**Department of Energy (DOE)**

**Office of Energy Efficiency and Renewable Energy (EERE)**

**OFFSHORE WIND ENERGY ATMOSPHERIC SCIENCE AND PROJECT DEVELOPMENT**

**Funding Opportunity Announcement (FOA) Number: DE-FOA-**0002236

**FOA Type: Modification 0001**

**CFDA Number:** 81.087

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| --- | --- |
| **FOA Issue Date:** | 04/01/2020 |
| **Submission Deadline for Concept Papers:** | 04/30/2020, 5:00pm ET |
| **Submission Deadline for Full Applications:** | 07/16/2020, 5:00pm ET |
| **Expected Submission Deadline for Replies to Reviewer Comments:** | 08/17/2020, 5:00pm ET |
| **Expected Date for EERE Selection Notifications:** | Late September 2020 – October 2020 |
| **Expected Timeframe for Award Negotiations:** | October 2020 – December 2020 |

* Applicants must submit a Concept Paper by 5:00pm ET the due date listed above to be eligible to submit a Full Application.
* To apply to this FOA, applicants must register with and submit application materials through EERE Exchange at <https://eere-Exchange.energy.gov>, EERE’s online application portal.
* Applicants must designate primary and backup points-of-contact in EERE Exchange with whom EERE will communicate to conduct award negotiations. If an application is selected for award negotiations, it is not a commitment to issue an award. It is imperative that the applicant/selectee be responsive during award negotiations and meet negotiation deadlines. Failure to do so may result in cancelation of further award negotiations and rescission of the selection.

**Modifications**

All modifications to the FOA are [HIGHLIGHTED] on the cover page and in the body of the FOA.

|  |  |  |
| --- | --- | --- |
| **Mod. No.** | **Date** | **Description of Modification** |
| 0001 | 07/01/2020 | Updated the following dates (located on page i of the FOA):   * Submission Deadline for Full Applications * Expected Submission Deadline for Replies to Reviewer Comments * Expected Date for EERE Selection Notifications * Expected Timeframe for Award Negotiations |
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**Table of Contents**

[OFFSHORE WIND ENERGY ATMOSPHERIC SCIENCE AND PROJECT DEVELOPMENT i](#_Toc35955661)

[Table of Contents iii](#_Toc35955662)

[I. Funding Opportunity Description 1](#_Toc35955663)

[A. Background and Context 1](#_Toc35955664)

[i. Background and Purpose 1](#_Toc35955665)

[ii. Technology Space and Strategic Goals 1](#_Toc35955666)

[B. Topic Areas 2](#_Toc35955667)

[C. Applications Specifically Not of Interest 13](#_Toc35955668)

[D. Authorizing Statutes 14](#_Toc35955669)

[II. Award Information 14](#_Toc35955670)

[A. Award Overview 15](#_Toc35955671)

[i. Estimated Funding 15](#_Toc35955672)

[ii. Period of Performance 15](#_Toc35955673)

[iii. New Applications Only 16](#_Toc35955674)

[B. EERE Funding Agreements 16](#_Toc35955675)

[i. Cooperative Agreements 17](#_Toc35955676)

[ii. Funding Agreements with Federally Funded Research and Development Center (FFRDCs) 17](#_Toc35955677)

[III. Eligibility Information 17](#_Toc35955678)

[A. Eligible Applicants 17](#_Toc35955679)

[iii. Individuals 17](#_Toc35955680)

[iv. Domestic Entities 17](#_Toc35955681)

[v. Foreign Entities 18](#_Toc35955682)

[vi. Incorporated Consortia 19](#_Toc35955683)

[vii. Unincorporated Consortia 19](#_Toc35955684)

[B. Cost Sharing 19](#_Toc35955685)

[i. Legal Responsibility 20](#_Toc35955686)

[ii. Cost Share Allocation 20](#_Toc35955687)

[iii. Cost Share Types and Allowability 20](#_Toc35955688)

[iv. Cost Share Contributions by FFRDCs 21](#_Toc35955689)

[v. Cost Share Verification 22](#_Toc35955690)

[vi. Cost Share Payment 22](#_Toc35955691)

[C. Compliance Criteria 23](#_Toc35955692)

[i. Compliance Criteria 23](#_Toc35955693)

[D. Responsiveness Criteria 24](#_Toc35955694)

[E. Other Eligibility Requirements 24](#_Toc35955695)

[Topic Area 1 24](#_Toc35955696)

[i. Requirements for non-DOE/NNSA Federally Funded Research and Development Centers Included as a Subrecipient 24](#_Toc35955697)

[ii. Requirements for DOE/NNSA and non-DOE/NNSA Federally Funded Research and Development Centers Included as a Subrecipient 25](#_Toc35955698)

[F. Limitation on Number of Concept Papers and Full Applications Eligible for Review 26](#_Toc35955699)

[G. Questions Regarding Eligibility 26](#_Toc35955700)

[IV. Application and Submission Information 26](#_Toc35955701)

[i. Additional Information on EERE Exchange 28](#_Toc35955702)

[A. Application Forms 28](#_Toc35955703)

[B. Content and Form of the Concept Paper 28](#_Toc35955704)

[i. Concept Paper Content Requirements 28](#_Toc35955705)

[C. Content and Form of the Full Application 30](#_Toc35955706)

[i. Full Application Content Requirements 30](#_Toc35955707)

[ii. Technical Volume 32](#_Toc35955708)

[iii. Resumes 37](#_Toc35955709)

[iv. Letters of Commitment 37](#_Toc35955710)

[v. Statement of Project Objectives (SOPO) 37](#_Toc35955711)

[vi. SF-424: Application for Federal Assistance 37](#_Toc35955712)

[vii. Budget Justification Workbook 37](#_Toc35955713)

[viii. Summary/Abstract for Public Release 38](#_Toc35955714)

[ix. Summary Slide 38](#_Toc35955715)

[x. Subrecipient Budget Justification (if applicable) 38](#_Toc35955716)

[**xi.** **Budget for DOE/NNSA FFRDC - Topic Area 2 Only (if applicable)** 39](#_Toc35955717)

[**xii.** **Authorization for non-DOE/NNSA - Topic Area 1 & 2 or DOE/NNSA FFRDCs - Topic Area 2 Only (if applicable)** 39](#_Toc35955718)

[xiv. Waiver Requests: Foreign Entities and Foreign Work (if applicable) 40](#_Toc35955719)

[xv. Data Management Plan (DMP) 40](#_Toc35955720)

[xvi. U.S. Manufacturing Commitments 40](#_Toc35955721)

[D. Content and Form of Replies to Reviewer Comments 43](#_Toc35955722)

[E. Post Selection Information Requests 43](#_Toc35955723)

[F. Dun and Bradstreet Universal Numbering System (DUNS) Number and System for Award Management (SAM) 44](#_Toc35955724)

[G. Submission Dates and Times 44](#_Toc35955725)

[H. Intergovernmental Review 44](#_Toc35955726)

[I. Funding Restrictions 44](#_Toc35955727)

[i. Allowable Costs 44](#_Toc35955728)

[ii. Pre-Award Costs 45](#_Toc35955729)

[iii. Performance of Work in the United States (Foreign Work Waiver) 46](#_Toc35955730)

[iv. Construction 47](#_Toc35955731)

[v. Foreign Travel 47](#_Toc35955732)

[vi. Equipment and Supplies 47](#_Toc35955733)

[vii. Domestic Preference – Infrastructure Projects 47](#_Toc35955734)

[viii. Lobbying 47](#_Toc35955735)

[ix. Risk Assessment 48](#_Toc35955736)

[x. Invoice Review and Approval 48](#_Toc35955737)

[V. Application Review Information 49](#_Toc35955738)

[A. Technical Review Criteria 49](#_Toc35955739)

[i. Concept Papers 49](#_Toc35955740)

[ii. Full Applications 49](#_Toc35955741)

[iii. Criteria for Replies to Reviewer Comments 54](#_Toc35955742)

[B. Standards for Application Evaluation 54](#_Toc35955743)

[C. Other Selection Factors 54](#_Toc35955744)

[i. Program Policy Factors 54](#_Toc35955745)

[D. Evaluation and Selection Process 55](#_Toc35955746)

[i. Overview 55](#_Toc35955747)

[ii. Pre-Selection Interviews 55](#_Toc35955748)

[iii. Pre-Selection Clarification 56](#_Toc35955749)

[iv. Recipient Integrity and Performance Matters 56](#_Toc35955750)

[v. Selection 57](#_Toc35955751)

[E. Anticipated Notice of Selection and Award Negotiation Dates 57](#_Toc35955752)

[VI. Award Administration Information 57](#_Toc35955753)

[A. Award Notices 57](#_Toc35955754)

[i. Ineligible Submissions 57](#_Toc35955755)

[ii. Concept Paper Notifications 57](#_Toc35955756)

[iii. Full Application Notifications 58](#_Toc35955757)

[iv. Successful Applicants 58](#_Toc35955758)

[v. Alternate Selection Determinations 58](#_Toc35955759)

[vi. Unsuccessful Applicants 59](#_Toc35955760)

[B. Administrative and National Policy Requirements 59](#_Toc35955761)

[i. Registration Requirements 59](#_Toc35955762)

[ii. Award Administrative Requirements 60](#_Toc35955763)

[iii. Foreign National Access Under DOE Order 142.3A, “Unclassified Foreign Visits and Assignments Program” 60](#_Toc35955764)

[iv. Subaward and Executive Reporting 61](#_Toc35955765)

[v. National Policy Requirements 61](#_Toc35955766)

[vi. Environmental Review in Accordance with National Environmental Policy Act (NEPA) 61](#_Toc35955767)

[vii. Applicant Representations and Certifications 61](#_Toc35955768)

[viii. Statement of Federal Stewardship 63](#_Toc35955769)

[ix. Statement of Substantial Involvement 63](#_Toc35955770)

[x. Intellectual Property Management Plan (IPMP) 64](#_Toc35955771)

[xi. Subject Invention Utilization Reporting 65](#_Toc35955772)

[xii. Intellectual Property Provisions 65](#_Toc35955773)

[xiii. Reporting 65](#_Toc35955774)

[xiv. Go/No-Go Review 65](#_Toc35955775)

[xv. Conference Spending 66](#_Toc35955776)

[xvi. Uniform Commercial Code (UCC) Financing Statements 66](#_Toc35955777)

[VII. Questions/Agency Contacts 67](#_Toc35955778)

[VIII. Other Information 67](#_Toc35955779)

[A. FOA Modifications 67](#_Toc35955780)

[B. Government Right to Reject or Negotiate 68](#_Toc35955781)

[C. Commitment of Public Funds 68](#_Toc35955782)

[D. Treatment of Application Information 68](#_Toc35955783)

[E. Evaluation and Administration by Non-Federal Personnel 69](#_Toc35955784)

[F. Notice Regarding Eligible/Ineligible Activities 69](#_Toc35955785)

[G. Notice of Right to Conduct a Review of Financial Capability 69](#_Toc35955786)

[H. Requirement for Full and Complete Disclosure 69](#_Toc35955787)

[I. Retention of Submissions 70](#_Toc35955788)

[J. Title to Subject Inventions 70](#_Toc35955789)

[K. Government Rights in Subject Inventions 71](#_Toc35955790)

[L. Rights in Technical Data 72](#_Toc35955791)

[M. Copyright 72](#_Toc35955792)

[N. Export Control 73](#_Toc35955793)

[O. Personally Identifiable Information (PII) 73](#_Toc35955794)

[P. Annual Independent Audits 74](#_Toc35955795)

[Appendix A – Cost Share Information 75](#_Toc35955796)

[Appendix B – Sample Cost Share Calculation for Blended Cost Share Percentage 80](#_Toc35955797)

[Appendix C – Waiver Requests and Approval Processes: 1. Foreign Entity Participation as the Prime Recipient; and 2. Performance of Work in the United States (Foreign Work Waiver) 82](#_Toc35955798)

[Appendix D – Data Management Plans 84](#_Toc35955799)

[Appendix E – Glossary 86](#_Toc35955800)

[Appendix F – Definition of Technology Readiness Levels 89](#_Toc35955801)

[Appendix G – List of Acronyms 90](#_Toc35955802)

[Appendix H – Topic Area 1 Federal Capabilities and Prospective Roles 91](#_Toc35955803)

[Appendix I – Supporting Documents 97](#_Toc35955804)

1. Funding Opportunity Description
   1. Background and Context
2. Background and Purpose

The Wind Energy Technologies Office (WETO) is within the Department of Energy’s (DOE) Office of Energy Efficiency and Renewable Energy (EERE). EERE advances America’s leadership in science and technology through early-stage research and development in sustainable transportation, renewable power, and energy efficiency.

WETO enables growth and U.S. competitiveness in the domestic wind industry by supporting early-stage research on technologies that enhance energy affordability, reliability, and resilience and strengthen U.S. energy security, economic growth, and environmental quality. More information is available at <https://www.energy.gov/eere/wind/wind-energy-technologies-office>.

WETO works with DOE National Laboratories, industry, universities, and other federal agencies to conduct research and development activities through competitively selected, directly funded, and cost-shared projects. WETO’s efforts target land-based utility-scale, offshore, and distributed wind power to fully support a national clean energy economy.

The Office of Energy Efficiency and Renewable Energy (EERE) is issuing, on behalf of the Wind Energy Technologies Office (WETO), Funding Opportunity Announcement (FOA) DE-FOA-0002236 entitled “Offshore Wind Atmospheric Science and Project Development.” The activities supported by this FOA are authorized under the Energy Policy Act of 2005 (EPACT 2005) Public Law 109-58 (Aug. 5, 2005), Title IX Research and Development, Section 931(a)(2)(B).  This provision is found in the United States Code at 42 U.S.C. § 16231(a)(2)(B). Title IX, Section 931 authorizes the Secretary of Energy to conduct a program of research, development, demonstration and commercial application for wind energy; including low speed wind energy, offshore wind energy, testing and verification, and distributed wind energy generation. Among the authorized activities identified in Section 931 are economic and technical analysis of renewable energy potential, including resource assessments.

1. Technology Space and Strategic Goals

This FOA has Two Topic Areas

Topic Area 1: The overall goal of this Topic Area is to provide funding for a project that will improve wind resource modeling and predictions in *offshore wind energy development areas****.*** Using lessons-learned and information gained during the previous program work in complex-terrain wind resource modeling and prediction, this Topic Area will focus on improving wind resource model physics for foundational wind forecasts and other applications in offshore wind energy development areas.

Topic Area 2: The overall goal of this Topic Area is to provide funding for a project(s) that will enable demonstration of a novel technology or methodology that will advance the state-of-the-art of offshore wind energy in the United States. The proposed project must either implement an innovative technology at engineering/pilot or full-scale, or employ a novel methodology that has yet to be utilized commercially in the United States for offshore wind.

* 1. Topic Areas

**Topic Area 1: Offshore Wind Resource Measurement and Modeling Science**

This Topic Area will provide funding to one recipient to lead an offshore field study, including the deployment of appropriate measurement systems, and to work with Department of Energy (DOE) and National Oceanic and Atmospheric Administration (NOAA) laboratories in analysis and modeling using the resulting data. This project will address a national need to improve offshore wind resource characterization, including forecasting. It is anticipated that the overall project will make use of state-of-the-art atmospheric and oceanographic observations to improve numerical weather prediction (NWP) models and their underlying physical parameterizations for marine atmospheric boundary layers; will help achieve subsequent improvement for offshore wind plant power prediction accuracy, will improve the ability of independent system operators to efficiently integrate offshore wind power generation into the local distribution and transmission system, and will reduce operational costs and extend plant lifetimes through improved description of wind and wave characteristics that generate mechanical loads on turbines.

