SunShot
U.S. Department of Energy

Sustainable and Holistic IntegratioN of Energy storage and Solar PV (SHINES)

Informational Webinar

November 13, 2014

None of the information presented here is legally binding. The content included in this presentation is intended only to summarize the contents of funding opportunity DE-FOA-0001108. Any content within this presentation that appears discrepant from the Funding Opportunity Announcement (FOA) language is superseded by the FOA language. All Applicants are strongly encouraged to carefully read the FOA guidelines and adhere to them. Neither the U.S. Department of Energy (DOE) nor the employees associated with DOE working on this presentation shall be held liable for errors committed by Applicants based on potentially incorrect or inaccurate information presented herein.

Agenda

- Systems Integration: SHINES introduction and overview
- SHINES Target Metrics to be met by all awardees
- SHINES Scope of Work
- Concept Paper and Full Application Details

Sustainable and Holistic IntegratioN of Energy storage and Solar PV (SHINES)

- SunShot Funding Opportunity Announcement
  Currently Open

FOA Issue Date:	**October 29, 2014**
Informational Webinar:	**November 13, 2014**
Submission Deadline for Concept Papers:	December 16, 2014 5:00pm ET
Submission Deadline for Full Applications:	March 19, 2015 5:00pm ET
Expected Submission Deadline for Replies to Reviewer Comments:	May 15, 2015 5:00pm ET
Expected Date for EERE Selection Notifications:	June 22, 2015
Expected Timeframe for Award Negotiations	60 days

- https://eere-exchange.energy.gov/default.aspx#FoaId266730f7-8882-43a5-aa86-dd215373ea22

SHINES FOA Details

- Period of Performance: Up to three years
- DOE Funds Available (subject to appropriations): $15 Million
- Cost Share Requirement: at least 50%
- Minimum award amount: $500,000
- Minimum award amount: $5,000,000
- Approximate number of awards: 3 - 5

SHINES FOA - Goal

- Enable the development and demonstration of integrated, scalable, and cost-effective technologies for solar that incorporates energy storage and works seamlessly to meet both consumer needs and the needs of the electricity grid.

- Such an integrated solution should utilize smart inverters, and be capable of working with smart buildings, smart appliances, and utility communication and control systems.

SHINES FOA - Intent

- This FOA is not intended to fund basic research in energy storage materials or battery electrochemistry, rather, funding will be targeted to leverage advances in energy storage/load management design and performance to create a solution consisting of hardware and development of algorithms, soft/firmware that are integrated with PV systems

- The projects awarded through this FOA are expected to enable disruptive and transformative innovation to create robust, flexible, and reliable SHINES solutions that would enable large-scale integration of solar into the grid in a sustainable, reliable, and cost-effective manner

SHINES Solution Features

The SHINES solution as envisioned by SunShot will:

- be grid-connected,
- consist of the solar PV plant and energy storage,
- utilize smart inverters,
- be capable of operating in conjunction with smart loads (such as optimized operation of HVAC systems and other appliances),
- enable demand response,
- incorporate solar and load forecasting into decisions; and
- be interoperable internally and externally using standard protocols that satisfy communication and control capabilities as required by the local utility, home/building energy management systems, and/or the building/community where it is installed.

SHINES Solution Target Metrics

Area of Focus	Target Metrics to be met by all awardees
Consistent Component Lifetimes	• As the SHINES integrated solution is envisioned to perform for 25 years, components and subsystems are expected to be fully functional during that service lifetime. • If the sub-systems of the proposed SHINES solution are to be replaced within the 25 year lifetime, the overall solution including all equipment replacement costs must meet all of the target metrics in this table and in incorporated into the LCOE calculation. • Further, the SHINES solution and all of its components should be designed to be compliant with applicable ANSI, UL, NEC and OSHA standards.

SHINES Solution Target Metrics

Area of Focus	Target Metrics to be met by all awardees
Performance Requirements for the Energy Storage and Load Management component of the SHINES solution	Over their 25 year service lifetime, the SHINES solutions must satisfy all of the following, • perform ≥ 18,000 cycles (charge and discharge) with DoD 100% of PV capacity within 1 hour; • perform ≥ 50,000 cycles (charge and discharge) with DoD no less than 40% of PV capacity within 1 minute; • have ≥ 90% roundtrip efficiencies for each cycle.; • operate at rated power for at least 4 hours with less than 5% internal energy loss in a fully charged state.

