

Request for Information: Offshore Wind Transmission System Integration Research Needs DE-FOA-0002389

DATE: 11/23/2020

SUBJECT: Request for Information (RFI)

Description

The U.S. Department of Energy's (DOE) Office of Energy Efficiency and Renewable Energy (EERE) Wind Energy Technologies Office (WETO) seeks information from the public on research needs regarding the integration of large-scale offshore wind energy generation into the transmission grid. In addition to input on overall research priorities, focus areas include considerations of technical means to enhance transmission utilization and mitigate congestion; updates to system integration studies and analyses in view of anticipated offshore wind additions; and priorities for improvements to data, models, and analytical tools. This RFI is intended to inform WETO's strategic planning on research aimed at lowering the cost of integrating offshore wind power into the grid, while enhancing system reliability and resiliency. Sources for reports and statements of fact appear as embedded hyperlinks, vice footnoted references.

Background

U.S. installed wind capacity has grown over the past decade, reaching nearly [110 gigawatts](#) (GW) as of June 2020. While this total includes only [30 megawatts](#) (MW) of offshore wind, wind resources offshore in U.S. waters are abundant, having a technical potential of greater than [2,000 GW](#). Interest in offshore wind development is increasing. A number of coastal states in northeast and mid-Atlantic have established offshore wind energy targets as part of their clean energy and/or renewable portfolio policies. Firm projections to 2035 include those built and others with power purchase agreements, in solicitation, or under legislative mandate. These total about [25,000 MW](#). Growing interest in offshore wind is also prevalent in the [Great Lakes](#) and along the [Pacific Coast](#).

The task of integrating tens of gigawatts of offshore wind into the nation's electricity system over next 15 years faces unique challenges both in the water and onshore. To better understand and inform these challenges, WETO supported several studies, including the 2014 National Offshore Wind Energy Grid Interconnection Study ([NOWEGIS](#)), the 2018 [study](#) on Values of Offshore Wind along U.S. East Coast, and the 2020 [study](#) on Potential Impact of Offshore Wind on Future Power System in Northeastern U.S. In Europe, the North Sea Wind Power Hub Consortium recently completed an integration [study](#) that goes beyond direct connections to the grid and includes sector coupling and a role for hydrogen.

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.

Purpose

The purpose of this RFI is to solicit feedback from industry, academia, research laboratories, government agencies, and other stakeholders on research needs regarding the integration of large-scale offshore wind energy generation into the transmission grid. Specific requests fall into four broad areas, as outlined below. The responses will inform WETO's strategic and research planning in the general area of offshore wind and systems integration. 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.

Confidential Business Information

Pursuant to 10 CFR 1004.11, any person submitting information that he or she believes to be confidential and exempt by law from public disclosure should submit via email: one copy of the document marked "confidential" including all the information believed to be confidential, and one copy of the document marked "non-confidential" with the information believed to be confidential deleted. DOE will make its own determination about the confidential status of the information and treat it according to its determination.

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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

The questions below are meant to stimulate thoughts and comments in the identified areas. They are not intended to be limiting or exhaustive. As such, responders may offer additional relevant comments in the topic areas, even if a question is not specifically asked. The questions are given as follows and responders are welcome to answer all or any subset of the questions.

Category 1: Offshore Wind Systems Integration R&D Portfolio

The goal of the [Systems Integration](#) subprogram is to enable and support the cost-effective, cyber-secure, reliable, and resilient operation of the nation's electric energy system with increasing levels of wind power and, in this RFI case, offshore wind power. WETO's Systems Integration subprogram currently supports research in wind energy systems hardware and controls; wind energy hybrid systems with storage and energy conversions; analyses of transmission adequacy and flexibility; grid reliability and resiliency support; and physical and cybersecurity.

In this category, WETO seeks information on: high-priority research needed to realize the subprogram goal; R&D gaps and opportunities not currently addressed; and any other relevant or interfacing technical areas believed to be important to the successful integration of large scale offshore wind integration with the grid. Specifically,

1. What offshore wind systems integration research needs are not adequately addressed by WETO's current portfolio focus areas? Please provide details.
2. What are the top research priorities for you or your organization with respect to offshore wind grid integration where WETO might assist or complement your research, provide support, or undertake activities to de-risk those activities?

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Category 2: Means to Enhance Transmission Utilization and Mitigate Congestion

In order to accommodate the influx of gigawatt-scale additions of offshore wind, sufficient onshore transmission infrastructure is needed. Until transmission expansions or upgrades are put in place, transmission congestion is typically mitigated through unwanted and costly curtailment, as noted in the 2020 National Renewable Energy Laboratory (NREL) [study](#).

