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

Request for Information: Eagle Impact Minimization Technologies and Field Testing Opportunities

DATE: Feb. 24, 2016

SUBJECT: Request for Information (RFI)

DESCRIPTION: The Department of Energy's (DOE) Office of Energy Efficiency and Renewable Energy (EERE) invites input from the public regarding a potential funding opportunity to advance the readiness of technologies intended to reduce eagle mortalities at operational wind turbines or wind facilities. EERE seeks input on the focus and structure of a potential funding opportunity to support both technology field testing and validation activities and focused research and development (R&D) to advance eagle impact minimization technologies towards commercialization, and on how to prioritize funding for research within this framework. Additionally, EERE is seeking input on the conditions under which technology vendors or developers would consider participating in a campaign to field test and validate their technologies and the conditions under which wind farm owner/operators would consider hosting field testing and validation activities at their operational facilities.

NOTE: The Department of Energy (DOE) issued a similar RFI on June 25, 2014 on research needs regarding wind energy wildlife impact minimization technologies. DOE is issuing this RFI around a new potential funding opportunity focused solely on eagle impact minimization technologies in an effort to ensure that we have the most up-to-date feedback. If you feel your response to the last RFI adequately responds to this current RFI, please simply re-submit your previous response and indicate that you wish it to be considered as part of this RFI.

BACKGROUND: The mission of the Wind Program, located within the Wind and Water Power Technologies Office in EERE, is to accelerate widespread U.S. deployment of clean, affordable, and reliable wind power to promote energy security, economic growth, and environmental quality. For more information about the Wind Program and the Wind and Water Power Technologies Office, please visit our website at http://wind.energy.gov.

The Wind Program is committed to supporting technological innovations that facilitate the growth of the domestic wind industry. In addition to wind technology R&D, the Program funds R&D to address market barriers that affect the deployment of wind energy, including the effects of wind on wildlife. In permitting wind facilities and complying with state and federal laws protecting wildlife, such as the Endangered Species Act, Migratory Bird Treaty Act, and Bald and Golden Eagle Protection Act, developers and operators of wind energy facilities often must take measures to mitigate (avoid, minimize, or compensate for) the potential impacts of their facilities on protected species.

Bald and Golden Eagles are protected under the Bald and Golden Eagle Protection Act (BGEPA). Their habitat spans virtually the entire country, thereby posing one of the most

challenging siting issues to wind developers, particularly in the west and mid-west where population densities are greatest. In 2009, the U.S. Fish and Wildlife Service (USFWS) promulgated a final rule under the BGEPA allowing for the issuance of incidental take permits. To obtain a permit, developers must demonstrate that they have considered and addressed the risks to eagles and implemented agency-approved Advanced Conservation Practices (ACPs) (i.e. technologies and techniques to minimize impacts at operational facilities) to reduce eagle take to acceptable levels. Developers may also be required to compensate for take that cannot be adequately avoided or minimized. However, since the issuance of this rule, the USFWS has not approved any ACPs under BGEPA due to a lack of data supporting the effectiveness of proposed impact minimization solutions.

While guidelines exist for siting wind facilities in the landscape and wind turbines within a facility to avoid impacts to wildlife, technologies to minimize impacts at operational facilities for most species are either in early stages of development or simply do not exist. Research in this area is on-going, but significant advancements are needed to address the siting and permitting challenges currently faced by the wind industry.

Significant work to perfect these technologies and methods remains to be done. Wind energy facility developers and operators working in areas with Bald and Golden Eagles and other species of concern (such as California Condors or other sensitive migratory birds) have applied a number of mostly experimental technologies to minimize their impacts. These include, for example; using radar in combination with onsite biologists to identify individuals of these species as they approach a wind energy facility and shutting down the facility or individual turbines to minimize the risk of collision; using radar integrated with the wind facility's Supervisory Control And Data Acquisition (SCADA) systems to shut down the facility or individual turbines given birds or other targets in the vicinity; and, shutting down when certain weather conditions are present (e.g. fog) that may put these species at higher risk. Both automated and manual "Detect and Deter" systems have also been proposed for testing but have not been widely deployed in the U.S. at commercial facilities.

More research, development, field testing, and validation of impact minimization technologies is needed in order for the industry to grow while managing the impacts that increased wind energy deployment may cause to sensitive wildlife. Particularly important will be field testing and demonstration of these technologies at operational wind facilities, with a goal to see statistically significant and cost-effective reduction of mortality of key species of concern, and the publication of such results in the peer-reviewed literature.