Offshore wind conditions are different from those found on land, as diurnal temperature variability of the ocean surface is minimal and thus is not the primary driving mechanism of the surface winds. However, there is strong interaction between the atmosphere and the ocean surface, including wave conditions, that profoundly affects winds and turbulence at turbine hub height. The marine atmospheric boundary layer on the U.S. Atlantic coast is influenced by coastal low-level jets, radiative cooling at the top of marine stratocumulus clouds, coastal circulations, sea breezes, the nearby very warm water of the Gulf Stream, offshore temperature advection of continental air leading to significant marine boundary layer stratification, and variable surface roughness from waves. At present, the full impact of these conditions on predictions of offshore wind power and structural loads is unclear. This is partly because NWP models, including foundational weather forecast models available from NOAA’s National Weather Service (NWS), are insufficiently validated in these offshore regions due to historically sparse data and difficulty in obtaining measurements. The models are currently poorly documented in the offshore environment with respect to their ability to predict wind speed changes and ramp events at turbine heights, constraining commercial wind forecast models in predicting these events for optimum system operations. As offshore wind deployment increases its contribution to the nation’s energy mix, the ability for developers to estimate annual energy production and operating costs and for system operators to anticipate wind speed changes, such as ramp events, is critical to ensuring integration of offshore wind power and grid reliability.

A key goal of this topic area is to support the reduction of the unsubsidized levelized cost of energy (LCOE) for utility-scale fixed-bottom offshore wind energy systems from 2017 reference wind costs of $0.17kWh, to $0.05/kWh by 2030. Offshore wind resource characterization improvements could increase the revenue of offshore wind operators, lower annual operating costs through better prediction of appropriate service weather windows, power production, and wind plant lifetimes, thus lowering the financial risk associated with installation and overall power production, all of which contribute to a lower LCOE. Information on a similar prior project focused on land based wind energy, the “Wind Forecast Improvement Project”, may be found in Appendix I – Supporting Documents.

Project Objectives

Specific objectives of this topic area are to fund a project that, in collaboration with DOE and NOAA partners, will:

● Carry out a research program to address primary challenges that the offshore wind industry faces with respect to wind resource characterization, including wind forecasting.

● Working with DOE and NOAA partners, proposed team members and available resources described in this FOA, design and implement an observational field campaign in an area relevant to near-term U.S. offshore wind development activities that would support the improvement of the fundamental physics of mesoscale and finer scale model methods and thus improve offshore wind resource characterization. It is expected that the field study will span at least a full annual cycle and take place primarily in the offshore environment.

● Improve the understanding of physical phenomena, processes, and atmospheric properties in the offshore regions, particularly wind speed, shear, and turbulence within anticipated rotor planes. Such understanding would be supported by increased knowledge, for example, of air-sea interaction, turbulence structure, and atmospheric dynamics and thermodynamics.

● Develop new or improved Weather Research and Forecasting (WRF) model parameterizations or atmospheric/metocean modeling theories in conjunction with NOAA and the DOE National Labs identified under this topic area. These improvements should better represent physical processes, such as air-sea interaction, turbulence, boundary layer dynamics and coastal circulations, while increasing the accuracy of predicted wind changes in foundational weather and metocean models.

● Develop, for industry, support tools and data or other mechanisms that would transfer knowledge developed through this project to practical industry use; such tools could include improved probabilistic forecast information, uncertainty quantification and forecast reliability for system operations, or better methods to incorporate ocean and atmospheric wave and turbulence information into turbine or wind plant design.

● Disseminate results that contribute to improvements in the state-of-the-art wind resource characterization as well as any additional discoveries that benefit wind or meteorological communities.

DOE Partners Supporting this Topic Area

The awardee will work collaboratively with current DOE partners described below that are funded separately to collaborate with this topic area’s awardee. Applicants should not contact these partners directly for assistance in preparing their application and will collaborate with these contributors at DOE expense only if competitively selected and awarded.

*NOAA*

NOAA’s Office of Oceanic and Atmospheric Research (OAR) and the National Weather Service (NWS) will be collaborating partners in the design, planning and execution of the field campaign including the deployment of meteorological instrumentation, data collection and assimilation, and the development of experimental foundational weather forecast models to support this topic area. Additional information about NOAA’s project role and modeling capabilities can be found in Appendix H (Federal Capabilities and Prospective Roles).

*DOE Federally Funded Research and Development Centers (FFRDC)*

Several of the U.S. Department of Energy’s national laboratories have ongoing research and development programs supporting the advancement of wind energy in the U.S. In particular, the National Renewable Energy Laboratory (NREL), Argonne (ANL), Lawrence Livermore (LLNL), and Pacific Northwest National Laboratories (PNNL) will be directly funded by DOE to carry out research complementary to that funded through this topic area, and to collaborate with the topic area awardee in the field design, instrument deployment, data management, data analysis, and modeling associated with this project. Additional information about the DOE FFRDC capabilities and research interests can be found in Appendix H (Federal Capabilities and Prospective Roles).

All work under EERE funding agreements must be performed in the United States. See Section IV.I.iii. and Appendix C.

**Topic Area 1 Specific Application Requirements**

The awardee team is expected to bring various demonstrated capabilities and expertise to this project, including: complex project management experience and expertise, including formal project planning; atmospheric and oceanographic equipment and data acquisition experience, including quality assurance and control; marine logistics and permitting expertise to deploy instrumentation in an offshore environment; familiarity with foundational offshore atmospheric and oceanographic physics and numerical weather prediction models; the ability to partner with private industry to determine operational wind plant system needs and benefits through the use of improved forecasts; and, any necessary cooperation from wind plant developers within a proposed offshore wind development area. Applicants should propose a study that can flexibly and effectively incorporate federally provided resources (NOAA and FFRDC staff and equipment) but can also stand on its own merits within the funding available through this topic area. Applicants must submit a Statement of Project Objectives (SOPO) and budget for the entire project period. However, only the first budget period will be negotiated in detail. The SOPO and budget will be further refined and negotiated for each subsequent budget period following the go/no-go discussions and decision. Appendix I provides references for documents supporting the context for this topic area from previous workshops and studies.

Project Team

In addition to the aforementioned DOE pre-selected project partners, the proposed team may include wind plant operators, owners, developers and manufacturers, wind forecasters, weather service providers, wind measurement instrument suppliers, regional academia, State or local Government, or others. Each of the participants should be able to bring added value to the research agenda or coordination needs of the project such as historic wind energy resource data, ongoing wind and power output measurements, measurement hardware, wind plant outage and availability data, marine logistics experience, theoretical and computational experience in meteorology and oceanography, and other evaluation, analysis, and project implementation support as appropriate.

Regions of Interest

WETO is interested in the U.S. Northeast and Mid-Atlantic offshore regions, where offshore wind development activities are currently happening, as candidate areas for studying physical processes. Applicants should select a study area of appropriate scale within this region that experiences the physical processes of interest listed in the next section. These regions would provide data for more complete validation of NWP models and related models used in day-ahead wind forecasts. They also assure that the field campaign takes place in an offshore wind area in proximity to Federally defined wind energy areas or areas that have significant state and local government offshore wind development interest.

Physical Processes of Interest

The awardee will work with project partners, collaboratively leveraging NOAA and FFRDC resources that may be available, to design, plan and implement a data measurement and analysis campaign in the region of interest. This multi-seasonal study is expected to improve knowledge of atmospheric and oceanographic processes relevant to the wind industry which may include:

* + marine atmospheric boundary layer thermodynamic structure and processes;
  + coastal low-level jets;
  + air-sea interaction, including prediction of breaking waves;
  + land-sea interactions, including sea breeze impacts in offshore wind areas;
  + surface and boundary layer turbulence; and
* other phenomena such as weather fronts or Gulf Stream meanders affecting wind power production or structural loading

Instrumentation and Data Management

It is expected that the awardee and its team will provide and deploy, including acquiring all necessary permits, a sufficiently complete set of their own equipment for offshore deployment to execute a fully successful project. DOE and its partners have identified a preliminary list of Government Furnished Equipment (GFE) that could be made available to enhance the core effort of the awardee. This list is provided in Table 1. Many of these resources have been designed for deployment on land, including islands, although some of them could be deployed on an appropriate stable platform at sea if such a platform were available. Applicants are encouraged to consider how these resources could enhance and extend their proposed core project, recognizing that overall funding availability will likely necessitate the use of an appropriately selected subset. It is not assumed that all of the available GFE could be used effectively, and the ultimate suite will depend on the science planning during Budget Period 1. It is anticipated that coordination regarding instrumentation and equipment needs and availability by project partners would be finalized in Budget Period 1 planning discussions.

**Table 1. List of Potential Government Furnished Equipment**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Observational Equipment/Instrumentation** | | **Maximum Number** | **Notes** |
| Remote Sensing | Wind Profiling Radar (WPR) with RASS | 915 MHz | 12 | 2 Vaisala 915 MHz (ANL)  10 915MHz (NOAA) |
| Lidar | Scanning Doppler | 5 | 1 Halo Streamline XR (NOAA; 3-5 km range, 50 m resolution)  2 Leosphere 200S (NOAA; 3-5 km/4-7 km range, 50/100m reolution)  2 Galion 4000 (NREL) |
| Vertical Profiling | 4 | 1 WindCube V2 from LLNL  2 ZephIR 300s from LLNL  1 WindCube v2 from NREL |
| Sodar | Vertical Profiling | 6 | 2 Doppler mini-sodars (ANL)  1 Scintec Doppler (PNNL)  3 2-3 KHz CT2 systems (NOAA) |
| K-band radar |  | 1 | 1 from ANL |
| X-band radar | Scanning Doppler | 1 | 1 from NREL |
| Microwave radiometer | Vertical Profiling | 2 | 2 Radiometrics MP3000A (NOAA) |
| Micro Rain Radar (MRR) | 24 GHz | 1 | 1 from ANL (METEK MRR-2) |
| Ceilometer |  | 8 | 1 Vaisala (NREL)  4 Vaisala CT25K (NOAA)  2 Vaisala CL31 (NOAA)  1 Vaisala CL51 (NOAA) |
| AERI | Temperature/humidity profiles | 3 | 3 AERI passive radiometric systems from NREL |
| Surface Met | Anemometer | Sonic | 10 | 6 from ANL (Metek)  1 from LLNL (Campbell Sci.)  3 from PNNL |
| Cup | 3 | 2 from ANL  1 from LLNL |
| T/RH sensor | | 4 | 3 from ANL  1 from LLNL |
| Pressure sensor  High accuracy barometers | | 11 | 3 from ANL  6-8 from NOAA |
| Microbarographs with [Quad-Disc Probe](about:blank) | | 13 | 13 (NOAA) |
| Wind vane direction | | 2 | 1 from ANL  1 from LLNL |
| Wind bird | | 3 | 3 from ANL |
| Tipping Rain Gauge | | 3 | 3 from ANL |
| Laser Disdrometer | | 1 | 1 from ANL (OTT Parsivel2) |
| Surface Weather Station | | 6 | 6 from PNNL |
| Met tower | 10-m | 36 | 3 from ANL  33 from NOAA |
| Hygrometer | Krypton | 2 | 2 from ANL |
| Infrared | 2 | 2 from PNNL |
| In Situ Profiling | Radiosonde system |  | 1 | 1 from NREL (Vaisala) |
| Radiation/Fluxes | Energy Balance Bowen Ratio System |  | 1 | 1 from ANL |
| Radiometer | Net Radiometer | 1 | 1 from ANL |
| Albedometer | 1 | 1 from ANL |
| Upwelling/downwelling SW and LW radiometers | 3 | 3 RADSYS systems (NOAA) |
| ECOR Flux Module | 1 | 1 from ANL |
| [Mobile SURFRAD station](https://www.esrl.noaa.gov/gmd/grad/surfrad/index.html) | 2 | 2 (NOAA) |
| Metocean | DOE buoy with wind profiling lidar |  | 2 | <https://wind.pnnl.gov/lidarbuoys.asp> |

The application should define the core project proposed by the applicant, including how the instrumentation provided by the applicant will be sufficient to support it. The application should also indicate GFE of interest and how it could extend the project objectives if it were available. While two lidar buoys are expected to be available as GFE, DOE anticipates that additional lidar buoys or offshore platforms such as jack-up barges, may be necessary to support offshore wind measurement instrumentation. The application should address the logistical plans for offshore deployment of required instrumentation.

Where possible, data collected by the awardee for this project should be supplied in near real-time to project partners for help with quality control. All awardees will be required to upload project-generated data and metadata to the A2e Data Archive and Portal, or [DAP](https://a2e.energy.gov/about/dap), following that system’s protocols. The DAP, funded by WETO, has been established to collect, preserve, and disseminate data and metadata for WETO projects under EERE. By providing data to the DAP, projects can meet the Data Management Plan requirements as described in “A2e Data Archive and Portal (DAP) Data Management Guidelines” (available at <https://a2e.energy.gov/docs/program/A2e-dap-DMP_PI_guidance.docx>). It is recommended that awardees engage the A2e DAP team as soon as the project is initiated. Currently, each project is guaranteed long-term archival preservation of up to 10 TB of data. Data archival requirements that exceed 10 TB can be negotiated. Applicants should describe data collection and formatting, archival, quality assurance/quality control and processes for sharing data among partners in the Data Management Plan (Appendix D).

Model Development and Decision Support Tools

Utilizing data collected and results from the field campaign, the successful applicant will use the WRF model, specifically the Advanced Research Weather Research Forecasting (WRF) (WRF-ARW). Ideally, the applicant would use WRF version 4.0 with the High-Resolution Rapid Refresh namelist (provided by NOAA), so that the new or improved physical schemes developed as part of this project could be more easily incorporated into NOAA’s operational regional NWP models (see [www.wrf-model.org/](http://www.wrf-model.org/) for more information on the WRF model). These NWP models that provide the basis for demonstrating forecast improvements include the 13-km Rapid Refresh (RAP) and the 3-km High-Resolution Rapid Refresh (HRRR) (Benjamin et al. 2016). For more information on NOAA NWP models and forecasting output, please refer to Appendix H.

Applicants should also describe development of tools or methodologies that will enable developers or operators to better use improved knowledge of winds and turbulence or will provide improved decision support to system operators. These capabilities can include general methodologies for defining probabilistic forecast information, uncertainty quantification and forecast reliability for system operations, or improved use of turbulence and wave load inputs for plant design or operations.

Budget Periods

The proposed planned project performance period should be 60 months and will consist of four budget periods.

In Budget Period one (up to 12 months), the awardee will develop a plan of collaboration with NOAA, FFRDCs and subrecipient team members to identify specific GFE that will be used and to define the mutual and complementary objectives and activities of all participants. Specific planning during this period will include the following:

1. Development of an overall integrated project management plan, including definition of leadership roles and responsibilities and defined organization structure
2. Development of an expanded science plan that accounts for the planned GFE and the intellectual and computational resources of NOAA and FFRDCs.
3. Field campaign implementation plan including finalization of the testing location, test layout, goals/milestones and a standardized means of collecting and archiving data
4. Initiation of necessary instrumentation permits and leasing arrangements
5. Initiation of necessary National Environmental Policy Act (NEPA) determinations
6. Completion of partnership arrangements with key partners including potential wind farm developers, Bureau of Ocean Energy Management (BOEM), state and local leadership, etc.
7. Completion of a data management plan including the utilization of the A2e DAP
8. Completion of a detailed project management plan and a risk management plan for work to be executed by the awardee
9. Finalize SOPO and budget for Budget Period 2 (BP2)

During Budget Period 2 (up to 12 months), the awardee will have responsibility in conjunction with the NOAA and FFRDCs for coordinating deployment of the necessary instrumentation and data acquisition equipment to proceed with the field campaign. This will include completion of the necessary site access land use or leasing agreements, power availability, permitting, and the installation and startup of necessary equipment and instrumentation.

During Budget Period 3 (up to 18 months), the awardee will have responsibility for coordinating the field campaign among the team members (NOAA, FFRDCs, etc.), which would include, for instruments controlled by the awardee, the collection of relevant data and data quality control, tracking instrument operability/status, and archiving all data collected. This Budget Period will also include operation and timely maintenance of instrumentation, identification of case studies for further analysis, replacement of instrumentation as required, and preliminary analysis of data. It is expected that NOAA and FFRDC instrument providers will have responsibility for data collection through their instrumentation. However, the awardee will be responsible for the overall field campaign coordination, including data collection, to ensure consistency, quality and standardization among team members.

During Budget Period 4 (up to 18 months), the awardee will have responsibility for managing coordinated data analysis and model improvement with its NOAA and FFRDC partners. This phase will include analyzing data from the field campaign, identifying ways to better represent physical processes in model physical schemes or atmospheric modeling theories, testing those theories with the NOAA RAP and HRRR models and WRF-ARW, and disseminating information. The awardee will be responsible for identifying, planning and assuring timely applications for high performance computing needs and availability with NOAA and FFRDCs.

