that will be used in the course of the proposed work, the Principal Investigator should indicate whether that type of data will be subject to public release or kept confidential (referred to as "limited rights data"). Any use of limited rights data or labeling of data as "protected data" must be consistent with the DMP Requirements noted above.

Suggested Elements for a DMP

The following list of elements for a DMP provides suggestions regarding the data management planning process and the structure of the DMP:

Data Types and Sources: A brief, high-level description of the data to be generated or used through the course of the proposed work and which of these are considered digital research data necessary to validate the research findings or results.

Content and Format: A statement of plans for data and metadata content and format including, where applicable, a description of documentation plans, annotation of relevant software, and the rationale for the selection of appropriate standards. Existing, accepted community standards should be used where possible. Where community standards are missing or inadequate, the DMP could propose alternate strategies for facilitating sharing, and should advise the sponsoring program of any need to develop or generalize standards.

Sharing and Preservation: A description of the plans for data sharing and preservation. This should include, when appropriate: the anticipated means for sharing and the rationale for any restrictions on who may access the data and under what conditions; a timeline for sharing and preservation that addresses both the minimum length of time the data will be available and any anticipated delay to data access after research findings are published; any special requirements for data sharing, for example, proprietary software needed to access or interpret data, applicable policies, provisions, and licenses for re-use and redistribution, and for the production of derivatives, including guidance for how data and data products should be cited; any resources and capabilities (equipment, connections,

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systems, software, expertise, etc.) requested in the research proposal that are needed to meet the stated goals for sharing and preservation (this could reference the relevant section of the associated research proposal and budget request); and whether/where the data will be preserved after direct project funding ends and any plans for the transfer of responsibilities for sharing and preservation.

Protection: A statement of plans, where appropriate and necessary, to protect confidentiality, personal privacy, Personally Identifiable Information, and U.S. national, homeland, and economic security; recognize proprietary interests, business confidential information, and intellectual property rights; and avoid significant negative impact on innovation, and U.S. competitiveness.

Rationale: A discussion of the rationale or justification for the proposed data management plan including, for example, the potential impact of the data within the immediate field and in other fields, and any broader societal impact.

Additional Guidance

In determining which data should be shared and preserved, researchers must consider the data needed to validate research findings as described in the Requirements, and are encouraged to consider the potential benefits of their data to their own fields of research, fields other than their own, and society at large.

DMPs should reflect relevant standards and community best practices and make use of community accepted repositories whenever practicable.

Costs associated with the scope of work and resources articulated in a DMP may be included in the proposed research budget as permitted by the applicable cost principles.

To improve the discoverability of and attribution for datasets created and used in the course of research, EERE encourages the citation of publicly available datasets within the reference section of publications, and the identification of datasets with persistent identifiers such as Digital Object Identifiers (DQIs). In most cases, EERE can provide DOIs free of charge for data resulting from DOE-funded research through its Office of Scientific and Technical Information (OSTI) DataID Service.

EERE's Digital Data Management principles can be found at: <u>EERE Digital Data Management |</u> <u>Department of Energy</u>

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Definitions

Data Preservation: Data preservation means providing for the usability of data beyond the lifetime of the research activity that generated them.

Data Sharing: Data sharing means making data available to people other than those who have generated them. Examples of data sharing range from bilateral communications with colleagues, to providing free, unrestricted access to anyone through, for example, a webbased platform.

Digital Research Data: The term digital data encompasses a wide variety of information stored in digital form including: experimental, observational, and simulation data; codes, software and algorithms; text; numeric information; images; video; audio; and associated metadata. It also encompasses information in a variety of different forms including raw, processed, and analyzed data, published and archived data. •

Research Data: The recorded factual material commonly accepted in the scientific community as necessary to validate research findings, but not any of the following: preliminary analyses, drafts of scientific papers, plans for future research, peer reviews, or communications with colleagues. This 'recorded' material excludes physical objects (e.g., laboratory samples). Research data also do not include:

(A) Trade secrets, commercial information, materials necessary to be held confidential by a researcher until they are published, or similar information which is protected under law; and

(8) Personnel and medical information and similar information the disclosure of which would constitute a clearly unwarranted invasion of personal privacy, such as information that could be used to identify a particular person in a research study."

Validate: In the context of DMPs, validate means to support, corroborate, verify, or otherwise determine the legitimacy of the research findings. Validation of research findings could be accomplished by reproducing the original experiment or analyses; comparing and contrasting the results against those of a new experiment or analyses; or by some other means.

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Doc 17

Rodriguez, Susan (CONTR)

From: Sent: To: Cc: Subject: Hamos, Ian Friday, September 14, 2018 12:09 PM Passarelli, Derek Chalk, Steven RE: Solar FOA for New Topic 1

I would suggest the same based on our conversation earlier.

lan Hamos Chief of Staff Office of the DAS for Renewable Power U.S. Department of Energy 1000 Independence Ave. SW Washington, DC, 20585

From: Passarelli, Derek Sent: Friday, September 14, 2018 3:04 PM To: Hamos, Ian <Ian.Hamos@EE.doe.gov> Cc: Chalk, Steven <Steven.Chalk@ee.doe.gov> Subject: RE: Solar FOA for New Topic 1

Ian,

One matter I forgot to clarify. (b) (5)

Derek

From: Passarelli, Derek <<u>Derek.Passarelli@ee.doe.gov</u>> Date: Friday, Sep 14, 2018, 12:56 PM To: Hamos, Ian <<u>Ian.Hamos@EE.doe.gov</u>> Cc: Chalk, Steven <<u>Steven.Chalk@ee.doe.gov</u>> Subject: RE: Solar FOA for New Topic 1

Ian,

We will modify to include Letters of Intent. (b) (5)

the only

I will confirm with the CO that there are no other

changes that I am aware of are the inclusion of Letters of Intent and (b) (5)

substantive changes.

I will provide the FOA to Cathy, Alex, Steve and Charlie once it is finalized and has all review concurrences.

Derek

From: Hamos, Ian < Ian. Hamos@EE.doe.gov> Date: Friday, Sep 14, 2018, 12:41 PM To: Passarelli, Derek < Derek. Passarelli@ee.doe.gov> Cc: Chalk, Steven <<u>Steven.Chalk@ee.doe.gov</u>> Subject: Solar FOA for New Topic 1

Derek,

Steve just got out from talking to Cathy, and he wanted me to relay a couple important points:

1. Yes, we can do Letters of Intent 2. (b) (5)

- a. Send to Cathy, Alex, Steve, and Charlie please.
- 3. Cathy wants to make sure that the new language is the only change, and that the rest of the FOA is parallel with the original. (b) (5)

Thanks for all your help on this. And let Steve or me know if you have questions.

Thanks,

Ian Hamos Chief of Staff Office of the DAS for Renewable Power U.S. Department of Energy 1000 Independence Ave. SW (202)586-3465 Washington, DC, 20585

Doc 18

Rodriguez, Susan (CONTR)

From:	
Sent:	
To:	
Cc;	
Subject:	
Attachments:	

Gay, Charlie Monday, September 17, 2018 6:57 AM Chalk, Steven Hamos, Ian Topic 1 Comparison comparison 1840 v 1987.docx

....attached

- Charlie 202-287-1987

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potentiany successful, application, it describes SETC, the goals of this FOA, the application process, and various program details. Each step in the application process is discussed to help potential applicants understand the requirements for submitting a compliant application. This document tells potential applicants what types of projects are eligible for funding and how to construct the application. Deviating from the FOA instructions will likely result in a non-

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compliant, and therefore ineligible, application. This document contains the answers to many commonly asked questions. Reading the document in full should answer the majority of the questions potential applicants may have.

- To apply to this FOA, applicants must register with and submit application materials ٠ through EERE Exchange at https://eere-Exchange.energy.gov, EERE's online application portal.
- . Applicants must designate primary and backup points-of-contact in EERE Exchange with whom EERE will communicate to conduct application, review and award negotiations. If an application is selected for award negotiations, it is not a commitment to issue an award. It is imperative that the applicant/selectee be responsive during award negotiations and meet negotiation deadlines. Failure to do so may result in cancelation of further award negotiations and rescission of the Selection.

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Energy Efficiency & Renewable Energy

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I.	Funding Opportunity Description	Formatted: Font: Calibri
	A. Description/Background This Funding Opportunity Announcement (FOA) is being issued by the U.S. Department of Energy's (DOE), Office of Energy Efficiency and Renewable Energy (EERE), Solar Energy Technologies Office (SETO). This section describes the overall goals of SETO and the type of projects that are being solicited for funding support through this FOA.	Formatted: Font: Calibri
	In 2016, solar power surpassed 1% of annual electricity supply in the United States for the first time, and the Energy Information Administration projects that solar will grow to 5% of U.S. electricity by 2030, ¹ Further, if the price of solar electricity and/or energy storage declines more rapidly than projected, that percentage could be even higher, ² But solar is more than just a source of affordable electricity; it also provides the potential to improve grid reliability and resilience, increase employment, ³ create business opportunities, increase energy diversity, and provide environmental benefits.	Formatted: Footnote Reference, Not Superscript/ Subscript Formatted: Footnote Reference, Not Superscript/ Subscript Formatted: Footnote Reference, Font color: Auto, Not Superscript/ Subscript
	The mission of the Solar Energy Technologies Office (SETO) is to support early-stage research and development to improve the performance and flexibility of solar technologies that contribute to a reliable and resilient U.S. electric grid. The office invests in innovative research efforts that securely integrate more solar energy into the grid, enhance the use, storage and dispatch of solar energy, and lower solar electricity costs.	
	SETO focuses on two different solar energy technologies: photovoltaic (PV) technologies that directly convert sunlight into electricity, typically via a semiconductor, and concentrating solar thermal power (CSP) technologies that convert sunlight to heat, which can be converted or stored until needed, and then used to generate electricity or provide other energy services. Because sunshine	Formatted: Footnote Reference, Not Superscript/ Subscrip
1 U.S. 0484 (2- P.A. the US 3- The	Department of Energy, Energy information Administration, International Energy Outlook 2017, DOE/EIA- 2017). Basore and W.J. Cole, "Comparing supply and demand models for future photovoltalc power generation in A," submitted to Progress in Photovoltaics: Research and Applications, 2017. Solar Foundation, National Solar Jobs Census, 2010 – 2016. Questions about this FOA? Email <u>SETO.FOA@ee.doe.gov</u> Problems with FERE Exchange? Email SERE <u>EERE ExchangeSupport@hg.doe.gov</u> helude FOA name and number in subject line.	Formatted: Footnote Text, Indent: Left: 0", First line: 0" Formatted: Footnote Text, Indent: Left: 0", First line: 0" Don't keep with next Formatted: Tab stops: 3", Centered + 6", Right + Not at 5.56"

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Energy Efficiency & Renewable Energy

varies with the time of day, location, and season, solar power systems must be paired with adaptive loads, other sources of power, or energy storage to deliver electricity whenever it's needed. This dependency reduces the value of solar power systems once solar starts to supply a significant fraction of the electricity within a given region and highlights the need for a focus on addressing grid integration challenges.

SETO, in partnership with other offices at DOE, launched the SunShot Initiative in February 2011 with the goal of solar electricity becoming price-competitive with conventional utility sources by 2020,4 The SunShot 2020 goal has already been achieved for utility-scale PV, and with continued effort, it is likely to be achieved for grid-tied solar applications. As a result of this tremendous progress and in response to the growing deployment of solar in the U.S., SETO is increasing its focus on addressing the challenges related to seamlessly integrating high penetrations of solar energy onto the nation's electricity grid. Additionally, SETO set 2030 cost targets to further reduce the cost of solar electricity across all market sectors, which would make solar one of the most affordable sources of electricity and enable a substantial fraction of U.S. electricity demand to be supplied by solar technology,⁵ The targets for the unsubsidized cost of electricity at the point of grid connection in a location with average U.S. solar resources are 3¢ per kilowatt-hour (kWh) for utility-scale photovoltaics, 4¢ per kWh for commercial rooftop photovoltaics, 5¢ per kWh for residential rooftop photovoltaics, and 5¢ per kWh for concentrating solar power with thermal energy storage.

By supporting early-stage research across the solar energy technology space through this FOA, SETO can foster innovation and enable integrated multitechnology solutions that can advance the widespread adoption of solar power while securely integrating it into the nation's energy grid,

Topic 1: Advanced Solar Systems integration Technologies describes SETO research priorities in the seamless integration of high penetrations of solar energy onto the nation's electricity grid. Responsive projects would advance the prediction, monitoring, and control of solar power production, the capabilities of solar power electronics and the integration of solar energy with synergistic technologies.

SunShot Vision Study, NREL Technical Report DOE/GO-102012-3037, 2012.
 U.S. Dept. of Energy, The SunShot Initiative's 2030 Goal: 3¢ per Kilowatt Hour for Solar Electricity, 2016.

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Topic-2: Concontrating Solar Thermal Power Research and Development describes SETO research priorities that support solar technologies that focus sunlight to generate and store high-temperature-heat for electricity generation and other end uses. Responsive projects would contribute to increasing solar power adoption and grid reliability often through combined power and storage.

Topic 3: Photovoltaic Research and Development describes SETO-research priorities that support the further development of photovoltaic technologies that improve system reliability, annual energy yield, demonstrate performance of novel PV devices and develop new PV materials. Responsive projects would directly contribute to increasing PV affordability through continuous improvements in PV efficiency and reliability. SETO's work ensures that a pipeline of innovation continues to reduce PV system cost, increase power conversion efficiency, and reduce supplychain capital expense.

Topic 4: Improving and Expanding the Solar-Industry through Workforce Initiatives describes SETO research priorities that support solar workforce development. Responsive projects would focus on increasing the size of the pipeline of skilled workers being employed by the solar Industry while simultaneously working to increase the participation of veterans and other talent pools, providing increased value to the solar industry as a whole.

SETO's funding supports U.S. leadership in solar technology R&D by funding the next generation of innovative technologies and by developing domestic research talent.

Historically, SETO has released separate funding opportunities that address specific stages and types of solar research. For the first time, this funding program combines SETO-funding efforts into one FOA for fiscal year 2018 (FY2018). Subject to availability of funds appropriated by Congress for the purpose of this program, the availability of future year budget authority, and approval, SETO intends to adjust topic descriptions and reopen this funding program for new applications each year relatively soon after budget guidance has been provided. By providing a more streamlined and consistent FOA strategy SETO hopes to further accelerate the advancement of solar research.

B. Topic Areas / Technical Areas of Interest

This section describes technical areas of interest for this funding opportunity in more detail. Applicants can apply to any of the topic areas below based on the scope and duration of the proposed project. Individual applications should be submitted for each-topic. This solicitation intends to support research and development that

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advances scientific understanding. Therefore, applicants should budget and plan to disseminate any findings in peer-reviewed publications, presentations, and patents as applicable.

Topic 1 Advanced Solar Systems Integration Technologies DOE Is committed to improving the affordability of energy technologies and strengthening the Energy Sector's capability to withstand cyber and physical threats, including natural disasters. Improving the strategic location and situational awareness of solar systems can help ensure continuity of service in the face of widespread and coordinated threats. Developing innovative approaches to accelerate the transfer of solar system solutions that will improve Energy Sector resilience is also a priority.

The Systems Integration (SI) subprogram supports early-stage research and development that advances the reliable, resilient, secure and affordable integration of solar energy onto the U.S. electric grid. For more in-depth discussion of solar grid integration, please visit "Solar Grid Integration" <u>https://energy.gov/eere/solar/downloads/technical-background-2018-seto-funding-opportunity-announcement</u>.

In 2011, solar power comprised less than 0.1% of the U.S. electricity supply with an^{4~} installed capacity of just 1.2 gigawatts (GW). Solar now supplies nearly 2% of the annual U.S. electricity demand⁶ with an installed capacity of roughly 47 GWs⁷, and is continuing to grow. According to U.S. Energy Information Administration (EIA), in some states and regions, solar represents up to 15% of total annual electricity generation. Instantaneous solar generation can reach a much higher level, more than 40% in some cases.⁸

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⁶ U.S. Energy Information Administration (EIA), Electric Power Monthly with Data for November 2017, published

in January 2018. https://www.eia.gov/electricity/monthly/current_month/epm.pdf

Source: Solar Energy Industries Association (SEIA), http://www.seia.org/

* For example, in the California Independent System Operator (CAISO) Monthly Renewables Performance Report, the 5-minute market data shows that at the maximum solar served almost 45% of the load in September 2017. See http://www.caiso.com/Documents/MonthlyRenewablesPerformanceReport-Nov2017.html Questions about this FOA? Email <u>SETO-FOA@ec.dge.gov</u>. Problems with EERE Exchange? Email EERE <u>EERE EERE Support@hg.doc.gov</u>

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Figure 1: For the first time, in March 2017 solar supplied 2% of the U.S. electricity demand, while wind and solar combined accounted for 10% of the U.S. electricity generation. {Source: EIA}

As the penetration of solar energy on the grid continues to increase, it becomes imperative to identify the associated technical, economic and regulatory challenges, and to develop impactful solutions in order to ensure compatibility with the existing grid and a smooth transition to a secure, reliable and resilient grid of the future.

Traditional grid 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 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 customers to manage their electricity use and participate in markets, and provide strong protection against physical and cyber risks.

The current business-as-usual trajectory for the electric industry will not result in a timely transition to a modernized grid⁹. Since large investments in the past and today in the nation's electric grid infrastructure will remain in service for decades, it is important that the U.S. make smart decisions to invest in enabling and forward-looking technologies that will support the creation of a modern grid infrastructure in the coming

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Department of Energy Grid Modernization Multiyear Program Plan (MYPP)

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	years. There is a critical need to foster innovations and new technology adoptions by decreasing regulatory, market and business model uncertainties, demonstrating technology maturity and reducing implementation risks.	
l	The Department of Energy's Grid Modernization Initiative ¹⁰ , is a cross-cutting effort that + aligns grid modernization efforts across the multiple DOE Program Offices. As part of the Grid Modernization initiative (GMI), the SI subprogram supports targeted technology research and development (R&D) that addresses the technical challenges with achieving higher solar penetration, while supporting a safe, reliable, secure and cost-effective electric power system.	Formatted: Indent: Left: 0.5"
Į	More broadly, the Grid Modernization Initiative focuses on the development of holistic Arron solutions for the grid of the future. Several key technology areas have been identified in the Grid Modernization Multi-Year Program Plan (MYPP) ¹¹ :	Formatted; Indent: Left: 0.5"
	 Devices and Integrated Systems Testing; Sensing and Measurements; Systems Operations, Power Flow and Control; Design and Planning Tools; Security and Resilience; and Institutional Support. 	
	Progress In all of these areas is considered crucial for the effective grid integration of solar energy and modernization of the grid, as illustrated in Figure 2. A specific focus of the SETO Systems Integration subprogram includes understanding the impacts of increasing penetration of solar energy on grid reliability and power quality, developing best practices for interconnecting and integrating solar with energy storage and synergistic technologies, addressing the variability of solar generation, researching power electronic technologies for flexible power flow control, enhancing situational awareness of solar generation at the grid edge and informing the standardization of interconnection, interoperability, and cybersecurity for PV and other distributed energy resources (DER) systems. Taking these all together, the goal is to advance the knowledge-base and the ability to integrate solar generation, at scale, into electric transmission and distribution systems in a cost-effective, secure, and reliable manner.	Formatted: Indent: Left: 0,5"
	 Accessed 01 November 2017, <u>https://energy.gov/under-secretary-science-and-energy/grid-modernization-initiative</u> Department of Energy Grid Modernization Multiyear Program Plan (MYPP), Accessed 01 November 2017, <u>https://energy.gov/downloads/grid-modernization-multi-year-program-plan-mypp</u> 	Formatted: Tab stops: 3", Centered + 6", Right + Not at 5.56"
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Figure 2: illustration of high level solar penetration in a modernized electricity power system.

In this FOA the SETO Systems Integration subprogram seeks to fund research in the following topic areas:

Adaptive

B. Topic Areas/Technical Areas of Interest

- Topic 1.1 Solar Grid Integration;
- Solar Observability;
- Solar + X; and
- Innovative Pathways,

Modernizing the grid also requires a workforce capable of understanding and managing this clynamic and digital environment. For those interested in developing proposals related to training the digital grid workforce of the future, please refer to Topic 4 of this FOA.

Topic 1.1 Adaptive Solar Grid Integration

This topic will support applications to research and field validate innovative technologies that enable distributed unique and innovative solutions that will improve the resiliency of the <u>Energy Sector's capability to withstand all hazards; focusing on cyber and physical vectors</u>,

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Specifically, the solutions should identify the strategic location of solar photovoltaic (PV) to contribute to grid reliability and resilience by providing solar dispatchability and grid-support functions-including energy, capacity, and reliability and resilience services, systems that will ensure the Energy Sector provides continuity of service in the face of wide spread and coordinated threats. These technologiessolutions can be deployed throughout the electric bulk power systems or associated transmission to distribution system. The approaches will focus on developing flexible interconnection requirements and dynamic hosting capacity concepts for solar PV as opposed to today's prevalent "firm" interconnection requirements and static hosting capacity planning, substations. It is expected that the same design concepts will be applicable for energy storage and other distributed energy resources (DERs), Through the Intelligent control of the distributed assets, flexible interconnection requirements can increase the overall hosting capacity for solar and DERs in the distribution system, support diverse customer interconnection choices, improve system reliability and resilience, and reduce PV curtailment.). The approaches will test the systems' ability to operate and adapt at both steady and degraded states, Applications must consider diverse DER options (e.g. PVphotovoltaics, energy storage, and flexible load) available as well as power systems engineering alternatives, and demonstrate the benefits of the proposed technologies in the hosting capacity analysis solutions. It should also be shown in these solutions how a fleet of PV systems from multiple customers atphotovoltaics systems from multiple locations will be able to respond to fast changing conditions under normal operations and provide power to critical loads during grid outages - with consideration of other DER options and distribution system constraints. Example projects may include, but are not limited to, new design and use-case concepts, essential reliability services, adaptive capabilities, voltage support, previously uncontemplated and unique capabilities and control hardware and software innovations for smart PV inverters and DER management system (DERMS) that allow more flexibility to interconnection and operation of small scale PV and other DER systems.

Topic 1.2 Solar Observability

This topic will support applications to research, develop and validate observability or situational awareness technologies at the grid edge to support planning and operation with high PV penetration.systems. Applications must have an assessment of economic viability of the proposed system, activity or component in the respective part of the project. Applicant's solar photovoltaic projects may require working with critical infrastructure owners and operators and state, local, tribal and territories entities to take proactive steps to manage risk and strengthen the security and resilience of the Nation's critical infrastructure, considering all hazards that could have a debilitating impact on national security, economic stability, public health and safety, or any combination thereof. These solar photovoltaic projects shall seek to reduce vulnerabilities, minimize consequences, identify and disrupt threats, and hasten response and recovery efforts related to critical infrastructure to ensure public health and safety while improving national security and economic security.

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Toplc 1.2 Solar Situational Awareness and Analysis

This Topic will support applications to research and field validate unique and innovative solutions that will improve the resiliency of the Energy Sector's capability to withstand all hazards; focusing on cyber and physical vectors. Specifically, the solutions should enhance operator capability to observe solar systems deployed throughout the bulk power systems or associated transmission to distribution substations or Behind-the-Meter (BTM) solar including but not limited to battery storage, systems controls, and demand response. Primary focus areas include PV-solar photovoltaic integrated sensor technologies, secure and robust electricity supply delivery and communication tools, advanced data analytics (including machine learning) and detection of cyber intrusion. Artificial Intelligence and Machine to Machine capabilities, and voltage testing. Projects may also be considered with secondary focus areas, may also be considered which enhance grid-edge observability of solar systems byinclude the integration with additional-of observed data into planning, operations and business unit systems. All applications should have an assessment of economic viability of the system or component in the application and as part of the project.

Topic 1.3 Solar + X

This topic will support applications to research and field validate innovative approaches to Integrate Behind the Meter (8TM) solar PV with synergistic technologies (including but not limited to energy storage, building controls, demand response, electric vehicles, and other DERs) to support-dispatchability and provide grid services - including energy, capacity, and reliability and resilience services - as a single control point. Projects will focus on research and development in control-coordination and optimization of BTM-customer-owned and co-located behind a single (master) meter: PV, storage, and other DER assets in response to broader system wide-conditions, with-key interest in-utilizing DER-assets to provide critical power during outages. Projects may consider traditional "firm" DER interconnection requirements as well as emerging flexible interconnection approaches (such as those sought in Topic 1.1) and Innovative compensation mechanisms. In an effort to minimize the overall system-cost for solar integration arising from new hardware deployment, such as battery storage, , applicants are encouraged to consider how solar and load estimation, advanced data analytics, and artificial Intelligence can be utilized in the operations of their proposed systems. All Applicants should that would operate at both steady and degraded states. Applications must have an assessment of economic viability of the system or component in the application as part of the project.

Topic 1.4 Innovative Pathways: Systems Integration

proposed system, activity or component in the respective part of the project. Applicant's solar situational awareness and analysis projects may require working with critical infrastructure owners and operators and state, local, tribal and territories entities to take proactive steps to manage risk and strengthen the security and resilience of the Nation's critical infrastructure, considering all hazards that could have a debilitating impact on national security, economic stability, public health and safety, or any combination thereof. These projects shall

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seek to contribute to one or more risk components: reduce vulnerabilities, minimize consequences, identify and disrupt threats, and/or hasten response and recovery efforts related to critical infrastructure to ensure public health and safety while improving national security and economic security.

Topic 1,3 Solar Technology Transfer

This topic will explore unique and innovative approaches and models to accelerate the transfer of systems Integration and related technologies from the lab into the real world. Rather than funding research on individual technology solutions directly, applicants will research and develop new methods to advance research portfoliossolar system solutions that will improve the resiliency of solar (and related) technologies and overcome challenges endemic to the solar technology transfer-space, including knowledge gaps between the research/industrial communities and constraints on access to necessary resources. Applicants must demonstrate a realistic pathway to test, scale and sustain the model after the period of performance, the Energy Sector's capability to withstand all hazards; focusing on cyber and physical vectors. Potential areas of interest include, but are not limited to, projects or models tothat deploy alternative capital (e.g., local public private partnerships, foundations), for technology R&D or transfer, structures to Incentivize industry-researcher collaboration, approaches to lower barriers such that new entrants can leverage existing facilities or capabilities, data and build capacity (e.g., dormant manufacturing capacity or underutilized laboratory space), approaches and methods that serve to drive down the hardware cost and accelerate processes around hardware ensure solutions, validation, certifications, resilience and certification.

Concentrating Selar Thermal Power Research and Development Topic 2

The Concentrating Solar Thermal Power (CSP) research and development (R&O) program supports early stage research to improve the performance, reduce the cost, and improve the lifetime and reliability of CSP materials, components, subsystems, and integrated concepts. The technical feasibility and low cost of integrating thermal energy storage (TES) with CSP allows for a-unique value proposition among renewable energy resources. CSP-with thermal energy storage-can provide electricity on demand. Most embodiments of CSP-utilize traditional turbine based heat engine, similar to over 90% of current US electricity generation. This combination of readily scalable energy storage with proven turbine technology and an adaptable capacity factor (depending on the sizing of the solar collector field and thermal energy storage) can broadly enable reliable renewable electricity production. To achieve a significant, marketdriven, deployment of CSP in the US, SETO seeks projects with R&D objectives supporting the 2030 SunShot targets of 5¢/kWh for a baseload CSP plant (> 12 hours of TES) and 10¢/kWh for a peaker CSP plant (≤ 6 hours of TES).

Current state of the art CSP power plants are based on a central 'Power Tower' design that uses molten nitrate salls as both the primary heat transfer fluid (HTF) and a sensible TES material, at a hot fluid temperature of approximately 565 °C. Recent SETO-R&D objectives and

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funding opportunities have focused on the most promising thermal transport systems capable of higher-operating temperatures (> 700 °C) for integration with advanced, high efficiency power cycles, referred to as Generation 3 CSP.12 in addition to lowering solar field costs, integration with high-efficiency, low-cost power cycles is a key mechanism to lower the cost of energy generation from CSP. SETO is currently developing these concepts through the Gen3 CSP Systems Integration Funding Opportunity and Gen3 Lab Support, 13-The current SETO FY18 FOA does not seek concepts redundant to topics prioritized in Gen3 CSP initiatives. This distinction is particularly important for applications proposing to address the receiver, HTF, or TES subsystems. Notably, the Gen3-CSP initiative does not attempt to address innovations in power cycles or solar collectors, which are of particular interest in this funding opportunity. Applications that propose innovations in thermal transport systems should seek to investigate innovation outside of Gen3 CSP concepts: concept applies to a different temperature regime; concept supports heat transfer-media-outside those identified as most promising in the Gen3 CSP-roadmap; concept-requires a > 5-year-research timeframe before it would reach maturity appropriate for integration within a larger system; or concept is supply to withstand wide spread and coordinated threats compatible with surrent CSP system architectures, provided that a pathway to the targeted LCOE can be demonstrated.

 ¹² Mehos, Mark, et al. Concentrating Solar Power Gen3 Demonstration Roadmap, No. NREL/TP 5500-67464. NREL (National Renewable Energy Laboratory (NREL), Golden, CO (United States)), 2017.
 ¹² https://energy.gov/esre/sunshot/funding-opportunity-announcement-generation-3-concentrating-solar-powersystems-gen3ccp

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Figure 3: Waterfull chart showing one possible path to achieving on unsubsidized Lovelized Cost of Electricity (LCOE) of 6C/KWA for a concentrating solar power tower plant in the southwestern United States (BOP - Balance of Plant). The challenges involved in achieving the SunShot targets for CSP<u>.1 and Topic</u> <u>1.2</u>

Applicant's solar technology transfer projects may require interdisciplinary solutions throughout a wide variety of fields in science and technology. The emphasis is on technological advances derived from fundamental understanding, rather than Edisonian trialand error approaches. There is no single "CSP challenge" but rather a

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series of challenges of heat transfer, fluid mechanics, thermodynamics, optical physics, materials science, extreme automation in the solar field, corrosion mitigation, advanced manufacturing, thermo-mechanical engineering design, low-cost sensors and control, and predictive operations and maintenance, among others, in order to clarify the targets, a selfconsistent set of-point solutions for each subsystem's efficiency, cost, and lifetime have been generated. These are presented in Figure 2 with the economic impact by area-displayed in Figure 3. These goals exemplify only one of many possible combinations of techneconomic metrics that-could be employed to build a 5¢/kWh_e-CSP plant.

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objectivesworking with critical infrastructure owners and operators and state, local, tribal and territories entities to take proactive steps to manage risk and strengthen the security and resilience of the Nation's critical infrastructure, considering all hazards that is compatible with the SunShot targets. Likely solutions will vary as specific innovation occurs in the many technical fields touching CSP. In the topics below, specific subsystem targets are often described to focus objectives and simplify discussion. However, Figure 4 shows how successful improvements to certain aspects of a hypothetical CSP plant could relax the requirements on other areas. While these tradeoffs can (and should) be used to better describe the value of a proposed innovation, applicants should not invoke undefined improvements in areas outside of their proposed R&D as justification for relaxing technical metrics. Alternately, Figure 4 demonstrates how innevations going beyond the SunShot metrics have an increased value proposition. With this in mind, concepts that can achieve cost, efficiencyhave a debilitating impact on national security, economic stability, public health and safety, or other relevant metrics significantly beyond those outlined in Figure 2 have additional value to SETD.