PURPOSE: The purpose of this RFI is to solicit feedback from industry, academia, research laboratories, impact minimization technology developers, government agencies, and other stakeholders aimed at validating the effectiveness and accelerating the commercial readiness of eagle impact minimization technologies.

In this RFI, "impact minimization technology" or "technologies" means any device meant to deter eagles away from turbine blades; technology designed to automatically detect and classify

eagles, with the intent of triggering a deterrent device or alteration of turbine operation (curtailment); or any other method (such as painting of turbine blades to increase visibility to eagles) that can be employed at an operational wind energy facility that has the intended effect of reducing impacts (particularly mortality) to wildlife species of concern. This definition specifically excludes methods situated in other parts of the mitigation hierarchy, such as pre-construction siting or micrositing impact avoidance measures, or compensatory mitigation, such as lead abatement programs.

Further described below, EERE is seeking particular input on:

1) A proposed framework for funding the advancement of eagle impact minimization technologies aimed at reducing impacts to eagles at operational wind energy facilities; and

2) The conditions under which wind-farm owner/operators would consider participating in a campaign to demonstrate, field-test, and validate such technologies.

This is solely a request for information and not a Funding Opportunity Announcement (FOA). EERE is not accepting applications.

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.

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-0001541. 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:

To ensure consistency in characterization of where a technology is on the pathway to commercialization, EERE utilizes a Technology Readiness Level (TRL) framework to provide a common yardstick for measuring technological progress from basic scientific research (TRL 1) to full commercial readiness (TRL 9), per Table 1 below.

Table 1: Technology Readiness Levels

TRL 1	**Basic Research:** Initial scientific research has been conducted. Principles are qualitatively postulated and observed. Focus is on new discovery rather than applications.

TRL 2	**Applied Research:** Initial practical applications are identified. Potential of material or process to solve a problem, satisfy a need, or find application is confirmed.
TRL 3	**Critical Function or Proof of Concept Established:** Applied research advances and early stage development begins. Studies and laboratory measurements validate analytical predictions of separate elements of the technology.
TRL 4	**Lab Testing/Validation of Alpha Prototype Component/Process:** Design, development and lab testing of components/processes. Results provide evidence that performance targets may be attainable based on projected or modeled systems.
TRL 5	**Laboratory Testing of Integrated/Semi-Integrated System:** System Component and/or process validation is achieved in a relevant environment.
TRL 6	**Prototype System Verified:** System/process prototype demonstration in an operational environment (beta prototype system level).
TRL 7	**Integrated Pilot System Demonstrated:** System/process prototype demonstration in an operational environment (integrated pilot system level).
TRL 8	**System Incorporated in Commercial Design:** Actual system/process completed and qualified through test and demonstration (pre-commercial demonstration).
TRL 9	**System Proven and Ready for Full Commercial Deployment:** Actual system proven through successful operations in operating environment, and ready for full commercial deployment.

CATEGORY 1: Potential Funding Opportunity Structure

To accelerate and facilitate the commercialization, regulatory approval, and deployment of eagle impact minimization technologies, EERE seeks input on the development of a potential research, development, and demonstration Funding Opportunity Announcement (FOA) based around the Technology Readiness Level (TRL) framework explained above (see Table 1).

Based on initial consideration of the status of wildlife impact minimization technologies, EERE is considering the following breakout of activities by TRL level. If EERE ultimately pursues a FOA along these lines, the balance of funding allocated for each topic would be informed by EERE's understanding, in large part from responses to this RFI, of the relative need for investment at the low, middle, and high TRL levels, respectively.

EERE is considering the following three Topic Areas for a possible future FOA:

Topic Area 1: Eagle Physiology and Behavior (Required non-federal cost share: 20%)

This Topic Area would support research on the visual and acoustic capabilities of eagles, with the intent of identifying stimuli that will serve as optimal deterrents, or optimizing existing stimuli known to have some deterrent impact on eagles. Work under this topic may include physiological work as well as behavioral testing to evaluate the response to stimuli. Projects would be short term (1 year) in duration with the intent of making the data available for Topic Area 2 and 3 projects as recipients work to refine their technologies after initial testing.

Topic Area 2: TRL 5-6 – Prototype advancement through laboratory and small-scale field testing (Required non-federal cost share: 20%)

This Topic Area would support advancements in technologies designed to automatically detect and identify and/or deter eagles and to ready them for full system testing in an operational environment. This work could include establishing the effectiveness of a prototype technology in a controlled or small-scale setting and iterative design improvements based on initial performance. For example, this Topic Area might support the field testing of a prototype eagle detection or deterrent system in an outdoor environment not associated with a wind facility, such as at a field location, to establish its ability to reliably detect or reduce eagle activity without habituation. Work could also include system cost analysis to establish the potential cost-effectiveness of the proposed detection or minimization technology in operation at a wind facility.