**Topic Area 2: Project Development for Offshore Wind Technology**

Although the offshore wind market in the United States is poised for growth, further cost reductions and barriers to deployment must be addressed through targeted innovation. Historically, validations of new technologies and methodologies have proven to be effective in de-risking and accelerating their adoption by the wind industry. However, the high costs of offshore project development can limit the ability to validate innovations at full scale in the offshore environment. This area of interest provides project development funds to enable validation of a novel technology or methodology that will advance the state-of-the-art of offshore wind energy in the United States.

The proposed work should enable the applicant to perform the necessary project development to implement the new technology/methodology at an offshore wind plant that will be operational no later than 2025. Project funds are to be applied to costs incurred during the development stage of an offshore wind technology demonstration project that is currently in planning. For the purposes of this award, WETO defines project development as: the systematic use of resources, knowledge and practices to implement a novel technology or methodology, including design and development of prototypes and processes, to meet specific goals and objectives which, in this case, must relate to advancing the state-of-the-art of offshore wind energy technology. Funds for project development may be used to advance a technology from TRL 4 to TRL7 (see Appendix F), research the applicability and cost effectiveness of a new technology or methodology, and for site-specific engineering to utilize the technology, including procurement of the hardware for the proposed technology.

To be eligible for award, offshore wind projects where the proposed technology/methodology validation testing would take place must already be underway at the time of the application to this FOA—meaning specifically that a site has been secured, permitting and site assessments are underway or complete, and construction engineering and hardware selection are underway. In the Letters of Commitment section of the Full Application Content Requirements (Section IV.C.iv), the applicant must include documentation clearly identifying permission to conduct validation testing from a site or lease holder; or a statement of interest from one or more site or lease holders with a detailed plan including current progress and a path forward towards obtaining such permission. Documentation clearly identifying permission to conduct validation testing from a site or lease holder will be specifically identified as a Budget Period 1 Go/No-Go criteria for Topic Area 2 awards, and will be required prior to continuing into Budget Period 2. The validation testing could be stand-alone or a portion of a larger commercial-scale offshore wind plant installation. In either case, the innovative technology/methodology must be one that has not been utilized commercially in the United States to date.

Up to two awards will be made, totaling $10M.

The proposed project must:

• Implement an innovative technology at least at engineering/pilot scale, up to full-scale, or employ a novel methodology that has yet to be utilized commercially in the United States for offshore wind; and

• Have substantiated the potential to reduce commercial-scale LCOE or future commercial scale project risk.

The innovative technology or methodology being proposed must be applicable to state-of-the-art offshore wind turbines and supporting structures of a size and multi-megawatt generating capacity typically installed in utility-connected, multi-turbine arrays.

Proposed projects could include project development activities for validation testing of commercial-scale innovations such as:

* Next-generation turbines and components;
* Innovative foundation types;
* Turbine controls;
* Wind plant controls;
* Manufacturing and fabrication processes;
* Foundation and turbine installation techniques or technologies;
* Transmission cable installation methodologies;
* Operations and maintenance (O&M) technology and procedures;
* Autonomous offshore geophysical/geotechnical surveys; or
* Autonomous inspection or repair.

As a part of the technology transfer effort and a requirement of the award, the applicant will commit to a suite of project instrumentation and data collection, and to making that dataset available to DOE and its National Laboratories for up to five years after the project end date for use in further research. If the validation testing is part of a larger offshore wind installation, the data delivered to DOE should include the baseline data and the validated data. For example:

* If project development funds are used to support a new installation technique, data delivered to DOE would include baseline and innovative techniques data, i.e. cycle times, noise emitted, cost savings, etc.
* If project development funds are used to support a new controls strategy, data delivered to DOE would include performance data for the baseline turbine(s) and the innovative turbines over the course of pertinent load conditions.
* If project development funds are used to support a new O&M strategy, data regarding baseline O&M and innovative O&M would be provided, i.e. availability, number of trips to the turbines, etc.

The strongest applicants will show that the proposed us of project development funds will clearly enable demonstration of innovations addressing common needs of the wider offshore wind industry. Successful applications should include substantive information supporting any assumptions that the proposed project will have significant impact on one or more of the offshore wind industry needs below:

* Reducing offshore wind energy costs;
* Reducing financing and permitting risks;
* Accelerating the rate of offshore wind deployment;
* Disseminating performance data, as set forth in the Data Management Plan (Appendix D);
* Decreasing environmental barriers to deployment or operation; or
* Validating innovative solutions beneficial to multiple commercial applications.

Metrics for success include a demonstrable cost reduction for offshore wind based on projected commercial-scale implementation of the innovative technology or methodology, and data collected from the follow-on successful demonstration of the innovation.

All work under EERE funding agreements must be performed in the United States. See Section IV.I.iii. and Appendix C.

* 1. Applications Specifically Not of Interest

The following types of applications will be deemed nonresponsive and will not be reviewed or considered (See Section III.D. of the FOA):

For All Topic Areas:

* Applications that fall outside the technical parameters specified in Section I.A and I.B of the FOA.
* Applications for proposed technologies that are not based on sound scientific principles (e.g., violates the laws of thermodynamics).

For Topic Area 1:

* Applications using forecast models that are not WRF or WRF-based are not of interest.
* Applications that limit the sharing of data with project partners (e.g. NOAA) or significantly restrict access to data collected from this field measurement campaign for any potential future use are not of interest.
* Applications for developing new instrumentation or measurement technologies, including remote sensors are not of interest.
* Applications that do not include offshore wind or are outside the region of interest described are not of interest.
* Applications for development of new models or WRF planetary boundary layer schemes that are not open source and publicly available are not of interest.
* Applications limiting the field campaign phase to less than four seasons are not of interest.

For Topic Area 2:

* + Applications proposing projects that do not have a clearly identified commitment to disseminate project results and validate the technology or methodology subsequent to the end of the project are not of interest.
  + Applications that have not identified a host location are not of interest.
  + Applications proposing a scope of work that is currently funded by EERE are not of interest.
  1. Authorizing Statutes

The programmatic authorizing statute is the Energy Policy Act of 2005 (EPACT 2005), Public Law 109-58 (Aug 5, 2005), Title IX Research and Development, Section 931(a)(2)(B). This provision is found in the United States Code at 42 U.S.C. § 16231(a)(2)(B).

Awards made under this announcement will fall under the purview of 2 Code of Federal Regulation (CFR) Part 200 as amended by 2 CFR Part 910.

1. Award Information
   1. Award Overview
2. Estimated Funding

EERE expects to make a total of approximately $20 million of federal funding available for new awards under this FOA, subject to the availability of appropriated funds. EERE anticipates making approximately 2-3 awards under this FOA.

EERE may issue awards in one, multiple, or none of the following topic areas:

**Topic Area 1: Offshore Wind Resource Measurement and Modeling Science**:

The overall goal of this Topic Area is to provide funding for a project that will improve wind resource modeling and predictions in offshore wind energy development areas. Using lessons-learned and information gained during the previous program work in complex-terrain wind resource modeling and prediction, this Topic Area will focus on improving wind resource model physics for foundational wind forecasts and other applications in offshore wind energy development areas.

EERE may issue approximately 1 award in this topic area in the amount of up to $10 million.

**Topic Area 2: Project Development for Offshore Wind Technology:**

The overall goal of this Topic Area is to provide funding for a project that will enable validation of a novel technology or methodology that will advance the state-of-the-art of offshore wind energy in the United States. The proposed project must either implement an innovative technology at engineering/pilot or full-scale, or employ a novel methodology that has yet to be utilized commercially in the United States for offshore wind.

EERE may issue approximately 1-2 awards in this topic area. Individual awards may vary between $5 and $10 million.

EERE may establish more than one budget period for each award and fund only the initial budget period(s). Funding for all budget periods, including the initial budget period, is not guaranteed.

1. Period of Performance

Topic Area 1: EERE anticipates making an award that will run up to 60 months in length, comprised of 4 budget periods:

Budget Period 1 - Up to 12 months for the completion of project planning and test plan development;

Budget Period 2 - Up to 12 months to deploy instrumentation and data acquisition equipment;

Budget Period 3 - Up to 18 months to conduct a field campaign, including the collection of data for each of the four seasons; and

Budget Period 4 - 18 months for data analysis and model improvement or development.

Topic Area 2: EERE anticipates making awards that will run up to 60 months in length, comprised of up to 3 Budget Periods:

Budget Period 1 – Up to 18 months for the completion of project planning, initial design, and preliminary R&D activities.

Budget Period 2 – Up to 18 months for the finalization of design and R&D activities, and test plan development (if applicable).

Budget Period 3 – Up to 24 months for testing and validation or field campaign activities (if applicable).

Project continuation will be contingent upon several elements, including satisfactory performance and Go/No-Go decision review. For a complete list, see Section VI.B.xiv. At the Go/No-Go decision points, EERE will evaluate project performance, project schedule adherence, the extent milestone objectives are met, compliance with reporting requirements, and overall contribution to the program goals and objectives. As a result of this evaluation, EERE may, at its discretion, authorize the following actions: (1) continue to fund the project, contingent upon the availability of funds appropriated by Congress for the purpose of this program and the availability of future-year budget authority; (2) recommend redirection of work under the project; (3) place a hold on federal funding for the project, pending further supporting data or funding; or (4) discontinue funding the project because of insufficient progress, change in strategic direction, or lack of funding.

1. New Applications Only

EERE will accept only new applications under this FOA. EERE will not consider applications for renewals of existing EERE-funded awards through this FOA.

* 1. EERE Funding Agreements

Through cooperative agreements and other similar agreements, EERE provides financial and other support to projects that have the potential to realize the FOA objectives. EERE does not use such agreements to acquire property or services for the direct benefit or use of the United States government.

1. Cooperative Agreements

EERE generally uses cooperative agreements to provide financial and other support to prime recipients.

Through cooperative agreements, EERE provides financial or other support to accomplish a public purpose of support or stimulation authorized by federal statute. Under cooperative agreements, the government and prime recipients share responsibility for the direction of projects.

EERE has substantial involvement in all projects funded via cooperative agreement. See Section VI.B.ix. of the FOA for more information on what substantial involvement may involve.

1. Funding Agreements with Federally Funded Research and Development Center (FFRDCs)

In most cases, FFRDCs are funded independently of the remainder of the project team. The FFRDC then executes an agreement with any non-FFRDC project team members to arrange work structure, project execution, and any other matters. Regardless of these arrangements, the entity that applied as the prime recipient for the project will remain the prime recipient for the project.

1. Eligibility Information

To be considered for substantive evaluation, an applicant‘s submission must meet the criteria set forth below. If the application does not meet these eligibility requirements, it will be considered ineligible and removed from further evaluation.

* 1. Eligible Applicants

1. Individuals

U.S. citizens and lawful permanent residents are eligible to apply for funding as a prime recipient or subrecipient.

1. Domestic Entities

For-profit entities, educational institutions, and nonprofits that are incorporated (or otherwise formed) under the laws of a particular state or territory of the United States and have a physical location for business operations in the United States are eligible to apply for funding as a prime recipient or subrecipient. Nonprofit organizations described in section 501(c)(4) of the Internal Revenue Code of 1986 that engaged in lobbying activities after December 31, 1995 are not eligible to apply for funding.

State, local, and tribal government entities are eligible to apply for funding as a prime recipient or subrecipient.

For Topic Area 1, DOE/NNSA FFRDCs are not eligible to apply for funding as a prime recipient or subrecipient.

For Topic Area 2, DOE/NNSA FFRDCs are eligible to apply for funding as a subrecipient, but are not eligible to apply as a prime recipient.

Non-DOE/NNSA FFRDCs are eligible to apply for funding as a subrecipient, but are not eligible to apply as a prime recipient.

Federal agencies and instrumentalities (other than DOE) are eligible to apply for funding as a subrecipient, but are not eligible to apply as a prime recipient. For Topic Area 1, NOAA is not eligible to apply for funding as a prime recipient or subrecipient.

1. Foreign Entities

Foreign entities, whether for-profit or otherwise, are eligible to apply for funding under this FOA. Other than as provided in the “Individuals” or “Domestic Entities” sections above, all prime recipients receiving funding under this FOA must be incorporated (or otherwise formed) under the laws of a state or territory of the United States and have a physical location for business operations in the United States. If a foreign entity applies for funding as a prime recipient, it must designate in the Full Application a subsidiary or affiliate incorporated (or otherwise formed) under the laws of a state or territory of the United States to be the prime recipient. The Full Application must state the nature of the corporate relationship between the foreign entity and domestic subsidiary or affiliate.

Foreign entities may request a waiver of the requirement to designate a subsidiary in the United States as the prime recipient in the Full Application (i.e., a foreign entity may request that it remains the prime recipient on an award). To do so, the applicant must submit an explicit written waiver request in the Full Application. Appendix C lists the necessary information that must be included in a request to waive this requirement. The applicant does not have the right to appeal EERE’s decision concerning a waiver request.

In the waiver request, the applicant must demonstrate to the satisfaction of EERE that it would further the purposes of this FOA and is otherwise in the economic interests of the United States to have a foreign entity serve as the prime recipient. EERE may require additional information before considering the waiver request.

A foreign entity may receive funding as a subrecipient.

1. Incorporated Consortia

Incorporated consortia, which may include domestic or foreign entities, are eligible to apply for funding as a prime recipient or subrecipient. For consortia incorporated (or otherwise formed) under the laws of a state or territory of the United States, please refer to “Domestic Entities” above. For consortia incorporated in foreign countries, please refer to the requirements in “Foreign Entities” above.

Each incorporated consortium must have an internal governance structure and a written set of internal rules. Upon request, the consortium must provide a written description of its internal governance structure and its internal rules to the EERE Contracting Officer.

1. Unincorporated Consortia

Unincorporated Consortia, which may include domestic and foreign entities, must designate one member of the consortium to serve as the prime recipient/consortium representative. The prime recipient/consortium representative must be incorporated (or otherwise formed) under the laws of a state or territory of the United States. The eligibility of the consortium will be determined by the eligibility of the prime recipient/consortium representative under Section III.A. of the FOA.

Upon request, unincorporated consortia must provide the EERE Contracting Officer with a collaboration agreement, commonly referred to as the articles of collaboration, which sets out the rights and responsibilities of each consortium member. This agreement binds the individual consortium members together and should discuss, among other things, the consortium’s:

* Management structure;
* Method of making payments to consortium members;
* Means of ensuring and overseeing members’ efforts on the project;
* Provisions for members’ cost sharing contributions; and
* Provisions for ownership and rights in intellectual property developed previously or under the agreement.
  1. Cost Sharing

**Cost Share 20%**

The cost share must be at least 20% of the total allowable costs for research and development projects (i.e., the sum of the government share, including FFRDC costs if applicable, and the recipient share of allowable costs equals the total allowable cost of the project) and must come from non-federal sources unless otherwise allowed by law. (See 2 CFR 200.306 and 2 CFR 910.130 for the applicable cost sharing requirements.)

To assist applicants in calculating proper cost share amounts, EERE has included a cost share information sheet and sample cost share calculation as Appendices A and B to this FOA.

1. Legal Responsibility

Although the cost share requirement applies to the project as a whole, including work performed by members of the project team other than the prime recipient, the prime recipient is legally responsible for paying the entire cost share. If the funding agreement is terminated prior to the end of the project period, the prime recipient is required to contribute at least the cost share percentage of total expenditures incurred through the date of termination.

The prime recipient is solely responsible for managing cost share contributions by the project team and enforcing cost share obligations assumed by project team members in subawards or related agreements.

1. Cost Share Allocation

Each project team is free to determine how best to allocate the cost share requirement among the team members. The amount contributed by individual project team members may vary, as long as the cost share requirement for the project as a whole is met.

1. Cost Share Types and Allowability

Every cost share contribution must be allowable under the applicable federal cost principles, as described in Section IV.I.i. of the FOA. In addition, cost share must be verifiable upon submission of the Full Application.