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The DOE National Laboratories (<u>http://energy.gov/maps/doe-national-laboratories</u>) provide unique-capabilities, such as the National Solar Thermal Test Facility (NSTTF)¹⁴, and development of the System Advisory Model (SAM).¹⁵ As appropriate and needed, applicants may design a statement of project objectives (SOPO)-that takes advantage of unique DOE facilities and capabilities. In such cases, justified SOPOs and clear budgets must be developed in consultation with the relevant National Laboratory, and the Applications must include a letter of commitment from the concerned National Laboratory, confirming the proposed budget, scope, and availability of the facilities and/or laboratory personnel to complete the proposed work within the proposed project schedule. <u>Note that collaboration with or the use of facilities at a</u> <u>DOE National Laboratory is not a regularement for Application to this FOA; Applications will be</u> evaluated on their own-merit as per the criteria set forth in this FOA.

Principal Investigators (PI) and their team funded by SETO are expected to produce high impact outcomes with a view-towards commercialization and wide dissemination including pursuit of patents, licensing or other intellectual property protection and publication of the results of their funded research in high-visibility, high-impact-factor, peer-reviewed journals. All outcomes resulting from the funded research will be required to include an acknowledgement that the work was supported by the U.S. Department of Energy, Solar-Energy Technologies Office, under the specific award-number.

The specific CSP Topic Areas of interest are detailed below.

Topic 2.1 ____ Small Innovative Projects in Solar (SIPS): CSP

This topic area will fund small, focused projects investigating the applicability of emerging thermal or optical manipulation processes, and related material systems, to the CSP application. The limitations to manipulating heat and light (both in terms of feasibility and cost) are core constraints to CSP plant design. Innovations for controlling energy in these forms may create an opportunity for novel colar thermal concepts and enable new types of CSP systems. Such concepts, if successfully proven, should support dramatic progress towards the CSP 2030 levelized cost of electricity (LCOE) goal of 5C/kWh for baseload or 10C/kWh for peaking power generation. Applications to this topic should propose projects that<u>any combination thereof. These projects shall</u> seek to prove or disprove a central hypothesis that would disruptively alter the design of CSP plants in such a way as to enable the targeted costs. Applicants must demonstrate an understanding of the major issues impeding the proposed technical approach, and clearly identify the particular barrier(s) that will be the target of the research effort. Along with topics of interest motivated by the above *Background Section*, examples of research areas which could support emerging technologies for the CSP application include but are not limited to:

<u>http://energy.sandia.cov/?page_id=1267</u>
 <u>https://sam.nrei.gov/</u>

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- Metamaterials, waveguides, index matching optics. > New collector tracking paradigm
- Active optics, self-adaptive optics -> Reducing sources of collector optical distortion
- High thermal conductivity structural materials -> Novel thermal exchange or transport concepts
- Novel surface plasmon control -> New efficiencies and physical embodiments of solar receivers
- ----Phononic crystals, thermal rectification-->-Passive thermal transport or control of TES
- High-temperature thin-film insulators with environmental compatibility. > Lower peak temperature on piping alloys and contribute to one or more risk components supporting the HTF

This topic area will use an abbreviated application process. In an effort to limit the resources required by applicants to apply for the Small and Innovative Projects in Solar (SIPS) (from Topic 2.1 and 3.1) a simplified application process in described in section IV.D of this document. Following submission of an LOI, there is an expedited concept paper phase for SIPS projects. SIPS projects do not need to submit a concept paper by the deadline listed on the cover paper; Topic Areas 2.1 and 3.1 SIPS applications must instead resubmit their Letter of Intent again as the concept paper and also include a summary slide by the concept paper deadline to bypass an administrative software restriction of EERE Exchange. Full SIPS applications should be submitted by the full application deadline, and all SIPS full applications should complete their submitisions using the format provided in section IV.D. Failure to complete these required process steps will result in an inability to submit a SIPS application for review.

Topic 2.2. --- Advanced-CSP Collectors

This topic will fund research and development of innovations in novel CSP collectors, which direct solar flux to an absorber (receiver), where it is converted to heat., as well as technologies associated with collector installation and operation. The solar collector field is one of the single largest components of the cost of constructing a CSP plant (approximately 25% of the direct capital costs). The component must efficiently concentrate light while minimizing fabrication, Installation, and operating costs. Collectors that are able to cost effectively achieve high concentration ratios can directly improve the efficiency of the receiver. This effect becomes particularly impactful at high receiver temperatures. With these factors in mind, R&D concepts supporting a significant decrease in CSP LCOE and satisfying the below figure of merit (FOM) by accounting for Cost-per reflective surface area (in \$/m2), efficiency times 100 (Eff), and concentration ratio (CR) are of primary interest.

Gost FOM < 0.65Bff + CR/50

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For example, a heliostat with a cost of \$60/m², a 55% annualized optical efficiency, and ability to achieve a concentration ratio of 2000 suns, would satisfy the FOM: 0.631 < 0.65. Hardware of interest should be operable for 30 years or have a viable replacement strategy. Cost must account for all contributions to installed cost. Environmental impacts on the collector, particularly operable wind speeds and survivable wind speeds, should be considered.

Beyond development of the core collector hardware, applications which address collector assembly and installation in support of the above figure of merit will also be considered. A connection should be drawn between metrics that can be investigated in the project (such as time and motion studies) and their impact on the figure of merit.

Finally, applications which propose technologies addressing the operation and/or maintenance of CSP-collectors are also cought. Such applications may address optical losses not generally dictated by the optical hardware (aiming technology, control systems, performance degradation, collector down time, wind mitigation, etc.) as well as operational cost of the collector field. Applicants may describe the effect of the proposed technology on avoided collector capital cost, annual efficiency improvement, or other variables relatable to the LCOE of a CSP plant.

For further information on challenges and opportunities relating to Topic 2,2, Advanced CSP Collectors, visit <u>https://energy.gov/eere/solar/downloads/technical-background-2018-seto-</u>funding_opportunity_announcement.

Topic 2.3 Advanced Power Cycles for CSP

This topic will fund innovations in power cycles compatible with cost competitive CSP. The power cycle subsystem converts collected thermal energy from the CSP receiver and/or thermal energy storage into electricity. Under this topic, applications developing advanced power cycles are sought. Appropriate power cycles must be able to convert thermal energy to electricity at an efficiency greater than 50%, must have a capital cost of less than \$900/kW (including heat exchange into the power cycle), must be compatible with dry cooling, and support 30 years of CSP operation. While this topic is open to a variety of high-efficiency, lowcost-thermal to-electric power cycles, the supercritical CO₂ (sCO₂) cycle is of particular interest. <u>EERE</u>, with the Offices of Nuclear Energy and Fossil Energy, have collaboratively focused on the development of the sCO₂ Brayton cycle.¹⁶ Shared research goals have accelerated the development of critical components and broadened the foundational knowledge related to this cycle. Applicants proposing further R&D of the sCO₂ cycle must be familiar with state of the art developments fostered by this initiative as well as external entities.

14 https://energy.gov/under-secretary-science and energy/supercritical co2-tech-team

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Supercritical GO₂ Power Cycles

The supercritical CO₂ (sCO₂) cycle is a viable candidate to satisfy the cost and efficiency requirements stated above. It is advantageous for its high conversion efficiency, dry cooling compatibility, small size (influencing construction and O&M costs), and efficient Integration with CSP heat transfer media. Applications of interest for this subtopic fall into 4 categories:

- Component Innovations supporting sCO2 cycle variations uniquely advantageous to operation of a complete CSP plant
- 2- Component innovations for the sCO2 Recompression Closed Brayton Cycle
- 3. Materials and Manufacturing Innovations supporting the cycle's use with CSP
 - a. Emphasis is placed on innovations supporting the primary heater which couples the power cycle to a specific CSP HTF or TES system. Innovations relevant to other components throughout the cycle are ancouraged

Novel Power Cycles Impacting CSP-Market Viability

Alternative thermal-to-electric conversion processes may offer improved performance, be more amenable to CSP, or allow a CSP-system to operate in some superior embodiment. Research into such alternative cycles which enable a transformative step in CSP may be proposed as part of this topic. Proposals must indicate a power cycle efficiency target, cost target, and the constraints placed on other CSP subsystems. All proposed CSP configurations must be amenable to integration with thermal energy storage.

For further information on challenges and opportunities relating to Topic 2.3, Advanced Power Gycles for CSP, visit <u>https://energy.gov/oere/solar/downloads/technical-background-2018-seto-</u> funding_opportunity_announcement.

Topic 2.4 ----- Advanced CSP Thermal Transport System and Components

This topic will fund innovations in the CSP receiver subsystem and thermal energy storage subsystem. All CSP components between the collector field and the power cycle can be collectively labeled the thermal transport system. This begins where the incident photon is converted to thermal energy, and ends immediately before the thermal energy is exchanged into the power cycle. Components in this section include the receiver panel, heat transfer media (HTM), HTM piping, HTM structure (e.g. tower), HTM movement (pump, circulator, elevator, etc.), thermal energy storage (TES) media, TES containment and heat exchange, heat tracing, system sensors, and controls. To be compatible with the CSP LCOE target of 5¢/kWh, these systems must collectively cost less than \$615/kWh while supporting a 50% efficient power cycle, a 90% efficient receiver panel, 14 hours of TES with 99% energetic efficiency and 95% exergetic efficiency, and total parasitic losses no more than 6% of the turbine gross power. These targets must be met by a reliable system able to operate for 30 years at the temperature conditions required by the targeted power cycle.

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Research and development applications are sought for individual components or collections of components compatible with the above cost and efficiency paradigm. Research projects can include sub-commercial scale versions of the component to test operational compatibility. Projects should include detailed cost modelling for the economic viability of the component at scale. Targeted power cycles must be identified (which determine the temperature of the thermal transport system). If a targeted power cycle has an efficiency below 50%, additional savings or performance improvements elsewhere must offset the performance loss in the power cycle.

As described in the introduction to Topic 2, concepts redundant with the Gen3 CSP initiative are not of interest/³⁷-New opportunities to achieve cost competitive CSP are sought by exploring new temperature paradigms, new basic research solutions several steps from component integration, and innovations supporting system architectures unique from the described Gen3 system and pathways.

For further Information on challenges and opportunities relating to Topic 2.4, Advanced CSP Thermal Transport System and Components, visit

https://energy.gov/cere/solar/downloads/technical-background-2018-seta-fundingopportunity-announcement-

Topic 2.5 Innovative Pathways: Concentrating Solar Power

This topic will explore innovative approaches and models to accelerate the transfer of CSP and related technologies from the lab into the real-world. Rather than funding research on individual technology solutions directly, applicants will research and develop new methods to advance research portfolios of solar (and related) technologies and overcome challenges endemic to the solar technology transfer space, including knowledge gaps between the research/industrial communities and constraints on access to necessary resources. Applicants must demonstrate a realistic pathway to test, scale and sustain the model after the period of performance. Potential areas of interest include, but are not limited to, models to deploy alternative capital (e.g., local public private partnerships, foundations) for technology R&D or transfer, structures to incentivize industry researcher collaboration, approaches to lower barriers such that new entrants can leverage existing facilities, data and build capacity (e.g., dormant manufacturing capacity or underutilized laboratory space), and methods to drive down the cost and accelerate processes around hardware validation and certification.

¹⁷ Mehas, Mark, et al. Concentrating Solar Power Gen3 Demonstration Roadmap. No. NREL/TP-5500-67464. NREL (National Renewable EnergyLaboratory (NREL), Golden, CO (United States)), 2017.

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Topic 3 _____ Photovoltaic Research and Development (PVRD)

Future improvements in the efficiency, cost, reliability, and lifetime of PV technologies-have the potential to substantially: reduce the cost of solar power and contribute to greater-energy affordability. Figure 5-Illustrates one possible-path for realizing a factor of two reduction in the levelized cost of electricity (LCOE) for utility-scale PV (UPV)-18 The values shown in Figure 5 are for a U.S. location with average solar resources and without incentives-PV-systems located elsewhere in the 48 contiguous states have annual solar exposure that can be as much as 30% higher or 30% lower than the national average, with a corresponding variation in the cost of solar electricity for those locations.

The path for achieving 3¢ per kWh for UPV Illustrated in Figure 6 assumes a PV module efficiency of 25% and a module price of 25¢ per







Figure-G:-PV technology pathways to reach 3¢/kWh in a U.S. location with average solar-resourcen-specifically-illustrating-the-trade-offs-between-module-price, efficiency-and-reliability. All points on all lines are combinations of metrics that reach 3¢/kWh. The orange dot identifies the combination of module price and efficiency used to generate Figure-

watt, but other-combinations of module cost and performance can deliver the same LCOE. Figure 6 Illustrates various combinations of module efficiency, module-price, and system

18 Single-axis tracking, 21% capacity factor (AC), 7% nominal-weighted-average-annual-cost of capital, 2.5% annual inflation, operation/maintenance (O&M) of \$4/kW₆, yr escalating 2% faster than inflation, 5 yr depreciation, 37% effective tax rate. No investment tax credit or financial incentives beyond Modified Accelerated Cost Recovery System (MACRS) are included in the calculation.

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lifetime that all represent LCOE of 3¢ per kWh under standard UPV project conditions.³⁸ The module price needs to be high enough to support a sustainable module supply chain, yet low enough to help drive growth in market domand.²

The photovoltaics (PV) research and development (R&D) program supports early-stage research to increase performance, reduce materials and processing costs, and improve reliability of PV cells, modules, and systems. The average levelized cost of electricity (LCOE) generated from utility-scale PV-systems has recently met the SunShot 2020 cost target of \$0.06/kWh, however additional early-stage PV-R&D is necessary to reach newly announced SunShot 2030 targets for utility, commercial, and residential systems. Durable and high-efficiency cells and modules manufactured at lower costs will drive the LCOE of utility scale PV-systems toward \$0.03/kWh. Such cost reductions can enable dispatchable, PV-generated electricity and increase grid resiliency where the cost savings can be applied to energy storage devices, demand side management, grid operation, and advanced power electronics to provide affordable, resilient, secure, and reliable electricity for U.S. consumers.

Photovoltaic module prices have dropped dramatically since 2010, due in part to increasing economies of scale worldwide and the commercialization of innovative PV-cell and module technologies. However, these decreases in module price-have narrowed operating margins for module manufacturers and highlight the importance of early-stage research efforts to transform scalable manufacturing processes across the PV supply chain.

Maximizing performance and energy yield, increasing reliability, and decreasing the cost of PV technologies requires improvements across all components of a PV-system, as shown by the potential roadmap to the 2030 cost targets in Figure 5. Technical challenges span from increasing module efficiency/ulnerabilities, minimize consequences, identify and disrupt threats, and/or hasten response and recovery efforts related to critical infrastructure to ensure public health and safety while reducing cost per watt, reducing fielded degradation rates, and enhancing system design to improve energy yield and system operations. Research and development is critical to ensure that performance gains realized in the laboratory translate into greater energy output in the field when modules are subjected to environments beyond those determining the standard test conditions (STC) nameplate rating. The paragraphs below describe in more detail the most important research and development opportunities relevant to the different aspects of affordable and reliable PV systems.

Improving PV performance has been a primary pathway toward reducing the LCOE of solar electricity, as more efficient modules lead to increased energy production and reduced electricity costs. As PV technologies begin to approach officiency limits, additional understanding and control is required to further improve performance and durability. At the cell level, different absorber technologies face unique technical challenges to closing the gap between their theoretical efficiency limits and current lab and commercial scale performance

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records. Despite these individual differences, increasing cell efficiency generally requires understanding which defects are detrimental to carrier lifetime and open-circuit voltage; optimizing doping control; quantifying and finding solutions for bulk and interface recombination pathways; developing new cell architectures or optical designs to utilize a wider range of the solar spectrum; and improving the quality of passivation and contact formation. Improving the celentific understanding of, and finding solutions for, these efficiency-limiting factors is a critical SETO priority to enable future cost reductions across the PV industry. Early in the supply chain, low-cost methods for wafer and cell preparation must reduce material use and increase throughput and yield while maintaining high-quality device characteristics such as carrier lifetime. Additionally, low cost methods and materials for contacts and metallization are required to further improve the performance and durability of PV cells and modules.

A consistent gap in absolute efficiency persists between cell and module technologies. This difference is due to factors such as large-area non-uniformities, optical losses including shading or reflection from module-components, spacing between cells, and interconnection losses. The development of methods to characterize and subsequently improve large area-uniformity and reduce the defect density of high throughput processes are of interest to help improve the performance of PV modules. Module fabrication represents the largest cost category in the PV module, due to the substantial-cost of interconnection, frontsheet, encapsulant, and backsheet materials as well as the time consuming lamination steps that require large areas in the factory. Additionally, cell-level research on scalable manufacturing processes informed by technoeconomic analyses are important opportunities to improve module-level performance, reduce materials and manufacturing costs, and subsequently lower the LCOE of PV systems. The Solar Energy Technologies Office is soliciting proposals addressing all of these important R&D challenges that will help reduce manufacturing costs to sustainable levels.

Photovoltaic systems that provide reliable energy-production beyond the typical 25-30 year warranties offer an important opportunity to further improve the affordability of solar electricity. Durability concerns impact all module components and span a module's operational lifetime. By understanding and minimizing degradation rates in module components and architectures, the operational lifetime of PV systems can be extended to increase the overall energy generation, which reduces the LCOE of the system as shown in Figure 6. In addition, as module failure mechanisms are understood and solved, the perceived investment risk in PV systems can be lowered, which can lead to reduced financing rates. To realize these cost reductions, it is critical to understand the science of degradation in cell and module materials, identify relevant degradation, and improve the relevance of accelerated testing to failure mechanisms seen in the field. In particular, the ability to predict how multiple environmental stressors, including light, heat, blas, and moisture, interact with each other and act on each module layer to cause particular degradation pathways is of primary interest for this solicitation. Furthermore, research projects addressing how novel materials for

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components such as encapsulants, backsheets, and front barriers affect module degradation modes and designing accelerated tests to qualify new or altered module components w/// support progress toward module lifetimes beyond 30 years. Projects in module and system reliability are encouraged to leverage capabilities of the <u>Durable Module Materials (DuraMAT)</u> <u>Consortium</u>, which brings together national laboratories, universities, and industry to discover and develop new materials, testing methodologies, and designs for durable PV systems.

At the other end of the value chain, research is needed to define new module applications and form factors in order to further increase the economic and aesthetic value of PV through integration with existing environments. Additionally, as the deployment of PV technologies increases and systems mature, more sustained efforts will be required to understand costeffective methods to recycle modules and minimize waste across absorber technologies at the end of a module's life.

Beyond cell and module improvements, the optimized design and installation of PV systems at utility, commercial, and residential scales have the potential to maximize energy yield without Increasing the overall LCOE of the system. Research efforts to maximize energy yield. sometimes measured by the ratio of energy produced (kWh) to nameplate power (kW), could include reducing module temperature coefficients or developing new module designs.- Factors such as module tilt, spacing, azimuthal orientation, and tracking provide tradeoffs between energy and power densities of an installation, and the appropriate optimization of these factors depends on location, irradiance, and local pricing schemes. Technology approaches that reduce PV system costs by improving the speed and cost of PV system design and/or system installation are of interest for this solicitation. Research and development into balance of system technologies, including but not limited to inverters, junction boxes, cables, connectors, racking, and tracking also provide a path to reduce system-level costs. For example, reliable module level electronics have the opportunity to increase energy yield and improve shade tolerance, while alternative methods of durable framing, racking, and mounting PV modules can reduce weight, expand appropriate applications, or maximize energy yield when combined with novel architectures like bifacial modules.-Finally-underlying all of these system-level advances is an increase in the amount of data available for performance monitoring and failure detection. Data-acquisition at the module and system levels combined with analytic tools and machine learning-algorithms-provide opportunities to diagnose both-system-and module-level failures. Software and hardware solutions that provide more precise energy production estimates and streamline operations by monitoring PV-system components can inform cell and module research, decrease risk, and increase the overall value of PV arrays across their life cycle,

Furthermore, all of the plans for technology Innovation described above would benefit from the development of new, complementary financing instruments to attract early-private capital investment to the commercialization of these innovations.-SETO works with innovation hubs

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and the national laboratories to identify new financing arrangements that enable patient investors and specialized funds to transition these innovations from government funding to the private sector and expand the domestic market share throughout the PV value chain.

The DOE National Laboratories (<u>http://energy.gov/maps/doe_national-laboratories</u>) provide unique capabilities that can support SETOs goals noted above. As appropriate and needed, applicants may design a work plan that takes advantage of the unique DOE facilities and capabilities. In such cases, justified work plans and clear budgets must be developed in consultation with the relevant National Laboratory, and the Applications must include a letter of commitment from the concerned National Laboratory confirming the proposed budget, scope, and availability of the facilities and/or laboratory personnel to complete the proposed work within the proposed project schedule. <u>Note that collaboration with or the use of facilities</u> <u>at a DOE National Laboratory is not a requirement for Application to this FOA</u>.

The topic areas below provide five different funding mechanisms to support proposals addressing the technical challenges surrounding efficiency, cost, and reliability as described above. Also, please refer to the summary report based on the <u>PV innovation Roadmap Request</u> for information for a more detailed discussion of these challenges as they pertain to different technologies.

Topic 3.1 — Small Innovative Projects in Solar (SIPS): Photovoltaics This topic area will fund small, focused projects in novel and/or-emerging areas of photovoltaics research, which inherently involve significant technical risk but have the potential to produce dramatic progress towards a solar LCOE of \$0.03/kWh by 2030. Applications of interest will contain targeted, well-defined projects that will demonstrate new-concepts for continued study in the future or will be innovative, short-term projects. Along with topics of interest motivated by the background and task summary sections above, examples of emerging areas that would merit focused study include rapid growth techniques not-previously demonstrated for PV absorber materials, novel metallization methods, alternate watering processes, low cost and high efficiency cell or medule concepts, improved reliability of PV materials and modules, as well as life cycle analysis for emerging solar and module recycling technologies.

This topic area will use an abbreviated application process. In an effort to limit the resources required by applicants to apply for the Small and Innovative Projects in Solar (SIPS) (from Topic 2.1 and 3.1), a simplified application process is described in section IV.D of this document. Following submission of an LOI, there is an expedited concept paper phase for SIPS projects. SIPS projects do not need to submit a concept paper by the deadline listed on the cover paper; Topic Areas 2.1 and 3.2 SIPS applications must instead resubmit their Letter of Intent again as the concept paper and also include a summary slide by the concept paper deadline to bypass an administrative software restriction of EERE Exchange, Full SIPS applications should be

Questions about this FOA? Email <u>SETO:FOA@ee.doe.gov</u>. Problems with SERE Exchange? Email EERE: <u>EERE ExchangeSupport@hg.doe.gov</u> Include FOA name and number in subject line. Formatted: Tab stops: 3", Centered + 6", Right + Not at

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submitted by the full application deadline, and all SIPS full applications should complete their submissions using the format provided in section IV.D. Failure to complete these required process steps will result in an inability to submit a SIPS application for review.

Topic 3.2 Increasing Affordability, Reliability, and Manufacturability of PV Cells, Modules, and Systems

This topic area will fund PV research aimed at the development of cell and module technologies leading to substantial improvements in the performance and reliability of PV technologies while reducing materials, component, manufacturing, Installation, and operation and maintenance costs. Along with topics of interest motivated by the background and task summary sections, examples of emerging areas that would merit focused study include reducing the material inputs and supply chain costs of wafers, cells and modules; Improving the durability and process yield of perovskite solar cells; mitigating degradation modes and reducing manufacturing costs for heterojunction and other advanced silicon architectures; optimizing defect and depart control in CdTe and CdSeTe alloys; determining and tracking how individual defects impact thin film solar cells; and otherwise developing concepts that significantly modify PV materials, cells, and module architectures to achieve improvements in the state of the art. Projects focused on the application of advances in materials science, advanced metrology to accurately characterize all optical and electrical aspects of materials and device performance, and deposition methods or processes to improve cell or module performance, Improve service lifetime, and/or reduce manufacturing capital costs are strongly encouraged. Early-stage research into novel module form factors, module-level power electronics, system architectures, or innovative tracker technologies that provide significant opportunities to improve the affordability of installed PV systems are also of interest. This topic will also support research using "deep software" technologies, those that require multi-year research efforts, to advance artificial intelligence and data analytics to transform how PV system data can be leveraged to understand module and array-performance. Research that automates fault or failure monitoring and connects these detections to cell or module design provides an important feedback loop to inform cell and module research or system operation, creating the potential to maximize energy generation and the overall value of PV systems national security and economic security,

Applications of interest will conduct targeted research to advance industrially relevant photovoltaic technologies that have the potential to impact the market within ten years.

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Successful projects will improve the state of the art in cell, module, or system performance, reliability, and/or manufacturability, toward the SunShot 2030 targets. Cross-sector teams involving national lab, university and/or industry partners are encouraged.

Topic 3.3 ----- Collaborative Cross-Cutting PV Research

This topic area will fund projects that form interdisciplinary teams to investigate the application of new scientific concepts that extend beyond the boundaries of traditional PV absorber technologies. Applications must demonstrate the formation of integrated and functional teams with distinct and complementary capabilities in order to solve challenges through the application of technologies that are adjacent to or underutilized in PV-research but have the potential to significantly anhance the state of the art of PV technologies. Applications focused on developing the detailed understanding of defects, degradation, and limitations in performance of PV materials, cells, and modules by a coordinated team including cell/modules experts and detailed characterization and/or modeling expertise are encouraged. Functional areas of interest include: surface passivation, interfaces and carrier-selective contacts, metallization, newer and industrially relevant cell designs and architectures, wafer or thin film processing and fabrication, cell interconnection and module design, cell and module reliability, and multi-junction devices. The applications must clearly demonstrate the complementary capabilities that only when integrated successfully will allow the team to collectively achieve the project objectives.

Project teams should have existing expertise within the proposed research area, have clear research goals, and be capable of obtaining a defined, measurable impact on the state of the art within the three year project timeframe. Projects should include a lead investigator who coordinates communication with the rest of the team and ensures that individual progress among participants contributes to overall project objectives. In addition, successful applications will include representation from at least two research groups that provide non-overlapping and required expertise to address the proposed research objectives. Where relevant, applicants are encouraged to leverage expertise in characterization, modeling, and/or other relevant methods from research areas beyond solar. The anticipated annual project funding level is set to accommodate the formation of collaborative project teams. Applications of interest will focus on research relevant to competitive photovoltaic technologies and will have the potential to impact the market within ten years. Successful projects will improve the state of the art in module performance, reliability, and/or manufacturability, toward the SunShot-2030 cost targets.

Topic 3.4 ---- Innovative Pathways: Photovoltaics

This topic will explore innovative approaches and models to accelerate the transfer of photovoltaic and related technologies from the lab into the real world. Rather than funding research on individual technology solutions directly, applicants will research and develop new methods to advance research portfolios of solar (and related) technologies and overcome

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challenges endemic to the solar technology transfer-space, including knowledge gaps between the research/industrial communities and constraints on access to necessary resources. Applicants must demonstrate a realistic pathway to test, scale and sustain the model after the period of performance. Potential areas of interest include, but are not limited to, models to deploy alterative capital (e.g.-local public-private partnerships, foundations) for technology R&D or transfer, structures to incentivize industry-researcher collaboration, approaches to lower barriers such that new entrants can leverage existing facilities, data and build capacity (e.g., dormant manufacturing capacity or underutilized laboratory space), and methods to drive down the cost and accelerate processes around hardware validation and certification. Research on efforts and models that expand PV access to low and moderate income (LMI) Americans should also be submitted to this topic, including solutions to overcome creditworthiness and information asymmetry issues within LMI communities.

Topic 4: — Improving and Expanding the Solar Industry through Workforce Initiatives

As discussed in earlier topics, renewable energy deployment in the United States has experienced rapid growth in recent years, fueling a similarly rapid increase in jobs in the renewable energy sector, with solar standing out as a particularly strong job creating industry. As of November 2017, the solar industry employed over 250,000 workers, the result of an annual average growth rate of 16% for the 2012 2017 time period⁴⁹. This rate is approximately 9 times that of the overall U.S. economy. Given that, frequently, employers cite a lack of the proper skills and experience as a major source of difficulty in hiring new staff⁴⁹, and that a grid with ever-increasing amounts of solar requires next-generation skills in information science and data analysis, expanding the skill set of solar workers and those that play an important role in the deployment and management of solar energy requires a skilled workforce, particularly in science, technology, engineering, and math (STEM), to ensure that the adoption of solar and other DERs occurs in a stable and sustainable fashion.

One key focus of the Solar Energy Technologies Office is to create programs that support consistent, high-quality-workforce training and credentialing that affect the U.S. solar industry. Doing so addresses key challenges to the solar industry such as the speed of interconnections and maintaining consistent information across varying regulatory and market landscapes. Developing tools and trainings that assist solar and other professionals, attract talent to the solar industry, and that help veterans and other talent pools to fill the growing workforce needs of the solar industry are targeted strategies to achieve these goals. To this end, this topic area addresses two primary aspects of the U.S. workforce relevant to the expansion of solar energy; (1) increased participation of tolent pools, such as veterans, in the solar industry and (2) enhancing the digital skills of U.S. electric grid workers through coordinated industry effort.

¹⁹ National Solar Jobs Census 2017, (The Solar Foundation, 2018)

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It is currently a priority of the U.S. government to support "actions that place an emphasis on expanding the STEM workforce to include all Americans,"²⁰ Other industries have derived significant economic benefits from increasing participation in their workforce from broader talent pools and, as such, the solar industry has an opportunity to benefit from new workforce initiatives. Solar employers frequently cite difficulty in finding fully qualified employees, suggesting that the existing talent pools being tapped by the industry may not be sufficient in providing the skilled labor solar needs. As such, an opportunity exists for programs that grow and expand the labor pool.

