Request for Information (RFI)

Photovoltaics (PV) Research and Development

OPEN DATE: June 15, 2015
CLOSE DATE: July 15, 2015 at 5:00 pm

SUBJECT: RFI to Identify Opportunities for Innovation in Photovoltaic Technologies.

BACKGROUND: The U.S. Department of Energy's Solar Energy Technologies Office and SunShot Initiative work to accelerate the market competitiveness of solar energy by targeting cost reductions and supporting increased solar deployment. To this end, we intend to support innovations in photovoltaic power generation that will move the industry forward.

Manufacturing costs associated with photovoltaic module production have decreased dramatically over the past decade, but further improvements are still needed. Cell and module developments that maximize efficiency, service lifetime, and total energy output while minimizing installation material and labor costs are critical to the future of commercial photovoltaic technologies. **Figure 1** provides an illustration of how key PV system parameters interact with one another to meet the SunShot goal of $0.06/kWh.

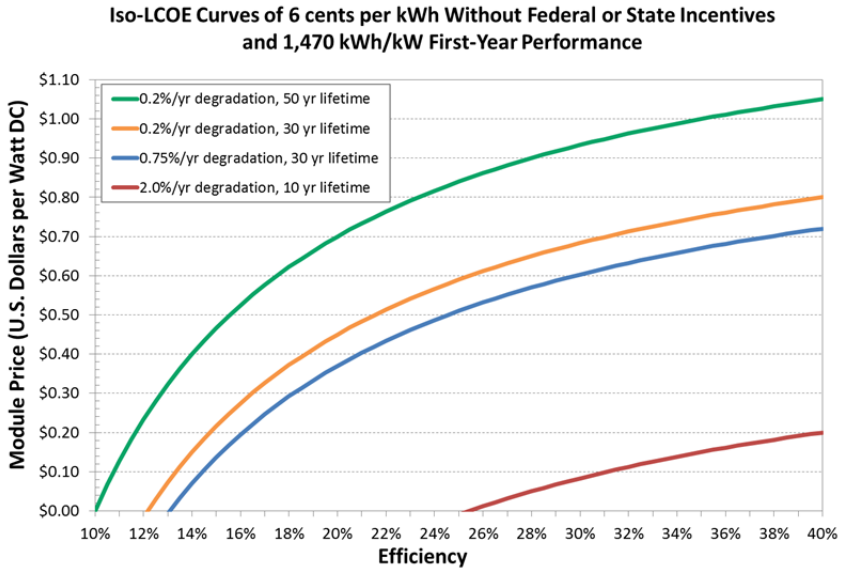

Figure 1. Permutations of the key metrics of efficiency, reliability, and module price that might enable the SunShot target of 6 cents per kWh. For all cases, the balance-of-systems and overhead contribution is held constant at $150/m^2. All of the points located on each of the curves will result in 6 cents per kWh electricity costs, but with substantial differences in how those costs are distributed within the various system parameters. These calculations use an initial system power production of 1470 kWh/kW/year.

This is a Request for Information (RFI) only. EERE 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. EERE may or may not issue a Funding Opportunity Announcement (FOA) based on consideration of the input received from this RFI.

DESCRIPTION: At this time, we would like to gauge the issues and opportunities that the research and industrial communities find most important in reducing the levelized cost of energy associated with photovoltaic power generation.

The successful development of new research efforts will require the continuous and careful assessment of how innovative technologies will improve solar cost metrics and bring manufacturers and installers closer to cost competitiveness with other energy generation methods. **Figure 2** shows the effects that various changes to PV system parameters will have on LCOE, and illustrates one of the various development scenarios in which the SunShot goals are accomplished. Please take a few moments to consider the questions on the following page and to frame your answers within the 6 cents/kWh cost goal that makes up the core of the SunShot vision.

