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

Request for Information: Acceleration of Distributed Generation from Wind Energy Systems

DATE: August 11, 2014

SUBJECT: Request for Information (RFI)

DESCRIPTION:
The Department of Energy's (DOE) Wind Program established a new perspective on distributed wind in 2013 with the first annual market report titled, "*Wind Technologies in Distributed Applications*. The report can be found here: http://www1.eere.energy.gov/wind/pdfs/2012_distributed_wind_technologies_market_report.pdf

Defining distributed wind by technology application, rather than size, has shifted the Research and Development (R&D) paradigm to include all wind technologies used in distributed applications (small, medium, and large), not just small wind turbines. DOE invites input from the public regarding this shift in perspective and the Wind Program's newly established research and development focus areas, which include Wind Resource Characterization & Assessment; Turbine Technology; Distributed Grid Integration; and Soft Cost Reduction. Comments that can be used to evaluate DOE's new perspective on distributed wind and realigned research and development focus areas will help inform future activities and priorities.

BACKGROUND:
The Wind and Water Power Technologies Office (WWPTO) is within the Department of Energy's Office of Energy Efficiency and Renewable Energy (DOE EERE). WWPTO program activities lead the nation's efforts to accelerate the deployment of wind power technologies through improved performance, lower costs, and reduced market barriers. The Wind Program works with national laboratories, industry, universities, and other federal agencies to conduct research and development activities through competitively selected, directly funded, and cost-shared projects. WWPTO efforts target offshore wind, land-based, utility-scale and distributed applications of wind power technology. To find more information about the Wind Program, please visit: http://energy.gov/eere/wind/wind-program

The focus of this RFI will be on the Wind Program's distributed wind portfolio. Distributed wind energy systems are commonly installed on residential, agricultural, commercial, institutional, and industrial sites connected either physically or virtually on the customer side of the meter (to serve on-site load) or directly to the local distribution or micro grid (to support local grid operations or offset nearby loads). Because the definition is based on a wind project's location relative to end-use and power-distribution infrastructure, rather than on technology size or project size, the distributed wind market includes wind turbines and projects of many sizes. For example, distributed wind systems can range in size from a 1-kilowatt (kW) or smaller off-grid

turbine at a remote cabin to a 10-kW turbine at a home, to one or several multi-megawatt turbines at a university campus, manufacturing facility, or other large facility. To find more information on the Wind Program's distributed wind portfolio, please visit: http://energy.gov/eere/wind/distributed-wind

DOE's Wind Program is planning a research and development program aligned with its new perspective which will seek to ensure distributed wind energy system performance meets consumer expectations; develop reliable, low-cost technology optimized for distributed applications; increase utility confidence in integration of distributed wind systems; and streamline the project development and installation process. The activities under this program would encompass the following recently established focus areas:

1. Wind Resource Characterization & Assessment
    - Better understanding of resource creates reliable turbine designs and properly sited distributed wind systems, and mitigates financial risk with regard to payback

2. Turbine Technology
    - Technology transfer and innovation to expand rotors and increase hub heights for small and midsize turbines for increased performance, and advanced manufacturing for lower cost systems

3. Distributed Grid Integration
    - Accurate generator modeling and clear understanding of operating impacts to mitigate interconnection/integration effects

4. Soft Cost Reduction
    - Reduced red tape from permitting requirements and interconnection procedures will lower costs, accelerate adoption and integration

PURPOSE:

The purpose of this RFI is to solicit feedback from industry, academia, research laboratories, government agencies, and other stakeholders on DOE's new perspective on distributed wind and R&D focus areas in order to inform future activities and priorities. EERE is specifically interested in information on each of the focus areas listed above. This is solely a request for information and not a Funding Opportunity Announcement (FOA). EERE is not accepting applications through this RFI. DOE will not respond to questions regarding this RFI.

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 NOT to 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:

> **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-0001155. 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.