As previously discussed, solar, other DERs, and other advanced technologies are being deployed and connected to the grid every day. As the pace of technological innovation in the grid accelerates, it is crucial that the workforce supporting and operating these technologies grow, adapt to new challenges, and anticipate future needs. As with much of the US economy, the grid-is experiencing huge growth every year in-terms of the rate and quantity of data-being generated by sensors and operational systems throughout the country. Solar, in particular, has rapidly elevated the need for greater visibility and understanding of the dynamics of the distribution side of the grid to support grid operation with increasing penetrations of distributed resources. As solar deployment continues to grow rapidly, the need to effectively utilize the large amounts of data being generated will only continue to Increase. The security of related systems is also of utmost importance to physical, cyber and national security and the data produced by these systems needs to be properly structured, stored, and made accessible to those with the skills to derive meaningful operational or strategic insights from it (e.g. in utilizing parcel data and substation hosting capacities to predict solar adoption for distribution planning purposes). As such, these are the skills this funding topic focuses on for grid workers. with the expectation that a greater knowledge base in the relevant elements of the digital grid will contribute to greater grid reliability and resiliency as well as reduce costs associated with infrastructure investments,

In order to maximize the impact of federal funding provided for workforce training as a part of this FOA, the Prime Recipient and Subrecipients of projects funded in this topic will be required to license, under a Creative Commons Attribution License (CCBY), to the public all work related to training or education developed in the performance of the award. Please note that, in certain circumstances regarding sensitive topics and material (e.g. sensitive cybersecurity course content), awardees will confer with DOE on the appropriateness of including such materials in an open format and may, at both parties' discretion, decide to leave such materials out of the Creative Commons license, The decision on what material warrants conference with DOE will be determined by the recipient. By default, all materials that are

²⁰ Mulvaney, M. (August 17, 2017). FY 2019 Administration Research and Development Budget Priorities (M-17-30). Retrieved from <u>https://www.whitehouse.cov/sites/whitehouse.cov/liles/omb/memorendo/2017/m-17-30.pdf</u>

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Topic 4.1 Expanding the Solar Workforce

This-topic area is focused on two primary and complementary concepts: (1) the solar industry reports continued shortages of workers with the proper skill set and (2) the solar industry does not sufficiently leverage all potential talent pools, such as our nation's veterans and students attending community and technical colleges. Further background information on these issues can be found here: https://energy.gov/eere/solar/downloads/technical-background-2018-seto-guandeement, Further background information on these issues can be found here: https://energy.gov/eere/solar/downloads/technical-background-2018-seto-guandeement, Further background information on these issues can be found here: https://energy.gov/eere/solar/downloads/technical-background-2018-seto-guandeement, Further background information on these issues can be found here: https://energy.gov/eere/solar/downloads/technical-background-2018-seto-funding-opportunity-anguancement, Work funded by this topic will include initiatives focused on Increasing the pipeline of skilled workers, including veterans, in the regions of the US-where they are most needed by the solar industry.

Successful projects in this topic area will demonstrate a strong connection to the solar industry with engagement from potential employers for program participants, taking the form, for example, of embedded traineeships within target companies or apprenticeships; a targeted analytical focus describing the specific skills and communities that will be targeted as part of the proposed workforce program; and a rigorous methodology for assessing, and periodically re-assessing, the value the project has provided to the solar industry as a whole, such that value-adding pivots to program design may be incorporated as appropriate. In addition, any proposed training program with formal credentials or certifications should be accompanied by evidence that affirms the value of such credentialing to potential employers, to ensure that time and financial resources are spent well in the curriculum being described.

Given the Department of Energy's commitment to helping our nation's veterans find jobs uniquely suited to their talents in the energy sector, proposals focusing on incorporating veterans into new or existing solar workforce training initiatives are strongly encouraged. Proposals relating to veterans programs should include discussion of what veteran/active duty military communities (e.g. occupational specialities) will be target audiences of the program being proposed. Proposals targeting trainee communities that are shown to be currently underutilized, and that can be reasonably expected to receive employment in the solar industry following participation in the proposed program, are of particular interest. In addition,

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participant communities should be chosen in such a way as to match trainces¹ pre-existing (or learned through training) skill sets with open positions of relevance or general industry needs. Applicants that can show a high level of awareness and familiarity of the military community and that have experience working with relevant Federal agencies, non-profit organizations, national labs, and companies in this space are encouraged to apply.

Topic 4.2 — Digital Adaptation Training for Distributed Energy-Resources on the Grid This topic area intends to fund a program that supports the digital transition in power systems by increasing the quality, accessibility, and value of training content and delivery. The use of communications and measurement technology in coordination with distributed energy resources (DERs, especially solar) are contributing to the grid becoming a more dynamic system. For tomorrow's grid-operations, more experts are needed at the intersection of power systems and digital systems — such as cybersecurity, interoperability, machine learning, predictive analytics, data science, information technology, and communications system infrastructure. Training and credentials are needed to make it easier to find and hire these experts as well as ensure a consistent level of understanding across the industry. Increased standardization can Improve the reliability and resilience of the future grid by reducing the number of weak-links in the system. Further background-information can be found here: <u>https://energy.gov/eere/solar/downloads/technical-background-2018-seto-funding-opportunity-announcement</u>.

Applications must describe an initiative with national relevance to guide workforce efforts in the power systems industry, and utilities especially, into a digital future. This initiative should rely on regional hubs to maximize impact, as demonstrated in other-workforce development efforts. The initiative should address system level challenges such as credentials for new job roles or training standards. In addition, the initiative should develop and test new course material and delivery-mechanisms (e.g. online-only, hybrid, and fully in person learning approaches) targeted at power systems professionals to further understanding of the best methods for increasing engagement and knowledge retention of participants. The Initiative should justify which topics it prioritizes and what the right audience is for those topics (e.g. power systems engineers, executives, customer support representatives, etc.)-It may be useful to reference a grid architecture framework in identifying these needs.²⁴ Efforts should focus on issues related to new technology adoption and impact on operations, particularly as related to solar. For example, relevant topics may include distribution planning using advanced DER adoption modeling, roll-out of power electronics, data analytics, and other topics. The scope of the initiative may vary from direct training to wider information sharing efforts among industry stakeholders, as appropriate for the identified topics. Proposals should describe how their

²⁴ Taft ID, and AS Becker Dippmann. 2015. <u>Grid Architecture</u>. PNNL 24044, Pacific Northwest National Laboratory, Richland, WA...

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Initiative fits into existing training and professional development efforts and why government funding is appropriate for this effort.

Successful applications must demonstrate a strong connection with the power systems industry broadly, and utilities specifically, to facilitate an ongoing needs assessment of the industry. In addition, successful applications will incorporate strategies to facilitate adoption of the program, such as developing grid-specific credentials on these topics and working with human resources (HR) departments to determine the value. Applications that include innovations in the development or delivery of professional development, such as experiential learning or peer networks, are of particular interest. Applications with higher cost share, letters of commitment to partner or participate from the power systems and utility industry, and a plan for a sustainable revenue model to expand the scope will be viewed more favorably. Applications should also identify opportunities to increase the diversity of the power systems workforce. In terms of gender, race, and veteran status. Applications should detail a plan for independent third-party evaluation, which includes designing a pilot to execute in the first year. One milestone in the first quarter of work proposed should be focused on the hiring of the evaluation firm, subject to DOE feedback.

All work under EERE funding agreements must be performed in the United States.

C. Applications Specifically Not of Interest

The following types of applications will be deemed nonresponsive and will not be <u>merit</u>-reviewed or considered (See Section III.D of the FOA):

- Applications that fall outside the technical parameters specified in Section I.B of the FOA.
- Applications for proposed technologies that are not based on sound scientific principles (e.g., violates the laws of thermodynamics).
- Undifferentiated research, products, and/or solutions: This FOA seeks innovative solutions that help achieve SETO goals. Incremental advancement of undifferentiated or duplicative efforts is insufficient to meet SETO goals and is not of interest to this FOA.
- Projects lacking influential impact from <u>federal Federal</u> funds: This FOA intends to fund projects where Federal funds will provide a clear and measurable impact, (e.g. retiring risk sufficiently for follow-on investment or catalyzing development.) Projects that have sufficient monies and resources to be executed regardless of federal funds are not of interest.

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	 Re-funding the same idea at the same technology readiness level: This FOA does not intend to as fund mine SETO superdoes for the same idea at the 	
	same technology readiness level.	
	 Applications focusing exclusively on HVAG and water-heating applications are not of interest. 	
	 Products or solutions for systems which do not tie to a grid or micro-grid (i.e. wholly off-grid applications and portable power). Fundamental electro, chamical battory materials resparse. 	
	Hydrogen and fuel cell technologies	
	Any Concept Papers or Full Applications that focus on "Areas Specifically Not + of Interest" will be rejected as nonresponsive and will not be considered for	Formatted; List Paragraph, Buileted + Level: 1 + Aligned at 1" + Indent at; 1.25", Don't keep with next, Don't keep line together
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	D. Authorizing Statutes	Formatted; Font: Calibri
	The programmatic authorizing statute is EPACT 2005, Section 931 (a)(2).	Formatted: Indent: Left: 0.88", Don't keep with next, Don't keep lines together
	Awards made under this announcement will fall under the purview of 2 CFR Part	Formatted: Indent: Left: 0"
	20D as amended by 2 CFR Part 910.	Formatted: Indent: Left: 0.88", Don't keep with next, Don't keep lines together
11.	Award Information	Formatted: Font: Calibri
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	I. Estimated Funding (b) (5)	
	EERE expects to make <u>approximately</u> <u>of Federal funding available</u>	
	tor new awards based on the gwishnee provided in the below table (under	
	this FOA, subject to the availability of appropriated funds). The cells are	
	The expected total amount of funding allocated for the subtopic	
	o Note: The actual funding numbers per subtopic may be	
	somewhat higher or lower depending on the number and	
	quality of applications within each subtople	
	 The average expected amount for an individual award within that subtopic 	
	 Note: EERE anticipates making (b) (5)awards under this FOA. < EERE may issue one, multiple, or no awards. Individual award 	Formatted: Normal, Indent: Left: 1,25", No bullets or numbering
	amountsawards may be somewhat higher or lower than the expected	
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amount depending on the scope of the project <u>vary</u> (b) (5)
<u>million.</u>
 The expected award duration for a project within that subtopic
 Note: Depending on the scope of the proposed project,
some projects may have shorter durations, and in rare cases,
longer-durations
 The expected number of awards that could be made for the

subtople

 Note: The actual number of awards per subtopic will depend on the number and quality of applications within each subtopic

	Tonic Title	Details (\$105.5M in total funding,
		below values are approximate)
TOPIC 1:/	Adaptive Local Grids, Advanced Systems Integration Tech	mologies (20% cost share, TRL 2-5)
Topic-1.1	Adaptive Local Grids	\$1814
		\$4.5M/award
		3-years
		4 awards
Topic 1.2	Solar Observability	\$26M
Tople 1.3	Solar + X	\$3M/award
		3 years
		8-awards
Topic 1.4	Innovative Pathways: Systems Integration	\$2M
		\$1M/awa#d
		3 years
		2 awards
Торі	c 2: Concentrating Solar Power Research and Develop	ment (20% cost share, TRL 2-5)
Topic 2.1	Small Innovative Projects In Solar (SIPS): Concentrating Solar Power	\$3₩
•		\$300k/award
		1.5 years
		20 awards
Tepic 2.2	Advanced CSP Collectors	\$20M total
Topic 2.3	Advanced Power Cycles for CSP	\$2M/award
Tanic 3.4	Advanced CSP Thermal Transport System and Components	3 years
		10 owards
Topic 2.5	Innovative Pathways: Concentrating Solar Power	\$1M
		\$1M/award
		3 years
		<u>1 award</u>
	Topic 3: Photovoltaics Research and Development (20% cost share, TRL 2-5)
Topic 3.1	Small Innovative Projects in Salar (SIPS); Photovoitaies	\$2M
		\$200k/award
		1,5 years
		10-awards
Topic 3.2	Increasing Affordability, Reliability, and Manufacturability of	\$21M
-	PV Cells, Modules, and Systems	\$1.5M/award

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		14-awards
Topic 3,4	Innovative Pathways: Photovoltaics	\$4M
		\$1M/award
		3-years
		4-awards
+	(Topic 4.1 - No cost share (Education and Outreach) / Top	bic 4.2 - 20% cost share)
Topic 4.1	Exeanding the Solar Workforce	<u>\$2.5M</u>
Topic 4.1	Expanding the Solar Workforco	\$2.5M \$1,25M/award
Topic 4.1	Expanding the Solar Workforco	\$2.5M \$1,25M/award 2-years
Topic 4.1	Expanding the Solar Workforco	\$2.5M \$1.25M/Jaward 2-years 2-awards
Topic 4.1 Topic 4.2	Expanding the Solar Workforce Digital Adaptation in Power Systems through Workforce	\$2.5M \$1.25M/award 2.years 2.owards \$6M
Topic 4.1 Topic 4.2	Expanding the Solar Workforce Digital Adaptation in Power Systems through Workforce	\$2.5M \$1,25M/award 2-years 2-awards \$6M \$2M/award
Topic 4.1	Expanding the Solar Workforco Digital Adaptation in Power Systems through Workforce Initiatives	\$2.5M \$1.25M/award 2 years 2 owards \$6M \$3M/award 5 years

EERE may issue awards in one, multiple, or none of the topic areas-under this + FOA:-

EERE may establish more than one budget period for each award and fund only the initial budget period(s). Funding for all budget periods, including the initial budget period, is not guaranteed. <u>Before the expiration of the initial</u> <u>budget period(s)</u>, <u>EERE may perform a down-select among different</u> <u>recipients and provide additional funding only to a subset of recipients.</u>

ii. Period of Performance

EERE anticipates making awards that will run from one up to five years36 months in length, comprised of one or more budget periods. Project continuation will be contingent upon satisfactory performance and go/no-go decision review. At the go/no-go decision points, EERE will evaluate project performance, project schedule adherence, meeting milestone objectives, compliance with reporting requirements, and overall contribution to the program goals and objectives. As a result of this evaluation, EERE will make a determination to continue the project, re-direct the project, or discontinue funding the project.

iii. New Applications Only

EERE will accept only new applications under this FOA. EERE will not consider - applications for renewals of existing EERE-funded awards through this FOA.

E.B. EERE Funding Agreements

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TIAs are not necessarily subject to all of the requirements of 2 CFR Part 200 as amended by 2 CFR Part 910.

In a TIA, EERE may modify the standard Government terms and conditions, including but not limited to:

- Intellectual Property Provisions: EERE may negotiate special arrangements with recipients to avoid the encumbrance of existing intellectual property rights or to facilitate the commercial deployment of inventions conceived or first actually reduced to practice under the EERE funding agreement.
- Accounting Provisions: EERE may authorize the use of generally accepted accounting principles (GAAP) where recipients do not have accounting systems that comply with Government recordkeeping and reporting requirements.

EERE will be more amenable to awarding a TIA In support of an application from a consortium or a team arrangement that includes cost sharing with the private sector, as opposed to an application from a single organization. Such a consortium or teaming arrangement could include a FFRDC, if a DOE/NNSA FFRDC is a part of the consortium or teaming arrangement, the value of, and funding for the DOE/NNSA FFRDC portion of the work will be authorized and funded under the DOE field work authorization system and performed under the laboratory's Management and Operating contract. Funding for a non-DOE/NNSA FFRDC would be through an interagency agreement under the Economy Act or other statutory authority, Other appropriate contractual accommodations, such as those involving intellectual property, may be made through a "funds in" agreement to facilitate the FFRDCs participation in the consortium or teaming arrangement. If a TIA is awarded, certain types of information described in 10 CFR 603,420(b) are exempt from disclosure under the Freedom of Information Act for five years after DOE receives the information.

An applicant may request a TIA if it believes that using a TIA could benefit the --RD&D objectives of the program (see section 603,225) and can document these benefits. If an applicant is seeking to negotiate a TIA, the applicant must include an explicit request in its Full Application. After an applicant is selected for award negotiation, the Contracting Officer will determine if awarding a TIA would benefit the RD&D objectives of the program in ways that likely would not happen if another type of assistance agreement (e.g., cooperative agreement subject to the requirements of 2 CFR Part 200 as

Questions about this FOA? Email <u>SETO:FOA@ea.doe.gav</u>. Rroblems with <u>EERE Exchange? Email EERE ExchangeSupport@ha.doe.gov</u> Include FOA name and number in subject line. - { Formatted: Indent: Left: 1.25"

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amended by 2 CFR Part 910). The Contracting Officer will use the criteria in 10 CFR 603, Subpart B, to make this determination.

111. Eligibility Information

To be considered for substantive evaluation, an applicant's submission must meet the 🐳 criteria set forth below. If the application does not meet these initial requirements, it will be considered non-responsive, removed from further evaluation, and ineligible for any award.

λ.	EÌ	ligible Applicants	Formatted: Font: Calibri
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	ī.	Individuals 4	Formatted: Font: Calibri, 12 pt
	••	115 citizens and lauful nermanent residents are eligible to apply for funding	Formatted: Indent: Left: 0.5", Hanging: 0.38"
		as a Prime Recipient or Subrecipient	Formatted: Font: Calibri
	ij.	Domestic Entities	Formated: Numbered + Level: 1 + Numbering Style: I, ii, ii + Start at: 1 + Alignment; Left + Aligned at: 1" + Indent at: 1.25"
		For-profit entities, educational institutions, and nonprofits that are	Formatted: Indent: Left: 1.25"
		incorporated (or otherwise formed) under the laws of a particular State or	Formatted: Font: Calibri
		territory of the United States are eligible to apply for funding as a Prime	Formatted: Indent: Left: 1,25"
		Recipient or Subrecipient, 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.	
		State, local, and tribal government entitles are eligible to apply for funding as + a Prime Recipient or Subrecipient.	Formatted: Indent: Left: 1,25"
		DOE/NNSA Federally Funded Research and Development Centers (FFRDCs)	
		are eligible to apply for funding as a Subrecipient freeelying up to 49.9% of	
		the award funding) but not as a Prime Recipient or Subrecipient.	
		Non-DOE/NNSA FFRDCs are eligible to apply for funding as a Subrecipient	
		(receiving up to 49.9% of the award funding), but are not eligible to apply as	
		a Prime Recipient.	
		Federal agencies and instrumentalities (other than DOE) are eligible to apply	
		for funding as a <u>Subrecipient, but are not eligible to apply as a</u> Prime	
		Recipient or as a Subrecipient.	
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Foreign entities, whether for-profit or otherwise, are eligible to apply for Formatted: Indent: Left: 1.25" funding under this FOA. Other than as provided in the "Individuals" or "Domestic Entitles" sections above, 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. Foreign entities may request a walver of the requirement to designate a Formatted: Indent: Left: 1.25" subsidiary in the United States as the Prime Recipient in the Full Application (I.e., a foreign entity may request that it remains the Prime Recipient on an award). To do so, the Applicant must submit an explicit written waiver request in the Full Application. Appendix C lists the necessary information that must be included in a request to waive this requirement. The applicant does not have the right to appeal EERE's decision concerning a waiver request. In the waiver request, the applicant must demonstrate to the satisfaction of 4--- Formatted: Indent: Left: 1.25" EERE that it would further the purposes of this FOA and is otherwise in the economic interests of the United States to have a foreign entity serve as the Prime Recipient, EERE may require additional information before considering the waiver request. A foreign entity may receive funding as a Subrecipient. Formatted: Indent: Left: 1.25" Formatted: Font: Calibri iv. Incorporated Consortia Incorporated consortia, which may include domestic and/or foreign entities, Formatted: Indent: Left: 1,25" are eligible to apply for funding as a Prime Recipient or Subrecipient. For consortia incorporated (or otherwise formed) under the laws of a State or territory of the United States, please refer to "Domestic Entities" above. For consortia incorporated in foreign countries, please refer to the requirements in "Foreign Entities" above. Each incorporated consortium must have an internal governance structure Formatted: Indent: Left: 1.25" and a written set of internal rules. Upon request, the consortium must provide a written description of its internal governance structure and its Internal rules to the EERE Contracting Officer. Formatted: Tab stops: 3", Centered + 6", Right + Not at Questions about this FOA? Email SETO.FOA@ee.doe.gov. Problems with EERE Exchange7 Email EERE - <u>EERE - ExchangeSupport@ha.doe.gov</u> Include FOA name and number in subject-line. 447



v. Unincorporated Consortia	Formatted: Font: Calibri
Unincorporated Consortia, which may include domestic and foreign entitles, must designate one member of the consortium to serve as the Prime Recipient/consortium representative. The Prime Recipient/consortium representative must be incorporated (or otherwise formed) under the laws of a State or territory of the United States. The eligibility of the consortium will be determined by the eligibility of the Prime Recipient/consortium representative under Section III.A of the FOA.	Formatted; Indent: Left: 1.25"
Upon request, unincorporated consortia must provide the EERE Contracting Officer with a collaboration agreement, commonly referred to as the articles of collaboration, which sets out the rights and responsibilities of each consortium member. This agreement binds the individual consortium members together and should discuss, among other things, the consortium's:	Formatted; Indent: Left: 1.25*
 Management structure; Method of making payments to consortium members; Means of ensuring and overseeing members' efforts on the project; Provisions for members' cost sharing contributions; and Provisions for ownership and rights in intellectual property developed previously or under the agreement. 	
F.B. Cost Sharing	Formatted: Fork: Callbri
1. Cost Share 20% - applicable to Topice 1, 2, and 3. The cost share must be at least 20% of the total allowable costs for research and development projects (i.e., 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) and must come from non-Federal sources unless otherwise allowed by law. (See 2 CFR 200.306 and 2 CFR 910.130 for the applicable cost sharing requirements.)	Formatted: Font: Bold Formatted: Font: Bold Formatted: Normal, Indent: Left: 0.88", No bullets or numbering Formatted: Indent: Left: 0.88" Formatted: Font color: Blue
 Cost Share Not Required — Applicable to Topic 4.1 Cost Share will not be required specifically and exclusively for topic 4.1; This topic deals with education and outreach activities which do not require cost share contributions; 	Formatted: Indent: Left: 0"
 Cost Share 20% - applicable to Topic 4.2 Topic 4.2 requires a minimum cost share of 20% cost share. Under this workforce development topic, cost share will be an important measure of 	Formatted: Tab stops: 3", Centered + 6", Right + Not at 5.56"
Questions-about this FOA? Email <u>SETO-FOA@ce.doo.gov</u> . Problems with EERE Exchange? Email EERE- <u>EERE ExchangeSupport@hg.doe.gov</u> Include FOA-name and number in subject line.	
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> the level of commitment from critical project partners. By requiring cost share, SETO seeks industry partners that will provide financial and other recources, guidance and support to generate applications that will fund the creation of training programs that are high-impact and relevant to the power systems industry.

To assist applicants in calculating proper cost share amounts, EERE has included a cost share information sheet and sample cost share calculation as Appendices \overline{AB} and \overline{BC} to this FOA.

i. Legal Responsibility

Although the cost share requirement applies to the project as a whole, including work performed by members of the project team other than the Prime Recipient, the Prime Recipient is legally responsible for paying the entire cost share. The Prime Recipient's cost share obligation is expressed in the Assistance Agreement as a static amount in U.S. dollars (cost share amount) and as a percentage of the Total Project Cost (cost share percentage). If the funding agreement is terminated prior to the end of the project period, the Prime Recipient is required to contribute at least the cost share percentage of total expenditures incurred through the date of termination.

The Prime Recipient is solely responsible for managing cost share contributions by the Project Team and enforcing cost share obligation assumed by Project Team members in subawards or related agreements.

ii. Cost Share Allocation

Each Project Team is free to determine how best to allocate the cost share requirement among the team members. The amount contributed by individual Project Team members may vary, as long as the cost share requirement for the project as a whole is met.

ill. Cost Share Types and Allowability

Every cost share contribution must be allowable under the applicable Federal cost principles, as described in Section IV.J.1 of the FOA. In addition, cost share must be verifiable upon submission of the Full Application.

Project Teams may provide cost share in the form of cash or in-kind contributions. Cost share may be provided by the Prime Recipient, Subrecipients, or third parties (entities that do not have a role in performing

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the scope of work). Vendors/Contractors may not provide cost share. Any partial donation of goods or services is considered a discount and is not allowable.

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Cash contributions include, but are not limited to:	personnel costs, fringe Formatted: Font: 12 pt
costs, supply and equipment costs, indirect costs a	and other direct costs. Formatted: Plain Text, Indent; Left: 1.25"
In-kind contributions are those where a value of the readily determined, verified and justified but when transacted in securing the good or service comprise contribution Allowable in-kind contributions inclut the donation of volunteer time or the donation of	ne contribution can be • (Formatted: Indent: Left: 1.25" re no actual cash is ing the ide, but are not limited to: space or use of equipment.
Project teams may use funding or property receive governments to meet the cost share requirement, not provided to the state or local government by t	ed from state or local <
The Prime Reciplent may not use the following sou obligations including, but not limited to:	Irces to meet its cost share + [Formatted: Indent: Left: 1.25"
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 Revenues or royalites from the prospective beyond the project period; Proceeds from the prospective sale of an a: Federal funding or property (e.g., Federal g by the Federal Government); or Expenditures that were reimbursed under Program. 	sset of an activity; rants, equipment owned a separate Federal
Project Teams may not use the same cash or in-kir cost share requirements for more than one projec	nd contributions to meet 🔸 - · · (Formatted: Indent: Left: 1.25"
Cost share contributions must be specified in the p from the Prime Recipient's records, and necessary and efficient accomplishment of the project. As all considered part of total project cost, the cost shar under the same Federal regulations as Federal dol cost share contribution must be reviewed and app Contracting Officer and incorporated into the proje expenditures are incurred.	Project budget, verifiable + Formatted: Indent: Left: 1.25" and reasonable for proper sources of cost share are e dollars will be scrutinized lars to the project. Every roved in advance by the ect budget before the
Questions-about this FOA2 Email <u>SETO.FOA@ee.doc.g</u> blems with EERE Exchange2 Email EERE <u>ExchangeSuppo</u>	Formatted: Tab stops: 3", Centered + 6", Right + No 5,56" // ft@ha.spe.gev

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Applicants are encouraged to refer to 2 CFR 200.306 as amended by 2 CFR Formatted: Indent: Left: 1.25 910.130 & 10 CFR 603.525-555 for additional guidance on cost sharing. Formatted: Font: Calibri iv. Cost Share Contributions by FFRDCs Because FFRDCs are funded by the Federal Government, costs incurred by Formatted: Indent: Left: 1.25", Don't keep with next, Don't keep lines together FFRDCs generally may not be used to meet the cost share requirement. FFRDCs may contribute cost share only if the contributions are paid directly from the contractor's Management Fee or another non-Federal source. Formatted: Font: Calibri v. Cost Share Verification Applicants are required to provide written assurance of their proposed cost Formatted; Indent: Left: 1,25" share contributions in their Full Applications. Upon selection for award negotiations, applicants are required to provide Formatted: Indent: Left: 1.25" additional information and documentation regarding their cost share contributions. Please refer to Appendix A of the FOA. Formatted: Font: Calibri vi. Cost Share Payment EERE requires Prime Recipients to contribute the cost share amount Formatted: Indent: Left: 1,25" incrementally over the life of the award. Specifically, the Prime Recipient's cost share for each billing period must always reflect the overall cost share ratio negotiated by the parties (i.e., the total amount of cost sharing on each involce when considered cumulatively with previous involces must reflect, at a minimum, the cost sharing percentage negotiated). As FFRDC funding will be provided directly to the FFRDC(s) by DOE, Prime Recipients will be required to provide project cost share at a percentage commensurate with the FFRDC costs, on a budget period basis, resulting in a higher Interim invoicing cost share ratio than the total award ratio. In limited circumstances, and where it is in the government's interest, the Formatted: Indent: Left: 1.25" 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. Regardless of the interval requested, the Prime Recipient must be up-to-date on cost share at each interval. Such requests must be sent to the Contracting Officer during award negotiations and include the following information: (1) a detailed justification for the request; (2) a proposed schedule of payments, including amounts and dates; (3) a written commitment to meet that schedule; and (4) such evidence as necessary to demonstrate that the Prime Recipient has complied with its cost share obligations to date. The Contracting Officer must approve all such requests Formatted: Tab stops: 3", Centered + 6", Right + Not at before they go into effect. Questions about this FOA? Email SETO.FOA@ee.dae.gov. Problems with EERE Exchange? Email EERE-<u>EERE ExchangeSupport@hg.doe.gov</u> Include FOA name and number in subject line.

Formatted: Font; Calibri G.C. Compliance Criteria Letters of Intent, Concept Papers, Full Applications, and Replies to Reviewer Formatted: Font: Bold Comments must meet all Compliance criteria listed below or they will be Formatted: Normal, Indent: Left: 0.86" considered noncompliant. EERE will not merit-review or consider noncompliant Formatted: Font: Bold submissions, including Letters of Intent, Concept Papers, Full Applications, and Formatted: Font: Bold Replies to Reviewer Comments that were: submitted through means other than Formatted: No Underline EERE Exchange; submitted after the applicable deadline; and/or submitted Formatted: Font color: Blue incomplete. EERE will not extend the submission deadline for applicants that fail to submit required information due to server/connection congestion. Formatted: Font: Calibri i. Compliance Criteria Formatted: Numbered + Level: 1 + Numbering Style: i, ii, iii, -Letters of Intent+ Start al: 1 + Alignment: Left + Aligned al: 1" + Indent al: 1,25" Letters of Intent 1. Full Applications Full Applications are deemed compliant if: Formatted: Indent: Left: 1.5" Formatted: Font color: Auto -The applicant entered-all required information and clicked the Formatted: Font color: Auto "Create Concept Paper/Full Application" button in EERE Exchange by the deadline stated in the FOA. -Concept Papers Concept Papers are deemed compliant if: The applicant submitted a compliant Letter of Intent; Formatted: Indent: Left: 1.75", Buileted + Level: 1 + Aligned at: 1.5" + Indent at: 1.75" The Concept Paper, complies with the content and form requirements in Section IV.CD of the FOA; and Formatted: Font color: Auto The applicant successfully uploaded all required documents and Formatted: Font color: Auto clicked the "Submit" button in EERE Exchange by the deadline stated in thisthe FOA. -Full Applications Full Applications are deemed compliant if: The applicant submitted a compliant Letter of Intent and compliant Concept Paper; The Full Application complies with the content and form requirements in Section IV.D of the FOA; and - The applicant successfully uploaded all required documents and A clicked the "Submit" button in EERE Exchange by the deadline stated in the FOA. Formatted: Tab stops: 3", Centered + 6", Right + Not at Questions about this FOA? Email SETO.FOA@ee.doe.gov. Problems-with EERE Exchange? Email EERE- EERE-ExchangeSupport@hg.doe.gov Include FOA name and number in subject line. 417



2. Replies to Reviewer Comments Formatted: Indent: First line: 0" Replies to Reviewer Comments are deemed compliant if: Formatted: Indent: Left: 0" Formatted: Indent: Left: 1.75", Bulleted + Level: 1 + Aligned at: 1.5" + Indent at: 1.75" The Reply to Reviewer Comments complies with the content and form requirements in Section IV.E of the FOA; and Formatted: Font color: Auto The applicant successfully uploaded all required documents to Formatted: Font color: Auto EERE Exchange by the deadline stated in the FOA. - Document Submission **Required Documents Checklist for Concept Paper Submission** Please check this page when submitting the application to help ensure the application is complete and compliant. Completed Deadline Submission **Optional**/ Format FOA Section [X] Mandatory 2018 W.C.I. Cover Page Mandatory doc. or (1 Page Max) -dock-or (Page 51) pdf 2018 N.C.I. Project doc. or Mandatory Description +docx of (Page 50) (3 Page Max) pdf 2018 Summary Slide -ppt-or Mandatory ₩.с. (Page 51) .pptx Completed Other mandatory concept paper compliance criteria FGA Section Cost Share-met? Cost share % = (Applicant ₩.B. (Pages-38-42) Contribution)/(EERE Contribution + Appendix A & 8 Applicant Contribution} Concept Paper-completed and submitted by 3:00pm EST Cover-Page on the due date? Page limit guidelines met? (If 'ne', EERE will delete IV.C.I. anything over the page limit from the .doc or .docx (Page-50) application file-prior to review to prevent unfair advantage} **Required Documents-Checklist for Full Applications** Please check this page when submitting the application to help ensure the application is complete and compliant. Formatted: Tab stops: 3", Centered + 6", Right + Not at 5,56" Completed Deadline Submission Format Optional/Mandatory FOA Section (X)

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	i Dequirements for DOF MINEA Endorally Eucled Research and	
	I. Requirements for DUE/NNSA Federally Funded Research and	
	Development Centers (FFRDC) Listed as the Applicant	
	A DOE/NNSA FFRDC is eligible to apply for funding under this FOA if its	
	cognizant Contracting Officer provides written authorization and this	
	authorization is submitted with the application. If a DOE/NNSA FFROC is	
	selected for award negotiation, the proposed work will be authorized under	
	the DOE work authorization process and performed under the laboratory's	
	Management and Operating (M&O) contract,	
	The following wording is acceptable for the authorization:	
	Authorization is granted for the (Enter Laboratory Name) Laboratory	
	to participate in the proposed project. The work proposed for the	
	laboratory is consistent with or complementary to the missions of the	
	laboratory, and will not adversely impact execution of the DOE	
	assigned programs at the laboratory.	
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	Funded Research and Development Centers included as a	
	Subrecipient	
	DOE/NNSA and non-DOE/NNSA FFRDCs may be proposed as a Subrecipient	Formatted: Indent: Left: 1.25"
	on another entity's application subject to the following guidelines:	
	1. Authorization for non-DOE/NNSA FFRDCs	- " Formatted: Indent: Left: 1,5", No bullets or numbering
	The Federal agency sponsoring the FFRDC must authorize in writing the	Formatted: Indent: Left: 1.5"
	use of the FFRDC on the proposed project and this authorization must be	
	submitted with the application. The use of a FFRDC must be consistent	
	with its authority under its award.	
	2. Authorization for DOE/NNSA FFRDCs	···· Formatted; Indent: Left: 1.5". No bullets or numbering
	The cognizant Contracting Officer for the FERDC must authorize in writing	Formatted: Indent: Left: 1.5"
	the use of the FFRDC on the proposed project and this authorization must	
	be submitted with the application. The following wording is acceptable	
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Energy Efficiency & Renewable Energy

> Authorization is granted for the [Enter Laboratory Name] Laboratory to participate in the proposed project. The work proposed for the laboratory is consistent with or complementary to the missions of the laboratory, and will not adversely impact execution of the DOE assigned programs at the laboratory.