Project teams may provide cost share in the form of cash or in-kind contributions. Cost share may be provided by the prime recipient, subrecipients, or third parties (entities that do not have a role in performing the scope of work). Vendors/contractors may not provide cost share. Any partial donation of goods or services is considered a discount and is not allowable.

Cash contributions include, but are not limited to: personnel costs, fringe costs, supply and equipment costs, indirect costs and other direct costs.

In-kind contributions are those where a value of the contribution can be readily determined, verified and justified but where no actual cash is transacted in securing the good or service comprising the contribution. Allowable in-kind contributions include, but are not limited to: the donation of volunteer time or the donation of space or use of equipment.

Project teams may use funding or property received from state or local governments to meet the cost share requirement, so long as the funding was not provided to the state or local government by the federal government.

The prime recipient may not use the following sources to meet its cost share obligations including, but not limited to:

* Revenues or royalties from the prospective operation of an activity beyond the project period;
* Proceeds from the prospective sale of an asset of an activity;
* Federal funding or property (e.g., federal grants, equipment owned by the federal government); or
* Expenditures that were reimbursed under a separate federal program.

Project teams may not use the same cash or in-kind contributions to meet cost share requirements for more than one project or program.

Cost share contributions must be specified in the project budget, verifiable from the prime recipient’s records, and necessary and reasonable for proper and efficient accomplishment of the project. As all sources of cost share are considered part of total project cost, the cost share dollars will be scrutinized under the same federal regulations as federal dollars to the project. Every cost share contribution must be reviewed and approved in advance by the Contracting Officer and incorporated into the project budget before the expenditures are incurred.

Applicants are encouraged to refer to 2 CFR 200.306 as amended by 2 CFR 910.130 for additional cost sharing requirements.

1. Cost Share Contributions by FFRDCs

Because FFRDCs are funded by the federal government, costs incurred by FFRDCs generally may not be used to meet the cost share requirement. FFRDCs may contribute cost share only if the contributions are paid directly from the contractor’s Management Fee or another non-federal source.

1. Cost Share Verification

Applicants are required to provide written assurance of their proposed cost share contributions in their Full Applications.

Upon selection for award negotiations, applicants are required to provide additional information and documentation regarding their cost share contributions. Please refer to Appendix A of the FOA.

1. Cost Share Payment

EERE requires prime recipients to contribute the cost share amount incrementally over the life of the award. Specifically, the prime recipient’s cost share for each billing period must always reflect the overall cost share ratio negotiated by the parties (i.e., the total amount of cost sharing on each invoice when considered cumulatively with previous invoices must reflect, at a minimum, the cost sharing percentage negotiated).

In limited circumstances, and where it is in the government’s interest, the EERE Contracting Officer may approve a request by the prime recipient to meet its cost share requirements on a less frequent basis, such as monthly or quarterly. Regardless of the interval requested, the prime recipient must be up-to-date on cost share at each interval. Such requests must be sent to the Contracting Officer during award negotiations and include the following information: (1) a detailed justification for the request; (2) a proposed schedule of payments, including amounts and dates; (3) a written commitment to meet that schedule; and (4) such evidence as necessary to demonstrate that the prime recipient has complied with its cost share obligations to date. The Contracting Officer must approve all such requests before they go into effect.

Topic Area 1:

As Non-DOE/NNSA FFRDC funding will be provided directly to the Non-DOE/NNSA FFRDC(s) by DOE, prime recipients will be required to provide project cost share at a percentage commensurate with the Non-DOE/NNSA FFRDC costs, on a budget period basis, resulting in a higher interim invoicing cost share ratio than the total award ratio.

Prime Recipients are not required to provide cost share on Technical Assistance provided by FFRDCs as described in Section 1.B.

Topic Area 2:

As FFRDC funding will be provided directly to the FFRDC(s) by DOE, prime recipients will be required to provide project cost share at a percentage commensurate with the FFRDC costs, on a budget period basis, resulting in a higher interim invoicing cost share ratio than the total award ratio.

* 1. Compliance Criteria

**Concept Papers, Full Applications and Replies to Reviewer Comments must meet all compliance criteria listed below or they will be considered noncompliant. EERE will not review or consider noncompliant submissions**, including Concept Papers, Full Applications, and Replies to Reviewer Comments that were: submitted through means other than EERE Exchange; submitted after the applicable deadline; or submitted incomplete. EERE will not extend the submission deadline for applicants that fail to submit required information by the applicable deadline due to server/connection congestion.

1. Compliance Criteria
   * + 1. *Concept Papers*

Concept Papers are deemed compliant if:

* The Concept Paper complies with the content and form requirements in Section IV.B. of the FOA; and
* The applicant successfully uploaded all required documents and clicked the “Submit” button in EERE Exchange by the deadline stated in this FOA.
  + - 1. *Full Applications*

Full Applications are deemed compliant if:

* The applicant submitted a compliant Concept Paper;
* The Full Application complies with the content and form requirements in Section IV.C. of the FOA; and
* The applicant successfully uploaded all required documents and clicked the “Submit” button in EERE Exchange by the deadline stated in the FOA.
  + - 1. *Replies to Reviewer Comments*

Replies to Reviewer Comments are deemed compliant if:

* The Reply to Reviewer Comments complies with the content and form requirements in Section IV.D. of the FOA; and
* The applicant successfully uploaded all required documents to EERE Exchange by the deadline stated in the FOA.
  1. Responsiveness Criteria

All “Applications Specifically Not of Interest,” as described in Section I.C. of the FOA, are deemed nonresponsive and are not reviewed or considered.

* 1. Other Eligibility Requirements

Topic Area 1

1. Requirements for non-DOE/NNSA Federally Funded Research and Development Centers Included as a Subrecipient

Non-DOE/NNSA FFRDCs may be proposed as a subrecipient on another entity’s application subject to the following guidelines:

* + - 1. *Authorization for non-DOE/NNSA FFRDCs*

The federal agency sponsoring the FFRDC must authorize in writing the use of the FFRDC on the proposed project and this authorization must be submitted with the application. The use of a FFRDC must be consistent with its authority under its award.

* + - 1. *Value/Funding*

The value of and funding for the FFRDC portion of the work will not normally be included in the award to a successful applicant. Usually, DOE will fund a non-DOE/NNSA FFRDC through an interagency agreement with the sponsoring agency.

* + - 1. *Cost Share*

Although the non-DOE/NNSA FFRDC portion of the work is usually excluded from the award to a successful applicant, the applicant’s cost share requirement will be based on the total cost of the project, including the applicant’s, the subrecipient’s, and the non-DOE/NNSA FFRDC’s portions of the project.

* + - 1. *Responsibility*

The prime recipient will be the responsible authority regarding the settlement and satisfaction of all contractual and administrative issues including, but not limited to disputes and claims arising out of any agreement between the prime recipient and the non-DOE/NNSA FFRDC contractor.

* + - 1. *Limit on FFRDC Effort*

The scope of work to be performed by the non-DOE NNSA FFRDC may not be more significant than the scope of work to be performed by the applicant.

**Topic Area 2:**

1. Requirements for DOE/NNSA and non-DOE/NNSA Federally Funded Research and Development Centers Included as a Subrecipient

DOE/NNSA and non-DOE/NNSA FFRDCs may be proposed as a subrecipient on another entity’s application subject to the following guidelines:

* + - 1. *Authorization for non-DOE/NNSA FFRDCs*

The federal agency sponsoring the FFRDC must authorize in writing the use of the FFRDC on the proposed project and this authorization must be submitted with the application. The use of a FFRDC must be consistent with its authority under its award.

* + - 1. *Authorization for DOE/NNSA FFRDCs*

The cognizant Contracting Officer for the FFRDC must authorize in writing the use of the FFRDC on the proposed project and this authorization must be submitted with the application. The following wording is acceptable for this authorization:

Authorization is granted for the Laboratory to participate in the proposed project. The work proposed for the laboratory is consistent with or complementary to the missions of the laboratory, and will not adversely impact execution of the DOE assigned programs at the laboratory.

* + - 1. *Value/Funding*

The value of and funding for the FFRDC portion of the work will not normally be included in the award to a successful applicant. Usually, DOE will fund a DOE/NNSA FFRDC contractor through the DOE field work proposal (WP) system and non-DOE/NNSA FFRDC through an interagency agreement with the sponsoring agency.

* + - 1. *Cost Share*

Although the FFRDC portion of the work is usually excluded from the award to a successful applicant, the applicant’s cost share requirement will be based on the total cost of the project, including the applicant’s, the subrecipient’s, and the FFRDC’s portions of the project.

* + - 1. *Responsibility*

The prime recipient will be the responsible authority regarding the settlement and satisfaction of all contractual and administrative issues including, but not limited to disputes and claims arising out of any agreement between the prime recipient and the FFRDC contractor.

* + - 1. *Limit on FFRDC Effort*

The scope of work to be performed by the FFRDC may not be more significant than the scope of work to be performed by the applicant.

* 1. Limitation on Number of Concept Papers and Full Applications Eligible for Review

Topic Area 1:

An entity may submit more than one Concept Paper and Full Application under this topic area, provided that each application describes a geographically unique, scientifically distinct project and provided that an eligible Concept Paper was submitted for each Full Application.

Topic Area 2:

An entity may only submit one Concept Paper and one Full Application to this Topic Area. If an entity submits more than one Concept Paper and one Full Application to this topic area, EERE will request a determination from the applicant’s authorized representative as to which application should be reviewed. Any other submissions received listing the same entity as the applicant to this topic area will not be eligible for further consideration. This limitation does not prohibit an applicant from collaborating on other applications (e.g., as a potential subrecipient or partner) so long as the entity is only listed as the applicant on one Concept Paper and one Full Application under this topic area.

An entity may apply to both Topic Area 1 and Topic Area 2, subject to the individual Topic Area limitations as outlined above.

* 1. Questions Regarding Eligibility

EERE will not make eligibility determinations for potential applicants prior to the date on which applications to this FOA must be submitted. The decision whether to submit an application in response to this FOA lies solely with the applicant.

1. Application and Submission Information

The application process will include two phases: a Concept Paper phase and a Full Application phase. **Only applicants who have submitted an eligible Concept Paper will be eligible to submit a Full Application**. At each phase, EERE performs an initial eligibility review of the applicant submissions to determine whether they meet the eligibility requirements of Section III of the FOA. EERE will not review or consider submissions that do not meet the eligibility requirements of Section III. All submissions must conform to the following form and content requirements, including maximum page lengths (described below) and must be submitted via EERE Exchange at <https://eere-exchange.energy.gov/>, unless specifically stated otherwise. **EERE will not review or consider submissions submitted through means other than EERE Exchange, submissions submitted after the applicable deadline, or incomplete submissions**. EERE will not extend deadlines for applicants who fail to submit required information and documents due to server/connection congestion.

A **Control Number** will be issued when an applicant begins the EERE Exchange application process. This control number must be included with all application documents, as described below.

The Concept Paper, Full Application, and Reply to Reviewer Comments must conform to the following requirements:

* Each must be submitted in Adobe PDF format unless stated otherwise;
* Each must be written in English;
* All pages must be formatted to fit on 8.5 x 11 inch paper with margins not less than one inch on every side. Use Times New Roman typeface, a black font color, and a font size of 12 point or larger (except in figures or tables, which may be 10 point font). A symbol font may be used to insert Greek letters or special characters, but the font size requirement still applies. References must be included as footnotes or endnotes in a font size of 10 or larger. Footnotes and endnotes are counted toward the maximum page requirement;
* The Control Number must be prominently displayed on the upper right corner of the header of every page. Page numbers must be included in the footer of every page; and
* Each submission must not exceed the specified maximum page limit, including cover page, charts, graphs, maps, and photographs when printed using the formatting requirements set forth above and single spaced. If applicants exceed the maximum page lengths indicated below, EERE will review only the authorized number of pages and disregard any additional pages.

Applicants are responsible for meeting each submission deadline. **Applicants are strongly encouraged to submit their Concept Papers and Full Applications at least 48 hours in advance of the submission deadline**. Under normal conditions (i.e., at least 48 hours in advance of the submission deadline), applicants should allow at least 1 hour to submit a Concept Paper, Full Application, or Reply to Reviewer Comments. Once the Concept Paper, Full Application, or Reply to Reviewer Comments is submitted in EERE Exchange, applicants may revise or update that submission until the expiration of the applicable deadline. If changes are made to any of these documents, the applicant must resubmit the Concept Paper, Full Application, or Reply to Reviewer Comments before the applicable deadline.

EERE urges applicants to carefully review their Concept Papers, and Full Applications and to allow sufficient time for the submission of required information and documents. All Full Applications that pass the initial eligibility review will undergo comprehensive technical merit review according to the criteria identified in Section V.A.ii. of the FOA.

1. Additional Information on EERE Exchange

EERE Exchange is designed to enforce the deadlines specified in this FOA. The “Apply” and “Submit” buttons will automatically disable at the defined submission deadlines. Should applicants experience problems with EERE Exchange, the following information may be helpful.

Applicants that experience issues with submission PRIOR to the FOA deadline: In the event that an applicant experiences technical difficulties with a submission, the applicant should contact the EERE Exchange helpdesk for assistance ([EERE-ExchangeSupport@hq.doe.gov](mailto:EERE-ExchangeSupport@hq.doe.gov)). The EERE Exchange helpdesk or the EERE Exchange system administrators will assist applicants in resolving issues.

* 1. Application Forms

The application forms and instructions are available on EERE Exchange. To access these materials, go to <https://eere-Exchange.energy.gov> and select the appropriate funding opportunity number.

Note: The maximum file size that can be uploaded to the EERE Exchange website is 10MB. Files in excess of 10MB cannot be uploaded, and hence cannot be submitted for review. If a file exceeds 10MB but is still within the maximum page limit specified in the FOA, it must be broken into parts and denoted to that effect. For example:

**ControlNumber\_LeadOrganization\_Project\_Part\_1**

**ControlNumber\_LeadOrganization\_Project\_Part\_2**

* 1. Content and Form of the Concept Paper

To be eligible to submit a Full Application, applicants must submit a Concept Paper by the specified due date and time.

1. Concept Paper Content Requirements

EERE will not review or consider ineligible Concept Papers (see Section III. of the FOA).

Each Concept Paper must be limited to a single concept or technology. Unrelated concepts and technologies should not be consolidated into a single Concept Paper.

The Concept Paper must conform to the following content requirements:

|  |  |  |
| --- | --- | --- |
| **Section** | **Page Limit** | **Description** |
| **Cover Page** | 1 page maximum | The cover page should include the project title, the specific FOA Topic Area being addressed, both the technical and business points of contact, names of all team member organizations, and any statements regarding confidentiality. |
| **Technical Description and Impacts** | 5 pages maximum | Applicants are required to describe succinctly:   * The proposed technology, including its basic operating principles and how it is unique and innovative; * The proposed technology’s target level of performance (applicants should provide technical data or other support to show how the proposed target could be met); * The current state-of-the-art in the relevant field and application, including key shortcomings, limitations, and challenges; * How the proposed technology will overcome the shortcomings, limitations, and challenges in the relevant field and application; * The potential impact that the proposed project would have on the relevant field and application; * The key technical risks/issues associated with the proposed technology development plan; and * The impact that EERE funding would have on the proposed project. |
| **Addendum** | 5 pages maximum | Applicants are required to describe succinctly the qualifications, experience, and capabilities of the proposed project team, including:   * Whether the Principal Investigator (PI) and project team have the skill and expertise needed to successfully execute the project plan; * Whether the applicant has prior experience which demonstrates an ability to perform tasks of similar risk and complexity; * Whether the applicant has worked together with its teaming partners on prior projects or programs; and * Whether the applicant has adequate access to equipment and facilities necessary to accomplish the effort or clearly explain how it intends to obtain access to the necessary equipment and facilities.   Applicants may provide graphs, charts, or other data to supplement their Technology Description. |

EERE makes an independent assessment of each Concept Paper based on the criteria in Section V.A.i. of the FOA. EERE will encourage a subset of applicants to submit Full Applications. Other applicants will be discouraged from submitting a Full Application. An applicant who receives a “discouraged” notification may still submit a Full Application. EERE will review all eligible Full Applications. However, by discouraging the submission of a Full Application, EERE intends to convey its lack of programmatic interest in the proposed project in an effort to save the applicant the time and expense of preparing an application that is unlikely to be selected for award negotiations.