REQUEST FOR INFORMATION CATEGORIES AND QUESTIONS: Below, each category of questions will be framed by the Wind Program's distributed wind focus areas and associated rationale. Before providing answers to the category questions, please first consider the following top level questions:

1. Does the Wind Program have a clear definition of what distributed wind is (reference background section)?

2. Are the Wind Program's focus areas representative of the issues most impacting deployment of distributed wind systems?
    - If not, what additional areas should the Wind Program focus on?

3. How should the focus areas be prioritized?

CATEGORY 1: Wind Resource Characterization and Assessment

Improving distributed wind resource characterization is a significant crosscutting opportunity to reduce Levelized Cost of Energy (LCOE), increase stakeholder confidence, and improve grid planning and operation. Better understanding of resource creates reliable turbine designs and properly sited distributed wind systems, provides better understanding of potential grid impacts, and mitigates financial risk with regard to payback. The Wind Program presently has an R&D emphasis on characterizing distributed wind resources in urban environments and developing more accurate, cost-effective assessment tools (or measurement devices). To improve and build up on present efforts the Wind Program is requesting the following information with regard to wind resource characterization and assessment:

1) What is the present state of the art for wind resource characterization and assessment technology being used for distributed wind project development?
   a) Do these technologies change by project size? If, yes, which sizes and technologies?
   b) What are typical technology configurations, resolutions, and maximum measurement heights?
   c) What are typical hardware costs?

2) Are distributed wind resources accurately characterized by existing wind measurement devices for use in wind turbine design tools?

3) What percent of system-installed costs are expended on resource assessment and siting?
   a) For the resource assessment and siting portion of the costs, what is the typical breakdown between hardware costs, labor costs, and modeling costs?
   b) Does this change by project size?

4) Would the distributed wind industry benefit from standardized practices and templates for resource assessment?
   a) Would a credentialing program be beneficial for site assessment?

5) Are predictive modeling tools for system performance accurate enough to confidently project the payback period?

CATEGORY 2: Turbine Technology

Optimizing design tools and next generation wind technology for distributed wind resources represents a significant opportunity to increase energy capture and reduce costs, thereby lowering LCOE. Through the Competitiveness Improvement Project, the Wind Program recently awarded funds to projects maximizing system performance and reliability and reducing costs through efficiencies in manufacturing. These partnerships will drive U.S. distributed wind systems to compete with retail electricity rates, and other sources of distributed generation, both domestically and abroad. To advance R&D in turbine technology for distributed applications, the Wind Program would like feedback on the following topics:

1) What design tools are small and midsize wind turbine manufacturers using to develop their technology?
   a) Is the present set of design tools adequate?
      i) If not, what capabilities are lacking?

2) Is the present state of the art for small and medium wind turbine technology optimized for distributed wind resources?

3) Is there a significant opportunity to reduce the hardware costs of small and medium wind turbines through efficiencies in manufacturing?

4) Will the cost increase of expanding rotor diameters and taller hub heights of small and medium wind turbines be justified by increased performance?

5) Are certified small wind turbines operating reliably?

6) Are small and medium wind turbine standards adequate?

7) Are small and midsize wind turbines experiencing component failures?
   a) If yes, which components?

CATEGORY 3: Distributed Grid Integration

By removing distributed wind integration barriers and improving understanding of the impacts or benefits of distributed wind systems on the electric grid, deployment can be accelerated. The Program is currently invested in work to increase confidence and reduce costs in distributed wind integration through better distribution system modeling tools, informed utilities, and gathering data to guide standards development to improve distributed wind deployment. To better inform future grid integration priorities, the Wind Program is seeking to collect feedback and experiences on the following topics:

1) Interconnection

a) Is there a general system size or range that more easily and quickly moves through the interconnection review and screening process? For example, does a 65kW wind turbine connecting to a 3-phase system with low penetrations of distributed wind on the feeder move through this process more easily than a 150kW device on a single-phase system?