3. Value/Funding

The value of and funding for the FFRDC portion of the work will not normally be included in the award to a successful applicant. Usually, DOE will fund a DOE/NNSA FFRDC contractor through the DOE field work proposal system and non-DOE/NNSA FFRDC through an interagency agreement with the sponsoring agency.

4. Cost Share

Although the FFRDC portion of the work is usually excluded from the award to a successful applicant, the applicant's cost share requirement will be based on the total cost of the project, including the applicant's and the FFRDC's portions of the project.

5. Responsibility

The Prime Recipient will be the responsible authority regarding the settlement and satisfaction of all contractual and administrative issues including, but not limited to disputes and claims arising out of any agreement between the Prime Recipient and the FFRDC contractor.

6. Limit on FFRDC Effort

The FFRDC effort, in aggregate, shall not exceed 49.950% of the total estimated cost of the project, including the applicant's and the FFRDC's portions of the effort.

J.F. Limitation on Number of Concept Papers and Full Applications Eligible for Review

Applicants may submit more than one-letter of intent, concept paper, and corresponding Full Application to this FOA, provided that each application describes a unique, scientifically distinct project.

Questions about this FOA? Email <u>SETO.FOA@ec.doe.gov.</u> Problems with SERE Exchange? Email <u>SERE EERE ExchangeSupport@hg.doe.gov</u> Include FOA name and number in subject line. Formatted: Indent: Left: 1.5", Right: 0.5"

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K.<u>G.</u>Questions Regarding Eligibility

EERE will not make eligibility determinations for potential applicants prior to the date on which applications to this FOA must be submitted. The decision whether to submit an application in response to this FOA lies solely with the applicant.

IV. Application and Submission Information

a.A. Application Process

The application process will include four phases: a Letter of Intent Phase, a Concept Paperone phase,: a Full Application phase, and a Reply to Reviewer Comments phase. Only applicants who have submitted a letter of intent will be eligible to submit a concept paper. In addition, submitting a compliant Concept Paper is required in order to be eligible to submit a Full Application. Replies to reviewer comments are optional but must be compliant if submitted... At each phase, EERE performs an initial complianceeligibility review of the applicant submissions to determine whether they meet the eligibility requirements of Section III of the FOA. EERE will not review or consider submissions that do not meet the eligibility requirements of Section III. All submissions must conform to the following form and content requirements, including maximum page lengths (described below) and must be submitted via EERE Funding Opportunity Exchange website at https://eere-exchange.energy.gov/, unless specifically stated otherwise. EERE will not review or consider submissions submitted through means other than EERE Exchange, submissions that are submitted after the applicable-submission deadline, and incomplete submissions. EERE will not extend deadlines for applicants who fail to submit required information and documents due to server/connection congestion. The EERE Funding Opportunity Exchange-website will-create the submission record and assign a Control Number when an applicant clicks the "Apply" button, completes the Letter of intent initial details page then clicks the "Create Concept Paper"-button located at the bottom of the page. The control number begins with the FOA number and is then followed by a dash and 4 random numbers (e.g., 1840-1576). The control number will remain the same through the entire-application process for each unique application-A control number will be issued when an applicant begins the EERE Exchange application process. This control number must be included with all Application documents, as described below.

Questions obout this FOA? Email <u>SETO.FQA@ee.doe.gov.</u> Problems with EERE Exchange? Email EERE<u>EExchangeSupport@ha.doe.gov</u> Include FOA name and number in subject line.

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> Formatted: Indent: Left: 0.88" The Letter of Intent, Concept Paper, The Full Application, and Reply to Reviewer Comments must conform to the following requirements: Formatted: Indent: Left: 0" Each must be submitted in Adobe PDF format unless stated otherwise. Each must be written in English. All pages must be formatted to fit on 8.5 x 11 inch paper with margins not less than one inch on every side. Use Use Times New Roman typeface, a black font color, and a font size of 12 point or larger (except in figures or tables, which may be 10 point font). A symbol font may be used to insert Greek letters or special characters, but the font size requirement still applies. References must be included as footnotes or endnotes in a font size of 10 or larger. Footnotes and endnotes are counted toward the maximum page requirement. Use of Times New Roman typeface is recommended, illegible submissions will not be reviewed. The Control Number must be prominently displayed on the upper right corner of the header of every page. Page numbers must be included in the footer of every page. Each submission must not exceed the specified maximum page limit, including cover page, charts, graphs, maps, and photographs when printed using the formatting requirements set forth above and single spaced. If applicants exceed the maximum page lengths indicated below, EERE will review only the authorized number of pages and disregard any additional pages, Applicants are responsible for meeting each submission deadline. Applicants are Formatted: Indent: Left: 0.88' strongly encouraged to submit their-Letters of Intent, Concept-Papers, and Full Formatted: Font color: Auto Applications at least 48 hours in advance of the submission deadline. Under normal conditions (i.e., at least 48 hours in advance of the submission deadline), applicants should allow at least 1 hour to submit a Letter of Intent, Concept Paper, Formatted: Font color: Auto Full Application, or Reply to Reviewer Comments. Once the Letter of Intent, Formatted: Font color: Auto Concept Paper, Full Application, or Reply to Reviewer Comments is submitted in Formatted: Font color: Blue EERE Exchange, applicants may revise or update that submission until the expiration of the applicable deadline. If changes are made, the applicant must resubmit the Letter of Intent, Concept Paper, Full Application, or Reply to Formatted: Font color: Auto Reviewer Comments before the applicable deadline. Formatted: Font color: Blue EERE urges applicants to carefully review their Full Applications and to allow Formatted: Indent: Left: 0.88" sufficient time for the submission of required information and documents. All Full Applications that pass the initial eligibility review will undergo comprehensive technical merit review according to the criteria identified in Section V.A.2 of the Formatted: Tab stops: 3", Centered + 6", Right + Not at FOA. 5.56 Questions about this FOA? Email SETO.FOA@ee.doc.gov.

Problems with EERE Exchange? Email EERE-<u>EERE-ExchangeSupport@hq.doe.qov</u> Include FOA nome and number in subject line.

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Additional Information on EERE Exchange
 EERE Exchange is designed to enforce the deadlines specified in this FOA. The
 "Apply" and "Submit" buttons will automatically disable at the defined submission deadlines. This means applicants in the process of submitting an application will be locked out and unable to complete the process (see cover page for application deadlines). Should applicants experience problems with EERE Exchange, the following information may be helpful.
 Applicants that experience issues with submission or have questions about EERE Funding Opportunity Exchange website functionalityPRIOR to the FOA deadline: In the event that an applicant experiences technical difficulties with

a submission, the Application should first-contact the EERE Exchange helpdesk for assistance (EERE-ExchangeSupport@hq.doe.gov). The EERE Exchange helpdesk email address for assistance <u>EERE-</u> <u>ExchangeSupport@hq.doe.gov</u>). If the situation cannot be resolved over email, applicants may also call the EERE-and/or the EERE Exchange helpdesk at 202-287-1090, however this line is likely to be busy on application deadline dates. The Exchange helpdesksystem administrators will assist Applicants in resolving issues.

Applicants that experience issues/issue with submissions that result in late submissions: In the event that an applicant experiences technical difficulties so severe that they are unable to submit their application by the deadline, the applicant should contact the <u>EERE</u> Exchange helpdesk for assistance (<u>EERE-ExchangeSupport@hq.doe.gov</u>). The <u>EERE</u> Exchange helpdesk and/or the EERE Exchange system administrators will assist the applicant in resolving all issues (including finalizing submission on behalf of and with the applicant's concurrence). PLEASE NOTE, however, those applicants who are unable to submit their application on time due to their waiting until the last minute when network traffic is at its heaviest to submit their materials will not be able to use this process. Note that EERE Exchange can create a report documenting when a login occurred and when a submission was started to determine specifically when issues have occurred.

L-B.__Application Forms

The application forms and instructions are available on EERE Exchange. To access these materials, go to <u>https://eere-Exchange.energy.gov</u> and select the appropriate funding opportunity number.

Questions about this FOA? Email <u>SETO-FOA@ec.doc.gov</u>. Problems with EERE Exchange? Email EERE <u>_EERE_ExchangeSupport@ha.doc.gov</u> Include FOA name and number in subject-line, Formatted; Font: Callbri Formatted; Font: Keep with next, Don't keep lines together Formatted; Indent: Left: 0.88°, Don't keep with next, Don't keep lines together

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Formatted: Font: Not Bold Note: The maximum file size that can be uploaded to the EERE Exchange website is 4 20MB10MB. Files in excess of 20MB10MB cannot be uploaded, and hence cannot Formatted: Indent: Left: 0.88" be submitted for review. If a file exceeds 20148, please attempt to reduce the size by compressing the file and/or images and figures within the file. If a file still exceeds 20MB10MB but is still within the maximum page limit specified in the FOA, it must be broken into parts and denoted to that effect. For example: ControlNumber_LeadOrganization_Project_Part_1 ControlNumber_LeadOrganization_Project_Part_2, etc. ii. Content and Form of the Letter of Intent To be eligible to submit a Concept Paper and Full Application, applicants must submit a Letter of Intent by the specified due date and time, Letters of Intent will be used by EERE to plan for the merit review process. The letters should not contain any proprietary or sensitive business information. The letters will not be used for down selection purposes, and do not commit an applicant to submit an application. EERE will not review or consider ineligible Letters of Intent (see Section III of the FOA]. Each applicant must provide the following information as part of the Letter of Intent: Project Title; - Lead Organization; Organization Type (Business < 500 Employees; Business > 1000 Employees; Business 500-1000 Employees; Federally Funded Research and Development Center (FFRDC); Government-Owned, Government Operated; Non Profit; University); Whether the Application has been previously submitted to EERE; % of effort contributed by the Lead Organization; The Project Team, including: o-The Principal Investigator for the Prime Recipient; o-Team Members (i.e., Subrecipients); and Ð -Key Participants (i.e., individuals who contribute in a substantive, measureable way to the execution of the proposed project); The specific FOA subtopic area being addressed and the Project Focus Area(s): e.g., Photovoltaics, CdTe deposition, Reliability Formatted: Tab stops: 3", Centered + 6", Right + Not at 5,56 Questions about this FOA? Email SETO.FOA@ee.doe.gov-Problems with EERE Exchange? Email EERE-EERE-ExchangeSupport@hg.doe.gov Include FOA name and number in subject line. •47



o- Topic/subtopic identification will help sort applications and determine reviewer expertise areas heeded for each application. -Abstract -- The abstract-provided should be not more than 200 words In length, and chould provide a truncated explanation of the proposed project. M. Content and Form of the Concept Paper To be eligible to submit a Full Application, applicants must submit a Concept Paper by the specified due date and time. Concept Paper Content Requirements Formatted: Font color: Blue Formatted: Normal, No bullets or numbering ESRE-will not review or consider non-compliant Concept Papers (see Section III of the FOA). Each Concept Paper must be limited to a single concept or technology. Unrelated concepts and technologies should not be consolidated into a single Concept Paper. The Concept Paper must conform to the following content requirements: Formatted: Tab stops: 3", Centered + 6", Right + Not at 5.56 Questions about this FOA7 Email SETO.FOA@ee.doe.gov-Problems with EERE Exchange? Email EERE- EERE-ExchangeSupport@ha.doe.gov Include FOA name and number in subject (ine. **√17**

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	careful consideration here is helpful.)
	The Project Team and contact information, including:
	• The Principal Investigator for the Prime Recipient (Technical Point of Contact).
	o- Team Members (I.e., Subrecipients)- and
	e- Key Participants (i.e., individuals who contribute in a
	substantive, measureable way to the execution of the proposed project); and
	 Budget Include a high level overview of estimated total project budget
	 Any Statements regarding confidentiality
	 No additional information, such as an application abstract, should
	be included on this page
Project Description	Applicants are required to describe succinctly
[4 Pages Max]	 The proposed technology or solution, including its basic
	perating principles and how it is unique and innovative;
	The current state of the art in the relevant field and
	application, including key shortcomings, limitations, and
	challenges;
	 How the proposed project will overcome the shortcomings;
	limitations, and challenges in the relevant field and application
	 The potential impact, with justification, that the proposed
	project would have on the relevant field and application and its
	relevance to industry and SETO goals as described in section I.B
	 Include a clear and concise (high-level) statement of the
	midpoint and end goals of the project. Each goal should be
	quantifiable and verifiable.
	 The most challenging risks the proposed project will likely face
	and mitigation strategies
	 The aspects of the team that are most relevant to the
	proposed work (i.e. applicant experience in the field and in
	working together, equipment and facilities access, etc.)
	 Applicants may provide graphs, charts, or other data to
	supplement their Technology Description, however, this
	supplemental information will count toward the page-limit-
	In additions an unlimited number of reference pages, one page letters
	of support and/or 1-page resumes of project participants may be
	automatical business water excited

Questions about this FOA2-Email <u>SETD.FOA@ec.doe.gov</u> Problems with FERE fixchange2-Email EERE-<u>EERE-ExchangeSupport@hq.doe.gov</u> Include FOA name and number in subject line,

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Summary Slide (Not	There is a PPT file template that can be downloaded from LERE
included in page limit)	Exchange.
	Applicants are required to provide a single PowerPoint slide
1	summarizing the proposed project. The slide must be submitted in
1	Microsoft PowerPoint format. This slide is used during the evaluation
	process and should be legible when viewed on a screen in a conference foom
	The Summary Slide regultes the following information:
	 The project's key idea/takeaway
	 A description of the project's Impact
ł	Proposed project goals
	*- Any key graphics (illustrations, charts, and/or tables)
	 Project title, Prime Recipient, Principal Investigator, and Sub- recipients
	 Requested SETO funds and proposed applicant cost share (if applicable)

EERE makes an independent assessment of each Concept Paper based on the criteria in Section V.A.I of the FOA. EERE will encourage a subset of applicants to submit Full Applications. Other applicants will be discouraged from submitting a Full Application. An applicant who receives a "discouraged" notification may still submit a Full Application. EERE will review all eligible Full Applications. However, by discouraging the submission of a Full Application, EERE intends to convey its lack of programmatic interest in the proposed project in an effort to save the applicant the time and expense of preparing an application that is unlikely to be selected for award negotiations.

EERE may include general comments provided from reviewers on an applicant's Concept Paper in the encourage/discourage notification posted on EERE Exchange at the close of that phase.

N. Content and Form of the SIPS Application

To be eligible to submit a Full Application, applicants must submit a SIPS application by the specified full application/SIPS application due date and time.

il. Concept Paper and SIPS Applications Content Regulrements

In an effort to limit the resources required by applicants to apply for the Small and Innovative Projects In Solar (SIPS) (from Topic 2.1 and 3.1) a simplified application process will be used. Following submission of an LOI,

Question: obout this FOA? Email <u>SETO: FOA@ec.gov</u> Problems with EERE Exchange? Email EERE <u>EERE ExchangeSupport@ha.doc.gov</u> Include FOA name and number in subject line. Formatted: Tab stops: 3", Centered + 6", Right + Not at 5,56"

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> there is an expedited concept paper-phase for SIPS projects. SIPS projects do not need to submit a concept paper by the deadline listed on the cover paper; <u>Tople Areas 2.1 and 3.1 SIPS applications must instead resubmit</u> <u>their Letter of Intent again as the concept paper and also include a</u> <u>summary slide by the concept paper deadline to bypass an administrative</u> <u>software restriction of EERE Exchange.</u> Full SIPS applications should be submitted by the full application and SIPS Application deadline, and all SIPS full applications should complete their submissions using the format provided in this section. Failure to complete these required process steps will result in an inability to submit a SIPS application for review.

All-SIPS Application documents must be marked with the Control Number issued to the applicant.

EERE will not review or consider non-compliant SIPS applications

Each application must be limited to a single concept or technology. Unrelated concepts and technologies should not be consolidated into a single application.

The SIPS application must conform to the following content requirements:

Questions about this FOA? Email <u>SETO.FOA@es.doc.qov</u>. Problems with EERE Exchange? Email <u>EERE ExchangeSupport@ha.doc.qov</u> Include FOA name and number in subject line. Formatted: Tab stops: 3", Centered + 6", Right + Not at 5.56"

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	- The Principal Investigator for the Prime Recipient (Technical
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	o-Team Members li.e. Subrecipients); and
	- Key Participants (I.e., Individuals who contribute in a
	substantive, measureable way to the execution of the
	proposed project); and
	budget
	Any-Statements-regarding-confidentiality
	 No additional information, such as an application abstract, should
	be included on this page
Project Description	Applicants are required to describe succinctly:
14 Pages Max	 The proposed technology or solution, including its basis
	operating principles and how it is unique and innovative:
	The current state of the art in the relevant field and
	application, including key shortcomings, limitations, and
	challenges;
	 How the proposed project will overcome the shortcomines.
	limitations, and challenges in the relevant field and application
	The actantial impact with instituation that the proposed
	project would have on the relevant field and application and it
	project would have on the relevant field and application and it relevance to industry and SETO goals as described in section 1.6
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Questions about this FOA? Email <u>SETO.FOA@ee.doc.gov</u> Problems with EERE Exchange? Email EERE <u>EERE ExchangeSupport@hg.doe.gov</u> Include FOA nome and number in subject line,

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included in page limit)	Exchange.
	Applicants are required to provide a single PowerPoint slide
	summarizing the proposed project. The slide must be submitted in
	Microsoft PowerPoint format. This slide is used during the evaluation
1	process and should be legible when viewed on a screen in a conference
	room.
	The Summary Slide requires the following information:
	 The project's key idea/takeaway
	 A description of the project's impact
	 Proposed project goals
	 Any key graphics (illustrations, charts, and/or tables)
	 Project title, Prime Recipiant, Principal Investigator, and Sub- recipients
	 Requested SETO (unds and proposed applicant cost share (if applicable)

EERE makes an independent assessment of each SIPS application based on the criteria in Section V.A.II of the FOA.

O-<u>i.</u> Content and Form of the Full Application Applicants must submit a Full Application by the specified due date and time to be + considered for funding under this FOA. Applicants must complete the following application forms found on the EERE Exchange website at <u>https://eere-Exchange.energy.gov/</u>, in accordance with the instructions.

Applicants will have approximately 30 days from receipt of the Concept Paper Encourage/Discourage notification on EERE Exchange to prepare and submit a Full Application. Regardless of the date the applicant receives the Encourage/Discourage notification, the submission deadline for the Full Application remains the date and time stated on the FOA cover page.

Questions about this FOA? Email <u>SETC.FOA@cc.doe:gev</u>. Problems with SERF Exchange? Email EERE <u>EERE ExchangeSupport@hq.doe.qov</u> Include FOA game and number in subject line.

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Each Full Application shall be limited to a single concept or technology. Unrelated concepts and technologies shall not be consolidated in a single Full Application.

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	Assistance	
	Budget Justification (EERE 335)	ControlNumber LeadOrganization Budget
	(Microsoft Excel format, Applicants must	Justification
	Use the template available in EERE	
	Exchange)	
	Summary for Public Release (1 page	ControlNumber LeadOrganization Summa
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l	Subrecipient Budget Justification, if	ControlNumber LeadOrganization Subreci
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1	Data Management Plan	ControlNumber LeadOrganization DMP

Note: The maximum file size that can be uploaded to the EERE Exchange 4website is 20MB10MB. Files in excess of 20MB10MB cannot be uploaded, and hence cannot be submitted for review. If a file exceeds 20MB, please attempt-to-reduce the size by compressing the file and/or-images and figures within the file, If a file still exceeds 20M810MB but is still within the

Questions about this FOA? Email SETO, FOA@cc.doc.gov. Problems with EERE Exchange? Email EERE EERE ExchangeSupport@ha.doe.gov Include FOA name and number in subject line.

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maximum page limit specified in the FOA it must be broken into parts and denoted to that effect. For example: ControlNumber_LeadOrganization_ProjectTechnicalVolume_Part_1 Formatted: Indent: Left 1.25" ControlNumber_LeadOrganization_ProjectTechnicalVolume_Part_2, etc Formatted: Font: Not Bold EERE will not accept late submissions that resulted from technical Formatted: Indent: Left: 1.25" difficulties due to uploading files that exceed 20MB10MB. EERE provides detailed guidance on the content and form of each Formatted: Indent: Left: 1,25" component below. ii. Technical Volume Formatted: Font: Calibri The Technical Volume must be submitted in Adobe PDF format-or Microsoft Formatted: Indent: Left: 1.25" word (.doc or .docx)-, The Technical Volume must conform to the following content and form requirements, including maximum page lengths. If applicants exceed the maximum page lengths indicated below, EERE will review only the authorized number of pages and disregard any additional pages. This volume must address the Merit Review Criteria as discussed in Section V.A.2 of the FOA. Save the Technical Volume in a single PDF file using the following convention for the title: "ControlNumber_LeadOrganization_TechnicalVolume". Applicants must provide sufficient citations and references to the primary Formatted: Indent: Left: 1.25" research literature to justify the claims and approaches made in the Technical Volume. However, EERE and reviewers are under no obligation to review cited sources, The Technical Volume to the Full Application may not be more than 4520 Formatted: Indent: Left: 1.25" pages, including the cover page, table of contents, and all citations, charts, Formatted: Default Paragraph Font graphs, maps, photos, or other graphics, and must include all of the Formatted: Default Paragraph Font information in the table below. There are not strict page limits on sections to allow applicants the flexibility to structure the application in a way to best articulate the project and address the content requirements. The applicant should consider the weighting of each of the evaluation criteria (see Section V.A.2 of the FOA) when preparing the Technical Volume. SECTION/PAGE LIMIT DESCRIPTION Formatted Table Project Title Cover Page Formatted: Tab stops: 3", Centered + 6", Right + Not at Questions about this FOA? Email SETO.FOA@co.doc.gov Problems with EERE Exchange? Email EERE <u>EERE ExchangeSupport@ha.doe.gov</u>

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Include FOA name and number in subject line.



		The cover page should include the project title the specific FOA]	Formatted: Foot: 10.5 pt
		SubTopicTopic Area being addressed [8] applicable], both the	Γ.	
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		A. Note: This will help cart applications and determine reviewer	1	Formatted: Font: 10.5 pt
		expectice areas needed for each application to taraful		
		consideration here is helpful.)		
		 The Project Team and business points of contact information; 	ļ	Formatted: Font: 10.5 pt, Font color: Text 1
		Including:		
		o	ł	
		Point of Contact)-	ł	
		o Team Members (i.e., Subrecipients); and		
		o Key Participants (i.e., individuals who contribute in a		_
		substantive, measureable way to the execution, names of the		Formatted: Font: 10.5 pt, Font color: Text 1
		proposed project); and	1	<u></u>
		 Budget - Include a high level averview of estimated project budget: 		
		Listing an estimated breakdown for the project, separated by teaming	ł	
		partners and only these high level activity categories		
		o	1	
		ab, Fringe Benefits	1	
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		o Cost Share	í –	
		Individual-line item costs within high level activities (i.e. within staff		
		time breaking out by employee 1, employee 2, etc) are not required.	1	
		There is a helpful Excel-document that can help calculate these costs	[
		that can be downloaded from EERE Exchange, the EERE 335 budget	1	
		justification form. This document is not a required application	1	
1	1	requirement but will be required if selected for negotiation of an		
		awarch		
1		 Any Statements all team member organizations, and any statements. 	ŀ	Formatted: Font: 10.5 pt
		regarding confidentiality		
)		 No additional information, such as an application abstract, should be		Formatted: Normal, Left, Space Before: 6 pt, After: 6 pt,
		included on this page		No bullets or numbering
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ENERGY Energy Efficiency & Renewable Energy

Project Overview (This	The Project Overview should contain the following information:	- (Formatted: Font: 10.5 pt
section should	 Background: The applicant should discuss the background of their 	
constitute	organization, including the history, successes, and current research	
approximately 10% of	and development status (i.e., the technical baseline) relevant to	
the Technical Volume)	the technical topic being addressed in the Full Application.	
	 Project Objectives/Goals: The applicant should provide a clear and 	- Formatted: Font: 10.5 pt, Font color: Text 1
	concise (high-level) statement of the goals and objectives of the	
	project as well as the expected outcomes. Goal: The applicant should _	- { Formatted: Font: 10.5 pt, Font color: Text 1
	explicitly Identify the targeted Improvements to the baseline	Formatted: Font: 10.5 pt
	technology and the critical success factors in achieving that goal	Formatted: Font: 10.5 pt, Font color: Text 1
	 Relevant, previous work efforts, demonstrated innovations, and how 	······································
	these enable the applicant to achieve the project our entry that DOE	Construction of the second sec
	DOE Impact: the applicant should discuss the impact that DOE funding would have an the proposed evaluat. Applicants chould	- Teomatted: Font: 10.5 pt
	cherifically evaluate on the proposed project. Applicants should	
	anticipated funding from other public and private sources, is	
	necessary to achieve the project objectives.	
·]	The protostrophylos Description should contain the following before other	Provident Park 40 Park State Task -
Project Technical	The ktolectrechnical pescubriou shound contain the joitowing hinorimadobit	Formatted: Font: 10.5 pc, Font color: Text 1
Description, Innovation,	 Relevance and Outcomes: The applicant should provide a detailed ` 	Formatted: Space After: 6 pt
and Impact (This section	description of the project for the first and final years technology,	Formatted: Font: 10.5 pt, Font color: Text 1
should constitute	Including the activities, scientific and other principles and	Formatted Table
the Technical Volume)	objectives, and outcomes that will be pursued during the project.	Formatted: Font: 10.5 pt, Font color: Text 1
the rechincar volume	to the goals and objectives of the EOA including the notential to	Formatted: Font: 10.5 pt, Font color: Text 1
	meet specific DOF mission technical targets or other relevant	Formatted: Font: 10.5 pt, Font color: Text 1
	performance targets. The applicant should clearly specify the	Formatted: Font: 10,5 pt, Font color: Text 1
	expected outcomes of the project,	- Formatted: Font: 10.5 pt, Font color: Text 1
	 Feasibility: The applicant should demonstrate the <u>technical</u> 	
	feasibility of the proposed project technology and capability of	- Formatted: Font: 10.5 pt, Font color: Text 1
	achieving the anticipated performance targets for the first and final	Formatted: Font: 10.5 pt, Font color: Text 1
	years, including a description of previous work done and prior	- Formatted: Font: 10.5 pt, Font color: Text 1
	results.	
	 Innovation and impacting models; The applicant should describe the current state of the act is the applicable field, the second content state 	
	innovation of the proposed calutienterbuology the advantages of	Formatted Normal
	the proposed solution technology over current and emerging	Formatted: Font color: Text 1
	areastechnologies, and the overall impact on advancing the	Formatted: Font color: Text 1
· · ·	current state/ of the art/technical baseline if the project is	Formatted: Font color: Text 1
	successful. The application should include a justification for the	Formatted: Font color: Text 1
)	impact-assessment approach and impact claim (e.g. performance 🛝	Formatted: Font color: Text 1
	Improvement expectations and ramifications, cost model with	Formatted: Font color: Text 1
	references, future market opportunity size, etc.) as well as a	', Formatted: Font color: Text 1
	description of the pathway to achieve stated impact after the end	Formatted: Font color: Text 1
	or the proposed project s period of performance,	Permatende Tale alonge 28 Castered a CB Picture 4 Act -4
		/ 5.56 ^a

Questions about this FCA2 Email SETO.FOA@eo.doc.gov. Problems with EERE Exchange? Email EERE <u>EERE ExchangeSupprt@ha.doe.gov</u> Include FOA name and number in subject line.