SHINES Solution Target Metrics

Area of Focus	Target Metrics to be met by all awardees
SHINES solution cost reduction	• The LCOE target by year 2020 for the entire SHINES solution ≤ 14 cents/kWh fully installed, interconnected to the grid, and approved for operation by the utility, without any changes to federal legislation enacted as of this FOA's issue date, when the SHINES solution is manufactured and installed at scale. • A credible pathway toward meeting the year 2020 LCOE target should be clearly shown for SHINES solution sizes between 5 kW and 2 MW. • The LCOE should include all components of the proposed solution, including the PV plant, energy storage, inverters, all other associated installation, hardware, software, interconnection, permitting, operating costs, and also the cost of energy from the grid used to charge the energy storage component of the SHINES solution.

SHINES Solution Target Metrics

Area of Focus	Target Metrics to be met by all awardees
Project Team	• The project team should include at least one utility, and is also expected to have a PV module supplier/solar installer, inverter company, energy storage supplier, and other key stakeholders as applicable, as part of their team, in designing, developing, and deploying the proposed SHINES solution

SHINES Solution Target Metrics

Area of Focus	Target Metrics to be met by all awardees
Interoperability, Communication and Control	• The SHINES solution must allow for monitoring, communication to and from, and control by utility and home energy management systems using at least one of most commonly used protocols by the utility control systems and at least one of the most commonly used protocols by the home energy management systems. • The SHINES solutions must use common interoperability, control and communication protocols and not rely on unique protocols, codes or standards that cannot be replicated at scale by the broader industry • The SHINES solutions must also show capability to interoperate with other commonly used communication and control protocols of both utility and home energy management systems. • Compatibility may be provided using DOE's VOLTTRON open source transaction platform or other open source solutions. • The SHINES solution must also have the demonstrated capability to respond to electricity market price signals and incorporate solar and load forecasting and as part of its decision making process in determining optimal operations.

SHINES Solution Target Metrics

Area of Focus	Target Metrics to be met by all awardees
Interconnection to the Grid	The SHINES solutions must meet all the interoperability, communication, control and visibility requirements by the utility partner and should also show a credible pathway toward meeting the following interconnection cost and time requirements by year 2020: • Minimizing the need for detailed technical studies to achieve the long term target of the interconnection cost < $1000 for each SHINES solution; • Interconnection time < 1 week from initial application to full approval for operations by the utility and other relevant approving agencies.

SHINES Solution Target Metrics

Area of Focus	Target Metrics to be met by all awardees
Benefits	The SHINES solution should clearly show the lasting economic value provided to all stakeholders – measured by net benefits such as lower electricity cost, improved reliability, efficient utilization of solar and load, and others as applicable.
SHINES solution application	The proposed SHINES solution should be shown to be flexible and scalable to support solar penetrations of up to 100% of peak load. The extent of flexibility and scalability of SHINES to support high solar penetrations should be determined in conjunction with existing and proposed distribution grid management schemes implemented by the utility to handle high penetrations of solar.
Infrastructure	The SHINES solution should explore inclusion of existing infrastructure to the extent possible, such as PV panels already present at proposed installation sites and other hardware and software currently available at the location

SHINES FOA – Required Scope of Work

- **Design:** Create a SHINES conceptual prototype, integrated solution for a residential or non-residential application that is at least 5 kW but less than 2 MW in size, demonstrated to meet all of the target metrics. The applicant can incorporate in addition to PV and energy storage, options such as demand response and load management as part of the SHINES solution to achieve the target metrics of the FOA.
- DOE expects the utility partner in the project team to be integrally involved in the fundamental design and development of the SHINES solution, provide specific guidance on the desired operation of the solution with the utility grid, and for the rest of the project team to demonstrate buy-in from the utility partner. The result from this activity forms a critical milestone in this project and determines the economic and technical viability of the solution proposed by the applicant.

