U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

Supporting Clean Energy Start-ups: Industry and Investment Partnerships for Scaling Innovation

DATE: October 19, 2016
SUBJECT: Request for Information (RFI) DE-FOA-0001669
RESPONSES DUE: November 14, 2016, 5:00pm (ET)

Description

The U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy's (EERE) Technology-to-Market (T2M) team is issuing a Request for Information (RFI). The purpose of this RFI is to gain public input on how T2M can best facilitate a more efficient clean energy innovation ecosystem in the U.S. by leveraging prior initiatives. T2M is looking to understand unaddressed challenges faced by early-stage clean energy start-ups and investors (and other capital providers) and industry partners that can help facilitate the transition of new technologies into the marketplace. The information being sought under this RFI is intended to assist EERE in further defining the scope and priorities of its initiatives by capitalizing on prior year investments to strengthen the U.S. Energy innovation ecosystem. Descriptions of current T2M efforts can be found at http://energy.gov/eere/technology-to-market/technology-market-program.

Background

The conventional technology-to-market pathway from invention to market entry has proven to be challenging for disruptive non-software clean energy technologies[1]. Specific challenges include high capital needs, long development times, the need to integrate into complex systems and supply chains, the need to work with established industry in a commodity market, and the need to operate within a shifting regulatory environment.

In this complex landscape where innovation pathways encounter many market barriers, it is critical for the U.S. to build a more efficient and interconnected innovation ecosystem in order to transition to a clean energy economy. For the purpose of this RFI, we define the innovation

[1] Bonvillian, W. B., & Weiss, C. (2015). *Technological Innovation in Legacy Sectors.* New York: Oxford University Press.; Gaddy, B., Sivaram, V., & O'Sullivan, F. (2016). *Venture Capital and Cleantech: The Wrong Model for Clean Energy Innovation.* Cambridge: MIT Energy Initiative.; Bachher, J.S., Clark, G.L., Monk, A.H.B., & Sridhar, K.S. (2014). *The Valley of Opportunity: Rethinking Venture Capital for Long-Term Institutional Investors*. Alternative Investment Analyst Review.; Hargadon, A.B. & Kenney, M. (2012). *Misguided Policy? Following Venture Capital into Clean Technology*. California Management Review, Vol. 54, No. 2, pp. 118-139.

ecosystem as the set of stakeholders (e.g. universities, business and industry, entrepreneurs and start-ups, labs and facilities, and capital providers) that can collectively enable the commercialization of clean energy technologies.

This RFI from EERE's Office of Strategic Programs (OSP) T2M program seeks to obtain information from the broad innovation community on challenges that start-up companies face in launching and scaling their products and businesses, and understand the interventions in the clean energy innovation ecosystem that could address these challenges.

In February 2016, the Clean Energy Investment Center (CEIC) within DOE's Office of Technology Transitions (OTT) issued an RFI on how to utilize DOE's considerable resources and expertise to support the investor community. The questions posed in that RFI primarily addressed specific services and tools that CEIC could develop to maximize the value of DOE engagement with the investment community and support clean energy investment decision making by the public. In response to stakeholder input from that RFI, CEIC has initiated several efforts to serve the investment community, including the Laboratory-Investor Knowledge Series (LINKS), a forum for public-private discussion of the challenges and opportunities around clean energy investment, and a Lab Partnering Service to connect investors with subject matter experts at the DOE national labs. Descriptions of current OTT efforts can be found at http://energy.gov/technologytransitions/services.

This RFI is intended to build upon DOE initiatives already underway to strengthen the clean energy innovation ecosystem in the U.S.

Purpose

The purpose of this RFI is to solicit feedback from industry, academia, research laboratories, government entities, capital providers, and other stakeholders on issues related to the pathway to market for clean energy technologies. Clean energy may be defined broadly; respondents are encouraged to provide a definition as context for their response.

EERE is particularly interested in the challenges and solutions related to the engagement of start-ups with the established energy industry, the challenges and solutions related to manufacturing and scale-up, and the specific mechanisms needed to improve the functioning of the clean energy innovation ecosystem.

T2M is seeking input on how inefficiencies and misalignments of incentives, resources, and/or information might be addressed. T2M is also seeking to understand what interventions in the clean energy innovation ecosystem could cause more capital to flow, either from conventional

---

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.

investors or other sources of capital. T2M does not require responses to all of the categories and would encourage all interested entities/individuals to respond to any and/or all of the categories and questions herein. This is solely a request for information and not a Funding Opportunity Announcement (FOA). EERE is not accepting applications.