In this category, WETO seeks input on potential technical solutions to: (a) enhance utilization of existing transmission assets; and/or (b) employ intermediary solutions/technologies to mitigate congestion while minimizing potential curtailment of offshore wind. Specifically,

1. What solutions have the potential to increase utilization of the existing transmission infrastructure, while mitigating congestion and reducing curtailment? What are the main barriers to implementing these solutions?
2. What are the most promising options to utilize otherwise curtailed offshore wind in your region across various time scales of near-term, intermediate-term, or longer-term? One example, as illuminated in the North Sea Offshore Wind Integration Study, is sector coupling through development of hydrogen facilities. Other examples may include batteries of various types, other forms of energy or chemical storage, energy conversions, and/or direct use of power without a grid connection. To what extent may existing infrastructure support or hinder these options? What are the opportunities and challenges for each timeframe?

Category 3: Transmission System Integration Studies and Analyses Related to Offshore Wind

The [National Offshore Wind Energy Grid Interconnection Study](#) (NOWEGIS) focused on the ability to integrate offshore wind into the U.S. grid by 2030, based on the levels proposed in the DOE [report](#) 20% Wind Energy by 2030.. It touched on areas relevant to offshore wind integration, such as staging projections, wind profiles, technology assessment, and initial analyses of several regions. Since the time of the study, many factors have changed including: additional data on offshore wind characteristics; stakeholder feedback; analyses of Bureau of Ocean Energy Management lease offerings; state offshore wind development policies and mandates; and announcements of additional onshore power plant retirements.

In this category, WETO seeks information regarding the need for new or updated studies of offshore grid integration, priority topic areas, and related systems analyses.

1. Would further DOE study of offshore wind integration be beneficial? If not, why not? If so, what extensions or additions to the NOWEGIS analysis should be prioritized?
2. What topic areas should be prioritized from the most important to the least? Examples: capacity adequacy; energy adequacy; operating reliability (power flow, contingency modeling, dynamic and

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transient stability); or other? Should offshore wind be treated differently in those kinds of analysis? If so, why?

3. Regional reliability studies often consider scenarios of large failures, such as loss of plants or disruption of electricity imports or gas pipelines. What potential large failures might be introduced to the overall transmission system as a result of offshore wind generation? Which weather scenarios are important to consider for offshore wind? What other unique offshore wind generation risk factors would be prudent to include?
4. When onshore grid at the point of interconnection has limited capacity, or may be seen as a so-called “weak grid,” are there options beyond onshore transmission upgrades? Other than dedicated point-to-point radial lines connecting offshore wind to the onshore grid, what transmission development options might be considered? What are the barriers in planning and implementing those options?
5. If merited, what approach would you recommend to facilitate a coordinated offshore transmission study among states, utilities, independent system operators (ISO), and other important stakeholders?

Category 4: Data, Models and Analytic Tools to Support Offshore Wind Grid Integration

As renewable integration has increased, challenges to modeling and simulations have arisen, such as the computational burden for large complex systems, model accuracy and more. In 2019, the North American Electric Reliability Corporation (NERC) issued [guidelines](#) that recommended additional data requirements for interconnection processes including inverter based generators. These recommendations improve the accuracy of modeling for various system studies.

In this category, WETO seeks information on priorities for improvement in data, models, and analytical tools to support offshore wind grid integration and related studies.

1. **Data:** Are there sufficient data, in terms of spatial and temporal granularity, to support the recommended studies? If not, what is missing? What barriers to data access and transparency exist?
2. **Models:** Are there existing models with the capability of incorporating new technologies (examples: hydrogen production and storage technologies)? If not, what additional capabilities are needed?
3. **Tools:** Do existing analytic tools used to support grid studies (capacity adequacy, energy adequacy, and operating reliability via power flow, contingency modeling, and dynamic and transient stability) have the capacity to include offshore wind? If not, what types of tools need to be upgraded? What open source capabilities need to be developed?

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Request for Information Response Guidelines

Responses to this RFI must be submitted electronically to WindEnergyRFI@ee.doe.gov no later than 5:00pm (ET) on 1/24/2021. It is recommended that attachments with file sizes exceeding 25MB be compressed (i.e., zipped) to ensure message delivery. Responses must be submitted as Microsoft Word (.docx) attachment and be no more than the number of pages specified in the below table 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.

Topic Area	Topic Area Title	Page Limit
1	Offshore Wind Systems Integration R&D Portfolio	2
2	Means to Enhance Transmission Utilization and Mitigate Congestion	3
3	Transmission System Integration Studies and Analyses Related to Offshore Wind	5
4	Data, Models and Analytic Tools to Support Offshore Wind Grid Integration	3

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