EERE may include general comments provided from reviewers on an applicant’s Concept Paper in the encourage/discourage notification posted on EERE Exchange at the close of that phase.

* 1. Content and Form of the Full Application

Applicants must submit a Full Application by the specified due date and time to be considered for funding under this FOA. Applicants must complete the following application forms found on the EERE Exchange website at <https://eere-Exchange.energy.gov/>, in accordance with the instructions.

Applicants will have approximately 30 days from receipt of the Concept Paper Encourage/Discourage notification on EERE Exchange to prepare and submit a Full Application. Regardless of the date the applicant receives the Encourage/Discourage notification, the submission deadline for the Full Application remains the date and time stated on the FOA cover page.

All Full Application documents must be marked with the Control Number issued to the applicant. Applicants will receive a control number upon clicking the “Create Concept Paper” button in EERE Exchange, and should include that control number in the file name of their Full Application submission (i.e., *Control number\_Applicant Name\_Full Application*).

1. Full Application Content Requirements

EERE will not review or consider ineligible Full Applications (see Section III. of the FOA).

Each Full Application shall be limited to a single concept or technology. Unrelated concepts and technologies shall not be consolidated in a single Full Application. Full Applications must conform to the following requirements:

|  |  |  |
| --- | --- | --- |
| **Submission** | **Components** | **File Name** |
| **Full Application (PDF, unless stated otherwise)** | Technical Volume (PDF format. See Chart in Section IV.D.ii.) | ControlNumber\_LeadOrganization\_TechnicalVolume |
| Resumes (PDF format. 1 page maximum per person) | ControlNumber\_LeadOrganization\_Resumes |
| Letters of Commitment, if applicable (PDF format. 1 page maximum per letter) | ControlNumber\_LeadOrganization\_LOCs |
| Statement of Project Objectives (SOPO) (Microsoft Word format. 15 page limit) | ControlNumber\_LeadOrganization\_SOPO |
| SF-424 Application for Federal Assistance (PDF format) | ControlNumber\_LeadOrganization\_App424 |
| Budget Justification (Microsoft Excel format. Applicants must use the template available in EERE Exchange) | ControlNumber\_LeadOrganization\_Budget\_Justification |
| Summary for Public Release (PDF format. 1 page limit) | ControlNumber\_LeadOrganization\_Summary |
| Summary Slide (Microsoft PowerPoint format. 1 page limit) | ControlNumber\_LeadOrganization\_Slide |
| Subrecipient Budget Justification, if applicable (Microsoft Excel format. Applicants must use the template available in EERE Exchange) | ControlNumber\_LeadOrganization\_Subrecipient\_Budget\_Justification |
| DOE WP for FFRDC, if applicable (PDF format. See [DOE O 412.1A, Attachment 3](https://www.directives.doe.gov/directives-documents/400-series/0412.1-BOrder-a/@@images/file)) | ControlNumber\_LeadOrganization\_WP |
| Authorization from cognizant Contracting Officer for FFRDC, if applicable (PDF format) | ControlNumber\_LeadOrganization\_FFRDCAuth |
| SF-LLL Disclosure of Lobbying Activities (PDF format, Required for Recipients and Subrecipients) | ControlNumber\_LeadOrganization\_SF-LLL |
| Foreign Entity and Foreign Work waiver requests, if applicable (PDF format) | ControlNumber\_LeadOrganization\_Waiver |
| Data Management Plan (Microsoft Word Format) | ControlNumber\_LeadOrganization\_DMP |
| Topic Area 2 Only:  U.S. Manufacturing Plan (PDF format) | ControlNumber\_LeadOrganization\_USMP |

**Note**: The maximum file size that can be uploaded to the EERE Exchange website is 10MB. Files in excess of 10MB cannot be uploaded, and hence cannot be submitted for review. If a file exceeds 10MB but is still within the maximum page limit specified in the FOA it must be broken into parts and denoted to that effect. For example:

**ControlNumber\_LeadOrganization\_TechnicalVolume\_Part\_1**

**ControlNumber\_LeadOrganization\_TechnicalVolume\_Part\_2**

**EERE will not accept late submissions that resulted from technical difficulties due to uploading files that exceed 10MB**.

EERE provides detailed guidance on the content and form of each component below.

1. Technical Volume

The Technical Volume must be submitted in Adobe PDF format. The Technical Volume must conform to the following content and form requirements, including maximum page lengths. If applicants exceed the maximum page lengths indicated below, EERE will review only the authorized number of pages and disregard any additional pages. This volume must address the Merit Review Criteria as discussed in Section V.A.ii. of the FOA. Save the Technical Volume in a single PDF file using the following convention for the title: “ControlNumber\_LeadOrganization\_TechnicalVolume”.

Applicants must provide sufficient citations and references to the primary research literature to justify the claims and approaches made in the Technical Volume. However, EERE and reviewers are under no obligation to review cited sources.

The Technical Volume to the Full Application may not be more than 30 pages, including the cover page, table of contents, and all citations, charts, graphs, maps, photos, or other graphics, and must include all of the information in the table below. The applicant should consider the weighting of each of the evaluation criteria (see Section V.A.ii of the FOA) when preparing the Technical Volume.

The Technical Volume should clearly describe and expand upon information provided in the Concept Paper. The Technical Volume must conform to the following content requirements:

|  |  |
| --- | --- |
| **SECTION/PAGE LIMIT** | **DESCRIPTION** |
| **Cover Page** | The cover page should include the project title, the specific FOA Topic Area being addressed, both the technical and business points of contact, names of all team member organizations, and any statements regarding confidentiality. |
| **Project Overview** (This section should constitute approximately 10% of the Technical Volume) | The Project Overview should contain the following information:   * Background: The applicant should discuss the background of their organization, including the history, successes, and current research and development status (i.e., the technical baseline) relevant to the technical topic being addressed in the Full Application. * Project Goal: The applicant should explicitly identify the targeted improvements to the baseline technology and the critical success factors in achieving that goal. * DOE Impact: The applicant should discuss the impact that DOE funding would have on the proposed project. Applicants should specifically explain how DOE funding, relative to prior, current, or anticipated funding from other public and private sources, is necessary to achieve the project objectives. |
| **Technical Description, Innovation, and Impact** (This section should constitute approximately 30% of the Technical Volume) | The Technical Description should contain the following information:   * Relevance and Outcomes: The applicant should provide a detailed description of the technology, including the scientific and other principles and objectives that will be pursued during the project. This section should describe the relevance of the proposed project to the goals and objectives of the FOA, including the potential to meet specific DOE technical targets or other relevant performance targets. The applicant should clearly specify the expected outcomes of the project. * Feasibility: The applicant should demonstrate the technical feasibility of the proposed technology and capability of achieving the anticipated performance targets, including a description of previous work done and prior results. * Innovation and Impacts: The applicant should describe the current state-of-the-art in the applicable field, the specific innovation of the proposed technology, the advantages of proposed technology over current and emerging technologies, and the overall impact on advancing the state-of-the-art/technical baseline if the project is successful. |
| **Workplan and Market Transformation Plan** (This section should constitute approximately 40% of the Technical Volume) | The Workplan should include a summary of the Project Objectives, Technical Scope, Work Breakdown Structure (WBS), Milestones, Go/No-Go Decision Points, and Project Schedule. A detailed SOPO is separately requested. The Workplan should contain the following information:   * Project Objectives: The applicant should provide a clear and concise (high-level) statement of the goals and objectives of the project as well as the expected outcomes. * Technical Scope Summary: The applicant should provide a summary description of the overall work scope and approach to achieve the objective(s). The overall work scope is to be divided by performance periods that are separated by discrete, approximately annual decision points (see below for more information on Go/No-Go decision points). The applicant should describe the specific expected end result of each performance period. * WBS and Task Description Summary: The Workplan should describe the work to be accomplished and how the applicant will achieve the milestones, will accomplish the final project goal(s), and will produce all deliverables. The Workplan is to be structured with a hierarchy of performance period (approximately annual), task and subtasks, which is typical of a standard WBS for any project. The Workplan shall contain a concise description of the specific activities to be conducted over the life of the project. The description shall be a full explanation and disclosure of the project being proposed (i.e., a statement such as “we will then complete a proprietary process” is unacceptable). It is the applicant’s responsibility to prepare an adequately detailed task plan to describe the proposed project and the plan for addressing the objectives of this FOA. The summary provided should be consistent with the SOPO. The SOPO will contain a more detailed description of the WBS and tasks. * Milestone Summary: The applicant should provide a summary of appropriate milestones throughout the project to demonstrate success. A milestone may be either a progress measure (which can be activity based) or a SMART technical milestone. SMART milestones should be **S**pecific, **M**easurable, **A**chievable, **R**elevant, and **T**imely, and must demonstrate a technical achievement rather than simply completing a task. Unless otherwise specified in the FOA, the minimum requirement is that each project must have at least one milestone per quarter for the duration of the project with at least one SMART technical milestone per year (depending on the project, more milestones may be necessary to comprehensively demonstrate progress). The applicant should also provide the means by which the milestone will be verified. The summary provided should be consistent with the Milestone Summary Table in the SOPO. * Go/No-Go Decision Points: The applicant should provide a summary of project-wide Go/No-Go decision points at appropriate points in the Workplan. A Go/No-Go decision point is a risk management tool and a project management best practice to ensure that, for the current phase or period of performance, technical success is definitively achieved and potential for success in future phases or periods of performance is evaluated, prior to actually beginning the execution of future phases. At a minimum, each project must have at least one project-wide Go/No-Go decision point for each budget period (12 to 18-month period) of the project. See Section VI.B.xiv. The applicant should also provide the specific technical criteria to be used to evaluate the project at the Go/No-Go decision point. The summary provided should be consistent with the SOPO. Go/No‐Go decision points are considered “SMART” and can fulfill the requirement for an annual SMART milestone. * End of Project Goal: The applicant should provide a summary of the end of project goal(s). At a minimum, each project must have one SMART end of project goal. The summary provided should be consistent with the SOPO. * Project Schedule (Gantt Chart or similar): The applicant should provide a schedule for the entire project, including task and subtask durations, milestones, and Go/No-Go decision points. * Project Management: The applicant should discuss the team’s proposed management plan, including the following:   + The overall approach to and organization for managing the work   + The roles of each project team member   + Any critical handoffs/interdependencies among project team members   + The technical and management aspects of the management plan, including systems and practices, such as financial and project management practices   + The approach to project risk management   + A description of how project changes will be handled   + If applicable, the approach to Quality Assurance/Control   + How communications will be maintained among project team members * Market Transformation Plan: The applicant should provide a market transformation plan, including the following:   + Identification of target market, competitors, and distribution channels for proposed technology along with known or perceived barriers to market penetration, including a mitigation plan   + Identification of a product development or service plan, commercialization timeline, financing, product marketing, legal/regulatory considerations including intellectual property, infrastructure requirements, data dissemination, U.S. Manufacturing Plan, and product distribution * A plan to distribute and license any software that will be developed under an award (e.g., open source, commercial licensing, or a combination), consistent with the goals of this FOA. |
| **Technical Qualifications and Resources** (Approximately 20% of the Technical Volume) | The Technical Qualifications and Resources should contain the following information:   * Describe the project team’s unique qualifications and expertise, including those of key subrecipients. * Describe the project team’s existing equipment and facilities that will facilitate the successful completion of the proposed project; include a justification of any new equipment or facilities requested as part of the project. * This section should also include relevant, previous work efforts, demonstrated innovations, and how these enable the applicant to achieve the project objectives. * Describe the time commitment of the key team members to support the project. * Describe the technical services to be provided by DOE/NNSA FFRDCs, if applicable. * For multi-organizational or multi-investigator projects, describe succinctly:   + The roles and the work to be performed by each PI and Key Participant   + Business agreements between the applicant and each PI and Key Participant   + How the various efforts will be integrated and managed   + Process for making decisions on scientific/technical direction   + Publication arrangements   + Intellectual Property issues   + Communication plans |
| **Topic Area-Specific Requirements** | **Include this in the Technical Qualifications and Resources section of the Technical Volume.**  Topic Area 1 Only: Describe the potential areas of engagement for technical collaboration anticipated with DOE/NOAA FFRDCs.  **Include this as an addendum to the Technical Volume. It does not count toward the 30 page limit.**  Topic Area 1 Only: Instrumentation and Observational Data Sources: The Applicant should provide a list of instruments and observational data sources to be used for the proposed project. The list should include:   * + Applicant-provided instrumentation, sensors or data sources in the proposed project region, including description of offshore platforms/buoys that could be deployed to support the project   + The Government-Furnished Equipment from the list in Table 1, along with a brief explanation (one to two sentences) for each instrument on how the instrument, if resources permit inclusion, would be used in the proposed project. Only instruments relevant to the proposed study need to be addressed.   + A brief description of how the overall suite of instruments or observational data sources will be used and contribute to the FOA objectives. |

1. Resumes

Applicants are required to submit one-page resumes for key participating team members. Multi-page resumes are not allowed. Save the resumes in a single PDF file using the following convention for the title “ControlNumber\_LeadOrganization\_Resumes”.

1. Letters of Commitment

Submit letters of commitment from all subrecipient and third party cost share providers. If applicable, also include any letters of commitment from partners/end users (1 page maximum per letter). Save the letters of commitment in a single PDF file using the following convention for the title “ControlNumber\_LeadOrganization\_LOCs”.

1. Statement of Project Objectives (SOPO)

Applicants are required to complete a SOPO. A SOPO template is available on EERE Exchange at <https://eere-Exchange.energy.gov/>. The SOPO, including the Milestone Table, must not exceed 15 pages when printed using standard 8.5 x 11 paper with 1” margins (top, bottom, left, and right) with font not smaller than 12 point. Save the SOPO in a single Microsoft Word file using the following convention for the title “ControlNumber\_LeadOrganization\_SOPO”.

1. SF-424: Application for Federal Assistance

Complete all required fields in accordance with the instructions on the form. The list of certifications and assurances in Field 21 can be found at <http://energy.gov/management/office-management/operational-management/financial-assistance/financial-assistance-forms>, under Certifications and Assurances. Note: The dates and dollar amounts on the SF-424 are for the complete project period and not just the first project year, first phase or other subset of the project period. Save the SF-424 in a single PDF file using the following convention for the title “ControlNumber\_LeadOrganization\_App424”.

1. Budget Justification Workbook

Applicants are required to complete the Budget Justification Workbook. This form is available on EERE Exchange at <https://eere-Exchange.energy.gov/>. Prime recipients must complete each tab of the Budget Justification Workbook for the project as a whole, including all work to be performed by the prime recipient and its subrecipients and contractors. Applicants should include costs associated with required annual audits and incurred cost proposals in their proposed budget documents. The “Instructions and Summary” included with the Budget Justification Workbook will auto-populate as the applicant enters information into the Workbook. Applicants must carefully read the “Instructions and Summary” tab provided within the Budget Justification Workbook. Save the Budget Justification Workbook in a single Microsoft Excel file using the following convention for the title “ControlNumber\_LeadOrganization\_Budget\_Justification”.

1. Summary/Abstract for Public Release

Applicants are required to submit a one-page summary/abstract of their project. The project summary/abstract must contain a summary of the proposed activity suitable for dissemination to the public. It should be a self-contained document that identifies the name of the applicant, the project director/principal investigator(s), the project title, the objectives of the project, a description of the project, including methods to be employed, the potential impact of the project (e.g., benefits, outcomes), and major participants (for collaborative projects). This document must not include any proprietary or sensitive business information as DOE may make it available to the public after selections are made. The project summary must not exceed 1 page when printed using standard 8.5 x 11 paper with 1” margins (top, bottom, left, and right) with font not smaller than 12 point. Save the Summary for Public Release in a single PDF file using the following convention for the title “ControlNumber\_LeadOrganization\_Summary”.

1. Summary Slide

Applicants are required to provide a single PowerPoint slide summarizing the proposed project. The slide must be submitted in Microsoft PowerPoint format. This slide is used during the evaluation process. Save the Summary Slide in a single file using the following convention for the title “ControlNumber\_LeadOrganization\_Slide”.