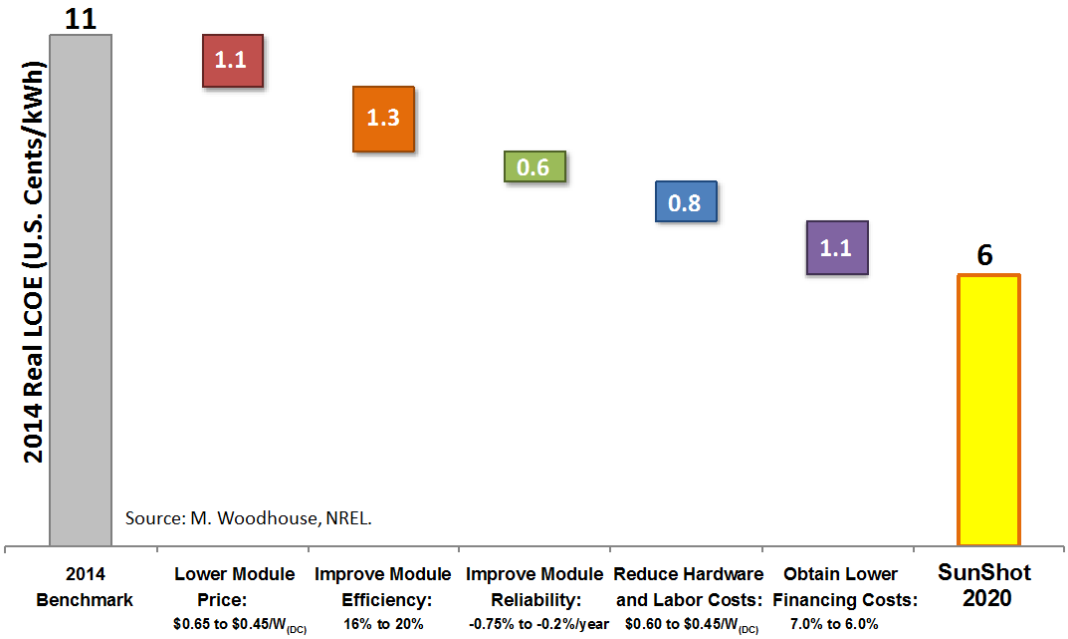

Figure 2. Hypothetical progression toward the SunShot LCOE goals for utility-scale solar plants at initial power production levels of 1470 kWh/kW/year. The effects of various performance improvements are shown in order to give a sense of the sensitivity of the overall cost of electricity toward each system performance parameter.

PURPOSE: This is solely a request for information and not a funding opportunity announcement. EERE is not accepting applications at this time. We greatly appreciate your time and contribution to enhancing the relevance and timeliness of federally funded research.

Please See the Next Page for RFI Categories and Questions.

CATEGORIES AND QUESTIONS

Please indicate when your responses are framed within a specific absorber technology. All comments and discussion are welcome. The following questions may be used as a guide:

Category 1: Key PV Technologies, Gaps, and Roadmaps

1.1) In which cell and module research areas will the application of federal funding be most impactful for meeting the $0.06/kWh SunShot goals and enabling the widespread adoption of photovoltaic power generation?

1.2) What innovations in PV technology would make it possible to achieve $0.02/kWh electricity costs by 2030?

1.3) What are the most effective competitive mechanisms for spurring innovation in photovoltaics research and development? (e.g. prize competitions, individual achievement awards, long-term research centers, funding opportunity announcements, etc.)

Category 2: PV Performance and Cost Goals

2.1) What changes to module design or production are necessary to reduce manufacturing costs to $0.35/W or less at module efficiencies above 22%? In what ways do existing module materials or components need to be improved in order to achieve this goal without compromising system lifetime?

2.2) What changes to module design or production are necessary to enable average annual degradation rates below 0.2% and service lifetimes of 50 years? What advances in module components or balance of systems hardware will be needed to achieve these goals in a cost-effective manner?

2.3) What changes to module or system design would reduce module operating temperatures, minimize sensitivity to spectral variations, inhibit soiling and sedimentation, or otherwise improve the fielded power output of PV arrays? Please justify your answers using quantitative impact metrics.

2.4) What changes to module form factor would enable the largest possible reductions in installation costs? Please justify your answer in terms of impact on total system prices.