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	Summary Statement of	Provide a succinct description of the specific activities to be conducted over	
	Project-Objectives	the proposed period of performance. Descriptions should contain enough	
	(SOPO)-Workplan and	detail to convey and disclose the work occurring (i.e., vague statements such as	
	Market Transformation	"we will then complete a proprietory process" are unacceptable). A summary	
	Plan (This section	of the general work involved is helpful for the review process, however,	
	should constitute	spending a tremendous amount of time outlining every detail of the project is	
	approximately 40% of	not-warranted until after selection. It is the Applicant's responsibility to	
	Appioximately 40% of	prepare an adequately detailed summary SOPO to convince reviewers that the	
	the reconical volumes	proposed project and team can meet the goals of the funding program. The	
		Summary SOPO should contain the following Information:	
		Scope Summary-The Workplan should include a summary of the Project	
		Objectives, Technical Scope, Work Breakdown Structure, Milestones,	
	[Go/No-Go Decision Points, and Project Schedule. A detailed Statement of	
		Project Objectives (SOPO) is separately requested. The Workplan should	
		contain the following information:	
		Contain the following nationality	
]	 Project Objectives: The applicant should provide a clear and 	
		concise (high-level) statement of the goals and objectives of the	
		project as well as the expected outcomes.	
	{	 Technical Scope Summary: The applicant should provide a 	Formatted: Font: 10.5 pt
		summary description of the overall work scope and approach to	
	· ·	achieving the project objectives/goals. The 'Scope Summary' achieve	
		the objective(s). The overall work scope is to be divided by	
		performance periods that are separated by discrete	
		approvimately appual decision points (see below for more	
		information on go/no-go decision points (see below to more	
		describe the specific excested and result of each performance	·
		noried	
		period.	
1		 work Breakdown Structure (WBS) and Task Description Summary: 	Formatted: Normal, Bulleted + Level: 1 + Aligned at: 0.25" + Indept at: 0.5"
		The workplan should describe the work to be accomplished and	
	1	now the applicant will achieve the milestones and achieve, will	Formatten: Font: 10.5 pt
		accomplish the final project goal(s)-), and will produce all	Formatted: Font: 10.5 pt
		deliverables. The Workplan is to be structured with a hierarchy of	
		performance period (approximately annual), task and subtasks,	
		which is typical of a standard work breakdown structure (WBS) for	
		any project. The Workplan shall contain a concise description of	
		the specific activities to be conducted over the life of the project.	
		The description shall be a full explanation and disclosure of the	
		project being proposed (i.e., a statement such as "we will then	
		complete a proprietary process" is unacceptable). It is the	
i		applicant's responsibility to prepare an adequately detailed task	
		plan to describe the proposed project and the plan for addressing	
		the objectives of this FOA. The summary provided should be	
		consistent with the SOPO. The SOPO will contain a more detailed	
		description of the WBS and tasks.	Formatted: Font: 10.5 pt
[Tasks It is critical that the overall project objective is broken into	
		separate Task sections that are clearly linked to and combine to result	
		in the project milestone and final objective. A Task is an executable or	Formatted: Tab stops: 3", Centered + 6", Right + Not at
1			/(<u>5,50</u> °)

Questians about this FOA? Email <u>SETO.FOA@ee.doc.goy</u>. Problems with EERE Exchange? Email EERE-<u>EERE SuchangeSupport@hg.doc.gov</u> Include FOA nome and number in subject line.

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		an operation that is enabled by the collection of sublasks associated		
		with it. As such, Tasks represent something more than just the	l	
		collection of data. Each task description should include a budget		
		amount for each year of proposed work.		
		 (Optional) Sub tasks may be included if further detail of the 	ĺ	
		breakdown of the work is needed. Each Task may be broken out into		
		component Subtask sections to specify the activities that will be		
		conducted to accomplish the task. A Subtask describes a specific		
Í		activity that is designed to deliver a device, tool, or technique to	ł	
		collect data. The approach through which the activity is performed is	Í	
		designed to allow the associated task to have a determinant outcome.		
		Broinst Schodula (Canti Chart-or cimilarly, Thoopplingst should 4		Formatted: Font: 10.5 pt
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		Milectore Summary The applicant should provide a summary of	ĺ	at: 0.5"
ĺ	1	- Milestone Summary. The applicant should provide a summary of	į.	ν _{τα}
		appropriate milestones throughout the project to demonstrate	ł	
ĺ		success. A milestone may be either a progress measure (which can		
		be activity based) or a SMART technical milestone. SMART	ļ	
		<u>milestones should be Specific, Measurable, Achievable, Relevant,</u>	(
		and Timely, and must demonstrate a technical achievement rather		
		than simply completing a task. Unless otherwise specified in the	ł	
	1	FOA, the minimum requirement is that each project must have at		
		least one milestone per quarter for the duration of the project		
		with at least one SMART technical milestone per year (depending	1	·
]		on the project, more milestones may be necessary to		
· [comprehensively demonstrate progress). The applicant should	1	
		also provide the means by which the milestone will be verified.		
. 1		Milectone Summary Table or Hist-		
		The applicant should around a summary of appropriate	ĺ	
	-	nerformance tareets for the project tormed 'milestones.' There		
		should have sufficient sumbar of milestones to domanstrate the		
1		annier of understands the store it will take to achieve the		
(nolect objectives.		
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		constabilities the hottom of the tack where decointing they	ł	
1		are rejourned to it is unite the applicant to display milestones in		
{		the use that is most appropriate to their property.		
		. Include the baceline capability of the applicant from it is		
		important to document what the team has demonstrated or is	l	Formatted: Foot: 10.5 of
		building off of to achieve the project objectives. The baceling		Formation, Join 10.5 pt
		canability is the effort that can be collably controlled with an end	17	Formatted: Add space between paragraphs of the same
		result that is repeatable.) I 7	+ Aligned at: 0.25" + Tab after: 0.5" + Indent at: 0.5"
l		 Include a The summary provided should be consistent with the 		Formatted; Font: 10.5 pt
		Milestone Summary Table in the SOPO.	Ľ,	Formatted: Font: 10.5 ot
1		eGo/No-Go Decision PeintPoints: The applicant should provide a *//	1	Formatted Fout 18.5 pt
ļ		summary of project-wide go/no-go decision points at t he midpoint	1	Contraction of the second seco
1	<u> </u>	of the project appropriate points in the Summary SOPOWorkplan. A	۱,	5,56" 5,56"

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go/no-go decision point is a risk management tool and a project	
management best practice to ensure that, for the current phase or	
period of performance, project technical success is definitively	- Formatted: Font: 10.5 pt
achieved and potential for success in future phases or periods of	
performance is evaluated, prior to actually beginning the	
execution of future phases. Unless otherwise specified in the FOA.	
the minimum requirement is that each project must have at least	
one project-wide go/no.go decision point for each hudget period	
(12 to 18 month period) of the project. The Applicant should also	- Energy Hade Easts 10 5 at
provide the specific technical criteria to be used to make the	romates role to spe
ge/po-ge decking. The summary provided should be consistent	
with the SOBO Color and action points are considered "CMART"	
with the 50FO, doyne go decision points are considered swamn	
and can juint the requirement for an annual swinking intestone.	
6 - Inspectant End of Project Goal: The applicant should provide a	- (Formatied: Font: 10.5 pt
summary of the end of project goalist.	
of MilestonesUnless otherwise specified in the FOA, the minimum	Formatted: Add space between paragraphs of the same
requirement is that each project must have one SMART end of	+ Alloned al: 0.25 ⁶ + Tab after: 0.5 ⁶ + Indent al: 0.5 ⁶
project goal. The summary provided should not be activity based	E
(he., provide a report, talk to sustamers, perform experiments); they	(Poinatear role 10.5 pt
chould Instead be SMART milestones (Specific, Measurable,	Formatted: Font: 10.5 pt
Achievable, Relevant, and Limely) and must demonstrate a definitive	
achievement of progress rather than simply performing work.	
consistent with the SOPO	
Project Schedule [Ganft Chart or similar]: The applicant should +	Formatted: Outline numbered + Level: 1 + Numbering
provide a schedule for the entire project, including task and	Style: Bullet + Aligned at: 0,25" + Tab after: 0.5" + Inden
subtask durations, milestones, and go/no-go decision points.	
 Project Management: The applicant should discuss the team's 	
proposed management plan, Including the following:	· · · · · · · · · · · · · · · · · · ·
 The overall approach to and organization for managing 	- Formatted: Font: 10.5 pt
the work	Formatted
o The roles of each Project Team member	
 Milestones should represent achievement of a specific mission- 	
related autcome as opposed to completion of task that may or	
may not achieve progress towards FOA related goals. For	
example 'make 100 phone calls' or 'explore 3 materials' are	
tasks that could be achieved without any measurable	
progress towards substantive goals. SETO is not interested in	
these types of milestones. Conversely-'sell 10 widgets' or	•
'achieve X% efficiency' relies on validation from	
entities/principles outside of the team's and represent	
measurable progress towards substantive goals related to	
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the FOA, — Although reports are required as part of the cooperative agreement, they cannot be used as milestones. Reports summarize observations, and milestones validate functionality.	Formalited Tab charge 38 Contered to 68 Michael Buch
	 go/no-go decision point is a risk management tool and a project management best practice to ensure that, for the current phase or period of performance, projecttechnical success is definitively achieved and potential for success in future phases or periods of performance is evaluated, prior to actually beginning the execution of future phases. Unless otherwise specified in the FOA, the minimum requirement is that each project must have at least one project wide go/no-go decision point for each budget period (12 to 18-month period) of the project. The Applicant should also provide the specific technical criteria to be used to make the go/no-go decision points are considered "SMART" and can fulfill the requirement for an annual SMART milestone. o Indude an End of project Goal: The applicant should provide a summary of the end of project goal(s). MilestonesUnjess otherwise specified in the FOA, the minimum 4 requirement is that each project must have one SMART end of project goal (s). MilestonesUnjess otherwise specific, Measurable, Achievable, Relevant, and Timely) and must demonstrate a definitive achievable, Relevant, and Timely) and must demonstrate a definitive achievable, Relevant, and Timely) and must demonstrate a definitive achievable, Relevant, and Timely) and must demonstrate a definitive achievable, Relevant, and Timely) and must demonstrate a definitive achievable, Relevant, and Ziner project. Including task and subtask durations, milestones, and go/no-go decision points. Project Schedule for the entire project. The applicant should + consistent with the SOPO. Project Schedule for the approach to and organization for mataging + the work The toles of each Project Team member Milestones should person to and organization for mataging + the work The toles of each Project Team member Milestones should be achieved without any measurable sciences words substantive goals. SETO is n

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ENERGY Energy Efficiency & Renewable Energy

	Г	o Any critical h	andoffs/interdependencies among Project	
	1	Team memb	ers	·
		o The technica	and management aspects of the	
	}	managemen	t plan including systems and practices such	
	· ·	as financial a	nd project management practices	
	} J		h to atalast sisk management	
		O THE approac	a the supervised at the second line the second second	
		o A description	or now project changes will be handled	
		o n'applicable,	the approach to Quality Assurance/Control	
)	o How commu	nications will be maintained among Project	
	1	leam memb	ers	
	1	 Market Transformation 	on Plan: The applicant should provide a	
	1 1	market transformatio	in plan, including the following:	
		o Identification	of target market, competitors, and	·
	1	distribution	channels for proposed technology along with	
	1	known or pe	rceived barriers to market penetration.	
		iorludine a m	aitieation plan	
		o Identification	of a product development and/or service	
	}	b identification	toplitation timeline (inancing product	
		plan, comme	reliferation antenne, matching, product	
		intellectual a	gavregulatory considerations including	
	1 1	meneciual p	roperty, initiastructure requirements, data	
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	 Explicitly Identify the task objectives/outcomes]	
	being addressed and a concise statement of the	· ·	
	objectives of that subtask.	1	
	Describe the work and techniques that will be		
	used and the expected result that will be		,
	generated from the effort.		
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	subtasks are listed)		
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	TeamTechnical Qualifications and Resources	The TeamTechnical Qualifications and	Formatted: Indent; Left: 1", Space After: 0 pt
	Approximately 20% of the Technical Volume	kesources should contain the tollowing	(Formatted: Font: 10.5 pt
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		 Describe the Project Team's unique 	Formatted: Font: 10.5 pt
		qualifications and expertise,	Formatted: Font: 10.5 pt
		including those of Key	Formatted: Font: 10.5 pt
		Describe the Project Team's	Formatted: Font: 10.5 pt
		existing equipment and facilities	Formatted: Font: 10.5 pt
		that will facilitate the successful	
		completion of the proposed	
		project; include a justification of	
		any new equipment or facilities	
		requested as part of the project.	
		TheThis section should also include	
		relevant, previous work efforts,	
		how these anable the applicant to	
		achieve the project objectives	
		Describe the time commitment of	- Formatted: Font: 10.5 pt
		the key team members to support	
		the project.	
		 TheAttach one-page resumes for 	
		key participating team members as	
		an appendix, Resumes do not	
		count towards the page	
		limit. Multi-page resumes are not	
		allowed.	
		Uescribe the technical services to he provided by DOE (MMEA CODOC)	Formatted: Font: 10.5 pt
		if applicable	
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	 Attach letters of commitment from all Subrecipient/third party cost share providers as an appendix. Letters of commitment do not count towards the page limit. Attach any letters of commitment - from partners/end users as an appendix (1 page maximum per letter). Letters of commitment do not count towards the page limit. The overall appresent to * end organization for mensing the work 	Formatted; Outline numbered + Level: 1 + Numbering Style: Bullet + Aligned at: 0,25" + Tab after: 0,5" + Indent at: 0,5" Formatted: Font: 10.5 pt Formatted
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	be performed by each Pl and Key Participant; o Business agreements between the applicant and each Pl and Key Participant; o How the various efforts	Numbering Style: Bullet + Aligned at: 0,75" + Tab after: 1" + Indent at: 1"
	will be integrated and managed; o Process for making decisions on scientific/technical direction; o Publication arrangements;	
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	commitment from all subrecipient/third party cost share providers as an appendix— Letters of	Commented [TEM2]: TEM: Use this row to add any specific requirements (documents, data) you want the Applicants to submit Change "FOAS pecific requirements" to whatever title you think is appropriate.
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	relevant entities ().e. end users of the proposed solution) as an appendix.	Formatted: Font: 10.5 pt Formatted: Tab stops: 3", Centered + 6", Right + Not at

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> Applicants are required to complete the Budget Justification Workbook, This form is available on EERE Exchange at https://eere-Exchange.energy.gov/. Prime Recipients must complete each tab of the Budget Justification Workbook for the project as a whole, including all work to be performed by the Prime Recipient and its Subrecipients and Contractors, and provide all requested documentation (e.g., a Federally-approved rate agreement, vendor quotes), Applicants should include costs associated with required annual audits and incurred cost proposals in their proposed budget documents. The "instructions and Summary" included with the Budget Justification Workbook, Applicants must carefully read the "Instructions and Summary" tab provided within the Budget Justification Workbook, Save the Budget Justification Workbook in a single Microsoft Excel file using the following convention for the title "ControlNumber LeadOrganization Budget Justification",

vi. Summary/Abstract for Public Release

Applicants are required to submit a one-page summary/abstract of their project. The project summary/abstract must contain a summary of the proposed activity suitable for dissemination to the public. It should be a selfcontained document that identifies the name of the applicant, the project director/principal investigator(s), the project title, the objectives of the project, a description of the project, including methods to be employed, the potential impact of the project (e.g., benefits, outcomes), and major participants (for collaborative projects). This document must not include any proprietary or sensitive business information as DOE may make it available to the public after selections are made. The project summary must not exceed 1 page when printed using standard 8.5 x 11 paper with 1" margins (top, bottom, left, and right) with font not smaller than 12 point. Save the Summary for Public Release in a single PDF file using the following convention for the title "ControlNumber_LeadOrganization_Summary",

iv-vil. Summary Slide

Applicants are required to provide a single PowerPoint slide summarizing the +proposed project. The slide must be submitted in Microsoft PowerPoint format, This slide is used during the evaluation process. Save the Summary Slide in a single file using the following convention for the title "ControlNumber_LeadOrganization_Slide".

The Summary Slide template can be downloaded from EERE Exchange and requires the following information:

Questions about this FOA? Email <u>SETO.FOA@ee.doe.gov</u>. Problems with FERE Exchange? Email EERE <u>EERE ExchangeSupport@hg.doe.gov</u> Include FOA name and number in subject line. Formatted: Font: Calibri
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A technology Summary;	
 A description of the technology's impact; Description of the technology's impact; 	
 Proposed project goals; Analysis and the standard standard	
 Any key graphics (illustrations, charts and/or tables); 	
 The project's key idea/takeaway; 	
 Project title, Prime Recipient, Principal Investigator, and Key 	
Participant Information; and	
 Requested EERE funds and proposed applicant cost share. 	
	[Formarced: FOA Template Style 3, Indenc: Left: 1.
vill. Subrecipient Budget Justification (EERE 335) (if applicable)	
Applicants must provide a separate budget justification, EERE 335 (i.e.,	
budget justification for each budget year and a cumulative budget) for each	
subrecipient that is expected to perform work estimated to be more than	
5250,000 or 25 percent of the total work effort (whichever is less). The	
budget justification must include the same justification information	
described in the "Budget Justification" section above, Save each subrecipient	
budget justification in a Microsoft Excel file using the following convention	
for the title	
"ControlNumber LeadOrganization Subrecipient Budget Justification",	
ix. Budget for DOE/NNSA FERDC (if applicable)	Formatted: Font; Calibri
If a DOF/NNSA FERDC contractor is to perform a portion of the work the	
applicant must provide a DOF Field Work Proposal (FWP) in accordance with	
the requirements in DOE Order 412.1. Work Authorization System DOE	
Order 412.1 and DOE O 412.1 (Field Work Pronosal form) area available at	
the following link, under "DOE Budget Forms":	
https://www.directives.doe.gov/directives-documents/400-series/0412.1-	`
BOrder-a-admche1/@@images/file. Save the FWP in a single PDE file using	
the following convention for the title	,
"ControlNumber LeadOrganization FWP".	
**x. Authorization for non-DOE/NNSA or DOE/NNSA FFRDCs (if	Formatted: Font: Calibil
applicable)	
The Federal agency sponsoring the FFRDC must authorize in writing the use	Formatted: Indent: Left: 1,25"
of the FFRDC on the proposed project and this authorization must be	
submitted with the application. The use of a FFRDC must be consistent with	
the contractor's authority under its award. Save the Authorization in a single	
PDF file using the following convention for the title	p
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vi-xiSF-LLL: Disclosure of Lobbying Activities (required)	- Formatted: Font: Callbri
Prime Recipients and Subrecipients may not use any Federal funds to	Formatted: Font: Calibri
influence or attempt to influence, directly or indirectly, congressional action	Formatted: Indent: Left: 1,25"
on any legislative or appropriation matters.	
Prime Recipients and Subrecipients are required to complete and submit	
SF-LLL, "Disclosure of Lobbying Activities"	,
(https://www.grants.gov/web/grants/forms/sf-424-individual-family.html) to +	Formatted; Indent: Left: 1,25"
<u>ensure that non-Federal funds have not been paid and will not be paid to any</u>	
person for influencing or attempting to influence any of the following in	
connection with your application;	
to ensure that non-Federal funds have not been paid and will not be paid	
to any person for influencing or attempting to influence any of the	
tellowing in connection with your application:	
 An officer or employee of any Federal agency; 	
 A Member of Congress; 	
 An officer or employee of Congress; or 	
 An employee of a Member of Congress. 	
Save the SF-LLL in a single PDF file using the following convention for the title < "ControlNumber_LeadOrganization_SF-LLL".	Formatted: Indent: Left: 1.25"
vii-xii. Walver Requests: Foreign Entitles and Performance of Work	Formatted; Font: Calibri
in the United States (if applicable)	
	Formatted: Indent: Left: 1.25"
1. Foreign Entity Participation:	Formatted: Indent: Left: 1.5", No bullets or numbering
As set forth in Section III.A.3, all Prime Recipients receiving funding under 4	Formatted: Font: Not Bold, Italic
this FOA must be incorporated (or otherwise formed) under the laws of a	Formatted; Indent: Left: 1.5"
State or territory of the United States. To request a waiver of this	
requirement, the applicant must submit an explicit waiver request in the	
Full Application. Appendix C lists the necessary information that must be	
included in a request to waive this requirement.	
2. Performance of Work in the United States	Formatted: Indent: Left: 1,5", No bullets or numbering
As set forth in Section IV.JK.iil, all work under EERE funding agreements 🔹 -	Formatted: Indent: Left: 1,5"
must be performed in the United States. This requirement does not apply	
to the purchase of supplies and equipment, so a waiver is not required	
for foreign purchases of these items. However, the Prime Recipient	Formatted; Tab stops: 3", Centered + 6", Right + Not at 5.56"
Quartions, about the SOA 2 Engel SEVO LOADer day and	
Problems with EERE Exchange? Email EERE EERE EERE ExchangeSupport@hg.doe.aov	
Include FOA name and number in subject line,	
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should make every effort to purchase supplies and equipment within the United States. <u>Appendix C lists the necessary information that must be</u> <u>included in a request to waive the Performance of Work in the United</u> <u>States requirement</u>.

P.A. Content and Form of Replies to Reviewer Comments

EERE will provide applicants with reviewer comments following evaluation of all eligible Full Applications. Applicants will have a brief opportunity to review the comments and to prepare a short Reply to Reviewer Comments responding to comments however they desire or supplementing their Full Application. The Reply to Reviewer Comments is an optional submission; applicants are not required to submit a Reply to Reviewer Comments. EERE will post the Reviewer Comments in Exchange. The expected submission deadline is on the cover page of the FOA; however, it is the applicant's responsibility to monitor Exchange in the event that the expected date changes. The expected submission deadline is on the cover page of the FOA; however, it is the applicant's responsibility to monitor email in the event that the expected date changes. The deadline will not be extended for applicants who are unable to timely submit their reply due to failure to check email or relying on the expected date alone. Applicants should enticipate having approximately three (3) business days to submit Replies to Reviewer Comments.

EERE will not review or consider ineligible Replies to Reviewer Comments (see + Section III of the FOA). EERE will review and consider each eligible Full Application, even If no Reply is submitted or if the Reply is found to be ineligible.

Replies to Reviewer Comments must conform to the following content and form requirements, including maximum page lengths, described below. If a Reply to Reviewer Comments is more than three pages in length, EERE will review only the first three (3) pages and disregard any additional pages.

SECTION	PAGELIMIT	DESERVICION
∓ext	2 pages max	A pplicants may respond to one or mere reviewer commants e r su pplem ent (heir Eull A ppli cation,
Optional	1 page max	Applicants may use this page however they wish; text, graphs, charts, or other data to respond to reviewer comments or supplement their full Application are acceptable.

Q. Possible Additional Documentation Requirements

Questions about this FOA? Email <u>SETO.FOA@ee.dog.gov</u>. Problems with EERE Exchange? Email <u>EERE ExchangeSupport@ha.doe.gov</u> Include FOA name and number in subject line. Formatted: Font color: Auto
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Energy Efficiency & Renewable Energy

In an effort to simplify and ease the application process, EERE will not require applicants to submit (at the time of the full application) all of the forms and documents that will eventually be required to process and approve a final project. However, each of the below documents are mandatory and must be supplied when requested and before the award can be made. If applicants foresee issues with completing the required documents they should not apply to this funding opportunity.

Additional Documents required prior to approval of new award:

viii. Statement of Project Objectives

Selectees are required to complete a full and complete Statement of Project Objectives (SOPO). Negotiations will leverage the application SOPO Summary as a starting point to complete the final project SOPO.

ix-i- Budget-Justification Workbook (EERE 335)

Selectees will be required to complete the Budget Justification Workbook. This form is available on EERE Exchange at <u>https://eere-</u> <u>Exchange-energy-gov/</u>. Prime Recipients must complete each tab of the Budget Justification Workbook for the project as a whole, including all work to be performed by the Prime Recipient and its Subrecipients and Contractors, and provide all requested documentation (e.g., a Federallyepproved rate agreement, vendor quotes). Selectees should include costs essociated with required annual audits and incurred-cost proposals in their proposed budget documents. The "Instructions and Summary" included with the Budget Justification Workbook will auto-populate as the applicant enters information into the Workbook. Selectees must carefully read the "Instructions and Summary" tab provided within the Budget Justification Workbook.

x. Subaward-Budget Justification (EERE 335) (if applicable) Selectees must provide a separate budget justification, EERE 335 (i.e., budget justification for each budget year and a cumulative budget) for each subawardee that is expected to perform work estimated to be more than \$250,000 or 25 percent of the total work effort (whichever is less).

xi. Summary/Abstract for Public Release

Selectees-are required to submit a one-page summary/abstract of their project. The project summary/abstract must contain a summary of the proposed activity suitable for dissemination to the public. It should be a

Questions-about this FOA7-Email <u>SETO-FOA@ee.doe.gov</u>. Problems-with EERE-Exchange? Email EERE-<u>EERE-ExchangeSupport@hg.doe.gov</u> Include FOA name-and-number in subject line. Formatted: Font: Calibri

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Energy Efficiency & Renewable Energy

self-contained document that identifies the name of the applicant, the project director/principal investigator(s), the project title, the objectives of the project, a description of the project, including methods to be employed, the potential impact of the project (e.g., benefits, outcomes), and major participants (for collaborative projects). This document must not include any proprietary or sensitive business information as DOE may make it available to the public after selections are made.

xii-i-Budget-for DOE/NNSA FFRDC (if applicable)

If a DOE/NNSA FFRDC contrastor is to perform a portion of the work, the Selectees must provide a DOE Field Work Proposal (FWP) in accordance with the requirements in DOE Order 412.1, Work Authorization System, DOE Order 412.1 and DOE O 412.1 (Field Work Proposal form) are available at the following link, under "DOE Budget Forms": <u>https://www.directives.doe.gov/directives-documents/400-seriec/0412.1-BOrder-a-admchg1/@@Images/file.</u>

xiii. U.S. Manufacturing Commitments

Meritorious applicants (except applications for Topic 4.1 and 4.2 which focus on workforce development) will be required to submit a US-Manufacturing Plan prior to selection for negotiation. The U.S. Manufacturing Plan is not a requirement or expectation that the project will include U.S. manufacturing activities during the award.Option 1: With U.S. Manufacturing Plans

As part of the application, applicants are required to submit a U.S. Manufacturing Plan, The U.S. Manufacturing Plan represents the applicant's measurable commitment that, if and when, any technology developed under the award-results in commercial products that those products will be manufactured in the U.S. or would otherwiseto support U.S. manufacturing and the economic benefit to US taxpayers. as a result of its award.

The <u>weight given to the U.S. Manufacturing Plans may be used by the</u> Selection Official as a program policy factor when selecting awards for negotiations. Seeduring the review and selection process varies based on the particular FOA. Applicants should review. Section V. C. I for more information on program policy factors A.2 of this FOA to determine the weight given to the U.S. Manufacturing Plans under this FOA.

A U.S. Manufacturing Plan should contain the following or similar preamble: "If selected for funding, the applicant agrees to the following commitments as a condition of that funding:" and, after the preamble, the plan should

Questions about this FOA? Email <u>SETO-FOA@ec.doc.aov.</u> Problems with EERE Exchange? Email EERE-<u>EERE-ExchangeSupport@hg.doe.gov</u> Include FOA name and number in subject-line. Commented [TEM3]: Choose the option that is applicable to your FOA, and delete the rest. Consult IP Counsel if you are unsure which option applies. Formatted: Font: Calibri Formatted: Font: Calibri

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> Include one or more specific and measureable commitments. For example, an applicant may commit particular types of products to be manufactured in the U.S. In addition to or instead of making a commitment tied to a particular product, the applicant may make other types of commitments still beneficial to U.S. manufacturing, the U.S. economy and/or the U.S. taxpayer. An applicant may commit to a particular investment in a new or existing U.S. manufacturing facility, keep certain activities based in the U.S. (i.e., final assembly) or support a certain number of jobs in the U.S. related to the technology and manufacturing. For an applicant which is likely to license the technology to others, especially universities for which licensing may be the exclusive means of commercialization the technology, the U.S. manufacturing plan may indicate the applicant's plan and commitment to use a licensing strategy that would likely support U.S. manufacturing.

When an applicant that is a domestic small business, domestic educational institution, or nonprofit organization is selected for an award, the U.S. Manufacturing Plan submitted by the applicant becomes part of the terms and conditions of the award. The applicant/awardee may request a waiver or modification of the U.S. Manufacturing Plan from DOE upon a showing that the original U.S. Manufacturing Plan is no longer economically feasible.

When an applicant that is a domestic large business is selected for an award, a class patent waiver applies as set forth in Section VIII. L. Under this class patent waiver, domestic large businesses may elect title to their subject inventions similar to the right provided to the domestic small businesses, educational institutions, and nonprofits by law. In order to avail itself of the class patent waiver, a domestic large business must agree that any products embodying or produced through the use of an invention conceived or first actually reduced to practice under the award will be substantially manufactured in the United States, unless DOE agrees that the commitments proposed in the U.S. Manufacturing Plan are sufficient.