Request for Information Categories and Questions

Note: T2M does not require responses to all of the categories and would encourage all interested entities/individuals to respond to any and/or all of the categories and questions where relevant.

Category 1: **Clean Energy Deal Flow for Industry and Capital Providers**

Clean energy technology companies and start-ups often encounter many challenges as they embark on the path to technology commercialization. These challenges appear evident in the venture capital model that seeks to bridge the gap between ideation and market entry. EERE is seeking information on how industry and investors (and other capital providers) perceive the pipeline of emerging clean energy companies, in order to better facilitate private sector engagement in clean energy innovation.

Information Requested

The following questions may guide, but should not restrict, responses:

General Questions

1. When and how do investors (or other capital providers) engage with early stage clean energy companies at the pre-venture capital stage? When and how do early stage clean energy companies engage with investors (or other capital providers)?
2. How do industry partners and investors (or other capital providers) view the early stage, pre-venture capital, clean energy company deal flow?
3. Are you aware of existing DOE efforts[2] that seek to increase deal flow? How are these efforts addressing or not addressing the market needs?
4. How can EERE's T2M team help facilitate deal flow in the market? For example, should efforts and resources be focused on helping the launch of new companies or on the advancement of existing companies?

[2] DOE efforts includes EERE and OTT programs, initiatives and services. EERE's efforts can be found at http://energy.gov/eere/technology-to-market/technology-market-program and OTT efforts can be found at http://energy.gov/technologytransitions/services.

5. From an investor and industry perspective, what are the activities and/or mechanisms (e.g. investment structures, public private partnership funding models, etc.) that could reduce the technical and market risk of start-ups to produce investible clean energy companies? What mechanisms currently exist and/or are under development that quantify and reduce or defray technical and market risk following the prototype stage?

6. What are the characteristics of clean energy companies at the pre-venture capital stage? Where are the companies on the technology, manufacturing, commercialization, and market readiness scales? Where do they need investor or industry partners to take an active role?

7. Venture capital funding can provide the necessary investment for some entrepreneurs to move from a prototype to commercially available product. These entrepreneurs are often faced with a dilemma: forgo the funding or narrow focus to achieve a high-value exit via a merger, acquisition, or public exit (IPO) which may overly constrain the start-up's ability to have a social impact. What are the alternative pathways in existence, and/or in the idea stage that could replace the need for an IPO and/or sale of the company (e.g. licensing of the technology to a strategic partner), thereby retaining the entrepreneur's ability to maximize impact? What mechanisms could enable those alternative pathways?

Category 2: **Market Challenges**

Early-stage clean energy companies across the U.S. continue to face difficult challenges in crossing the technological and commercialization "valleys of death," and in achieving commercial-scale deployment. EERE T2M recognizes that overcoming these challenges will require integration of different elements within the clean energy innovation ecosystem. This section requests information on the underlying factors driving specific challenges, and also requests information on existing and potential mechanisms to overcome those challenges.

Information Requested

The following questions may guide, but should not restrict, responses:

General Questions

1. As the challenge of access to capital is well documented, what are some of the other challenges facing clean energy, hardware-focused small businesses that have developed a functional prototype and wish to advance to a commercially ready prototype? Please

rank these challenges, articulate interdependencies where they exist, and be as specific as possible.

2. What are the reasons for the challenges? Please articulate specific inefficiencies, or misalignments of incentives, information, or resources that prevent individual companies from moving to the next stage.

   An example of a challenge could be: Companies lack access to scaling facilities. The set of reasons why there is a lack of access could include:
   - Lack of knowledge of available facilities
   - Lack of knowledge on how to approach facilities
   - Prohibitive costs to work with facilities
   - Lack of interest from partners possessing scaling facilities

   Please cite data or provide generalized examples, where possible. Responses should not be limited by the examples provided.

3. Do the challenges experienced by small clean energy companies reflect healthy competition and a properly functioning market, or do they reflect market failures? In either instance, what data exists to provide support for either selection?

4. What solutions have been tried that seek to overcome the primary challenges facing clean energy, hardware-focused small businesses? Were those attempts successful or unsuccessful, and why? What data supports either selection? What solutions have not been tried that might be worthwhile?

