

**DOE Request for Information**

**DE-FOA-0000699**

**Solar Energy Evolution and Diffusion Studies (SEEDS)**

**Open Date: March 15, 2012 Close Date: 5PM ET, April 06, 2012**

**This is a Request for Information (RFI) only. DOE will not pay for information provided under this RFI and no project will be supported as a result of this RFI. This RFI is not accepting applications for financial assistance or financial incentives. DOE may or may not issue a Funding Opportunity Announcement (FOA) based on consideration of the input received from this RFI. DOE may issue a FOA as described herein, may issue a FOA that is significantly different than the FOA described herein, or DOE may issue no FOA at all.**

**Background**

Achieving the SunShot Initiative’s aggressive cost-reduction targets[[1]](#footnote-1) will require more than technological breakthroughs. A comprehensive effort to move beyond today’s cost structure must include the discovery and implementation of novel methods for evolving and diffusing solar energy technologies via data-driven, use-inspired research on innovation dynamics and technology adoption patterns. This Request for Information (RFI) seeks to stimulate a series of systematic investigations that will result in viable methods for dramatically transforming the operations of solar researchers, manufacturers, developers, installers, and policymakers.

**Solar technology evolution**

*Objective*: Move beyond a qualitative model of innovation dynamics to a functional description with explanatory and predictive potential via a series of data-driven case studies of the solar energy technologies research, development, demonstration, and deployment processes. Analysis of records of journal publications, patents, movement of human capital (via business- and academic-related online social networks), federal research funding (DOE, NSF, DoD), and supply chain capital movement can reveal new insights. New mathematical models of technological evolution and the innovation process can provide guidance for how to accelerate the rate of improvement of solar energy technologies. Research will impact the design of research funding structures, advancements in production techniques, determining the significance of manufacturing in an innovation economy, and strengthening feedback between innovators and end-users.

**Solar technology diffusion**

*Objective*: Advance the foundations of innovation diffusion theory from *post hoc* empirical generalizations[[2]](#footnote-2) to a formal predictive science based on hypothesis-testing and falsifiable experiments using data-driven case studies and modeling exercises of solar energy technologies market dynamics (e.g., residential, commercial, and utility scale adoption patterns; manufacturing supply chains; industry spillover effects). Identifying the complex relationships between market patterns and decisions requires expertise from a broad array of disciplines including the traditional and computational social sciences. The availability of population-size datasets and powerful computational tools unlock the potential to study the human dimension of technology adoption with precision and wide scale[[3]](#footnote-3). Analysis of social interaction records (via online social networks), solar adoption patterns (via, for example, publicly available datasets), and solar installer data can reveal new insights and set initial conditions and parameters for realistic market simulations under test scenarios. Research will impact the design of the business practices for deploying distributed solar energy, innovative financing structures, and customer acquisition practices.

***Ad Lucem*: Modeling Market Transformation Pathways Workshop**

To further investigate the relevance of technology evolution and diffusion studies to achieving the SunShot goals, DOE held a workshop on February 17, 2012, to gather input on the key questions and identify potential research areas. The workshop was open to any interested parties, and participants included university researchers, experts from national laboratories, and residential solar energy technology installers. The workshop covered a range of topics including: modeling market dynamics, modeling technology evolution dynamics, and understanding consumer decision-making. The key results of the workshop were:

* Systematic, data-driven studies of solar energy technology evolution and diffusion can advance the general understanding of the technology-energy-society nexus and can be practically applied to transform research, development, demonstration and deployment processes.
* Availability of historical and current economic records pertaining to the solar industry is critical for technology evolution and diffusion research.
* The primary challenges in performing systematic, data-driven studies are identifying and acquiring access to relevant datasets.
* Qualitative descriptions of the social processes underlying technology evolution and diffusion can now be validated with analysis of large datasets.
* The availability of California Solar Initiative[[4]](#footnote-4) datasets has enabled researchers to study solar energy technology diffusion with unprecedented precision and granularity.
* Interdisciplinary analysis, including both traditional and computation social sciences, is required to propose strategies for overcoming market barriers related to large-scale solar deployment.

**Proposed Strategy**

To advance the public purpose of expanding the systematic study of these subjects, DOE is considering issuing a Funding Opportunity Announcement (FOA). DOE anticipates providing approximately $3M per year for this FOA. Possible topic areas for this FOA are listed below.

**1.) SunShot SEEDS Scholar-in-Residence / Visiting Scholar**

Through Topic 1, DOE would facilitate a partnership between a researcher and a private company (such as a solar installer or manufacturer), a nonprofit organization (such as a Rooftop Solar Challenge[[5]](#footnote-5) awardee), an electricity provider, or a local, state, or federal government agency. The researcher would have access to datasets to aid in the development of novel research tools that advance the general understanding of technology evolution or diffusion. Aggregated results, general insights, and methodology would be published in peer-reviewed journals with open access. The researcher would make specific strategy recommendations targeted at transforming the host institution’s practices. For longer-term projects, the scholar would apply research results to develop and implement a pilot experiment for accelerating solar technology evolution or diffusion.

*Potential FOA funding: Up to $150,000/year per awardee;*

*Anticipated Period of Award: 1 to 3 years; Anticipated Number of Awards: 3*

**2.) SunShot SEEDS Research Team**

Under Topic 2, an interdisciplinary team of researchers would formulate an analytical, a numerical, and a conceptual framework for studying solar technological progress or adoption patterns. The team could include, for example, physical scientists, computer scientists, social scientists, policy experts, and solar energy practitioners. During the first year, the emphasis would be on framing questions and defining practical solution pathways pertaining to social, behavioral, and economic barriers to achieving the SunShot goals based on tractable, explanatory, and data-driven investigations. The research results would be specific recommendations for pilot experiments based on sound quantitative evidence. During the second year, the project would transition to the design of pilot programs for accelerating solar technology evolution or diffusion (working with partner organizations). During the third year, the pilot program would be executed and analyzed by the Research Team for its efficacy.