For other entity types that are selected for award, please see Section VIII.L regarding U.S. manufacturing commitments,

Option 2: Without U.S. Manufacturing Plans

<u>EERE regulres subject inventions (i.e., inventions conceived or first actually reduced to practice under EERE awards) to be substantially manufactured in the United States by Project Teams and their licensees, as described below.</u>

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The applicant may request a modification or waiver of the U.S. Manufacturing Requirement.	
 Domestic Small Businesses, Educational Institutions and Nonprofits Domestic Small businesses (Including Small Business concerns), domestic educational institutions, and nonprofits that are Recipients or Subrecipients under EERE funding agreements must require their exclusive licensees to substantially manufacture the following products in the United States for any use or sale in the United States; (1) articles embodying subject inventions, and (2) articles produced through the use of subject inventions. This requirement does not apply to articles that are manufactured for use or sale overseas. 	
Domestic small businesses, domestic educational institutions and nonprofits must require their assignees to apply the same U.S. Manufacturing requirements to their exclusive licensees.	
These U.S. Manufacturing requirements do not apply to nonexclusive licensees.	Formatted: Font: 12 pt, Font color: Blue Formatted: Normal, No bullets or numbering
2. Large Businesses, Foreign Entities, and State and Local Government Entities Large businesses and foreign entities that are Recipients or Subrecipients under EERE funding agreements that take title to subject inventions through a patent waiver are required to substantially manufacture the following products in the United States: (1) products embodying subject inventions, and (2) products produced through the use of subject invention(s). This requirement applies to products that are manufactured for use or sale in the United States or overseas.	
Large businesses and foreign entities must apply the same U.S. Manufacturing requirements to their assignees, licensees, and entitles acquiring a controlling interest in the large business or foreign entity. Large businesses and foreign entities must require their assignees and entities acquiring a controlling interest in the large business or foreign entity to apply the same U.S. Manufacturing requirements to their licensees.	
<u>3. FFRDCs</u>	Formatted: Tab stops: 3", Centered + 6", Right + Not at 5,56"
Questions about this FOA? Email <u>SETO, FOA@ee,doo.gov</u> . Problems with EERE Exchange? Email EERE <u>EERE ExchangeSupport@hq.doe.gov</u> Include FOA name and number in subject line.	
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DOE FFRDCs are subject to the U.S. Manufacturing requirements set forth in their Management and Operating Contracts. All other FFRDCs are subject to the U.S. Manufacturing requirements as set forth above, based on their size and for-profit status.	
<u>xiv. Data Management Plan</u>	Formatted: Font: Calibri
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Applicants whose Full Applications are selected for award negotiations will	Formatted: FOA Template Body, Indent: Left: 0"
be required to submit a Data Management Plan during the award	Formatted: Indent: Left: 1.25"
negotiations phase. The Data Management Plan is a document that outlines	Formatted: Font color: Auto
the proposed plan for data sharing or preservation. Submission of this plan is	Formatted: Font color: Auto
required, and failure to submit the plan may result in the termination of	
award negotiations. As a courtesy, guidance for preparing a Data	
Management Plan is provided in Appendix D of the FOA.	·····
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C. Content and Form of Replies to Reviewer Comments	Formatted: FOA Template Style 3, Indent: Left: 1.25"
EERE will provide applicants with reviewer comments following evaluation of all	Formatted: Indent: Left: 0.5", Hanging: 0.38"
eligible Full Applications. Applicants will have a brief opportunity to review the	Formatted: Indent: Left: 0.886
comments and to prepare a short Reply to Reviewer Comments responding to	
comments however they desire or supplementing their Full Application. The Reply	
to Reviewer Comments is an optional submission; applicants are not required to	
submit a Reply to Reviewer Comments. EERE will post the Reviewer Comments in	
EERE Exchange. The expected submission deadline is on the cover page of the FOA;	
however, it is the applicant's responsibility to monitor EERE Exchange in the event	
that the expected date changes. The deadline will not be extended for applicants	
who are unable to timely submit their reply due to failure to check EERE Exchange	
or relying on the expected date alone. Applicants should anticipate having	
approximately three (3) business days to submit Replies to Reviewer Comments.	
FERE will not review or consider instigible Popling to Deviewer Comments from	- Earmanted Jolanti Lofti O 80
Section III of the EOA) EERE will review and consider each oligible Eul Application	Pointagrew indent. Leic 0.00
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Replies to Reviewer Comments must conform to the following content and form	Formatted: Indent: Left: 0.88"
requirements, including maximum page lengths, described below. If a Reply to	
Reviewer Comments is more than three pages in length, EERE will review only the	
first three (3) pages and disregard any additional pages.	
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<u>Text</u>	<u>2 pages max</u>	Applicants may respond to one or more reviewer comment or supplement their full Application.	
<u>Optional</u>	<u>1 page max</u>	Applicants may use this page however they wish: text, graph charts, or other data to respond to reviewer comments or supplement their Full Application are acceptable.	15,
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Mi	magement Plan-du	ring the award negotiations phase. The Data	
₩4	nagement Plan is (document that outlines the proposed plan for data	Farmatted: Font color: Auto
shi	wing or preservatio	n. Submission of this plan is required; and failure to	
şti	mit-the-plan-may-	esult in the termination of award negotiations. As a	
ça	urtesy guidance fo	r preparing-a Data-Management Plan is provided in	
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addition	al or clarifying info	rmation for any reason deemed necessary, including	
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• Ind	lirect cost informat	lon	
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 Co apj 	mmitment Letters [.] plicable	from Third Parties Contributing to Cost Share, if	
• Na	me and phone nun	ber of the Designated Responsible Employee for	
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DOE can	not make a Federa	award to an applicant until the applicant has complied	Formatted: Indent: Left: 0.88"
with all a	applicable DUNS an	d SAM requirements and, if an applicant has not fully	
complie	i with the requiren	ients by the time DOE is ready to make a Federal	Formatted: Tab stops: 3", Centered + 6", Right + 5,56"
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award, the DOE may determine that the applicant is not gualified to receive a Federal-award and use that determination as a basis for making a Federal award to another applicant. Each applicant (unless the applicant is an individual or Federal awarding agency that is excepted from those requirements under 2 CFR §25.110(b) or (c), or has an exception approved by the Federal awarding agency under 2 CFR §25.110(d)) is required to; (1) Be registered in the System for Award Management (SAM) at https://www.sam.gov before submitting its application; (2) provide a valid Dun & and Bradstreet Universal Numbering System (DUNS) number in its application; and (3) continue to maintain an active SAM registration with current information at all times during which it has an active Federal award or an application or plan under consideration by a Federal awarding agency. DOE may not make a Federal award to an applicant until the applicant has complied with all applicable DUNS and SAM requirements and, if an applicant has not fully complied with the requirements by the time DOE is ready to make a Federal award, the DOE may determine that the applicant is not qualified to receive a Federal award and use that determination as a basis for making a Federal award to another applicant.

T.F. Submission Dates and Times

Concept Popers, Full Applications, and Replies to Reviewer Comments must be submitted in EERE Exchange no later than 3:005 p.m. Eastern on the dates provided on the cover page of this FOA.

U.G. Intergovernmental Review

This FOA is not subject to Executive Order 12372 -- Intergovernmental Review of Federal Programs.

¥4H. Funding Restrictions

EERE funding is typically provided via invoice reimbursement. Recipients of government funding-must definitively show that all funds were expended and, if the funds are allowable costs, those funds will be reimbursed after taking cost share into account. Funds will not be provided up front, therefore, a level of cash on hand is required to meet cash flow requirements. This should be taken into account when applying for funding.

i. Allowable Costs

Questions about this FOA? Email <u>SETD.FDA@ee.dpe.gov</u>. Problems with EERE: Exchange? Email EERE-<u>EERE ExchangeSupport@hq.doe.gov</u> Include FOA name and number in subject line. Formatted: Font: Calibri

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All expenditures must be allowable, allocable, and reasonable in accordance with the applicable federal cost principles	e + ·	Formatted: Indent; Left: 1.25"
Refer to the following applicable Federal cost principles for more information:	4	Formatted: Indent: Left: 1.25"
 FAR Part 31 for For-Profit entities; and 2 CEP Part 300 Subpart E - Cart Principles for all other non-foderal 		
entities		Formatted: Font color: Custom Color(RGB(31,73,125))
ii. Pre-Award Costs		Formatted: Font: Colibri
Selectees must request prior written approval to charge pre-award costs. Pre-award costs are those incurred prior to the effective date of the Federal award directly pursuant to the negotiation and in anticipation of the Federa award where such costs are necessary for efficient and timely performance of the scope of work. Such costs are allowable only to the extent that they would have been allowable if incurred after the date of the Federal award and only with the written approval of the Federal awarding agency, through the Contracting Officer assigned to the award.	i i i	Formatted: Indent: Left: 1.25"
Pre-award costs cannot be incurred prior to the Selection Official signing the Selection Statement and Analysis. Pre-award costs can only be incurred if such costs would be reimbursable under the agreement if incurred after award.	ê ≁	Formatted: Indent: Left: 1.25"
Pre-Award expenditures are made at the Selectee's risk; EERE is not obligated to reimburse costs: (1) in the absence of appropriations; (2) if an award is not made; or (3) if an award is made for a lesser amount than the Selectee anticipated.	-4 ∽ =	Formatted: Indent: Left: 1.25"
iii-1Pre-Award Costs Related to National Environmental Policy Act		Formatted: Font: Bold, Not Italk
(NEPA) Requirements EERE's decision whether and how to distribute Federal funds under this FOA is subject to NEPA. Applicants should carefully consider and should seek legal counsel or other expert advice before taking any action relate to the proposed project that would have an adverse effect on the environment or limit the choice of reasonable alternatives prior to EERE completing the NEPA review process.	d	Formatted: FOA Template Style 4, Indent: Left: 1.5"
EERE does not guarantee or assume any obligation to reimburse costs where the Prime Recipient incurred the costs prior to receiving written	•••••• ا	Formatted: Indent: Left: 1.5" Formatted: Tab stops: 3", Centered + 6", Right + Not at 5.56"
Questions about this FOA? Email <u>SETO:FOA@ec.doc.gov</u> . Problems with EERE Exchange? Email EERE- <u>EERE ExchangeSupport@hq.doc.gov</u> Include FOA name and number in subject line.		
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authorization from the Contracting Officer. If the applicant elects to undertake activities that may have an adverse effect on the environment or limit the choice of reasonable alternatives prior to receiving such written authorization from the Contracting Officer, the applicant is doing so at risk of not receiving Federal funding and such costs may not be recognized as allowable cost share. Likewise, if a project is selected for negotiation of award, and the Prime Recipient elects to undertake activities that are not authorized for Federal funding by the Contracting Officer in advance of EERE completing a NEPA review, the Prime Recipient is doing so at risk of not receiving Federal Funding and such costs may not be recognized as allowable cost share. Nothing contained in the pre-award cost reimbursement regulations or any pre-award costs approval letter from the Contracting Officer override these NEPA requirements to obtain the written authorization from the Contracting Officer prior to taking any action that may have an adverse effect on the environment or limit the choice of reasonable alternatives.

ivalii. Performance of Work in the United States

1. Requirement

All work performed under EERE Awards must be performed in the United States. This requirement does not apply to the purchase of supplies and equipment; however, the Prime Recipient should make every effort to purchase supplies and equipment within the United States. The Prime Recipient must flow down this requirement to its Subrecipients.

2. Failure to Comply

If the Prime Recipient fails to comply with the Performance of Work in the United States requirement, EERE may deny reimbursement for the work conducted outside the United States and such costs may not be recognized as allowable recipient cost share. The Prime Recipient is responsible should any work under this Award be performed outside the United States, absent a waiver, regardless of if the work is performed by the Prime Recipient, Subrecipients, contractors or other project partners.

3. Walver

There may be limited circumstances where it is in the Interest of the project to perform a portion of the work outside the United States. To seek a waiver of the Performance of Work in the United States requirement, the applicant must submit a written waiver request to

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EERE. Appendix Clists the necessary information that must be included In a request to waive the Performance of Work in the United States requirement. Formatted: Indent: Left: 1.5" The applicant must demonstrate to the satisfaction of EERE that a waiver would further the purposes of the FOA and is in the economic interests of the United States. EERE may require additional information before considering a waiver request. Save the waiver request(s) in a single PDF file titled "ControlNumber_PerformanceofWork_Walver". The applicant does not have the right to appeal EERE's decision concerning a waiver request. Formatted: Font: Calibri +iv. Construction Recipients are required to obtain written authorization from the Contracting -Formatted: Indent: Left: 1,25" Officer before incurring any major construction costs. Formatted: Font: Calibi vi.v. Foreign Travel , if international travel is proposed for the proposed your, project, please note Formatted: Font color: Auto that the proposed travelyour organization must comply with the Formatted: Font color: Auto International Air Transportation Fair Competitive Practices Act of 1974 (49 Formatted: Font color: Auto USC 40118), commonly referred to as the "Fly America Act," and Formatted: Indent: Left: 1.25" implementing regulations at 41 CFR 301-10.131 through 301-10.143. The law Formatted: Font color: Auto and regulations require air transportation transport of people or property to, Formatted: Font color: Auto from, between, or within a country other than the United States, the cost of which is supported under this award, to be performed by or under a cost-Formatted: Font color: Auto sharing arrangement with a U.S. flag carrier, if service is available. Foreign travel costs are allowable only with the written prior approval of the Contracting Officer assigned to the award. Formatted: Font color: Blue vii.vi. Equipment and Supplies Formatted: Foot: Calibri To the greatest extent practicable, all equipment and products purchased Formatted: Font color: Auto with funds made available under this FOA should be American-made, This Formatted: Indent: Left: 1,25* requirement does not apply to used or leased equipment. Formatted: Indent: Left: 0" EERE will take an ownership interest in any property-purchased with award Formatted: Indent: Left: 1,25" funds or offered as cost share. Property disposition will be required at the end of a project if the current fair market value of property exceeds \$5,000. Any property purchased with award funds must either be sold, or the Formatted: Tab stops: 3", Centered + 6", Right + Not at recipient may retain the property. In either of these situations, the recipient Questions about this FOA? Email SETO.FOA@ee.doe.gov Problems with EERE Exchange? Email EERE-<u>EERE ExchangeSupport@ha.doe.aav</u> Include FCA name and number in subject line.

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Energy Efficiency & Renewable Energy

must buy out the government's interest based on the total cost share percentage of the award. Property may also be transferred to an eligible third party (other awardee) subject to EERE approval.- The rules for property disposition are set forth in 2 CFR 200.310 - 200.316 as amended by 2 CFR 910.360. viii.vii. Formatted: Font: Calibri Lobbying Formatted: Indent: Left: 0", First line: 0" Recipients and Subrecipients may not use any Federal funds to Influence or Formatted: Indent: Left: 1.25" attempt to influence, directly or indirectly, congressional action on any legislative or appropriation matters. Recipients and Subrecipients are required to complete and submit SF-LLL, "Disclosure of Lobbying Activities" Formatted: Indent: Left: 1,25" (https://www.grants.gov/web/grants/forms/post-award-reportingforms.html//sortby=1)https://www.grants.gov/web/grants/forms/sf-424individual-family.html) to ensure that non-Federal funds have not been paid Formatted: Font: Calibri and will not be paid to any person for influencing or attempting to influence any of the following in connection with your application: Formatted: Indent: Left: 0 An officer or employee of any Federal agency; A Member of Congress; An officer or employee of Congress; or An employee of a Member of Congress. Formatted: Font: Calibri ix-viii. Risk Assessment Prior to making a Federal award, the DOE is required by 31 U.S.C. 3321 and Formatted: Indent: Left: 1,25" 41 U.S.C. 2313 to review information available through any OMB-designated repositories of government-wide eligibility qualification or financial integrity information, such as SAM Exclusions and "Do Not Pay." Formatted: Indent: Left: 1.25", Space Before: Auto, After: In addition, DOE evaluates the risk(s) posed by applicants before they receive+ Auto Federal awards. This evaluation may consider: results of the evaluation of the applicant's eligibility; the quality of the application; financial stability; quality of management systems and ability to meet the management standards prescribed in this part; history of performance; reports and findings from audits; and the applicant's ability to effectively implement statutory, regulatory, or other requirements imposed on non-Federal entities, Formatted: Tab stops: 3", Centered + 6", Right + Not at Questions about this FOA? Emoli SETO FOA@ee.doc.gov. Problems with FERE Exchange? Email FERE EERE ExchangeSupport@hq.doc.gov Include FOA-name and number in subject line. 477

In addition to this review, DOE must comply with the guidelines on Formatted; Indent: Left: 1.25", Space Before: Auto, After: government-wide suspension and debarment in 2 CFR 180, and must require non-Federal entities to comply with these provisions. These provisions restrict Federal awards, subawards and contracts with certain parties that are debarred, suspended or otherwise excluded from or ineligible for participation in Federal programs or activities. Formatted: Font: Calibri x.ix.__Invoice Review and Approval DOE employs a risk-based approach to determine the level of supporting Formatted: Indent: Left: 1,25" documentation required for approving invoice payments. Recipients may be required to provide some or all of the following items with their requests for reimbursement: Summary of costs by cost categories Formatted; Normal, Indent; Left: 1.25", No bullets or numberina Timesheets or personnel hours report Formatted: Normal, Indent: Left: 1.25", Hanging: 0.25", Invoices/receipts for all travel, equipment, supplies, contractual, No bullets or numbering and other costs UCC filling proof for equipment acquired with project funds by forprofit recipients and subrecipients Explanation of cost share for invoicing period Formatted: Normal, Indent: Left: 1,25", No bullets or Analogous Information for some subrecipients numbering Other items as required by DOE Formatted; Bulleted + Level: 1 + Aligned at: 1.25" + Indent at: 1.5" Formatted; FOA Template Style 3, Indent: Left: 1,25" Formatted; Font: Calibri **Application Review Information** ٧. Formatted: Font: Calibri, 12 pt Formatted; Indent: Left: 0,38" **Technical Review Criteria** Formatted; Font: Calibri Formatted: No bullets or numbering xi, Concept Papers Formatted: Font: Calibri, 12 pt Concept papers Formatted; Indent: Left: 0.75" i. Full Applications Formatted: Normal Applications will be evaluated using Criterion 1 (Innovation and Impact) Formatted: Font: Calibri and Criterion 3 (Capability and Resources of against the Applicant/Project Formatted; Numbered + Level; 1 + Numbering Style: I, II, II, Team) technical-merit review criteria that are used for Full Application + Start at: 1 + Alignment: Left + Aligned at: 1" + Indent at: 1,25" evaluation. Each criterion will be weighted at 50%. Please see the following section for a list of those criteria. Formatted; Indent: Left: 1.25" Formatted: Tab stops: 3", Centered + 6", Right + Not at shown below. All sub-criteria are of equal weight. Questions about this FOA? Email SETO.FOA@ec.doc.gov Problems with EERE Exchange? Email EERE- EERE ExchangeSupport@hq.doe.gov Include FOA name and number in subject line. 447

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kiiti - Full-Applications	م	Formatted: Font: Calibri
Full applications and SIPS applications (Topics 2.1 and 3.1) will be evaluated based on the below criteria:		Formatted: Numbered + Level: 1 + Numbering Style: I, ii, II, + Start at: 1 + Algnment: Left + Algned at: 1" + Indent at: 1.25"
	4-	Formatteri: Indent: Left: 0"
Criterion 1: Technical Merit, Innovation, and Impact (Weight: 34%) - How	4 •• -• -	Formatted: Normal, Indent: Left: 1.25"
innovative and impactful is the project, assuming the stated outcomes can be achieved as written?50%)		Formatted: Font color: Text 1
Innovative Technical Merit and Innovation		
 Extent to which the proposed projecttechnology or solution is well 	<u>_><</u>	Formatted: Font color: Text 1
 beyond the state of the art process is innovative; Impactful Degree to which the current state of the technology and 		Formatted: Indext: Left: 1,5", Space After: 0 pt, Line spacing: single, Bulleked + Level: 1 + Aligned at: 1.25" + Indext at: 1,5"
the proposed advancement are clearly described;	Ň	Formatted: Font color: Text 1
 Extent to which the proposed project or solution, if successful, 	-~.``	Formatted: Font color: Text 1
impacts the core goals outlined in the FOA in Topics and Arcas of	-	Formatted: Font color: Text 1
Interest (FOA Section II). Extent to which the claimed impacts are		
feasible and justified.		
 Differentiated - Extent of differentiation with respect to existing 		
commercial products, solutions, programs, or technologies.		
 Scalable – Likelihood the proposed solution, if successful, could be 		
scaled to have a broader impact or be maintained at a sufficiently		
large scale after project completion.		
Griterion 2: Quality and FeesIbility of the Project-Plan (Weight: 33%) — Are the stated goals of the project SMART (Specific, Measurable, Aggressive (but achievable), Relevant, and Timely), are they likely to be accomplished within the scope of this project, and does the proposal show a clear path for growth and improvement over time?		
 Measurable — Extent to which application specifically and convincingly domonstrates how the applicant shows a clear upderstradium of the 	« – – • •	Formatted: List Paragraph, Indent: Left: 1.5", Bulleted + Level: 1 + Aligned at: 1.25" + Indent at: 1.5"
demonstrates now, the applicant shows setter understanding of the		Formatted: Font color: Text 1
that demonstrate clear progress-are aggressive-but-achievable, and		
are quantitative will move the state of the art to the proposed		
advancement; and		Formatted: Font color: Text 1
 Risks mitigated Extent to which the applicant understands and 		
discusses the project risks and challengesSufficiency of technical detail		
in the application to assess whether, the proposed work will face, and the		Formatted: Font color: Text 1
soundness of the strategies and methods that will be used to mitigate		· · · · · · · · · · · · · · · · · · ·
risks.	;	Formatted: Tab stops: 3", Centered + 6", Right + Not at 5.56"
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 Validated – Level of validation (letters of support/interest, partners, 	
customer-triats, is scientifically meritorious and revolutionary, including	Enemattedi Fost color: Text 1
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Reasonable assumptions - Reasonableness of the assumptions used to a	Formatted: List Pargraph Judgeh Loft: 1 51 Aufleted t
to form the execution strategy, (e.g., market size, customer	Level: 1 + Aligned at: 1.25" + Indent at: 1.5"
participation, costs, throughput at full scale, speed of in the literature	
With analyses that support the viability of the proposed scale-up or	Formatted: Font color: 1ext 1
adoption, and mode of funding). Work,	Formatted: Font color: Text 1
Keasonapie-budget the reasonableness	The second secon
Impact of Technology Advancement	Formatten: Oncessine, Font Color: Text 1
 How the overall funding requested to achieve the proposed project and supports the topic area objectives, and target specifications and 	Level: 1 + Aligned at: 1.25" + Indent at: 1.5"
metrics; and	Formatted: Font color: Text 1
	Formatted: Font color: Text 1
Griterion 3: Capability and Resources of the Applicant/Project Team	Formatted: Font color: Text 1
(Weight: 33%) - Is the team well qualified and positioned to successfully	Formatted: Font color: Text 1
complete this project?	
Capable - The training, capabilities, and experience of the	
assembled The potential impact of the project on advancing the state-	
<u>of-the-art.</u>	
Criterion 2: Project Research and Market Transformation Plan (30%) Research Approach, Workplan and SOPD	
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 Workgian	
and SOPO will succeed in meeting the project goals	
and Jor O win 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.	
Deville Antible and Debin 11	
baseline, Metrics, and Deliverables	
 The level of clarity in the definition of the baseline, metrics, and 	
milestones; and	2
 Relative to a clearly defined experimental baseline, the strength of 	
the quantitiable metrics, milestones, and a mid-point deliverables	Formatted: Tab stops: 3°, Centered + 6°, Right + Not at
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	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 market transformation plan including but not		
	limited to product development and/or service plan,		
	commercialization timeline, financing, product marketing,		
	legal/regulatory considerations including intellectual property,		
	intrastructure requirements 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 		Formatted: Font color: Text 1
	to address all aspects of the proposed work with a high probability of		
	success. Extent The qualifications, relevant expertise, and time		
	<u>commitment of the individuals on the team;</u>		
	 The sumclency of the facilities to support the work; The dense to which this the area used conserved. Areas the budgets 		Formatterit Fort start Tort t
	 Ine degree to which this ine proposed consontarieam (metading proposed Subcochiants) will be abled amountaries the ability to 	* . ~	Formatted: Folk color: Text 1
	proposed subjects will be able demonstrates the ability to	· ``	Formatted: font (0)08: Fex 1
	expedite further development and commercial deployment of the	` .	Level: 1 + Aligned at: 1.25" + Indent at: 1.5"
	proposed technologies:		Formatted: Font color: Text 1
	Participation — The level of participation by project participants as		Formatted: Font color: Text 1
	evidenced by letter(s) of commitment and how well they are	· ·	Formatted: Font color: Text 1
	integrated into the Team Qualifications and Resources section of the		
	Technical Valume-Workplan; and		Formatted: Font color: Blue
	 Commitment — Extent to which The reasonableness of the final team 		Formatted: Font color: Text 1
	required to complete this project is fully assembled budget and		Formatted: Font color: Text 1
	committed to the project (e.g., Are there any key members that are "to be bired at a later date")		
	Past Parformance - Extent in which the accombined team has shown		
	success in the past, Do E anourages new entrants and new ideas, but	;	Formatted: List Paragraph, Indent: Left: 1.5", Bulleted + Level: 1 + Aligned at: 1.25" + Indent at: 1.5"
	past successes and/or failures Will be noted.	÷ ,	Formatted: Font color: Text 1
	 Access Extent to Which the read as access to facilities, equipment, 	11	Formatted: Font color: Text 1
	people, expertise, data, knowledge, and any other resources required	112	Formatted: Font color: Blue
	to complete Spend plain of the proposed project and objectives.	/: 	Formatted: Normal, Indent: Left: 0"
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xiik<u>ii.</u> Criteria for Replies to Reviewer Comments

EERE has not established separate criteria to evaluate Replies to Reviewer Comments. Instead, Replies to Reviewer Comments are attached to the original applications and evaluated as an extension of the Full Application.

W-B. Standards for Application Evaluation

Applications that are determined to be eligible will be evaluated in accordance with this FOA, by the standards set forth in EERE's Notice of Objective Merit Review Procedure (76 Fed. Reg. 17846, March 31, 2011) and the guidance provided in the "Department of Energy Merit Review Guide for Financial Assistance," which is available at:

https://energy.gov/management/downloads/merit-review-guide-financialassistance-and-unsolicited-proposals-current.

X.C. Other Selection Factors

i. Program Policy Factors

In addition to the above criteria, the Selection Official may consider the following program policy factors in determining which Full Applications to select for award negotiations:

- The degree to which the proposed project exhibits technological er programmatic diversity when compared to the existing DOE project portfolio and other projects selected from the subject FOA;
- 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 accelerate commercialization and overcome key market barriers;
- Based on the commitments made in the U.S. Manufacturing Plan, the 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.;
- The degree to which the proposed project will accelerate transformational technological, financial, or workforce advances in areas that industry by itself is not likely to undertake because of technical orand financial uncertainty.
- The degree to which the proposed project collectively represents diverse types and sizes of applicant organizations.
- ; and

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- The degree to which the proposed project, or group of projects, represent a desired geographic distribution (considering past awards and current applications).
- The degree to which the proposed project avoids duplication/overlap with other publicly or privately funded work.
- The degree to which the proposed project supports complementary efforts or projects, which, when taken together, will best achieve the research goals and objectives.
- The degree to which the proposed project enables new and expanding market segments.
- Whether the project promotes increased-coordination with nongovernmental entities for demonstration of technologies and research applications to facilitate technology transfer.

¥-D. Evaluation and Selection Process

i. Overview

The evaluation process consists of multiple phases; each includes an initial eligibility review and a thorough technical review. Rigorous technical reviews of eligible submissions 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, in determining which applications to select.

il. Pre-Selection Interviews

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

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ENERGY **Renewable Energy** 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 Formatted: Indent: Left: 1.25" 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 Formatted: Indent: Left: 1.25" 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. iii. Pre-Selection Clarification Formatted; Font: Calibri EERE may determine that pre-selection clarifications are necessary from one Pormatted; Indent: Left: 1.25" or more applicants. Pre-selection clarifications are distinct from and less formal than pre-selection interviews. These pre-selection clarifications will solely be for the purposes of clarifying the application, and will be limited to information already provided in the application documentation. The preselection clarifications may occur before, during or after the merit review evaluation process. Information provided by an applicant that is not necessary to address the pre-selection clarification question will not be reviewed or considered. Typically, a pre-selection clarification will be carried out through either written responses to EERE's written clarification questions or video or conference calls with EERE representatives. The information provided by applicants to EERE through pre-selection Formatted; Font: +Body (Calibri), 12 pt clarifications is incorporated in their applications and contributes to the Formatted: Plain Text, Indent: Left: 1,25* merit review evaluation and EERE's selection decisions. If EERE contacts an applicant for pre-selection clarification purposes, it does not signify that the applicant has been selected for negotiation of award or that the applicant is among the top ranked applications. Formatted: Indent: Left: 1.25" EERE will not reimburse applicants for expenses relating to the pre-selection 🔹 clarifications, nor will these costs be eligible for reimbursement as pre-award costs. iv. Recipient Integrity and Performance Matters Formatted: Font: Calibri DOE, prior to making a Federal award with a total amount of Federal share Formatted: FOA Template Body, Indent: Left: 1,25" greater than the simplified acquisition threshold, is required to review and consider any information about the applicant that is in the designated Questions about this FOA? Email SETO.FOA@ec.doc.gov.SI.FOA.SETO@ee.doe.gov Problems with EERE Exchange? Email EERE- EERE-ExchangeSupport@ha.doe.gov Include FOA name and number in subject line. 91

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INERGY **Renewable Energy** integrity and performance system accessible through SAM (currently FAPIIS) (see 41 U.S.C. 2313). Formatted: Font: Calibri The applicant, at its option, may review information in the designated Formatted: FOA Template Body, Indent: Left: 1,25' integrity and performance systems accessible through SAM and comment on any information about itself that a Federal awarding agency previously entered and is currently in the designated integrity and performance system accessible through SAM. Formatted: Font: Calibri DOE will consider any written comments by the applicant, in addition to the Formatted: FOA Template Body, Indent: Left: 1,25" other information in the designated integrity and performance system, in making a judgment about the applicant's integrity, business ethics, and record of performance under Federal awards when completing the review of risk posed by applicants as described in 2 C.F.R. § 200.205. Formatted: Font: Calibri v. Selection Formatted: Indent: Left: 1.25" The Selection Official may consider the technical merit, the Federal Consensus Board's recommendations, program policy factors, and the amount of funds available in arriving at selections for this FOA. Formatted: Font: Calibri <u>Z.E.</u> Anticipated Notice of Selection and Award Dates FERF anticipates notifying applicants selected for negotiation of award b (b) and making superior but (b) (5) Formatted: Indent: Left: 0.88" and making awards by the dates listed on the FOA cover page[(b)(5)Formatted: Default Paragraph Font, Font color: Blue Formatted: Font: Calibri VI. Award Administration Information Formatted: Font: Callbri, 12 pt Formatted: Indent: Left: 0.38" Award Notices Formatted: Font: Callbri Formatted: No bullets or numbering i. Ineligible Submissions Formatted: Font: Calibri, 12 pt Ineligible Concept Papers and Full Applications will not be further reviewed Formatted: Indent: Left: 0.75' or considered for award. The Contracting Officer will send a notification Formatted: Font: Callbri letter by email to the technical and administrative points of contact Formatted: Numbered + Level: 1 + Numbering Style: i, ii, ill, ..., + Start at: 1 + Alignment: Left + Aligned at: 1" + Indent designated by the applicant in EERE Exchange. The notification letter will state the basis upon which the Concept Paper or the Full Application is at: 1,25" ineligible and not considered for further review. Formatted: Indent: Left: 1,25" **II. Concept Paper Notifications** EERE will notify applicants of its determination to encourage or discourage the submission of a Full Application. EERE will post these notifications to EERE Exchange:

Questions about this FOA? Email SETO.FOA@ee.doe.gov.SI.FOA.SETO@ee.doe.gov Problems with EERE Exchange? Email EERE- <u>EERE-ExchangeSupport@ha.doe.gov</u> include FOA name and number in subject line.

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Applicants may submit a Full Application even if they receive a notification discouraging them from doing so. By discouraging the submission of a Full Application, EERE intends to convey its lack of programmatic interest in the proposed project. Such assessments do not necessarily reflect judgments on the merits of the proposed project. The purpose of the Concept Paper phase is to save applicants the considerable time and expense of preparing a Full Application that is unlikely to be selected for award negotiations.

A notification letter encouraging the submission of a Full Application does not authorize the applicant to commence performance of the project. Please refer to Section IV-J.2 of the FOA for guildance on pre-award costs.

iii. Full Application Notifications

EERE will notify applicants of its determination via a notification letter by email to the technical and administrative points of contact designated by the applicant in EERE Exchange. The notification letter will inform the applicant whether or not Its Full Application was selected for award negotiations. Alternatively, EERE may notify one or more applicants that a final selection determination on particular Full Applications will be made at a later date, subject to the availability of funds or other factors.

iv-iii. Successful Applicants

Receipt of a notification letter selecting a Full Application for award negotiations does not authorize the applicant to commence performance of the project. If an application is selected for award negotiations, it is not a commitment by EERE to issue an award. Applicants do not receive an award until award negotiations are complete and the Contracting Officer executes the funding agreement, accessible by the Prime Recipient in FedConnect.