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.

Category 3: Industry Engagement

Commercialization and deployment of clean energy technologies that derive from universities, laboratories, and start-ups often requires extensive engagement between entrepreneurs and established industry due to complex system integration, production, and supply chain issues. EERE T2M is seeking information on how more productive partnerships can be built and maintained between new and established companies, through public-private partnerships or other mechanisms.

Information Requested

The following questions may guide, but should not restrict, responses:

General Questions

1. What are the existing mechanisms used by large U.S. corporations[3] to find and invest in clean energy innovations of strategic importance?
2. What are the strengths and weaknesses of existing mechanisms used by large U.S. corporations to find and invest in clean energy innovations? (For example, consider sponsored university research, internal innovation efforts and spin-outs, corporate venture capital, technology scouting, other open innovation efforts, acquisitions, etc.)
3. What are the strengths and weaknesses of databases and match-making approaches for connecting the innovator community with industry?
4. Are the existing mechanisms meeting the needs of (i) large U.S. corporations seeking to remain competitive, and (ii) the innovation community at large? Why or why not? If not, what are the specific gaps?
5. What are potential mechanisms that could be explored or scaled to address the gaps?

[3] For this RFI, large companies are defined roughly as having a market capitalization value greater than $2 billion.

Category 4: Scaling from prototype to production

Early planning around manufacturing and scale-up can prevent costly product redesign, making preparation for manufacturing and scale-up increasingly important to the successful commercialization of clean energy technologies. EERE T2M seeks to understand the needs, capabilities, and roles of the innovation ecosystem to better support start-ups as they progress from a functional to a commercially ready prototype. When considering the questions below, T2M defines a functional prototype as a prototype that has passed initial lab testing to validate the technology and works on the "lab bench." A commercially ready prototype is a prototype that is operational in industry-relevant conditions, targeted at a customer, manufacturable, and has the potential to scale.

Information Requested

The following questions may guide, but should not restrict, responses:

General Questions

1. What do potential investment and industry partners expect in terms of manufacturing readiness when partnering with a clean energy hardware company that has demonstrated a functional prototype? What manufacturing readiness is expected for a commercially ready prototype?

2. What programs from other federal or state agencies, aimed at supporting domestic manufacturing, can help to inform actions taken by EERE to help small clean energy hardware companies with functional prototypes advance those prototypes to be commercially ready?

3. What level of capital will make a difference to a small clean energy hardware company transitioning from a functional prototype to a commercially ready prototype? When answering this question, please specify the technology area(s) considered and any supporting rationale, as the level of capital may depend on the technology and scaling pathway. Would it be preferable, either from the viewpoint of the small company or a potential investment/industry partner, to provide capital directly or to provide free or reduced-cost services, such as those from providers of manufacturing capabilities?

4. Do clean energy incubator and accelerator organizations see preparing hardware companies for manufacturing and scale-up as part of their role? If so, is such preparation a priority and at what stage of the company can these organizations provide

assistance? What does, or should, such preparation entail? Do these organizations have gaps in capabilities or resources that limit them from effectively preparing companies for manufacturing and scale-up?

5. Many state level programs have built online directories of manufacturers (for example, MassDevelopment's Rapid Access Manufacturer's Portal). Are these directories useful to small clean energy hardware companies, or the incubators/accelerators supporting these companies, when transitioning from a functional prototype to a commercially ready prototype? If not, how can these directories be more useful?

6. What manufacturing specific advice and services are most important to small clean energy hardware companies when scaling from a functional prototype to a commercially ready prototype to early product production (e.g. connections to vetted contract manufacturers, access to product design consulting firms, or informal advice on product design)?

Request for Information Response Guidelines

Responses to this RFI must be submitted electronically to T2M@ee.doe.gov no later than 5:00pm (ET) on November 14, 2016. 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. Responses must be provided as a Microsoft Word (.docx) attachment to the email, and no more than 15 pages in length, 12 point font, 1 inch margins. Only electronic responses will be accepted.

Please identify your answers by responding to a specific question or topic if applicable. Respondents may answer as many or as few questions as they wish.

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.

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

- Company / institution name;
- Company / institution contact;
- Contact's address, phone number, and e-mail address.

Disclaimer and Important Notes

This RFI is not a 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

---

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.

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.

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:

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.

Notice of Restriction on Disclosure and Use of Data:
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-0001669. 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.

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.