The Summary Slide template requires the following information:

* A technology summary;
* A description of the technology’s impact;
* Proposed project goals;
* Any key graphics (illustrations, charts or tables);
* The project’s key idea/takeaway;
* Project title, prime recipient, Principal Investigator, and Key Participant information; and
* Requested EERE funds and proposed applicant cost share.

1. Subrecipient Budget Justification (if applicable)

Applicants must provide a separate budget justification for each subrecipient that is expected to perform work estimated to be more than $250,000 or 25 percent of the total work effort (whichever is less). The budget justification must include the same justification information described in the “Budget Justification” section above. Save each subrecipient budget justification in a Microsoft Excel file using the following convention for the title “ControlNumber\_LeadOrganization\_Subrecipient\_Budget\_Justification”.

1. **Budget for DOE/NNSA FFRDC - Topic Area 2 Only (if applicable)**

If a DOE/NNSA FFRDC contractor is to perform a portion of the work, the applicant must provide a DOE WP in accordance with the requirements in DOE Order 412.1A, Work Authorization System, Attachment 3, available at: <https://www.directives.doe.gov/directives-documents/400-series/0412.1-BOrder-a/@@images/file>. Save the WP in a single PDF file using the following convention for the title “ControlNumber\_LeadOrganization\_WP”.

1. **Authorization for non-DOE/NNSA - Topic Area 1 & 2 or DOE/NNSA FFRDCs - Topic Area 2 Only (if applicable)**

The federal agency sponsoring the FFRDC must authorize in writing the use of the FFRDC on the proposed project and this authorization must be submitted with the application. The use of a FFRDC must be consistent with the contractor’s authority under its award. Save the Authorization in a single PDF file using the following convention for the title “ControlNumber\_LeadOrganization\_FFRDCAuth”.

1. SF-LLL: Disclosure of Lobbying Activities (required)

Prime recipients and subrecipients may not use any federal funds to influence or attempt to influence, directly or indirectly, congressional action on any legislative or appropriation matters.

Prime recipients and subrecipients are required to complete and submit SF-LLL, “Disclosure of Lobbying Activities” (<https://www.grants.gov/web/grants/forms/sf-424-individual-family.html>) to ensure that non-federal funds have not been paid and will not be paid to any person for influencing or attempting to influence any of the following in connection with the application:

* An officer or employee of any federal agency;
* A Member of Congress;
* An officer or employee of Congress; or
* An employee of a Member of Congress.

Save the SF-LLL in a single PDF file using the following convention for the title “ControlNumber\_LeadOrganization\_SF-LLL”.

1. Waiver Requests: Foreign Entities and Foreign Work (if applicable)
   * + 1. Foreign Entity Participation:

As set forth in Section III.A.iii., all prime recipients receiving funding under this FOA must be incorporated (or otherwise formed) under the laws of a state or territory of the United States. To request a waiver of this requirement, the applicant must submit an explicit waiver request in the Full Application. Appendix C lists the necessary information that must be included in a request to waive this requirement.

* + - 1. Performance of Work in the United States (Foreign Work Waiver)

As set forth in Section IV.J.iii., all work under EERE funding agreements must be performed in the United States. This requirement does not apply to the purchase of supplies and equipment, so a waiver is not required for foreign purchases of these items. However, the prime recipient should make every effort to purchase supplies and equipment within the United States. Appendix C lists the necessary information that must be included in a foreign work waiver request.

Save the Waivers in a single PDF file using the following convention for the title “ControlNumber\_LeadOrganization\_Waiver”.

1. Data Management Plan (DMP)

Applicants are required to submit a DMP with their Full Applications. See Appendix D for details.

Save the DMP in a single Microsoft Word file using the following convention for the title “ControlNumber\_LeadOrganization\_DMP”.

1. U.S. Manufacturing Commitments

**Topic Area 1:**

EERE requires subject inventions (i.e., inventions conceived or first actually reduced to practice under EERE awards) to be substantially manufactured in the United States by Project Teams and their licensees, as described below. The applicant may request a modification or waiver of the U.S. Manufacturing Requirement.

1. **Domestic Small Businesses, Educational Institutions and Nonprofits**

Domestic Small businesses (including Small Business concerns), domestic educational institutions, and nonprofits that are recipients or subrecipients under EERE funding agreements must require their exclusive licensees to substantially manufacture the following products in the United States for any use or sale in the United States: (1) articles embodying subject inventions, and (2) articles produced through the use of subject inventions. This requirement does not apply to articles that are manufactured for use or sale overseas.

Domestic small businesses, domestic educational institutions and nonprofits must require their assignees to apply the same U.S. Manufacturing requirements to their exclusive licensees.

These U.S. Manufacturing requirements do not apply to nonexclusive licensees.

1. **Large Businesses, Foreign Entities, and State and Local Government Entities**

Large businesses and foreign entities that are recipients or subrecipients under EERE funding agreements that take title to subject inventions through a patent waiver are required to substantially manufacture the following products in the United States: (1) products embodying subject inventions, and (2) products produced through the use of subject invention(s). This requirement applies to products that are manufactured for use or sale in the United States or overseas.

Large businesses and foreign entities must apply the same U.S. Manufacturing requirements to their assignees, licensees, and entities acquiring a controlling interest in the large business or foreign entity. Large businesses and foreign entities must require their assignees and entities acquiring a controlling interest in the large business or foreign entity to apply the same U.S. Manufacturing requirements to their licensees.

1. **FFRDCs**

DOE FFRDCs are subject to the U.S. Manufacturing requirements set forth in their M&O Contracts. All other FFRDCs are subject to the U.S. Manufacturing requirements as set forth above, based on their size and for-profit status.

**Topic Area 2:**

Pursuant to the DOE Determination of Exceptional Circumstances (DEC) dated September 9, 2013, each applicant is required to submit a U.S. Manufacturing Plan as part of its application. The U.S. Manufacturing Plan represents the applicant's measurable commitment to support U.S. manufacturing as a result of its award.

Each U.S. Manufacturing Plan must include a commitment that any products embodying any subject invention or produced through the use of any subject invention will be manufactured substantially in the United States, unless the applicant can show to the satisfaction of DOE that it is not commercially feasible to do so (referred to hereinafter as “the U.S. Competitiveness Provision”). The applicant further agrees to make the U.S. Competitiveness Provision binding on any subawardee and any assignee or licensee or any entity otherwise acquiring rights to any subject invention, including subsequent assignees or licensees. A subject invention is any invention conceived of or first actually reduced to practice under an award.

Due to the lower technology readiness levels of this FOA, DOE does not expect the U.S. Manufacturing Plans to be tied to a specific product or technology. However, in lieu of the U.S. Competitiveness Provision, an applicant may propose a U.S. Manufacturing Plan with more specific commitments that would be beneficial to the U.S. economy and competitiveness. For example, an applicant may commit specific products to be manufactured in the U.S., commit to a specific investment in a new or existing U.S. manufacturing facility, keep certain activities based in the U.S. or support a certain number of jobs in the U.S. related to the technology. An applicant which is likely to license the technology to others, especially universities for which licensing may be the exclusive means of commercialization the technology, the U.S. Manufacturing Plan may indicate the applicant's plan and commitment to use a specific licensing strategy that would likely support U.S. manufacturing.

If DOE determines, at its sole discretion, that the more specific commitments would provide a sufficient benefit to the U.S. economy and industrial competitiveness, the specific commitments will be part of the terms and conditions of the award. For all other awards, the U.S. Competitiveness Provision shall be incorporated as part of the terms and conditions of the award as the U.S. Manufacturing Plan for that award.

The U.S. Competitiveness Provision is also a requirement for the Class Patent Waiver that applies to domestic large business under this FOA (see Section VIII.K. Title to Subject Inventions).

Save the U.S. Manufacturing Plan in a single PDF file using the following convention for the title “ControlNumber\_LeadOrganization\_USMP”.

* 1. Content and Form of Replies to Reviewer Comments

EERE will provide applicants with reviewer comments following the evaluation of all eligible Full Applications. Applicants will have a brief opportunity to review the comments and to prepare a short Reply to Reviewer Comments responding to the comments however they desire or supplementing their Full Application. The Reply to Reviewer Comments is an optional submission; applicants are not required to submit a Reply to Reviewer Comments. EERE will post the Reviewer Comments in EERE Exchange. The expected submission deadline is on the cover page of the FOA; however, it is the applicant’s responsibility to monitor EERE Exchange in the event that the expected date changes. The deadline will not be extended for applicants who are unable to timely submit their reply due to failure to check EERE Exchange or relying on the expected date alone. Applicants should anticipate having approximately three (3) business days to submit Replies to Reviewer Comments.

EERE will not review or consider ineligible Replies to Reviewer Comments (see Section III. of the FOA). EERE will review and consider each eligible Full Application, even if no Reply is submitted or if the Reply is found to be ineligible.

Replies to Reviewer Comments must conform to the following content and form requirements, including maximum page lengths, described below. If a Reply to Reviewer Comments is more than three (3) pages in length, EERE will review only the first three (3) pages and disregard any additional pages.

|  |  |  |
| --- | --- | --- |
| **SECTION** | **PAGE LIMIT** | **DESCRIPTION** |
| **Text** | 2 pages max | Applicants may respond to one or more reviewer comments or supplement their Full Application. |
| **Optional** | 1 page max | Applicants may use this page however they wish; text, graphs, charts, or other data to respond to reviewer comments or supplement their Full Application are acceptable. |

* 1. Post Selection Information Requests

If selected for award, EERE reserves the right to request additional or clarifying information regarding the following (non-exhaustive list):

* Indirect cost information;
* Other budget information;
* Commitment Letters from Third Parties Contributing to Cost Share, if applicable;
* Name and phone number of the Designated Responsible Employee for complying with national policies prohibiting discrimination (See 10 CFR 1040.5);
* Representation of Limited Rights Data and Restricted Software, if applicable; and
* Environmental Questionnaire.
  1. Dun and Bradstreet Universal Numbering System (DUNS) Number and System for Award Management (SAM)

Each applicant (unless the applicant is an individual or federal awarding agency that is excepted from those requirements under 2 CFR §25.110(b) or (c), or has an exception approved by the federal awarding agency under 2 CFR §25.110(d)) is required to: (1) Be registered in the SAM at <https://www.sam.gov/SAM/> before submitting its application; (2) provide a valid DUNS number in its application; and (3) continue to maintain an active SAM registration with current information at all times during which it has an active federal award or an application or plan under consideration by a federal awarding agency. DOE may not make a federal award to an applicant until the applicant has complied with all applicable DUNS and SAM requirements and, if an applicant has not fully complied with the requirements by the time DOE is ready to make a federal award, the DOE will determine that the applicant is not qualified to receive a federal award and use that determination as a basis for making a federal award to another applicant.

* 1. Submission Dates and Times

Concept Papers, Full Applications, and Replies to Reviewer Comments must be submitted in EERE Exchange no later than 5 p.m. Eastern Time on the dates provided on the cover page of this FOA.

* 1. Intergovernmental Review

This FOA is not subject to Executive Order 12372 – Intergovernmental Review of Federal Programs.

* 1. Funding Restrictions

1. Allowable Costs

All expenditures must be allowable, allocable, and reasonable in accordance with the applicable federal cost principles.

Refer to the following applicable federal cost principles for more information:

* Federal Acquisition Regulation (FAR) Part 31 for For-Profit entities; and
* 2 CFR Part 200 Subpart E - Cost Principles for all other non-federal entities.

1. Pre-Award Costs

Selectees must request prior written approval to charge pre-award costs. Pre-award costs are those incurred prior to the effective date of the federal award directly pursuant to the negotiation and in anticipation of the federal award where such costs are necessary for efficient and timely performance of the scope of work. Such costs are allowable only to the extent that they would have been allowable if incurred after the date of the federal award and **only** with the written approval of the federal awarding agency, through the Contracting Officer assigned to the award.

Pre-award costs cannot be incurred prior to the Selection Official signing the Selection Statement and Analysis.

Pre-award expenditures are made at the selectee’s risk. EERE is not obligated to reimburse costs: (1) in the absence of appropriations; (2) if an award is not made; or (3) if an award is made for a lesser amount than the selectee anticipated.

* + - 1. National Environmental Policy Act (NEPA) Requirements Related to Pre-Award Costs

EERE’s decision whether and how to distribute federal funds under this FOA is subject to NEPA. Applicants should carefully consider and should seek legal counsel or other expert advice before taking any action related to the proposed project that would have an adverse effect on the environment or limit the choice of reasonable alternatives prior to EERE completing the NEPA review process.

EERE does not guarantee or assume any obligation to reimburse pre-award costs incurred prior to receiving written authorization from the Contracting Officer. If the applicant elects to undertake activities that DOE determines may have an adverse effect on the environment or limit the choice of reasonable alternatives prior to receiving such written authorization from the Contracting Officer, the applicant is doing so at risk of not receiving federal funding for their project and such costs may not be recognized as allowable cost share. Nothing contained in the pre-award cost reimbursement regulations or any pre-award costs approval letter from the Contracting Officer override these NEPA requirements to obtain the written authorization from the Contracting Officer prior to taking any action that may have an adverse effect on the environment or limit the choice of reasonable alternatives. Likewise, if an application is selected for negotiation of award, and the prime recipient elects to undertake activities that are not authorized for federal funding by the Contracting Officer in advance of EERE completing a NEPA review, the prime recipient is doing so at risk of not receiving federal funding and such costs may not be recognized as allowable cost share.

1. Performance of Work in the United States (Foreign Work Waiver)
2. Requirement

All work performed under EERE awards must be performed in the United States. This requirement does not apply to the purchase of supplies and equipment; however, the prime recipient should make every effort to purchase supplies and equipment within the United States. The prime recipient must flow down this requirement to its subrecipients.

1. Failure to Comply

If the prime recipient fails to comply with the Performance of Work in the United States requirement, EERE may deny reimbursement for the work conducted outside the United States and such costs may not be recognized as allowable recipient cost share. The prime recipient is responsible should any work under this award be performed outside the United States, absent a waiver, regardless of whether the work is performed by the prime recipient, subrecipients, contractors or other project partners.

1. Waiver

There may be limited circumstances where it is in the interest of the project to perform a portion of the work outside the United States. To seek a foreign work waiver, the applicant must submit a written waiver request to EERE. Appendix C lists the necessary information that must be included in a request for a foreign work waiver.

The applicant must demonstrate to the satisfaction of EERE that a waiver would further the purposes of the FOA and is in the economic interests of the United States. EERE may require additional information before considering a waiver request. Save the waiver request(s) in a single PDF file titled “ControlNumber\_LeadOrganization\_Waiver”. The applicant does not have the right to appeal EERE’s decision concerning a waiver request.

1. Construction

Recipients are required to obtain written authorization from the Contracting Officer before incurring any major construction costs.

1. Foreign Travel

If international travel is proposed for your project, please note that your organization must comply with the International Air Transportation Fair Competitive Practices Act of 1974 (49 USC 40118), commonly referred to as the “Fly America Act,” and implementing regulations at 41 CFR 301-10.131 through 301-10.143. The law and regulations require air transport of people or property to, from, between, or within a country other than the United States, the cost of which is supported under this award, to be performed by or under a cost-sharing arrangement with a U.S. flag carrier, if service is available. Foreign travel costs are allowable only with the written prior approval of the Contracting Officer assigned to the award.

1. Equipment and Supplies

To the greatest extent practicable, all equipment and products purchased with funds made available under this FOA should be American-made. This requirement does not apply to used or leased equipment.

Property disposition will be required at the end of a project if the current fair market value of property exceeds $5,000. For-profit entity disposition requirements are set forth at 2 CFR 910.360. Property disposition requirements for other non-federal entities are set forth in 2 CFR 200.310 – 200.316.

1. Domestic Preference – Infrastructure Projects

As appropriate and to the extent consistent with law, Applicants shall ensure that, to the greatest extent practicable, iron and aluminum as well as steel, cement, and other manufactured products (items and construction materials composed in whole or in part of non-ferrous metals such as aluminum; plastics and polymer-based products such as polyvinyl chloride pipe; aggregates such as concrete; glass, including optical fiber; and lumber) used in the proposed project shall be produced in the United States. This requirement shall flow down to all sub-awards including all contracts, subcontracts and purchase orders for work performed under the proposed project.