REQUEST FOR INFORMATION RESPONSE GUIDELINES

Responses to this RFI must be submitted electronically to PVRD@ee.doe.gov no later than 5:00pm (ET) on July 15th, 2015. Responses must be provided as attachments to an email. It is recommended that attachments with file sizes exceeding 25MB be compressed (i.e. zipped) to ensure message delivery. Only electronic responses will be accepted.

Respondents are requested to provide the following information at the start of their response to this RFI:

- **Name**
- **Company or Affiliation**
- **Email address and/or phone number**

EERE will not respond to individual submissions or publish publicly a compendium of responses. A response to this RFI will not be viewed as a binding commitment to develop or pursue the project or ideas discussed.

DISCLAIMER AND IMPORTANT NOTES: This RFI is not a Funding Opportunity Announcement (FOA); therefore, EERE is not accepting applications at this time. EERE may issue a FOA in the future based on or related to the content and responses to this RFI; however, EERE may also elect not to issue a FOA. There is no guarantee that a FOA will be issued as a result of this RFI. Responding to this RFI does not provide any advantage or disadvantage to potential applicants if EERE chooses to issue a FOA regarding the subject matter. Final details, including the anticipated award size, quantity, and timing of EERE funded awards, will be subject to Congressional appropriations and direction.

Any information obtained as a result of this RFI is intended to be used by the Government on a non-attribution basis for planning and strategy development; this RFI does not constitute a formal solicitation for proposals or abstracts. Your response to this notice will be treated as information only. EERE will review and consider all responses in its formulation of program strategies for the identified materials of interest that are the subject of this request. EERE will not provide reimbursement for costs incurred in responding to this RFI. Respondents are advised that EERE is under no obligation to acknowledge receipt of the information received or provide feedback to respondents with respect to any information submitted under this RFI. Responses to this RFI do not bind EERE to any further actions related to this topic.

PROPRIETARY INFORMATION: Because information received in response to this RFI may be used to structure future programs and FOAs and/or otherwise be made available to the public, **respondents are strongly advised to NOT include any information in their responses that might be considered business sensitive, proprietary, or otherwise confidential.** If, however, a respondent chooses to submit business sensitive, proprietary, or otherwise confidential information, it must be clearly and conspicuously marked as such in the response.

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Responses containing confidential, proprietary, or privileged information must be conspicuously marked as described below. Failure to comply with these marking requirements may result in the disclosure of the unmarked information under the Freedom of Information Act or otherwise. The U.S. Federal Government is not liable for the disclosure or use of unmarked information, and may use or disclose such information for any purpose.

If your response contains confidential, proprietary, or privileged information, you must include a cover sheet marked as follows identifying the specific pages containing confidential, proprietary, or privileged information:

> **Notice of Restriction on Disclosure and Use of Data:**
> Pages [list applicable pages] of this response may contain confidential, proprietary, or privileged information that is exempt from public disclosure. Such information shall be used or disclosed only for the purposes described in this RFI DE-FOA-0001361. The Government may use or disclose any information that is not appropriately marked or otherwise restricted, regardless of source.

In addition, (1) the header and footer of every page that contains confidential, proprietary, or privileged information must be marked as follows: "Contains Confidential, Proprietary, or Privileged Information Exempt from Public Disclosure" and (2) every line and paragraph containing proprietary, privileged, or trade secret information must be clearly marked with double brackets or highlighting.

EVALUATION AND ADMINISTRATION BY FEDERAL AND NON-FEDERAL PERSONNEL: Federal employees are subject to the non-disclosure requirements of a criminal statute, the Trade Secrets Act, 18 USC 1905. The Government may seek the advice of qualified non-Federal personnel. The Government may also use non-Federal personnel to conduct routine, nondiscretionary administrative activities. The respondents, by submitting their response, consent to EERE providing their response to non-Federal parties. Non-Federal parties given access to responses must be subject to an appropriate obligation of confidentiality prior to being given the access. Submissions may be reviewed by support contractors and private consultants.