Topic Area 3: TRL 7-8 – Operational demonstration and validation (Required non-federal cost share: 50%)

This Topic Area would support the demonstration of a proposed detection and/or minimization technology at an operational wind facility at a scale sufficient to provide an accurate demonstration of efficacy or a statistically significant reduction of impact at a demonstrated reasonable cost. Given the rare nature of eagle mortality at wind farms, collecting behavior data that can demonstrate significant reductions in modeled risk of impact would be considered in lieu of demonstrating statistically significant reductions in the number of fatalities.

Projects under this topic are envisioned to be approximately 3 years in duration and would likely include the following components: 1) initial testing of device effectiveness outside of an operating wind farm, 2) technical and software improvements following initial testing, and 3) field testing at a minimum of two wind farms for a minimum of two field seasons with a study design appropriate for meta-analyses across sites. We anticipate that DOE would make a Go/No-Go decision after the initial testing and technical improvements, based on an evaluation of initial performance and demonstrated degree of readiness for wind farm trials.

EERE welcomes input on the approach outlined above. Specifically, we welcome feedback on the following questions:

1) What are the highest priority research gaps for eagle impact mitigation technologies? What are the research, development and testing opportunities that will make the greatest impact on the effectiveness of new or existing detection and deterrent components and systems, from both a hardware and software perspective? Are the topic areas proposed above well-aligned with addressing those priorities?

2) Is the model outlined above the optimal approach to supporting the development of eagle impact minimization technologies? If not, what improvements would you suggest?

3) Should a potential funding opportunity exclusively support technology to detect and or deter eagles or should it also support any other method (such as painting of turbine blades to increase visibility to eagles) that can be employed at an operational wind energy facility that has the intended effect of reducing impacts (particularly mortality)?

4) In regards to Topic Area 3, is the structure that EERE has laid out above the most appropriate or are there other models we should consider? For example:

    a. Should EERE consider selecting a single independent organization to conduct evaluations of minimization technologies at all sites selected through a potential funding opportunity rather than allowing applicant teams to select the entities?
    b. What would the ideal teaming structure look like for teams performing this work?

5) Should DOE attempt to establish or leverage one or more permitted locations, outside of wind farms, that projects would do their initial efficacy trials at? If so, what qualities should such a site have?

6) Should DOE attempt to leverage two or more wind farms with suitable permitting for testing activities and then require recipients to do their testing at these sites? Why or why not? If yes, how many sites would be necessary?

7) For Topic Area 3, what funding level (including cost share) would be appropriate to support the activities described? The Department is considering providing approximately $1.5 million per award. Is this an appropriate amount to support the work outlined above, assuming an additional 50% cost-share from applicants?

8) Please feel free to share comments on other items not considered here that you believe EERE should address as it develops a program to advance the mitigation of eagle impacts from wind energy development.

9) Beyond research on eagle and bat impact minimization technologies, what are the highest priority emerging wind wildlife issues for DOE to address?

CATEGORY 2: Wind Facility Owner/Operators - Needs and Interest

1) What are the factors you would need to consider (legal, permitting/regulatory, operational, financial, etc.) in evaluating whether to participate in a field test of a minimization technology, and under what conditions would you be prepared to host a field test at one of your facilities?

2) What can EERE do to help you overcome any obstacles you might face in hosting a field test?

3) How can EERE structure a field testing campaign to maximize the chance that owners or operators of wind facilities will agree to host field testing activities? For example, would the model of evaluation described in Topic Area 3 above affect your willingness to participate (applicants selecting teams including biologists to evaluate technologies at their sites versus EERE selecting a third party to conduct evaluations across all sites or some other model)?

4) For wind farm developers, if willing to provide this information: Are you currently applying for an Eagle Take Permit through Fish and Wildlife Service? Alternatively, are you in the process of negotiating a Settlement Agreement? If so, at what stage are you at in either process? Would you consider using these mechanisms to provide legal coverage to include testing activities at your wind farm?

5) What other factors or sensitivities should EERE consider in developing this technology testing and validation program?

REQUEST FOR INFORMATION RESPONSE GUIDELINES: Responses to this RFI must be submitted electronically to EagleImpact@ee.doe.gov no later than 5:00pm (EDT) on March 16, 2016. Responses must be provided as attachments to an email. ***Responses must be provided as a Microsoft Word (.docx or .doc) attachment to the email, of no more than 10 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 possible. 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.