1. Lobbying

Recipients and subrecipients may not use any federal funds to influence or attempt to influence, directly or indirectly, congressional action on any legislative or appropriation matters.

Recipients and subrecipients are required to complete and submit SF-LLL, “Disclosure of Lobbying Activities” (<https://www.grants.gov/web/grants/forms/sf-424-individual-family.html>) to ensure that non-federal funds have not been paid and will not be paid to any person for influencing or attempting to influence any of the following in connection with the application:

* An officer or employee of any federal agency;
* A Member of Congress;
* An officer or employee of Congress; or
* An employee of a Member of Congress.

1. Risk Assessment

Prior to making a federal award, the DOE is required by 31 U.S.C. 3321 and 41 U.S.C. 2313 to review information available through any Office of Management and Budget (OMB)-designated repositories of government-wide eligibility qualification or financial integrity information, such as SAM Exclusions and “Do Not Pay.”

In addition, DOE evaluates the risk(s) posed by applicants before they receive federal awards. This evaluation may consider: results of the evaluation of the applicant's eligibility; the quality of the application; financial stability; quality of management systems and ability to meet the management standards prescribed in this part; history of performance; reports and findings from audits; and the applicant's ability to effectively implement statutory, regulatory, or other requirements imposed on non-federal entities.

In addition to this review, DOE must comply with the guidelines on government-wide suspension and debarment in 2 CFR 180, and must require non-federal entities to comply with these provisions. These provisions restrict federal awards, subawards and contracts with certain parties that are debarred, suspended or otherwise excluded from or ineligible for participation in federal programs or activities.

1. Invoice Review and Approval

DOE employs a risk-based approach to determine the level of supporting documentation required for approving invoice payments. Recipients may be required to provide some or all of the following items with their requests for reimbursement:

* Summary of costs by cost categories;
* Timesheets or personnel hours report;
* Invoices/receipts for all travel, equipment, supplies, contractual, and other costs;
* UCC filing proof for equipment acquired with project funds by for-profit recipients and subrecipients;
* Explanation of cost share for invoicing period;
* Analogous information for some subrecipients; and
* Other items as required by DOE.

1. Application Review Information
   1. Technical Review Criteria
2. Concept Papers

Concept Papers are evaluated based on consideration of the following factors. All sub-criteria are of equal weight.

**Concept Paper Criterion: Overall FOA Responsiveness and Viability of the Project (Weight: 100%)**

This criterion involves consideration of the following sub-criteria:

* The applicant clearly describes the proposed technology, describes how the technology is unique and innovative, and how the technology will advance the current state-of-the-art;
* The applicant has identified risks and challenges, including possible mitigation strategies, and has shown the impact that EERE funding and the proposed project would have on the relevant field and application;
* The applicant has the qualifications, experience, capabilities and other resources necessary to complete the proposed project; and
* The proposed work, if successfully accomplished, would clearly meet the objectives as stated in the FOA.

1. Full Applications

Applications will be evaluated against the merit review criteria shown below. Each topic area has specifically tailored sub-criteria. All sub-criteria are of equal weight.

**Topic Area 1: Offshore Wind Resource Measurement and Modeling Science**

**Criterion 1: Technical Merit, Innovation, and Impact (30%)**

This criterion involves consideration of the following sub-criteria:

Technical Merit and Innovation

* Degree to which the proposal identifies the offshore wind industry’s challenges with respect to wind resource characterization, NWP modeling capabilities, and atmospheric and oceanographic loads for offshore wind in the U.S.;
* Extent to which the proposed project supports the objectives of this FOA and has the potential to advance the state-of-the-art of offshore wind forecasting and resource assessment;
* Degree to which the proposal describes understanding of NOAA’s Numerical Weather Prediction (NWP) models and Weather Research and Forecasting (WRF) models used for wind forecasting and system operations;
* Degree to which the proposal demonstrates the ability to improve wind forecasts for utility system operation;
* Degree to which the proposal describes a field experiment design and instrumentation deployment strategy to improve upon these models and understanding of the physical processes in the offshore region;
* Degree to which the proposal demonstrates technical knowledge of atmospheric data collection;
* Degree to which the proposed project plan is logical and well written;
* Degree to which the proposal describes procedures for public dissemination of intended or unintended discoveries as part of the application;
* Degree to which the proposed test region is in proximity to offshore wind development, and suitability of that region to accommodate a network of meteorological sensors and equipment to achieve the stated FOA objectives;
* Degree to which the proposal incorporates sound validation techniques and methodologies for model improvements; and
* Overall approach to obtaining the permits and approvals required to complete the field campaign.

Impact of Technology Advancement

* How the project supports the topic area objectives and target specifications and metrics; and
* The potential impact of the project on advancing the state-of-the-art.

**Criterion 2: Project Management (30%)**

This criterion involves consideration of the following factors:

* Degree to which the approach and critical path have been clearly described and thoughtfully considered;
* Degree to which the task descriptions are clear, detailed, timely, and reasonable, resulting in a high likelihood that the proposed work plan will succeed in improving offshore wind forecasts in the time frames described in this FOA;
* The level of clarity and input from the offshore wind industry in the determination of challenges and definition of project baseline improvements, metrics and project milestones;
* The quality of the plan to lead and organize a large team with a complex scope;
* Relative to a clearly defined experimental baseline, the strength of the quantifiable metrics, milestones, and mid-point deliverables, such that meaningful progress will be made;
* Degree to which the proposal describes the steps necessary to formally develop new WRF-based physical packages for public use;
* Degree to which the proposal describes appropriate distribution channels and procedures to ensure information dissemination amongst stakeholders;
* Quality and comprehensiveness of the Data Management Plan;
* The extent to which the proposal demonstrates an understanding of the key risk areas involved in the proposed work and the quality of the mitigation strategies to address them; and
* The level of knowledge and understanding of NEPA and permitting requirements to execute a successful field campaign.

**Criterion 3: Team and Resources (40%)**

This criterion involves consideration of the following factors:

* The capability of the Principal Investigator(s) and the proposed team to address all aspects of the proposal as well as qualifications (including experience with project management and coordination of large, complex projects, marine deployments, instrumentation and data collection, and weather forecasting/modeling), relevant expertise, and time commitment of the individuals on the team;
* The sufficiency of the proposed resources to support the work and identification/commitment of those resources including:
  + computational resources, time, and personnel;
  + observational data sources, sensors and instruments beyond the identified GFE, for field deployment and model improvement/development; and
  + other necessary field instrumentation such as data acquisition systems, communication and data transmission equipment.
* Level of participation by project participants as evidenced by letter(s) of commitment and how well they are integrated into the work plan, as well as their ability to work collaboratively to deploy observational equipment, establish data interfaces with project partners, monitor and maintain data integrity throughout the duration of the project , and share data and information relevant for the project’s success;
* Reasonableness of budget and spending plan for proposed project and objectives; and
* Team knowledge and experience with permitting marine projects in state and federal waters.

**Topic Area 2: Project Development for Offshore Wind Technology**

**Criterion 1: Technical Merit, Innovation, and Impact (30%)**

This criterion involves consideration of the following sub-criteria:

Technical Merit and Innovation

* The extent to which the proposed technology or process demonstrates full-scale, innovative offshore wind technology or methodology that can be used in future commercial offshore wind farm deployments;
* The degree to which documented progress has already been made in applicable siting, permitting, approval processes, environmental compliance, grid connection and public acceptance, including evidence that the responsible Federal, State, and local Authorities Having Jurisdiction (AHJs) are aware of the project and are in the process of evaluating any other necessary authorizations;
* The degree to which a site has been secured, permitting and site assessments are underway or complete, and construction engineering and hardware selection are underway, including documentation clearly identifying permission to conduct validation testing from the site or lease holder;
* Degree to which the current state of the technology is described and the degree of innovation for the proposed approach, and that the proposed concept offers advantages over other solutions or approaches from a cost of energy or overall risk reduction perspective; and
* The adequacy of the proposed testing, data collection and performance validation plan of the project innovation(s).

**Criterion 2: Project Research and Market Transformation Plan (30%)**

This criterion involves consideration of the following factors:

* Likelihood that proposed project will lead to a validation of the technology or methodology and eventual U.S. commercialization of the proposed innovative solutions;
* Extent to which a detailed cost of energy (LCOE) analysis, including all assumptions, calculations, and sources used to calculate the impact of the proposed design on LCOE, is presented for the proposed project with rigor, clarity, transparency and completeness;
* Likelihood that the proposed technology or method will improve the deployment or operation of wind plants, e.g. improve speed of installation, minimize stakeholder and or environmental impact, or improve overall plant performance;
* Discussion and demonstrated understanding of the key technical risk areas involved in the proposed work and the quality of the mitigation strategies to address them;
* Degree to which the task descriptions are clear, detailed, timely, and reasonable, resulting in a high likelihood that the proposed Work plan and SOPO will succeed in meeting the project goals; and
* Quality and comprehensiveness of the Data Management Plan.

**Criterion 3: Team and Resources (40%)**

This criterion involves consideration of the following factors:

Project Team:

* The degree to which applicant shows evidence of prior experience in offshore wind project development;
* The adequacy of the education, professional training, technical skills, and work experience of the Principal Investigator (PI) and other key personnel, including personnel from team member organizations; and
* The level and reasonableness of the time commitment of the PI and other key personnel, including personnel from team member organizations.

Work Plan:

* The clarity and adequacy of project deliverables including:
  + The specific end result; and
  + The proposed methods for publicly disseminating project-generated information, including but not limited to the final report, to the domestic offshore wind industry and to related stakeholder sectors.

1. Criteria for Replies to Reviewer Comments

EERE has not established separate criteria to evaluate Replies to Reviewer Comments. Instead, Replies to Reviewer Comments are attached to the original applications and evaluated as an extension of the Full Application.

* 1. Standards for Application Evaluation

Applications that are determined to be eligible will be evaluated in accordance with this FOA, by the standards set forth in EERE’s Notice of Objective Merit Review Procedure (76 Fed. Reg. 17846, March 31, 2011) and the guidance provided in the “DOE Merit Review Guide for Financial Assistance,” effective April 14, 2017, which is available at: <https://energy.gov/management/downloads/merit-review-guide-financial-assistance-and-unsolicited-proposals-current>.

* 1. Other Selection Factors

1. Program Policy Factors

In addition to the above criteria, the Selection Official may consider the following program policy factors in determining which Full Applications to select for award negotiations:

* The degree to which the proposed project exhibits technological diversity when compared to the existing DOE project portfolio and other projects selected from the subject FOA;
* The degree to which the proposed project optimizes the use of available EERE funding to achieve programmatic objectives;
* The level of industry involvement and demonstrated ability to accelerate commercialization and overcome key market barriers;
* The degree to which the proposed project is likely to lead to increased employment and manufacturing in the United States;
* The degree to which the proposed project will accelerate transformational technological advances in areas that industry by itself is not likely to undertake because of technical and financial uncertainty; and
* The degree to which the proposed project, or group of projects, represent a desired geographic distribution (considering past awards and current applications).
* Whether the proposed project will occur in a Qualified Opportunity Zone or otherwise advance the goals of Qualified Opportunity Zones[[1]](#footnote-2). The goals include spurring economic development and job creation in distressed communities throughout the United States.
* The degree to which the proposed project avoids duplication/overlap with other publicly or privately funded work.
* The degree to which the project promotes increased coordination with nongovernmental entities for demonstration of technologies and research applications to facilitate technology transfer.
  1. Evaluation and Selection Process

1. Overview

The evaluation process consists of multiple phases; each includes an initial eligibility review and a thorough technical review. Rigorous technical reviews of eligible submissions are conducted by reviewers that are experts in the subject matter of the FOA. Ultimately, the Selection Official considers the recommendations of the reviewers, along with other considerations such as program policy factors, in determining which applications to select.

1. Pre-Selection Interviews

As part of the evaluation and selection process, EERE may invite one or more applicants to participate in Pre-Selection Interviews. Pre-Selection Interviews are distinct from and more formal than pre-selection clarifications (See Section V.D.iii of the FOA). The invited applicant(s) will meet with EERE representatives to provide clarification on the contents of the Full Applications and to provide EERE an opportunity to ask questions regarding the proposed project. The information provided by applicants to EERE through Pre-Selection Interviews contributes to EERE’s selection decisions.

EERE will arrange to meet with the invited applicants in person at EERE’s offices or a mutually agreed upon location. EERE may also arrange site visits at certain applicants’ facilities. In the alternative, EERE may invite certain applicants to participate in a one-on-one conference with EERE via webinar, videoconference, or conference call.

EERE will not reimburse applicants for travel and other expenses relating to the Pre-Selection Interviews, nor will these costs be eligible for reimbursement as pre-award costs.

EERE may obtain additional information through Pre-Selection Interviews that will be used to make a final selection determination. EERE may select applications for funding and make awards without Pre-Selection Interviews. Participation in Pre-Selection Interviews with EERE does not signify that applicants have been selected for award negotiations.

1. Pre-Selection Clarification

EERE may determine that pre-selection clarifications are necessary from one or more applicants. Pre-selection clarifications are distinct from and less formal than Pre-Selection Interviews. These pre-selection clarifications will solely be for the purposes of clarifying the application, and will be limited to information already provided in the application documentation. The pre-selection clarifications may occur before, during or after the merit review evaluation process. Information provided by an applicant that is not necessary to address the pre-selection clarification question will not be reviewed or considered. Typically, a pre-selection clarification will be carried out through either written responses to EERE’s written clarification questions or video or conference calls with EERE representatives.

The information provided by applicants to EERE through pre-selection clarifications is incorporated in their applications and contributes to the merit review evaluation and EERE’s selection decisions. If EERE contacts an applicant for pre-selection clarification purposes, it does not signify that the applicant has been selected for negotiation of award or that the applicant is among the top ranked applications.

EERE will not reimburse applicants for expenses relating to the pre-selection clarifications, nor will these costs be eligible for reimbursement as pre-award costs.

1. Recipient Integrity and Performance Matters

DOE, prior to making a federal award with a total amount of federal share greater than the simplified acquisition threshold, is required to review and consider any information about the applicant that is in the designated integrity and performance system accessible through SAM (currently FAPIIS) (see 41 U.S.C. 2313).

The applicant, at its option, may review information in the designated integrity and performance systems accessible through SAM and comment on any information about itself that a federal awarding agency previously entered and is currently in the designated integrity and performance system accessible through SAM.

DOE will consider any written comments by the applicant, in addition to the other information in the designated integrity and performance system, in making a judgment about the applicant's integrity, business ethics, and record of performance under federal awards when completing the review of risk posed by applicants as described in 2 C.F.R. § 200.205.

1. Selection

The Selection Official may consider the technical merit, the Federal Consensus Board’s recommendations, program policy factors, and the amount of funds available in arriving at selections for this FOA.

* 1. Anticipated Notice of Selection and Award Negotiation Dates

EERE anticipates notifying applicants selected for negotiation of award and negotiating awards by the dates provided on the cover page of this FOA.

1. Award Administration Information
   1. Award Notices
2. Ineligible Submissions

Ineligible Concept Papers and Full Applications will not be further reviewed or considered for award. The Contracting Officer will send a notification letter by email to the technical and administrative points of contact designated by the applicant in EERE Exchange. The notification letter will state the basis upon which the Concept Paper or the Full Application is ineligible and not considered for further review.

1. Concept Paper Notifications

EERE will notify applicants of its determination to encourage or discourage the submission of a Full Application. EERE will post these notifications to EERE Exchange.

Applicants may submit a Full Application even if they receive a notification discouraging them from doing so. By discouraging the submission of a Full Application, EERE intends to convey its lack of programmatic interest in the proposed project. Such assessments do not necessarily reflect judgments on the merits of the proposed project. The purpose of the Concept Paper phase is to save applicants the considerable time and expense of preparing a Full Application that is unlikely to be selected for award negotiations.

A notification encouraging the submission of a Full Application does not authorize the applicant to commence performance of the project. Please refer to Section IV.I.ii. of the FOA for guidance on pre-award costs.

1. Full Application Notifications

EERE will notify applicants of its determination via a notification letter by email to the technical and administrative points of contact designated by the applicant in EERE Exchange. The notification letter will inform the applicant whether or not its Full Application was selected for award negotiations. Alternatively, EERE may notify one or more applicants that a final selection determination on particular Full Applications will be made at a later date, subject to the availability of funds or other factors.