*Potential FOA funding: Up to $750,000/year per team;*

*Anticipated Period of Award: 3 years; Anticipated Number of Awards: 2*

**3.) SunShot SEEDS researcher**

Topic 3 would target researchers with expertise in data analysis and computational tools. Researchers would examine technology evolution or diffusion challenges with an emphasis developing strategies pertaining specifically to solar energy technologies. Potential research directions include, but would not be limited to, advancements in applications of complexity science and behavioral economics.

*Potential FOA funding: Up to $150,000/year per awardee;*

*Anticipated Period of Award: 1 to 3 years; Anticipated Number of Awards: 3*

**4.) SunShot SEEDS USE-INSPIRED Data Collection**

In Topic 4, a data collection effort (performed by, for example, an economic historian) would be undertaken. The researcher would identify a specific non-redundant dataset that can be used to study a focused series of pertinent SEEDS research questions[[6]](#footnote-6); identify a method for gathering data (from a consortium of private companies, public organizations, or governments); suggest potential methods for data analysis; and submit the data to a centralized repository for open distribution.

*Potential FOA funding: Up to $150,000/year per awardee;*

*Anticipated Period of Award: 1 to 3 years, Anticipated Number of Awards: 2*

**Request for Information Guidelines**

Respondents are asked to comment on the questions below. **Respondents are also encouraged to comment on the efficacy of the anticipated SEEDS FOA**, as well as your interest in participating in such an opportunity.

***Questions****:*

1. Is your organization (e.g., solar installer, solar manufacturer, electricity provider, government agency, nonprofit organization, business-related online social network, academic-related online social network, etc.) interested in partnering with a researcher to systematically study solar energy technology evolution and diffusion dynamics?
2. Would your organization consider sharing data with a dedicated researcher, such that only aggregated, non-specific results and methodology are published in the open literature?
3. Answers to what set of questions would benefit your organization and your organization’s subset of the solar industry?
4. Are the proposed funding structures, levels, and time-scales described above appropriate to fulfill the proposed research objectives? Please explain why or why not.
5. Are there alternative funding structures that would be more effective at ensuring that theory and research is tested in the field? If so, please explain.
6. Are the four proposed SEEDS topic areas appropriate for stimulating research targeted at addressing specific challenges related to solar energy technology evolution and diffusion? Please explain.
7. Are the four proposed SEEDS topic areas appropriate for encouraging an interdisciplinary set of academic researchers to focus on the market and technological barriers related to large-scale solar deployment? Please explain.
8. How will systematic studies of solar energy technology evolution and diffusion advance the general understanding of the solar technology-energy-society nexus?
9. How can systematic studies of solar energy technology evolution and diffusion be practically applied to transform the solar industry’s manufacturing and distribution processes?

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A response to this RFI will not be viewed as a binding commitment to develop or pursue the project or ideas discussed. DOE may or may not issue a Funding Opportunity Announcement (FOA) based on consideration of the input received from this RFI.

**Respondents are requested to provide the following information at the start of their responses:**

* **Company/Institutional Name,**
* **Company/Institutional Contact,**
* **Address, phone number, and e-mail address,**
* **Brief description of the operations and mission of business or institution (a few sentences will suffice).**

All responses to this RFI must be delivered electronically in **Microsoft Word (.doc or .docx) format as an attachment to an email** sent to the following email address: SunShot.SEEDS-RFI@go.doe.gov. Emails should have the subject line **“SEEDS RFI Response”.**

Questions may be sent to SunShot.SEEDS-RFI@go.doe.gov with the subject line **“Question”.** DOE reserves the right to answer questions at DOE’s sole discretion, and answers to questions will be posted on the EERE Exchange website at <https://eere-exchange.energy.gov>.

***Responses to this RFI must be submitted by 5:00 pm Eastern Time on April 06, 2012.***

Responses should be limited to three pages. Please identify your answers by responding to a specific question if possible**.** DOE welcomes other comments as well. Identify these additional comments with an item in the RFI which will facilitate aggregating all the responses. Any information obtained as a result of this RFI is intended to be used by the Government on a non-attribution basis for program planning and procurement strategy development. Information or data that is restricted in any way or limited for use by the Government is not solicited and will not be considered. Responses will not be considered confidential. **Please do not respond with any information you deem proprietary or confidential.**

DOE has no obligation to respond to those who submit comments, nor to give any feedback on any decision based on the comments received.

DOE thanks you for your assistance and comments in helping build the solar energy industry in the United States.

1. see *SunShot Vision Study* at <http://www1.eere.energy.gov/solar/sunshot/vision_study.html> [↑](#footnote-ref-1)
2. E. M. Rogers, *Diffusion of Innovations*, Free Press, New York (2003). [↑](#footnote-ref-2)
3. D. Lazer *et al*., "Computational Social Science," *Science* **6**: 721-723 (2009). [↑](#footnote-ref-3)
4. California Solar Statistics is the official public reporting site of the California Solar Initiative. See <http://www.californiasolarstatistics.org/>. [↑](#footnote-ref-4)
5. See Rooftop Solar Challenge website at <http://www.eere.energy.gov/solarchallenge/> [↑](#footnote-ref-5)
6. The researcher may formulate relevant topics in collaboration with solar industry partners or other researchers supported by this FOA. [↑](#footnote-ref-6)