SHINES FOA – Required Scope of Work

- **Development and Deployment:** Perform detailed development and deployment of the proposed SHINES solution, and deploy it at single or multiple installations. It is the expectation of DOE for the deployment to occur in a setting/s that is applicable to a range of conditions widely prevalent across the country, in either actual residential or non-residential buildings of the types shown to be widespread across the nation, with building occupants performing their normal functions. All equipment and components proposed as part of the SHINES solution or proposed to be interacting with the developed SHINES solution should be actual equipment operating in real-world conditions without a proxy or a simulator in place of the actual equipment. Considerable interaction with both the utility and the consumer, is expected of the SHINES solution, and should be studied as part of the deployment.

SHINES FOA – Required Scope of Work

- **Demonstration:** Show that all of the target metrics can be met or exceeded after deployment of SHINES solution, using actual performance data for at least 1 year. In addition, applicants should perform in-depth value and process optimization analysis to show that there will be net benefits, these benefits will be sustained if the SHINES solution is deployed at scale, and show the pathway for deployment of the SHINES solution for levels of penetration of solar up to 100% of peak load.

Eligible Applicants (full details in FOA Section III.A)

- Individuals
  - U.S. citizens and lawful permanent residents
- Domestic entities
  - For- & not-for-profit, universities, national labs/FFRDCs
  - Can be held by foreign entity, but Applicant must be incorporated in U.S.
- Foreign entities
  - Waiver must be submitted for DOE approval
  - Can receive a minority of funding as sub-recipient
- Consortia
  - Can be a mix of domestic/foreign entities
  - Incorporated can apply as prime recipient
  - Unincorporated must designate a member as prime recipient

- **Applicants can submit more than one application**
  - Each submission must be unique and distinct from the other(s)

Key Points while submitting documents

- Follow the formatting criteria and page lengths stated in the FOA
- Triple check entries in Exchange
  - Submissions could be deemed non-compliant due to an incorrect entry and cannot be reviewed
- Make sure you hit the submit button
  - Any changes made after you hit submit will un-submit your application and you will need to hit the submit button again

Concept paper overview

- Provides early indicator of proposal relevance to FOA
  - Technical review criteria in FOA Section V.A.1
- For fairness, must conform to content requirements
  - Refer to FOA Section IV.C
- Encourage/Discourage notification sent to applicant
  - Notification will be sent approximately 4 weeks after concept paper due date
  - Applicants may submit a Full Application even if discouraged
- ***Concept papers are mandatory***
  - ***Only Applicants that submit a compliant Concept Paper are eligible to submit a Full Application.***

Concept papers due December 16, 2014 at 5pm ET

Concept papers are mandatory

Submit Concept Paper in EERE-Exchange by

December 16, 2014 5:00 PM ET

https://eere-exchange.energy.gov/

Only applicants that have submitted a compliant Concept Paper are eligible to submit a Full Application

Concept Paper Review Process

- Applicants will be provided review comments on their Concept Paper as well as an Encourage/Discourage decision
- It is **expected** that Encourage/Discourage notifications will be released on January 19, 2015
- Applicants will be provided approximately 2 months to prepare a Full Application.

Timeline

Nov. 13 – Informational webinar

Dec. 16 – Concept papers due (mandatory)

Jan. 19 – Encourage/Discourage decisions for Concept Papers

Mar. 19 – Full applications due

June 22 – Selection notifications (expected date)

August – Awards made (expected date)

Full Applications overview

- Provides detailed information on the proposal
  - Technical review criteria in FOA Section V.A.2
- For fairness, must conform to content requirements
  - Refer to FOA Section IV.D
- Applicants will be provided with reviewer comments following evaluation of all eligible Full Applications
- Applicants will have approximately three business days to prepare a short Reply to Reviewer Comments
  - Refer to FOA Section IV.F. for Content and Form of Replies to Reviewer Comments
- One or more applicants may be invited to participate in Pre-Selection Interviews
  - Refer to FOA Section V.D.2 for more details
- Expected date for Selection Notifications is June 22, 2015

Full Applications are due March 19, 2015 at 5pm ET

Submit Full Applications in EERE-Exchange by

March 19, 2015 5:00 PM ET

https://eere-exchange.energy.gov/

Reminder: Only applicants that have submitted a compliant Concept Paper are eligible to submit a Full Application

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Questions?

Email to sishines@ee.doe.gov

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