The award negotiation process will take approximately 60 days. Applicants must designate a primary and a backup point-of-contact in EERE Exchange with whom EERE will communicate to conduct award negotiations. The applicant must be responsive during award negotiations (i.e., provide requested documentation) and meet the negotiation deadlines. If the applicant fails to do so or if award negotiations are otherwise unsuccessful, EERE will cancel the award negotiations and rescind the Selection. EERE reserves the right to terminate award negotiations at any time for any reason.

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Renewable Energy

use only one account as the contact point for each submission. Applicants should also designate backup points of contact so they may be easily contacted if deemed necessary. <u>This step is required to apply to this</u> <u>FOA.</u>—The EERE Exchange enforces this requirement.—The Business and Technical Point of Contact fields on the Contact Information page of the submission record are mandatory data fields.

The EERE Exchange registration does not have a delay; however, <u>the</u> <u>remaining registration requirements below could take several weeks to</u> <u>process and are necessary for a potential applicant to receive an award</u> <u>under this FOA</u>.

2. DUNS Number

A DUNS Number is a unique nine-digit identifier for businesses. It is used to establish a Dun & Bradstreet business credit file, which is often referenced by lenders and potential business partners to help predict the reliability and/or financial stability of the company in question. You must have a DUNS Number if you want to apply for government funds.

To register for a DUNS Number, you'll need the following Information:

Legal name

- Headquarters name and address for your business
- Doing Business As (DBA) or other name by which your business is commonly recognized
- Physical address, city, state and ZIP Code
- Mailing address (if separate from headquarters and/or physical address)
- Telephone number
- Contact name and title
- Number of employees at your physical location
- Whether you are a Home-Based Business

A DUNS number may be obtained from D&B by telephone (currently 866-705-5711) or the Internet (currently at <u>Obtain a Dun and</u> Bradstreet Data Universal Numbering System (DUNS) number (including the plus 4 extension, if applicable) at http://fedgov.dnb.com/webform}-

3. System for Award Management

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]		Register with the System for Award Management (SAM) at	-	Formatted: Indent: Left: 1.5"
•		<u>https://www.sam.gov</u> , 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		
1		annually.	4	Formatted: Indent: Left: 0"
		You <u>must</u> have an active registration in SAM to do business with the Federal Government. To register in SAM, at a minimum, you will need the following information:		Pointacear moent: ELC 0
		 Your DUNS Number, Legal Business Name, and Physical Address from your Dun & Bradstreet (D&B) record. If you don't already have one, you can request a DUNS Number for FREE from D&B. Your Taxpayer-Identification Number (TiN) and Taxpayer Name associated with your TIN. Review your tax documents from the IRS (such as a 1099 or W-2 form) to find your Taxpayer Name. Your bank's routing number, your bank account number, and your bank account type, i.e. checking or savings, to set up Electronic Funds Transfer (EFT). 		
	4.	FedConnect	•	Formatted: Font: +Body (Calibri), Not Italk
		You must be registered in FedConnect in order to receive award	•	Formatted: FOA Template Style 4, Indent: Left: 1.5", No bullets or numbering
		https://www.fedconnect.net. 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 Gol Guide at		Formatted: Indent: Left: 1.5"
		https://www.fedconnect.net/FedConnect/Marketing/Documents/FedConnect_Ready_Set_Go.pdf.		Formatted: Default Paragraph Font
	5.	Grants.gov	•	Formatted: Font: +Body (Calibri), Not Italic
		Register in Grants.gov (<u>http://www.grants.gov</u>) to receive automatic	*	Formatted: FOA Template Style 4, Indent: Left: 1.5", No bullets or numbering
		note that Letters of Intent, Concept Papers, and Full Applications will not	- · . `	Formatted: Indent: Left: 1.5"
		be accepted through Grants.gov.		Formatted; Font: 12 pt
	6	Electronic Authorization of Applications and Award Documents	•	Formatted: Font: +Body (Calibri), Not Italic
	01	Submission of an application and supplemental information under this	,⊃<` +、	Formatted: FOA Tempiate Style 4, Indent: Left: 1.5", No
		FOA through electronic systems used by the Department of Energy, including EERE Exchange and FedConnect.net, constitutes the authorized representative's approval and electronic signature.		Dullets or numbering Formatted: Indent: Left: 1,5"
	Questions o Problems with EERE Exci	bout this FOA? Email SETO, FOA@ec.doc.gov. <u>5 .FOA.SETO@ec.doc.gov</u> wage? Email FERE- <u>EERE-ExchangeSupport@hg.doc.gov</u> include FOA name and number in subject line.		
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ii. Award Administrative Requirements	Formatted: Font: Calibri
The administrative requirements for DOE grants and cooperative agreements are contained in 2 CFR Part 200 as amended by 2 CFR Part 910. The information is provided so successful applicants are aware of the various items that will be required of them. Detailed information and clarification on these items can be provided during negotiations if it is needed.	Formatted: Indent: Left: 1.25"
iii. Foreign National Access to DOE Sites	Formatted: Font: Calibri
All applicants that ultimately enter into an award resulting from this FOA will +	Formatted: Font: +Body (Calibri)
be subject to the following requirement concerning foreign national involvement. Upon DOE's request, Prime Recipients must provide information to facilitate DOE's responsibilities associated with foreign national access to DOE sites, information, technologies, and equipment. A foreign national is defined as any person who was born outside the jurisdiction of the United States, is a citizen of a foreign government, and has not been naturalized under U.S. law. If the Prime Recipient or Subrecipients, contractors or vendors under the award, anticipate utilizing a foreign national person in the performance of an award, the Prime Recipient is responsible for providing to the Contracting Officer specific information of the foreign national(s) to satisfy compliance with all of the requirements for access approval.	Formatted: FOA Template Body, Indent: Left: 1.25"
iv. Subaward and Executive Reporting	Formatted: Font: Calibri
Additional administrative requirements necessary for DOE grants and cooperative agreements to comply with the Federal Funding and Transparency Act of 2006 (FFATA) are contained in 2 CFR Part 170. Prime Recipients must register with the new FFATA Subaward Reporting System database and report the required data on their first tier Subrecipients. Prime Recipients must report the executive compensation for their own executives as part of their registration profile in SAM.	Formatted: Indent: Left: 1.25"
v. National Policy Requirements	Formatted: Font: Calibri
The National Policy Assurances that are incorporated as a term and condition	Formatted: Indent: Left: 1,25"
of award are located at: <u>http://www.nsf.gov/awards/managing/rtc.isp</u> .	
vi. Environmental Review in Accordance with National Environmental Policy Act (NEPA)	Formatted: Font: Calibri
EERE's decision whether and how to distribute federal funds under this FOA is subject to the National Environmental Policy Act (42 USC 4321, <i>et seq.</i>). NEPA requires Federal agencies to Integrate environmental values into their	Formatted: Indent: Left: 1,25"
Questions about this FOA? Email SETO.FOA@ec.doc.gov. <u>SI.FOA.SETO@ec.doc.gov</u> Problems with FERE Exchange? Email EERE- <u>EERE-ExchanaeSupport@ha.doc.gov</u> Include FOA name and number in subject line.	

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	decision-making processes by considering the potential environmental impacts of their proposed actions. For additional background on NEPA, please see DOE's NEPA website, at <u>http://nepa.energy.gov/</u> .	
1	While NEPA compliance is a Federal agency responsibility and the ultimate decisions remain with the Federal agency, all recipients selected for an award will be required to assist in the timely and effective completion of the NEPA process in the manner most pertinent to their proposed project. If DOE determines certain records must be prepared to complete the NEPA review process (e.g., biological evaluations or environmental assessments), the costs to prepare the necessary records may be included as part of the project costs.	Formatted: Indent: Left: 1.25", Don't adjust space between Latin and Aslan text, Don't adjust space between Asian text and numbers
	vii, Applicant Representations and Certifications	Formatted; Font; Calibri
	•	(Formatted: Indent; Left: 1.25*
ĺ	1, Lobbying Restrictions	Formatted: Indent: Left: 1.25°
[By accepting funds under this award, the Prime Recipient agrees that none of the funds obligated on the award shall be expended, directly or indirectly, to influence Congressional action on any legislation or appropriation matters pending before Congress, other than to communicate to Members of Congress as described in 18 U.S.C. §1913. This restriction is in addition to those prescribed elsewhere in statute and regulation.	
	 Corporate Felony Conviction and Fèderal Tax Liability Representations In submitting an application in response to this FOA, the applicant represents that: 	Formatted: Indent: Left: 1.5", No bullets or numbering
	 a. It is not a corporation that has been convicted of a felony criminal violation under any Federal law within the preceding 24 months, and b. It is not a corporation that has any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability. 	
	For purposes of these representations the following definitions apply:	(Formatted: Indent: Left: 1.5"
	A Corporation includes any entity that has filed articles of incorporation + in any of the 50 states, the District of Columbia, or the various territories	Formatted; Indent: Left: 1.5"
ļ	Questions about this FOA? Email SETO.FOA@ee.doe.gov. <u>SI.FOA.SETO@ee.doe.gov</u> Problems with EERE Exchange? Email EERE- <u>EERE-ExchangeSupport@ha.doe.gov</u> include FOA name and number in subject line.	



> of the United States [but not foreign corporations]. It includes both forprofit and non-profit organizations.

- Nondisclosure and Confidentiality Agreements Representations In <u>submitting an application in response to this FOA the applicant</u> represents that:
 - a. It does not and will not require its employees or contractors to sign internal nondisclosure or confidentiality agreements or statements prohibiting or otherwise restricting its employees or contactors from lawfully reporting waste, fraud, or abuse to a designated investigative or law enforcement representative of a Federal department or agency authorized to receive such information.
 - b. It does not and will not use any, Federal funds to implement or enforce any nondisclosure and/or confidentiality policy, form, or agreement it uses unless it contains the following provisions:
 - (1) "These provisions are consistent with and do not supersede, conflict with, or otherwise alter the employee obligations, rights, or liabilities created by existing statute or Executive order relating to (1) classified information, (2) communications to Congress, (3) the reporting to an inspector General of a violation of any law, rule, or regulation, or mismanagement, a gross waste of funds, an abuse of authority, or a substantial and specific danger to public health or safety, or (4) any other whistleblower protection. The definitions, requirements, obligations, rights, sanctions, and liabilities created by controlling Executive orders and statutory provisions are incorporated into this agreement and are controlling."
 - (2) The limitation above shall not contravene requirements applicable to Standard Form <u>312</u>, Form <u>4414</u>, or any other form issued by a Federal department or agency governing the nondisclosure of classified information.

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U.B. DEPARTMENT OF ENERGY	Energy Efficiency & Renewable Energy	-
	(3) Notwithstanding the provision listed in paragraph (a), a 🛶 🛶	Formatted: Don't add space between paragraphs of the
	nondisclosure or confidentiality policy, form or agreement	
	that is to be executed by a person connected with the	Formatten
	conduct of an intelligence or intelligence-related activity,	
	other than an employee or officer of the United States	
	Government, may contain provisions appropriate to the	
	particular, activity, for which such document, is to be used.	
	Such form or agreement shall, at a minimum, require that	
	the person will not disclose any classified information	
	received in the course of such activity, unless specifically,	
	authorized to do so by the United States Government.	
1	Such nondisclosure or confidentiality forms shall also	
}	make it clear that they do not bar disclosures to Congress,	
	or, to an authorized official of an executive agency or the	
	Department of Justice, that are essential to reporting a	
	substantia <u>(violation of law</u> ,	
١	will Statement of Foderal Statementation	Formatted: Foot: Calibri
}	vin. Statement of rederal Stewardship	Easter and Tadata Laffe 1 278
l	EEKE will exercise normal Federal stewardship in overseeing the project	Pormatted; indent; Leit; 1.25"
	activities performed under EERE Awards. Stewardship Activities include, but	
	are not imited to, conducting site visits; reviewing performance and infancial	
	reports, providing assistance and/or temporary intervention in usual	
	circumstances to correct deficiencies that develop during the project;	
	assuring compliance with terms and conditions; and reviewing technical	
	performance after project completion to ensure that the project objectives	
	nave been accomplished,	
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	ix. Statement of Substantial Involvement	Formatted: Font: Calibri
i x,	······································	Formatted: Font: Italic, Font color: Blue
	EERE has substantial involvement in work performed under Awards made as	Formatted: Normal
I.	a result of this FOA. EERF does not limit its involvement to the administrative	Formatted: Normal, Indent: Left: 1.25"
	requirements of the Award, Instead, EERE has substantial involvement in the	
1	direction and redirection of the technical aspects or core activities of the	
l	project as a whole. Substantial involvement includes, but is not limited to.	
	the following:	
1	1. FERE shares responsibility with the recipient for the management	Formatted: List Paragraph, Indent: Left: 1.25". Numbered
I	control direction, and nerformance of the Project	+ Level: 1 + Numbering Style: 1, 2, 3, + Start at: 1 +
	control all control out portormance of the Holeon	Alignment: Left + Aligned at: 0.75" + Indent at: 1", Don't adjust space between Asian text and numbers
	Questions about this FOA? Email SETO.FOA@ee.doc.gov.SLFOA.SETO@ee.doe.gov	
Problems	with EERE Exchange? Email EERE- <u>EERE- ExchangeSupport@ha.doe.gov</u> include FOA name and number in	
	subject line.	
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 2. EERE may intervene in the conduct or performance of work under this Award for programmatic reasons. Intervention includes the interruption or modification of the conduct or performance of project activities. 3. EERE may redirect or discontinue funding the Project based on the outcome of EERE's evaluation of the Project at that the Go/No Go decision point(s). 4. EERE participates in major project decision-making processes. 	It: LeR: 1.25", Numbered 2, 3, + Start at: 1 + "+ Indent at: 1", Don't nd numbers It: LeR: 0" Ut: LeR: 1.25", Numbered 2, 3, + Start at: 1 + 5" + Indent at: 1", Don't nd numbers It: LeR: 0" It: LeR: 1.25", Numbered 2, 3, + Start at: 1 +
 3. EERE may redirect or discontinue funding the Project based on the outcome of EERE's evaluation of the Project at that the Go/No Go decision point(s). 4. EERE participates in major project decision-making processes. 	It: Left: 0" It: Left: 1.25", Numbered 2, 3, + Start at: 1 + 5" + Indent at: 1", Don't nd numbers It: Left: 0" It: Left: 1.25", Numbered 2.3. + Start at: 1 +
 3. EERE may redirect or discontinue funding the Project based on the outcome of EERE's evaluation of the Project at that the Go/No Go decision point(s). 4. EERE participates in major project decision-making processes. 	t: Left: 1.25", Numbered 2, 3, + Start at: 1 + " + Indent at: 1", Don't nd numbers t: Left: 0" I: Left: 1.25", Numbered 2.3. + Start at: 1 +
4. EERE participates in major project decision-making processes.	It: Left: 0"
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+ Level: 1 + Numbering Style: 1, 2, 4 Alignment: Left + Aligneent: Left + Numbering Style: 1, 2, 3, 4, 4, 4, 5, 5, 5, 4, 4, 5, 5, 5, 5, 5, 5, 5, 5, 5, 5, 5, 5, 5,	5" + Indent at: 1", Don't nd numbers
x. Subject Invention Utilization Reporting	
In order to ensure that Prime Becinients and Subrecinients holding title to the Engentied Foot Cabri	
subject to vinitige that fight heavies to compare a subject to the	1 251
inventions, EERE may require that each Prime Recipient holding title to a subject invention submit annual reports for 10 years from the date the subject invention was disclosed to EERE on the utilization of the subject invention and efforts made by Prime Recipient or their licensees or assignees to stimulate such utilization. The reports must include information regarding the status of development, date of first commercial sale or use, gross royalties received by the Prime Recipient, and such other data and information as EERE may specify.	
Xi. Intellectual Property Provisions	
The standard DOE financial assistance intellectual property provisions	1.25*
applicable to the various types of recipients are located at http://www1.eere.energy.gov/financing/resources.html .	
vii Domenting	·
Reporting requirements are identified on the Federal Assistance Reporting	1.25
https://energy.gov/eere/funding/eere-funding-application-and- management-forms.http://www1.eere.energy.gov/financing/resources.html.	
xiii. Go/No-Go Review	
Each project selected under this FOA will be subject to a periodic project	1.25*
evaluation referred to as a Go/No-Go Review, Federal funding beyond the	
Go/No Go decision point (continuation funding), is contingent on (1) the	
availability of funds appropriated by Congress for the purpose of this	
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> program and the availability of future-year budget authority; (2) meeting the objectives, milestones, deliverables, and decision point criteria of recipient's approved project and obtaining approval from EERE to continue work on the project; and (3) the submittal of required reports in accordance with the Statement of Project Objectives.

As a result of the Go/No Go Review, DOE may, at its discretion, authorize the + following actions: (1) continue to fund the project, contingent upon the availability of funds appropriated by Congress for the purpose of this program and the availability of future-year budget authority; (2) recommend redirection of work under the project; (3) place a hold on federal funding for the project, pending further supporting data or funding; or (4) discontinue funding the project because of insufficient progress, change in strategic direction, or lack of funding.

The Go/No-Go decision is distinct from a non-compliance determination. In the event a recipient fails to comply with the requirements of an award, EERE may take appropriate action, including but not limited to, redirecting, suspending or terminating the award.

xiv. ____Conference_Spending

The recipient shall not expend any funds on a conference not directly and programmatically related to the purpose for which the <u>grant or</u>, cooperative agreement was awarded that would defray the cost to the United States Government of a conference held by any Executive branch department, agency, board, commission, or office for which the cost to the United States Government would otherwise exceed \$20,000, thereby circumventing the required notification by the head of any such Executive Branch department, agency, board, commission, or office to the Inspector General (or senior ethics official for any entity without an Inspector General), of the date, location, and number of employees attending such conference.

xv. UCC Financing Statements

Per 2 CFR 910,360 (Real Property and Equipment) when a piece of equipment is purchased by a for-profit recipient or subrecipient with Federal Funds, and when the Federal share of the financial assistance agreement is more than \$1,000,000, the recipient or subrecipient must:

Properly record, and consent to the Department's ability to properly record if the recipient fails to do so, UCC financing statement(s) for all equipment in

Questions about this FOA? Email <u>SETO_FOA@ee.doa.gov.Sl.FOA.SETO@ee.doe.gov</u> Problems with EERE Exchange? Email EERE-<u>EERE-ExchangeSupport@ha.doe.gov</u> Include FOA name and number in subject line. Formatted: Normal, Indent: Left: 1.25"

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excess of \$5,000 purchased with project funds. These financing statement(s) must be approved in writing by the contracting officer prior to the recording, and they shall provide notice that the Recipient's title to all equipment (not real property) purchased with Federal funds under the financial assistance agreement is conditional pursuant to the terms of this section, and that the Government retains an undivided reversionary interest in the equipment. The UCC financing statement(s) must be filed before the Contracting Officer may reimburse the recipient for the Federal share of the equipment unless otherwise provided for in the relevant financial assistance agreement. The recipient shall further make any amendments to the financing statements, as necessary or as the <u>Contracting Officer_contracting officer</u> may direct.

VII. Questions/Agency Contacts

Upon the Issuance of a FOA, EERE personnel are prohibited from communicating (in writing or otherwise) with applicants regarding the FOA except through the established question and answer process as described below. Specifically, questions regarding the content of this FOA must be submitted to: SETO.FOA@ee.doe.gov. If potential or current applicants attempt to contact EERE personnel, they will forward your question to the appropriate inbox and reply with a statement that they are not permitted to discuss the FOA.SETO.@ee.doe.gov. Questions must be submitted to a business days prior to the application due date and time.

All questions and answers related to this FOA will be posted on EERE Exchange at: <u>https://eere-exchange.energy.gov</u>. Please note that you must first select this specific FOA Number in order to view the questions and answers specific to this FOA. EERE will attempt to respond to a question within 3 business days, unless a similar question and answer has already been posted on the website.

Questions related to the registration process and use of the EERE Exchange website should be submitted to: <u>EERE-ExchangeSupport@hq.doe.gov</u>.

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a.A. FOA Modifications	 ار	Formatted: Indent: Left: 0.5"
Amendments to this FOA will be posted on the EERE Exchange website and the	e .	Formatted: Font: Calibri
Grants gov system. However, you will only receive an email when an amende	ient ``,	Formatted: No bullets or numbering
or a FOA is posted on these sites if you register for email notifications for this	FOA	Formatted; Indent: Left: 0.86"

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Questions about this FOA7 Email SETO.FOA@ee.goe.gov.<u>51.FOA,3ETO@ee.gov</u> Problems with EERE Exchange? Email EERE-<u>EERE-ExchangeSupport@ha.doe.aov</u> Include FOA name and number in subject line. Formatted: Indent: Left: 0"

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In Grants.gov. EERE recommends that you register as soon after the release of the FOA as possible to ensure you receive timely notice of any amendments or other FOAs.

and B. Intormational webinar	
EERE will conduct at least two <u>one</u> informational webinarswebinar during the FOA process. One <u>it</u> will be held after the initial FOA release but before the due date for Concept Papers and the other will be held after concept paper-notifications and before the due date for full applications.	{Formatted: Indent: Left: 0,88"
being the date for interpretentions, an Applications,	
Attendance is not mandatory and will not positively or negatively impact the overall review of any applicant submissions. As the webinar will be open to all applicants who wish to participate, applicants should refrain from asking questions or communicating information that would reveal confidential and/or proprietary information specific to their project. Specific dates for the webinar can be found on the cover page of the FOA. Please check EERE Exchange for information regarding webinar registration.	Formatted: Indent: Left; 0.88"
CC C Covernment Dight to Paiest or Negotista	Formatted: Font: Calibri
Gent, Government Right to Reject of Negotiate	
EERE reserves the right, without qualification, to reject any or all applications received in response to this FOA and to select any application, in whole or in part, as a basis for negotiation and/or award.	formatteal indent; Lett: 0,88"
DD.D. Commitment of Public Funds	Formatted: Font: Calibri
The Contracting Officer is the only individual who can make awards or commit the Government to the expenditure of public funds. A commitment by anyone other than the Contracting Officer, either express or implied, is invalid.	Formatted: Indent: Left: 0,88"
EE. Treatment of Application Information	Formatted: Font: Calibri
In general, EERE will only use data and other information contained in applications for evaluation purposes, unless such information is generally available to the public or is already the property of the Government.	Formatted: Indent; Left: 0,88"
Applicants should not include trade secrets or commercial or financial information that is privileged or confidential in their application unless such information is necessary to convey an understanding of the proposed project or to comply with a requirement in the FOA.	Formatted: Indent: Left: 0,88"
The use of protective markings such as "Do Not Publicly Release – Trade Secret" or ↔ "Do Not Publicly Release – Confidential Business information" is encouraged.	
Questions about this FOA7 Email SETO-FOA@ec.doc.gov_SI,FOA,SETO@ee.doe.gov	

	However, applicants should be aware that the use of protective markings is not dispositive as to whether information will be publicly released pursuant to the Freedom of Information Act, 5 U.S.C. §552, et. seq., as amended by the OPEN Government Act of 2007, Pub. L. No. 110-175. (See Section I of this document, "Notice of Potential Disclosure Under the Freedom of Information Act (FOIA)" for additional information regarding the public release of information under the Freedom of Information Act.
I	Applicants are encouraged to employ protective markings in the following manner:
	The cover sheet of the application must be marked as follows and identify the specific pages containing trade secrets or commercial or financial information that Is privileged or confidential:
	Notice of Restriction on Disclosure and Use of Data: Pages [list applicable pages] of this document may contain trade secrets or commercial or financial information that is privileged or confidential, and is exempt from public disclosure. Such information shall be used or disclosed only for evaluation purposes or in accordance with a financial assistance or loan agreement between the submitter and the Government. The Government may use or disclose any information that is not appropriately marked or otherwise restricted, regardless of source. [End of Notice]
	The header and footer of every page that contains trade secrets or commercial or Formatted : Indent: Left: 0.88" financial information that is privileged must be marked as follows: "May contain trade secrets or commercial or financial information that is privileged or confidential and exempt from public disclosure."
	In addition, each line or paragraph containing trade secrets or commercial or financial information that is privileged or confidential must be enclosed in brackets.
	FF-F. Evaluation and Administration by Non-Federal Personnel In conducting the merit review evaluation, the Go/No-Go Review and Peer Review,+ the Government may seek the advice of qualified non Federal personnel as reviewers. The Government may also use non-Federal personnel to conduct routine, nondiscretionary administrative activities. The applicant, by submitting its application, consents to the use of non-Federal reviewers/administrators. Non- Federal reviewers must sign conflict of interest and non-disclosure agreements
	Questions about this FOA? Email SETO.FOA@ec.doc.gov.SI.FQA.SETO@ec.doc.gov

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prior to reviewing an application. Non-Federal personnel conducting administrative activities must sign a non-disclosure agreement.

Eligible activities under this FOA include those which describe and promote the understanding of scientific and lecthnical aspects of specific energy technologies, but not those which encourage or support political activities such as the collection and dissemination of information related to potential, planned or pending legislation. HH-H	GG-G. Notice Regarding Eligible/Ineligible Activities	Formatted: Font: Cabbri
HH-H. Notice of Right to Conduct a Review of Financial Formatted: Ford: Culluit Capability EERE reserves the right to conduct an independent third party review of financial	Eligible activities under this FOA include those which describe and promote the understanding of scientific and technical aspects of specific energy technologies, but not those which encourage or support political activities such as the collection and dissemination of information related to potential, planned or pending	Formatted: Indent: Left: 0.88"
HH-H. Notice of Right to Conduct a Review of Financial Permatted: Foot: Callui Capability EERE reserves the right to conduct an independent third party review of financial capability for applicants that are selected for negotation of award (including personal crodit information of principal(s) of a small business if there is insufficient information to determine financial capability of the organization). Information to determine financial capability of the organization). H-I. Notice of Potential Disclosure Under Freedom of Formatted: Foot: Callui Information Act (FOIA) Under the Freedom of Information Act, (FOIA), 5 U.S.C. §552, et. seq., as amended Formatted: Foot: Callui Under the Freedom of Information Act, (FOIA), 5 U.S.C. §552, et. seq., as amended Formatted: Index: Left: 0.88" Subject to public release under FOIA. The purpose of the FOIA is to afford the public the right to request and receive agency records and as such, subject to public release under FOIA. The purpose of the FOIA exemptions, not on the existence or nonexistence of protective markings or designations. Only the agency's designated FOIA Officer may determine if information received from the Applicant may be withheld pursuant to one of the nine FOIA exemptions, AII FOIA request received by DOE are processed in accordance with 10 C.F.R. Part 1004. HJ. Requirement for Full and Complete Disclosure d all information request defaints eFOA. Any failure to make a full and complete disclosure of all information request defaints eFOA. Any failure to make a full and complete disclosure of all information recelived from the Applicants are required to make a full	legislation.	
Capability EERE reserves the right to conduct an independent third party review of financial capability for applicants that are selected for negotiation of award (including personal credit information of principal(s) of a small business if there is insufficient information to determine financial capability of the organization). H-1. Notice of Potential Disclosure Under Freedom of Information Act (FOIA) Under the Freedom of Information Act, (FOIA), 5 U.S.C. \$552, et. seq., as amended +	HH-H. Notice of Right to Conduct a Review of Financial	Formatted: Font: Calibri
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 Advance and identified Waivers: Applicants may request a patent waiver that will cover subject inventions that may be invented under the award, in advance of or within 30 days after the effective date of the award. Even if an advance waiver is not requested or the request is denied, the recipient will have a continuing right under the award to request a waiver for identified inventions, i.e., individual subject inventions that are disclosed to EERE within the timeframes set forth in the award's intellectual property terms and conditions. Any patent waiver that may be granted is subject to certain terms and conditions in 10 CFR 784.

 Optional Determination of Exceptional Circumstances (DEC): Each meritorious applicant [excluding Topic 4 which is related to workforce development] will bels required to submit a U.S. Manufacturing Plan prior to preselection interviews as part of its application. If selected, the U.S. Manufacturing Plan shall be incorporated into the award terms and conditions for domestic small businesses and nonprofit organizations, DOE has determined that exceptional circumstances exist that warrants the modification of the standard patent rights clause for small businesses and non-profit awardees under Bayh-Dole to the extent necessary to implement and enforce the U.S. Manufacturing Plan. For example, the commitments and enforcement of a U.S. Manufacturing Plan may be tied to subject inventions. Any Bayh-Dole entity (domestic small business or nonprofit organization) affected by this DEC has the right to appeal it.