b) For systems required to go through a more rigorous interconnection review and screening process, what are some of the outcomes and upgrades that were required?
   i) What are some examples of issues that may be found in these studies? (Voltage violations, Fault current, Anti-islanding protection, Power backfeed?)
   ii) What are some of the mitigation strategies that have proven to solve these problems and what are the costs of these strategies?
   iii) Would back-feeding from the distribution system to the transmission system be a significant issue?
      (1) Are there examples of distributed wind backfeeding to the transmission grid?
      (2) What outcomes/measures were taken to mitigate this?

c) What are examples of interactions between distributed wind with other distributed technologies?

   i) Can they support or provide benefit to one another, or are there examples of negative impacts?
d) What are common transmission or distribution upgrades required both pre-construction and post-construction, and what are the related costs?

2) Permitting and Inspection of Electrical System

a) Who are local code officials/ authorities for electrical safety?
b) What are the applicable electrical and structural building codes (NEC, IBC, and IRC, IEEE1547, UL1741) that must be adhered to?

3) Business Models

a) What are suggested next generation utility business models that accurately value generation from distributed wind and allow for increased penetration from distributed wind facilities?
b) Are there other market-related components related to distributed wind turbines?
   i) Are there examples of participation in ancillary services market?
c) What are some regional and local incentives that support the development of distributed wind?

4) Operations

a) Is storage more economically viable than transmission applications in distributed wind systems to accommodate the variability and uncertainty of distributed wind?
b) What are examples of distributed wind providing grid support services?
c) What will be the impact of current revisions to IEEE 1547 or other standards that would impact distributed wind systems?
   i) Who will control delivery of ancillary services from distributed wind?
   ii) How will anti-islanding be handled when distributed wind is supplying grid support?
d) How will UL 1741 be affected by the IEEE 1547 revisions, and what would be the optimal outcome?

5) Education and User Tools

a) Would a tool that could provide distribution level forecasting to properly site and estimate power generation be useful, if there was enough detail available?
   i) Can we accurately forecast power generation from distributed wind facilities to optimize distribution grid operations and planning?
b) Would an open-source tool that aids & educates the public, when deciding to install distributed wind system, be a proper use of government funding?

i) What topics should such a tool cover or include? Permitting? Planning? Siting? Resource estimation (forecasting)? Electric codes and standards?

c) What types of public tools, aiding in the development of distributed wind systems, would be useful?
   i) Would a tool that shows the organizations, authorities, standards, and requirements for specific regions be useful?
   ii) Would a tool that shows utilities for specific locations and lines be useful?

d) What are publicly available tools that have been useful in early site planning and energy estimation for distributed wind systems?
   i) For example, HOMER, In My Backyard, PV Watts, Wind Finance, etc.

CATEGORY 4: Soft Cost Reduction

Local zoning and interconnection requirements do not generally address distributed wind energy systems, adding unnecessary time and cost. The Wind Program is not presently supporting work in this area; however believes that streamlined permitting requirements and interconnection procedures represent significant time and soft cost reduction opportunities, as well as a leveraging point across distributed renewable technologies. The Wind Program has an expanding interest in soft cost reduction for distributed wind energy systems and would like feedback on the following topics:

1) The distributed solar industry has identified significant potential to cut soft costs and is making a significant effort to do so. Does distributed wind have the same potential to reduce soft costs?

2) Would a program such as DOE's Rooftop Solar Challenge (http://energy.gov/articles/rooftop-solar-challenge-empowering-innovators-reach-sun) be beneficial to distributed wind?

3) Is financing available for distributed wind projects?
   a) Which size and type of projects?

REQUEST FOR INFORMATION RESPONSE GUIDELINES:
Responses to this RFI must be submitted electronically to DistributedGenerationRFI@ee.doe.gov no later than 5:00pm (EST) on September 25, 2014 Responses must be provided as .pdf or Microsoft Word (.docx) 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.

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

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.

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.