MM.M. Government Rights in Subject Inventions

Where Prime Recipients and Subrecipients retain title to subject inventions, the U.S. Government retains certain rights.

i. Government Use License

The U.S. Government retains a nonexclusive, nontransferable, irrevocable, paid-up license to practice or have practiced for or on behalf of the United States any subject invention throughout the world. This license extends to contractors doing work on behalf of the Government.

li. March-In Rights

The U.S. Government retains march-in rights with respect to all subject inventions. Through "march-in rights," the Government may require a Prime Recipient or Subrecipient who has elected to retain title to a subject invention (or their assignees or exclusive licensees), to grant a license for use of the invention to a third party. In addition, the Government may grant

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licenses for use of the subject invention when a Prime Recipient, Subrecipient, or their assignees and exclusive licensees refuse to do so. Formatted: Indent: Left: 1.25" DOE may exercise its march-in rights only if it determines that such action is -necessary under any of the four following conditions: Formatted: Indent: Left: 0* The owner or licensee has not taken or is not expected to take effective steps to achieve practical application of the invention within a reasonable time; The owner or licensee has not taken action to alleviate health or safety needs in a reasonably satisfied manner; The owner has not met public use requirements specified by Federal statutes in a reasonably satisfied manner; or The U.S. Manufacturing requirement has not been met. Formatted: Indent: Left: 0' Any determination that march-in rights are warranted must follow a fact-Formatted: Indent: Left: 1.25 finding process in which the recipient has certain rights to present evidence and witnesses, confront witnesses and appear with counsel and appeal any adverse decision. To date, DOE has never exercised its march-in rights to any subject Inventions. Commented [TEM6]: Select the option that is most applicable **Rights in Technical Data** NN-N. to your FOA, and delete the rest. Data rights differ based on whether data is first produced under an award or Formatted: Font: Calibri instead was developed at private expense outside the award. Formatted: Font: Callbri Formatted: Indent: Left: 0.88" "Limited Rights Data": The U.S. Government will not normally require delivery of Formatted: Indent: Left; 0.88" confidential or trade secret-type technical data developed solely at private expense prior to issuance of an award, except as necessary to monitor technical progress and evaluate the potential of proposed technologies to reach specific technical and cost metrics. Topics 1, 2 and 3 will be subject to the below-language: Option 1: (with data protection) Formatted: Font color: Blue Government rights in Technical Data Produced Under Awards: The U.S. Formatted: Indent: Left: 0.88" Government normally retains unlimited rights in technical data produced under Government financial assistance awards, including the right to distribute to the public. However, pursuant to special statutory authority, certain categories of data generated under EERE awards may be-protected from public disclosure for up to five years after the data is generated ("Protected Data"). For awards permitting Protected Data, the protected data must be marked as set forth in the awards Questions about this FOA? Email SETO.FOA@ee.doe.gov.SI.FOA.SETO@ee.doe.gov Problems with EERE Exchange? Email EERE-EERE-ExchangeSupport@ha.doe.gov Include FOA name and number in subject line.

intellectual property terms and conditions and a listing of unlimited rights data (i.e., non-protected data) must be inserted into the data clause in the award. In addition, invention disclosures may be protected from public disclosure for a reasonable time in order to allow for filing a patent application. Topic 4 will be subject to the below language: Option 2: (without data protection) Formatted: Font color: Blue Government Rights in Technical Data Produced Under Awards: The U.S. Formatted: Indent: Left: 0.88" Government retains unlimited rights in technical data produced under Government financial assistance awards, including the right to distribute to the public. One exception to the foregoing is that invention disclosures may be protected from public disclosure for a reasonable time in order to allow for filing a patent application. Formatted: Indent: Left: 0" Formatted: Font: Calibri Copyright 00.0. The Prime Recipient and Subrecipients of projects funded under Topic 4 may assert copyright in educational or learning materials developed under an award without DOE's permission only if the Prime Recipient and Subrecipients license the materials to the public under a Creative Commons Attribution License (CCBY). Formatted: Indent: Left: 0,88" For all other copyrightable works developed under awards, the The Prime Recipient*and Subrecipients may assert copyright in copyrightable works, such as software, first produced under the award without EERE approval. When copyright is asserted, the Government retains a paid-up nonexclusive, irrevocable worldwide license to reproduce, prepare derivative works, distribute copies to the public, and to perform publicly and display publicly the copyrighted work. This license extends to contractors and others doing work on behalf of the Government. Formatted; Font; Calibri **PP.P.** Personally Identifiable Information (PII) Formatted: Don't keep with next, Don't keep lines together All information provided by the Applicant must to the greatest extent possible exclude Personally Identifiable Information (PII). The term "personally identifiable information" refers to information which can be used to distinguish or trace an Individual's identity, such as their name, social security number, biometric records, etc. alone, or when combined with other personal or identifying information which is linked or linkable to a specific individual, such as date and place of birth, mother's maiden name, etc. (See OMB Memordum M-07-16 dated May 22, 2007, found at: https://www.whitehouse.gov/sites/default/files/omb/memoranda/fy2007/m07-16-pat https://www.whitehouse.gov/sites/whitehouse.gov/files/omb/memoranda/2007/+ Formatted: Not Highlight Formatted: Indent: Left: 0.88" m07-16.pdf Questions about this FOA? Email SETO.FOA@ee.doc.gov.SI.FOA.SETO@ee.doe.gov Problems with EERE Exchange? Email EERE-EERE-ExchangeSupport@ha.doe.gov Include FOA name and number in subject line.

energy

Energy Efficiency & **Renewable Energy**

By way of example, Applicants must screen resumes to ensure that they do not contain PII such as personal addresses, phone/cell numbers, personal emails and/or SSNs. In short, if the PII is not essential to the application, it should not be in the application.

QQ-Q. Annual Independent Audits

If a for-profit entity is a Prime Recipient and has expended \$750,000 or more of ODE awards during the entity's fiscal year, an annual Compliance Audit performed by an independent auditor is required. For additional information, please refer to 2 C.F.R. § 910.501 and Subpart F.

If an educational institution, non-profit organization, or state/local government is a Prime Recipient or Subrecipient and has expended \$750,000 or more of Federal awards during the non-Federal entity's fiscal year, then a Single or Program-Specific Audit is required. For additional information, please refer to 2 C.F.R. § 200,501 and Subpart F.

Applicants and sub-recipients (if applicable) should propose sufficient costs in the +-- project budget to cover the costs associated with the audit. EERE will share in the cost of the audit at its applicable cost share ratio.

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Renewable Energy

Appendix A – Cost Share Information

Cost Sharing or Cost Matching

The terms "cost sharing" and "cost matching" are often used synonymously. Even the DOE Financial Assistance Regulations, 2 CFR 200,306, use both of the terms in the titles specific to regulations applicable to cost sharing. EERE almost always uses the term "cost sharing," as it conveys the concept that non-federal share is calculated as a percentage of the Total Project Cost. An exception is the State Energy Program Regulation, 10 CFR 420.12, State Matching Contribution. Here "cost matching" for the non-federal share is calculated as a percentage of the Federal funds only, rather than the Total Project Cost.

How Cost Sharing is Calculated

As stated above, cost sharing is calculated as a percentage of the Total Project Cost. FFRDC costs must be included in Total Project Costs, Following is an example of how to calculate cost sharing amounts for a project with \$1,000,000 in federal funds with a minimum 20% nonfederal cost sharing requirement:

- Formula: Federal share (\$) divided by Federal share (%) = Total Project Cost ٠ Example: \$1,000,000 divided by 80% = \$1,250,000
- Formula: Total Project Cost (\$) minus Federal share (\$) = Non-federal share (\$) . Example: \$1,250,000 minus \$1,000,000 = \$250,000
- Formula: Non-federal share (\$) divided by Total Project Cost (\$) = Non-federal share (%) . Example: \$250,000 divided by \$1,250,000 = 20%

What Qualifies For Cost Sharing

While it is not possible to explain what specifically qualifies for cost sharing in one or even a couple of sentences, in general, if a cost is allowable under the cost principles applicable to the organization incurring the cost and is eligible for reimbursement under an EERE grant or cooperative agreement, then it is allowable as cost share. Conversely, if the cost is not allowable under the cost principles and not eligible for reimbursement, then it is not allowable as cost share. In addition, costs may not be counted as cost share if they are paid by the Federal Government under another award unless authorized by Federal statute to be used for cost sharing.

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The rules associated with what is allowable as cost share are specific to the type of organization that is receiving funds under the grant or cooperative agreement, though are generally the same for all types of entities. The specific rules applicable to:

- FAR Part 31 for For-Profit entities, (48 CFR Part 31); and
- 2 CFR Part 200 Subpart E Cost Principles for all other non-federal entities.

In addition to the regulations referenced above, other factors may also come into play such as timing of donations and length of the project period. For example, the value of ten years of donated maintenance on a project that has a project period of five years would not be fully allowable as cost share. Only the value for the five years of donated maintenance that corresponds to the project period is allowable and may be counted as cost share.

Additionally, EERE generally does not allow pre-award costs for either cost share or reimbursement when these costs precede the signing of the appropriation bill that funds the award. In the case of a competitive award, EERE generally does not allow pre-award costs prior to the signing of the Selection Statement by the EERE Selection Official.

General Cost Sharing Rules on a DOE award

- Cash Cost Share encompasses all contributions to the project made by the recipient or subrecipeint(s), for costs incurred and paid for during the project. This includes when an organization pays for personnel, supplies, equipment, etc. for their own company with organizational resources. If the item or service is reimbursed for, it is cash cost share. All cost share items must be necessary to the performance of the project.
- 2. In Kind Cost Share encompasses all contributions to the project made by the recipient or subrecipient(s) that do not involve a payment or reimbursement and represent donated items or services. In Kind cost share items include volunteer personnel hours, donated existing equipment, donated existing supplies, etc. The cash value and calculations thereof for all in Kind cost share items must be justified and explained in the Cost Share section of the project Budget Justification (EERE 335). All cost share items must be necessary to the performance of the project. If questions exist, consult your DOE contact before filling out the In Kind cost share section of the Budget Justification (EERE 335).
- 3. Funds from other Federal sources MAY NOT be counted as cost share. This prohibition includes FFRDC sub-recipients. Non-Federal sources include any source not originally derived from Federal funds. Cost sharing commitment letters from subrecipients must be provided with the original application.

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- 4. Fee or profit, including foregone fee or profit, are not allowable as project costs (including cost share) under any resulting award. The project may only incur those costs that are allowable and allocable to the project (including cost share) as determined in accordance with the applicable cost principles prescribed in FAR Part 31 for For-Profit entities and 2 CFR Part 200 Subpart E - Cost Principles for all other non-federal entities.
- 5. Vendors/Contractors may not provide cost share. Any partial donation of goods or services is considered a discount and is not allowable,

DOE Financial Assistance Rules 2 CFR Part 200 as amended by 2 CFR Part 910

As stated above, the rules associated with what is allowable cost share are generally the same for all types of organizations. Following are the rules found to be common, but again, the specifics are contained in the regulations and cost principles specific to the type of entity:

- (A) (b) For all Federal awards, any shared costs or matching funds and all Acceptable contributions. All contributions, including cash contributions and third party in-kind contributions, must be accepted as part of the non-Federal entity's Prime Recipient's cost sharing or matching when if such contributions meet all of the following criteria:
 - (1) (1) AreThey are verifiable from the non-Federal entity'srecipient's records;
 - (2) (2) AreThey are not included as contributions for any other Federal award; federallyassisted project or program.
 - (3) (3) AreThey are necessary and reasonable for the proper and efficient accomplishment of project or program objectives,
 - (4) (4) AreThey are allowable under Subpart E-Cost Principles of this part; the cost principles applicable to the type of entity incurring the cost as follows:
 - (5) AreFor-profit organizations. Allowability of costs incurred by for-profit organizations and those nonprofit organizations listed in Attachment C to OMB Circular A-122 is determined in accordance with the for-profit cost principles in 48 CFR Part 31 in the Federal Acquisition Regulation, except that patent prosecution costs are not allowable unless specifically authorized in the award document, (v) Commercial Organizations. FAR Subpart 31.2-Contracts with **Commercial Organizations**
 - b. Other types of organizations. For all other non-federal entities, allowability of costs is determined in accordance with 2 CFR Part 200 Subpart E.

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(5) They are not paid by the Federal Government under another Federal-award, except where the unless authorized by Federal statute authorizing a program specifically	4	Formatted: List Paragraph, Indent: Left: 0.5", Numbered + Level: 1 + Numbering Style: 1, 2, 3, + Start at: 1 + Alignment: Left + Aligned at: 0.25" + Indent at: 0.5"
provides that reactal funds made available for such program can to be applied to matching or used for cost sharing requirements of other Federal programs;or matching,		
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(6) (6) Are <u>They are</u> provided for in the approved budget-when required by the Federal awarding agency; and.	* - • - •	Formattedi List Paragraph, Indent; Left: 0,5", Numbered + Level: 1 + Numbering Style: 1, 2, 3, + Start at: 1 + Alignment: Left + Aligned at: 0,25" + Indent at: 0,5"
(7) Conform to other provisions of this part, as applicable.		
(c) Unrecovered Indirect costs, including indirect costs on cost sharing or matching may be included as part of cost sharing or matching only with the prior approval of the Federal awarding agency. Unrecovered indirect cost means the difference between the amount charged to the Federal award and the amount which could have been charged to the Federal award under the non-Federal entity's approved negotiated indirect cost-rate.		
(B) (d) Values for non-Federal entity contributions of services and Valuing and documenting contributions		
(1) Valuing recipient's property must be or services of recipient's employees. Values are established in accordance with the cost principles in Subpart E—Cost Principles. If a Federal awarding agency authorizes the non-Federal entity to donate buildings or land for construction/facilities acquisition projects or long-term use, the applicable cost principles, which mean that amounts chargeable to the project are determined on the basis of costs incurred. For real property or equipment used on the project, the cost principles authorize depreciation or use charges. The full value of the ltem may be applied when the item will be consumed in the performance of the award or fully depreciated by the end of the award. In cases where the full value of a donated property for capital asset is to be applied as cost sharing or matching, that full value of the property for capital asset is to be applied as cost sharing or matching, that full value of the property for capital asset is to be applied as cost sharing or matching, that full value of the value property for capital asset is to be applied as cost sharing or matching, that full value of the full val	4	Formatted: List Paragraph, Indent: Left: 0.5", Numbered + Level: 1 + Numbering Style: 1, 2, 3, + Start at: 1 + Alignment: Left + Aligned at: 0,25" + Indent at: 0,5"
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a. (1) The <u>certified</u> value of the remaining life of the property recorded in the non- Federal entity's recipient's accounting records at the time of donations; or	*-	Formatted: List Paragraph, Numbered + Level: 1 + Numbering Style: a, b, c, + Start at: 1 + Alignment: Left + Aligned at: 0.75" + Indent at: 1"
b. (2) The current fair market value. However, when if there is sufficient Justification, the Federal awarding agencyContracting Officer may approve the use of the current fair market value of the donated property, even if it exceeds the certified value described in (1) above at the time of donation, to the project. The Contracting Officer may accept the use of any reasonable basis for determining the fair market value of the property.	e	Formatted: List Paragraph, Numbered + Level: 1 + Numbering Style: a, b, c, + Start at: 1 + Alignment: Left + Aligned at: 0.75" + Indent at: 1" Formatted: Indent: Left: 0.25", First line: 0.04"
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ENERGY Renewable Energy (2) (e)Valuing services of others' employees. If an employer other than the recipient furnishes the services of an employee, those services are valued at the employee's regular rate of pay, provided these services are for the same skill level for which the employee is normally paid. (3) Valuing volunteer services. Volunteer services furnished by third-party professional and technical personnel, consultants, and other skilled and unskilled labor may be counted as cost sharing or matching if the service is an integral and necessary part of an approved project or program. Rates for third party-volunteer services must be consistent with those paid for similar work byin the non-Federal entity recipient's organization. In those instancesmarkets in which the required skills are not found in the non-Federal entityrecipient organization, rates must be consistent with those paid for similar work in the labor market in which the non Federal entityrecipient competes for the kind of services involved. In either case, paid fringe benefits that are reasonable, necessary, allowable, and allocable, and otherwise allowable may be included in the valuation. (f) When a third-party organization furnishes the services of an employee, these services must be valued at the employee's regular rate of pay-plus an amount of fringe benefits that is reasonable, necessary, allocable, and otherwise allowable, and indirect costs at either the thirdparty organization's approved federally negotiated indirect cost rate or, a rate in accordance with \$200.414 Indirect (F&A) costs, paragraph (d), provided these services employ the same skill(s) for which the employee is normally paid.-Where donated services are treated as indirect costs, indirect cost-rates will separate the value of the donated services so that reimbursement for the donated services will not be made. (4) (g) Donated Valuing property from donated by third parties. Formatted: List Paragraph, Indent: Left: 0.75° , Numbered + Level: 1 +Numbering Style: a, b, c, ... + Start at: 1 +Alignment: Left + Aligned at: $0.25^{\circ} +$ Indent at: 0.5° Donated supplies may include such items as equipment, office supplies, or laboratory supplies, or workshop and classroom supplies, Value assessed to donated property supplies included in the cost sharing or matching share must be reasonable and must not exceed the fair market value of the property at the time of the donation. (h) The method used for determining cost sharing or matching for third-party-donated equipment, buildings and land for which title passes to the non-Federal entity may differ according to the purpose of the Federal award, if paragraph (h)(1) or (2) of this section applies. (1) If the purpose of the Federal award is to assist the non-Federal entity in the acquisition of equipment, buildings or land, the aggregate value of the donated property may be claimed as cost sharing or matching: Questions about this FOA? Email SETO.FOA@ee.doe.gov. SI.FOA.SETO@ee.doe.gov Problems with EERE Exchange? Email EERE-<u>EERE-ExchangeSupport@hg.doe.gov</u> include FOA name and number in subject line.

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(2) If the purpose of the Federal award is to support activities that require the use of equipment, buildings or land, normally Normally only depreciation <u>or use</u> charges for equipment and buildings may be madeapplied. However, the fair morketrental charges for land and the full value of equipment or other capital assets and fair rental charges for land may be allowed,

value of equipment or other capital assets and fair rental charges for land may be allowed, provided that the Federal awarding agencywhen they will be consumed in the performance of the award or fully depreciated by the end of the award, provided that the Contracting Officer has approved the charges. See also 5200.420 Considerations for selected items of cost.

b. (i) The value of donated propertyWhen use charges are applied, values must be - determined in accordance with the usual accounting policies of the non-Federal entityrecipient, with the following qualifications:

(1) The value of donated land and buildings must not exceed its fair market-value at the time of donation to the non-Federal entity as established by an independent appraiser (e.g., certified real property appraiser or General Services Administration representative) and certified by a responsible official of the non-Federal entity as required by the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended, (42-U.S.C. 4601-4655) (Uniform Act) except as provided in the implementing regulations at 49 CFR part 24.

(2) The value of donated equipment must not exceed the fair market value of equipment of the same age and condition at the time of donation.

- i. (3) The value of donated space must not exceed the fair rental value of comparable space as established by an independent appraisal of comparable space and facilities in a privately-owned building in the same locality.
- ii. (4) The value of loaned equipment must not exceed its fair rental value.
- (5) (J) For third-partyDocumentation. The following requirements pertain to the recipient's supporting records for in-kind contributions, the fair market value of goods and from third parties:
 - a. Volunteer services must be documented and, to the extent feasible, supported by the same methods used internally by the non-Federal entity.recipient for its own employees.

(K) For IHEs, see also ONIB memorandum M-01-06, dated January 5, 2001, Clarification of OMB A-21-Treatment of Voluntary Uncommitted Cost Sharing and Tuition Remission Costs.

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b. The basis for determining the valuation for personal services and property must be documented.

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Appendix B – Sample Cost Share Calculation for Blended Cost Share Percentage

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The following example shows the math for calculating required cost share for a project with \$2,000,000 in Federal funds with four tasks requiring different Non-federal cost share percentages:

Task	Proposed Federal Share	Federal Share %	Recipient Share %
Task 1 (R&D)	\$1,000,000	80%	20%
Task 2 (R&D)	\$500,000	80%	20%
Task 3 (Demonstration)	\$400,000	50%	50%
Task 4 (Outreach)	\$100,000	100%	0%

Federal share (\$) divided by Federal share (%) = Task Cost

Each task must be calculated individually as follows:

Task 1

\$1,000,000 divided by 80% = \$1,250,000 (Task 1 Cost) Task 1 Cost minus federal share = Non-federal share \$1,250,000 - \$1,000,000 = \$250,000 (Non-federal share)

Task 2

\$500,000 divided 80% = \$625,000 (Task 2 Cost) Task 2 Cost minus federal share = Non-federal share \$625,000 - \$500,000 = \$125,000 (Non-federal share)

Task 3

\$400,000 / 50% = \$800,000 (Task 3 Cost) Task 3 Cost minus federal share = Non-federal share \$800,000 - \$400,000 = \$400,000 (Non-federal share)

Task 4

Federal share = \$100,000 Non-federal cost share is not mandated for outreach = \$0 (Non-federal share)

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The calculation may then be completed as follows:

Tasks	\$ Federal Share	% Federal Share	\$ Non-Federal Share	% Non-Federal Share	Total Project Cost
Task 1	\$1,000,000	80%	\$250,000	20%	\$1,250,000
Task 2	\$500,000	80%	\$125,000	20%	\$625,000
Task 3	\$400,000	50%	\$400,000	50%	\$800,000
Task 4	\$100,000	100%	\$0	0%	\$100,000
Totals	\$2,000,000		\$775,000		\$2,775,000

Blended Cost Share %

Non-federal share (\$775,000) divided by Total Project Cost (\$2,775,000) = 27.9% (Non-federal) Federal share (\$2,000,000) divided by Total Project Cost (\$2,775,000) = 72.1% (Federal)

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Appendix C – Waiver Requests: Foreign Entity Participation as the Prime Recipient and Performance of Work in the United States

1. Waiver for Foreign Entity Participation as the Prime Recipient As set forth in Section III.A.3, 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, To request a waiver of this requirement, an applicant must submit an explicit waiver request in the Full Application.

Overall, the applicant must demonstrate to the satisfaction of EERE that it would further the purposes of this FOA and is otherwise in the economic interests of the United States to have a foreign entity serve as the Prime Recipient. A request to waive the *Foreign Entity Participation as the Prime Recipient* requirement must include the following:

- Entity name;
- The rationale for proposing a foreign entity to serve as the Prime Recipient;
- Country of incorporation;
- A description of the project's anticipated contributions to the US economy;
 - How the project will benefit U.S. research, development and manufacturing, including contributions to employment in the U.S. and growth in new markets and jobs in the U.S.;
 - How the project will promote domestic American manufacturing of products and/or services;
- A description of how the foreign entity's participation as the Prime Recipient is essential to the project;
- A description of the likelihood of Intellectual Property (IP) being created from the work and the treatment of any such IP;
- Countries where the work will be performed (<u>Note: if any work is proposed to be</u> conducted outside the U.S., the applicant must also complete a separate request for waiver of the Performance of Work in the United States requirement).

EERE may require additional information before considering the waiver request.

The applicant does not have the right to appeal EERE's decision concerning a waiver request.

2. Waiver for Performance of Work in the United States

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As set forth in Section IV.J.3, all work under EERE funding agreements must be performed in the United States. This requirement does not apply to the purchase of supplies and equipment, so a waiver is not required for foreign purchases of these items. However, the Prime Recipient should make every effort to purchase supplies and equipment within the United States. There may be limited circumstances where it is in the interest of the project to perform a portion of the work outside the United States. To seek a waiver of the Performance of Work in the United States requirement, the applicant must submit an explicit waiver request in the Full Application. A separate waiver request must be submitted for each entity proposing performance of work outside of the United States.

Overall, a waiver request must demonstrate to the satisfaction of EERE that it would further the purposes of this FOA and is otherwise in the economic interests of the United States to perform work outside of the United States. A request to waive the *Performance of Work in the United States* requirement must include the following:

- The rationale for performing the work outside the U.S. ("foreign work");
- A description of the work proposed to be performed outside the U.S.;
- An explanation as to how the foreign work is essential to the project;
- A description of the anticipated benefits to be realized by the proposed foreign work and the anticipated contributions to the US economy;
 - The associated benefits to be realized and the contribution to the project from the foreign work;
 - How the foreign work will benefit U.S. research, development and manufacturing, including contributions to employment in the U.S. and growth in new markets and jobs in the U.S.;
 - How the foreign work will promote domestic American manufacturing of products and/or services;
- A description of the likelihood of Intellectual Property (IP) being created from the foreign work and the treatment of any such IP;
- The total estimated cost (DOE and Recipient cost share) of the proposed foreign work;
- · The countries in which the foreign work is proposed to be performed; and
- The name of the entity that would perform the foreign work.

EERE may require additional information before considering the waiver request.

The applicant does not have the right to appeal EERE's decision concerning a waiver request.

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Appendix D - Data Management Plan

A data management plan ("DMP")-will be required as part of award negotiations. It explains how data generated in the course of the work performed under an EERE award will be shared and preserved or, when justified, explains why data sharing or preservation is not possible or scientifically appropriate.

DMP Requirements

In order for a DMP to be considered acceptable, the DMP must address the following:

At a minimum, the DMP must describe how data sharing and preservation will enable validation of the results from the proposed work, or how results could be validated if data are not shared or preserved.

The DMP must provide a plan for making all research data displayed in publications resulting from the proposed work digitally accessible at the time of publication. This includes data that are displayed in charts, figures, images, etc. In addition, the underlying digital research data used to generate the displayed data should be made as accessible as possible in accordance with the principles stated above. This requirement could be met by including the data as supplementary information to the published article, or through other means. The published article should indicate how these data can be accessed.

The DMP should consult and reference available information about data management resources to be used in the course of the proposed work. In particular, a DMP that explicitly or implicitly commits data management resources at a facility beyond what is conventionally made available to approved users should be accompanied by written approval from that facility. In determining the resources available for data management at DOE User Facilities, researchers should consult the published description of data management resources and practices at that facility and reference it in the DMP. Information about other DOE facilities can be found in the additional guidance from the sponsoring program.

The DMP must protect confidentiality, personal privacy, Personally Identifiable Information, and U.S. national, homeland, and economic security; recognize proprietary interests, business confidential information, and intellectual property rights; avoid significant negative impact on innovation, and U.S. competitiveness; and otherwise be consistent with all laws (i.e., export control laws), and DOE regulations, orders, and policies.

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Data Determination for a DMP

The Principal Investigator should determine which data should be the subject of the DMP and, in the DMP, propose which data should be shared and/or preserved in accordance with the DMP Requirements noted above.

For data that will be generated through the course of the proposed work, the Principal Investigator should indicate what types of data should be protected from immediate public disclosure by DOE (referred to as "protected data") and what types of data that DOE should be able to release immediately. Similarly, for data developed outside of the proposed work at private expense that will be used in the course of the proposed work, the Principal Investigator should indicate whether that type of data will be subject to public release or kept confidential (referred to as "limited rights data"). Any use of limited rights data or labeling of data as "protected data" must be consistent with the DMP Requirements noted above.

Suggested Elements for a DMP

The following list of elements for a DMP provides suggestions regarding the data management planning process and the structure of the DMP:

Data Types and Sources: A brief, high-level description of the data to be generated or used through the course of the proposed work and which of these are considered digital research data necessary to validate the research findings or results.

Content and Format: A statement of plans for data and metadata content and format including, where applicable, a description of documentation plans, annotation of relevant software, and the rationale for the selection of appropriate standards. Existing, accepted community standards should be used where possible. Where community standards are missing or inadequate, the DMP could propose alternate strategies for facilitating sharing, and should advise the sponsoring program of any need to develop or generalize standards.

Sharing and Preservation: A description of the plans for data sharing and preservation. This should include, when appropriate: the anticipated means for sharing and the rationale for any restrictions on who may access the data and under what conditions; a timeline for sharing and preservation that addresses both the minimum length of time the data will be available and any anticipated delay to data access after research findings are published; any special requirements for data sharing, for example, proprietary software needed to access or interpret data, applicable policies, provisions, and licenses for re-use and redistribution, and for the production of derivatives, including guidance for how data and

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data products should be cited; any resources and capabilities (equipment, connections, systems, software, expertise, etc.) requested in the research proposal that are needed to meet the stated goals for sharing and preservation (this could reference the relevant section of the associated research proposal and budget request); and whether/where the data will be preserved after direct project funding ends and any plans for the transfer of responsibilities for sharing and preservation.

Protection: A statement of plans, where appropriate and necessary, to protect confidentiality, personal privacy, Personally Identifiable Information, and U.S. national, homeland, and economic security; recognize proprietary interests, business confidential information, and intellectual property rights; and avoid significant negative impact on innovation, and U.S. competitiveness.

Rationale: A discussion of the rationale or justification for the proposed data management plan including, for example, the potential impact of the data within the immediate field and in other fields, and any broader societal impact.

Additional Guidance

In determining which data should be shared and preserved, researchers must consider the data needed to validate research findings as described in the Requirements, and are encouraged to consider the potential benefits of their data to their own fields of research, fields other than their own, and society at large.

DMPs should reflect relevant standards and community best practices and make use of community accepted repositories whenever practicable.

Costs associated with the scope of work and resources articulated in a DMP may be included in the proposed research budget as permitted by the applicable cost principles.

To improve the discoverability of and attribution for datasets created and used in the course of research, EERE encourages the citation of publicly available datasets within the reference section of publications, and the identification of datasets with persistent identifiers such as Digital Object identifiers (DOIs). In most cases, EERE can provide DOIs free of charge for data resulting from DOE-funded research through its Office of Scientific and Technical Information (OSTI) DataID Service.

EERE's Digital Data Management principles can be found at: <u>EERE Digital Data Management]</u> Department of Energy

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Definitions

Data Preservation: Data preservation means providing for the usability of data beyond the lifetime of the research activity that generated them.

Data Sharing: Data sharing means making data available to people other than those who have generated them. Examples of data sharing range from bllateral communications with colleagues, to providing free, unrestricted access to anyone through, for example, a web-based platform.

Digital Research Data: The term digital data encompasses a wide variety of information stored in digital form including: experimental, observational, and simulation data; codes, software and algorithms; text; numeric information; images; video; audio; and associated metadata. It also encompasses information in a variety of different forms including raw, processed, and analyzed data, published and archived data.

Research Data: The recorded factual material commonly accepted in the scientific community as necessary to validate research findings, but not any of the following: preliminary analyses, drafts of scientific papers, plans for future research, peer reviews, or communications with colleagues. This 'recorded' material excludes physical objects (e.g., laboratory samples). Research data also do not include:

(A) Trade secrets, commercial information, materials necessary to be held confidential by a researcher until they are published, or similar information which is protected under law; and

(B) Personnel and medical information and similar information the disclosure of which would constitute a clearly unwarranted invasion of personal privacy, such as information that could be used to identify a particular person in a research study."

Validate: In the context of DMPs, validate means to support, corroborate, verify, or otherwise determine the legitimacy of the research findings. Validation of research findings could be accomplished by reproducing the original experiment or analyses; comparing and contrasting the results against those of a new experiment or analyses; or by some other means.

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Doc 19

Rodriguez, Susan (CONTR)

From: Sent: To: Cc: Subject:	Murley, Susanna (CONTR) Monday, September 17, 2018 11:02 AM Hamos, Ian Kanojia, Monica (CONTR);Bristol, Jennifer (CONTR) RE: Minneapolis Microgrid project
(b) (5)	
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anyone else notices,	. I don't expect any action from you Wanted to make sure you were aware of it in case
Best,	
Susanna	
Susanna Mutley Strategic Support Team Lead The Building People, LLC U. Contractor supporting the Sola: Office of Energy Efficiency and Office: 202.287.1637 Cell: (b)	S. Department of Energy t Energy Technologies Office 1 Renewable Energy (6)

From: Hamos, Ian Sent: Monday, September 17, 2018 12:46 PM To: Murley, Susanna (CONTR) <Susanna.Murley@EE.DOE.Gov> Cc: Kanojia, Monica (CONTR) <Monica.Kanojia@ee.doe.gov>; Bristol, Jennifer (CONTR) <Jennifer.Bristol@EE.doe.gov> Subject: RE: Minneapolis Microgrid project

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Interesting...(b) (5)

(b) (5)

Just my opinion of course,

no direction from me.

Ian Hamos Chief of Staff Office of the DAS for Renewable Power U.S. Department of Energy 1000 Independence Ave. SW Washington, DC, 20585

From: Murley, Susanna (CONTR) Sent: Monday, September 17, 2018 12:40 PM To: Hamos, Ian <<u>lan.Hamos@EE.doe.gov</u>> Cc: Kanojia, Monica (CONTR) <<u>Monica.Kanojia@ee.doe.gov</u>>; Bristol, Jennifer (CONTR) <<u>Jennifer.Bristol@EE.doe.gov</u>> Subject: Minneapolis Microgrid project

Hi Jan -

I wanted to make sure that you were aware that one of the potential awardees in Topic 1 says in this story that we "favorably responded to a proposal to fund the project."

https://energynews.us/2018/09/17/midwest/solar-entrepreneur-aims-to-bring-jobs-training-to-north-minneapolis/

We are working on an appropriate response with Golden. (b) (5)

Best,

Susanna

Susanna Murley

Strategic Support Team Lead The Building People, LLC | U.S. Department of Energy Contractor supporting the Solar Energy Technologies Office Office of Energy Efficiency and Renewable Energy Office: 202.287.1637 | Cell: (b) (6)