1. Successful Applicants

Receipt of a notification letter selecting a Full Application for award negotiations does not authorize the applicant to commence performance of the project. If an application is selected for award negotiations, it is not a commitment by EERE to issue an award. Applicants do not receive an award until award negotiations are complete and the Contracting Officer executes the funding agreement, accessible by the prime recipient in FedConnect.

The award negotiation process will take approximately 60 days. Applicants must designate a primary and a backup point-of-contact in EERE Exchange with whom EERE will communicate to conduct award negotiations. The applicant must be responsive during award negotiations (i.e., provide requested documentation) and meet the negotiation deadlines. If the applicant fails to do so or if award negotiations are otherwise unsuccessful, EERE will cancel the award negotiations and rescind the Selection. EERE reserves the right to terminate award negotiations at any time for any reason.

Please refer to Section IV.I.ii. of the FOA for guidance on pre-award costs.

1. Alternate Selection Determinations

In some instances, an applicant may receive a notification that its application was not selected for award and EERE designated the application to be an alternate. As an alternate, EERE may consider the Full Application for federal funding in the future. A notification letter stating the Full Application is designated as an alternate does not authorize the applicant to commence performance of the project. EERE may ultimately determine to select or not select the Full Application for award negotiations.

1. Unsuccessful Applicants

EERE shall promptly notify in writing each applicant whose application has not been selected for award or whose application cannot be funded because of the unavailability of appropriated funds.

* 1. Administrative and National Policy Requirements

1. Registration Requirements

There are several one-time actions before submitting an application in response to this FOA, and it is vital that applicants address these items as soon as possible. Some may take several weeks, and failure to complete them could interfere with an applicant’s ability to apply to this FOA, or to meet the negotiation deadlines and receive an award if the application is selected. These requirements are as follows:

* + - 1. EERE Exchange

Register and create an account on EERE Exchange at <https://eere-Exchange.energy.gov>.

This account will then allow the user to register for any open EERE FOAs that are currently in EERE Exchange. It is recommended that each organization or business unit, whether acting as a team or a single entity, use only one account as the contact point for each submission. Applicants should also designate backup points of contact so they may be easily contacted if deemed necessary. **This step is required to apply to this FOA.**

The EERE Exchange registration does not have a delay; however, **the remaining registration requirements below could take several weeks to process and are necessary for a potential applicant to receive an award under this FOA**.

* + - 1. DUNS Number

Obtain a DUNS number (including the plus 4 extension, if applicable) at <http://fedgov.dnb.com/webform>.

* + - 1. System for Award Management

Register with the SAM at <https://www.sam.gov/SAM/>. Designating an Electronic Business Point of Contact (EBiz POC) and obtaining a special password called a Marketing Partner ID Number (MPIN) are important steps in SAM registration. Please update your SAM registration annually.

* + - 1. FedConnect

Register in FedConnect at <https://www.fedconnect.net>. To create an organization account, your organization’s SAM MPIN is required. For more information about the SAM MPIN or other registration requirements, review the FedConnect Ready, Set, Go! Guide at <https://www.fedconnect.net/FedConnect/Marketing/Documents/FedConnect_Ready_Set_Go.pdf>.

* + - 1. Grants.gov

Register in Grants.gov (<http://www.grants.gov>) to receive automatic updates when Amendments to this FOA are posted. However, please note that Concept Papers and Full Applications will not be accepted through Grants.gov.

* + - 1. Electronic Authorization of Applications and Award Documents

Submission of an application and supplemental information under this FOA through electronic systems used by the DOE, including EERE Exchange and FedConnect.net, constitutes the authorized representative’s approval and electronic signature.

1. Award Administrative Requirements

The administrative requirements for DOE grants and cooperative agreements are contained in 2 CFR Part 200 as amended by 2 CFR Part 910.

1. Foreign National Access Under DOE Order 142.3A, “Unclassified Foreign Visits and Assignments Program”

All applicants selected for an award under this FOA may be required to provide information to DOE in order to satisfy requirements for foreign nationals’ access to DOE sites, information, technologies, equipment, programs or personnel. A foreign national is defined as any person who is not a U.S. citizen by birth or naturalization. If a selected applicant (including any of its subrecipients, contractors or vendors) anticipates involving foreign nationals in the performance of its award, the selected applicant may be required to provide DOE with specific information about each foreign national to ensure compliance with the requirements for access approval. National laboratory personnel already cleared for site access may be excluded. Access approval for foreign nationals from countries identified on the U.S. Department of State’s list of [State Sponsors of Terrorism](https://www.state.gov/state-sponsors-of-terrorism/) must receive final approval authority from the Secretary of Energy or the Secretary’s assignee before they commence any work under the award.

1. Subaward and Executive Reporting

Additional administrative requirements necessary for DOE grants and cooperative agreements to comply with the Federal Funding and Transparency Act of 2006 (FFATA) are contained in 2 CFR Part 170. Prime recipients must register with the new FFATA Subaward Reporting System database and report the required data on their first tier subrecipients. Prime recipients must report the executive compensation for their own executives as part of their registration profile in SAM.

1. National Policy Requirements

The National Policy Assurances that are incorporated as a term and condition of award are located at: <http://www.nsf.gov/awards/managing/rtc.jsp>.

1. Environmental Review in Accordance with National Environmental Policy Act (NEPA)

EERE’s decision whether and how to distribute federal funds under this FOA is subject to NEPA (42 U.S.C. 4321, *et seq.*). NEPA requires federal agencies to integrate environmental values into their decision-making processes by considering the potential environmental impacts of their proposed actions. For additional background on NEPA, please see DOE’s NEPA website, at <https://www.energy.gov/nepa>.

While NEPA compliance is a federal agency responsibility and the ultimate decisions remain with the federal agency, all recipients selected for an award will be required to assist in the timely and effective completion of the NEPA process in the manner most pertinent to their proposed project. If DOE determines certain records must be prepared to complete the NEPA review process (e.g., biological evaluations or environmental assessments), the recipient may be required to prepare the records and the costs to prepare the necessary records may be included as part of the project costs.

1. Applicant Representations and Certifications
2. Lobbying Restrictions

By accepting funds under this award, the prime recipient agrees that none of the funds obligated on the award shall be expended, directly or indirectly, to influence Congressional action on any legislation or appropriation matters pending before Congress, other than to communicate to Members of Congress as described in 18 U.S.C. §1913. This restriction is in addition to those prescribed elsewhere in statute and regulation.

1. Corporate Felony Conviction and Federal Tax Liability Representations

In submitting an application in response to this FOA, the applicant represents that:

1. It is **not** a corporation that has been convicted of a felony criminal violation under any federal law within the preceding 24 months; and
2. It is **not** a corporation that has any unpaid federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability.

For purposes of these representations the following definitions apply:

A Corporation includes any entity that has filed articles of incorporation in any of the 50 states, the District of Columbia, or the various territories of the United States [but not foreign corporations]. It includes both for-profit and non-profit organizations.

1. Nondisclosure and Confidentiality Agreements Representations

In submitting an application in response to this FOA the applicant represents that:

1. It **does not and will not** require its employees or contractors to sign internal nondisclosure or confidentiality agreements or statements prohibiting or otherwise restricting its employees or contactors from lawfully reporting waste, fraud, or abuse to a designated investigative or law enforcement representative of a federal department or agency authorized to receive such information.
2. It **does not and will not** use any federal funds to implement or enforce any nondisclosure or confidentiality policy, form, or agreement it uses unless it contains the following provisions:
3. *‘‘These provisions are consistent with and do not supersede, conflict with, or otherwise alter the employee obligations, rights, or liabilities created by existing statute or Executive order relating to (1) classified information, (2) communications to Congress, (3) the reporting to an Inspector General of a violation of any law, rule, or regulation, or mismanagement, a gross waste of funds, an abuse of authority, or a substantial and specific danger to public health or safety, or (4) any other whistleblower protection. The definitions, requirements, obligations, rights, sanctions, and liabilities created by controlling Executive orders and statutory provisions are incorporated into this agreement and are controlling.’’*
4. The limitation above shall not contravene requirements applicable to Standard Form 312 Classified Information Nondisclosure Agreement (<https://fas.org/sgp/othergov/sf312.pdf>), Form 4414 Sensitive Compartmented Information Disclosure Agreement (<https://fas.org/sgp/othergov/intel/sf4414.pdf>), or any other form issued by a federal department or agency governing the nondisclosure of classified information.
5. Notwithstanding the provision listed in paragraph (a), a nondisclosure or confidentiality policy form or agreement that is to be executed by a person connected with the conduct of an intelligence or intelligence-related activity, other than an employee or officer of the United States government, may contain provisions appropriate to the particular activity for which such document is to be used. Such form or agreement shall, at a minimum, require that the person will not disclose any classified information received in the course of such activity unless specifically authorized to do so by the United States government. Such nondisclosure or confidentiality forms shall also make it clear that they do not bar disclosures to Congress, or to an authorized official of an executive agency or the Department of Justice, that are essential to reporting a substantial violation of law.
6. Statement of Federal Stewardship

EERE will exercise normal federal stewardship in overseeing the project activities performed under EERE awards. Stewardship Activities include, but are not limited to, conducting site visits; reviewing performance and financial reports; providing assistance or temporary intervention in unusual circumstances to correct deficiencies that develop during the project; assuring compliance with terms and conditions; and reviewing technical performance after project completion to ensure that the project objectives have been accomplished.

1. Statement of Substantial Involvement

EERE has substantial involvement in work performed under awards made as a result of this FOA. EERE does not limit its involvement to the administrative requirements of the award. Instead, EERE has substantial involvement in the direction and redirection of the technical aspects of the project as a whole. Substantial involvement includes, but is not limited to, the following:

1. EERE shares responsibility with the recipient for the management, control, direction, and performance of the project.
2. EERE may intervene in the conduct or performance of work under this award for programmatic reasons. Intervention includes the interruption or modification of the conduct or performance of project activities.
3. EERE may redirect or discontinue funding the project based on the outcome of EERE’s evaluation of the project at the Go/No-Go decision point(s).
4. EERE participates in major project decision-making processes.
5. Intellectual Property Management Plan (IPMP)

As a first quarter milestone, awardees must submit an executed IPMP between the members of the consortia or team.

The award will set forth the treatment of and obligations related to intellectual property rights between EERE and the individual members. The IPMP should describe how the members will handle intellectual property rights and issues between themselves while ensuring compliance with federal intellectual property laws, regulations, and policies (see Sections VIII.K.-VIII.N. of this FOA for more details on applicable federal intellectual property laws and regulations). Guidance regarding the contents of IPMP is available from EERE upon request.

The following is a non-exhaustive list of examples of items that the IPMP may cover:

* The treatment of confidential information between members (e.g., the use of NDAs);
* The treatment of background intellectual property (e.g., any requirements for identifying it or making it available);
* The treatment of inventions made under the award (e.g., any requirements for disclosing to the other members on an application, filing patent applications, paying for patent prosecution, and cross-licensing or other licensing arrangements between the members);
* The treatment of data produced, including software, under the award (e.g., any publication process or other dissemination strategies, copyrighting strategy or arrangement between members, sharing of data collected amongst partners);
* Any technology transfer and commercialization requirements or arrangements between the members;
* The treatment of any intellectual property issues that may arise due to a change in membership of the consortia or team; and
* The handling of disputes related to intellectual property between the members.

1. Subject Invention Utilization Reporting

In order to ensure that prime recipients and subrecipients holding title to subject inventions are taking the appropriate steps to commercialize subject inventions, EERE may require that each prime recipient holding title to a subject invention submit annual reports for ten (10) years from the date the subject invention was disclosed to EERE on the utilization of the subject invention and efforts made by prime recipient or their licensees or assignees to stimulate such utilization. The reports must include information regarding the status of development, date of first commercial sale or use, gross royalties received by the prime recipient, and such other data and information as EERE may specify.

1. Intellectual Property Provisions

The standard DOE financial assistance intellectual property provisions applicable to the various types of recipients are located at <http://energy.gov/gc/standard-intellectual-property-ip-provisions-financial-assistance-awards>.

1. Reporting

Reporting requirements are identified on the Federal Assistance Reporting Checklist, attached to the award agreement. This helpful EERE checklist can be accessed at <https://www.energy.gov/eere/funding/eere-funding-application-and-management-forms>. See Attachment 2 Federal Assistance Reporting Checklist, after clicking on “Model Cooperative Agreement" under the Award Package section.

1. Go/No-Go Review

Each project selected under this FOA will be subject to a periodic project evaluation referred to as a Go/No-Go Review. At the Go/No-Go decision points, EERE will evaluate project performance, project schedule adherence, meeting milestone objectives, compliance with reporting requirements, and overall contribution to the EERE program goals and objectives. Federal funding beyond the Go/No-Go decision point (continuation funding) is contingent upon (1) availability of federal funds appropriated by Congress for the purpose of this program; (2) the availability of future-year budget authority; (3) recipient’s technical progress compared to the Milestone Summary Table stated in Attachment 1 of the award; (4) recipient’s submittal of required reports; (5) recipient’s compliance with the terms and conditions of the award; (6) EERE’s Go/No-Go decision; (7) the recipient’s submission of a continuation application; and (8) written approval of the continuation application by the Contracting Officer.

As a result of the Go/No-Go Review, DOE may, at its discretion, authorize the following actions: (1) continue to fund the project, contingent upon the availability of funds appropriated by Congress for the purpose of this program and the availability of future-year budget authority; (2) recommend redirection of work under the project; (3) place a hold on federal funding for the project, pending further supporting data or funding; or (4) discontinue funding the project because of insufficient progress, change in strategic direction, or lack of funding.

The Go/No-Go decision is distinct from a non-compliance determination. In the event a recipient fails to comply with the requirements of an award, EERE may take appropriate action, including but not limited to, redirecting, suspending or terminating the award.

1. Conference Spending

The recipient shall not expend any funds on a conference not directly and programmatically related to the purpose for which the grant or cooperative agreement was awarded that would defray the cost to the United States government of a conference held by any Executive branch department, agency, board, commission, or office for which the cost to the United States government would otherwise exceed $20,000, thereby circumventing the required notification by the head of any such Executive Branch department, agency, board, commission, or office to the Inspector General (or senior ethics official for any entity without an Inspector General), of the date, location, and number of employees attending such conference.

1. Uniform Commercial Code (UCC) Financing Statements

Per 2 CFR 910.360 (Real Property and Equipment) when a piece of equipment is purchased by a for-profit recipient or subrecipient with federal funds, and when the federal share of the financial assistance agreement is more than $1,000,000, the recipient or subrecipient must:

Properly record, and consent to the Department's ability to properly record if the recipient fails to do so, UCC financing statement(s) for all equipment in excess of $5,000 purchased with project funds. These financing statement(s) must be approved in writing by the Contracting Officer prior to the recording, and they shall provide notice that the recipient's title to all equipment (not real property) purchased with federal funds under the financial assistance agreement is conditional pursuant to the terms of this section, and that the government retains an undivided reversionary interest in the equipment. The UCC financing statement(s) must be filed before the Contracting Officer may reimburse the recipient for the federal share of the equipment unless otherwise provided for in the relevant financial assistance agreement. The recipient shall further make any amendments to the financing statements or additional recordings, including appropriate continuation statements, as necessary or as the Contracting Officer may direct.

1. Questions/Agency Contacts

Upon the issuance of a FOA, EERE personnel are prohibited from communicating (in writing or otherwise) with applicants regarding the FOA except through the established question and answer process as described below. Specifically, questions regarding the content of this FOA must be submitted to: WETOFOA2236@ee.doe.gov. Questions must be submitted not later than three (3) business days prior to the application due date and time. Please note, feedback on individual concepts will not be provided through Q&A.

All questions and answers related to this FOA will be posted on EERE Exchange at: <https://eere-exchange.energy.gov>. **Please note that you must first select this specific FOA Number in order to view the questions and answers specific to this FOA**. EERE will attempt to respond to a question within three (3) business days, unless a similar question and answer has already been posted on the website.

Questions related to the registration process and use of the EERE Exchange website should be submitted to: [EERE-ExchangeSupport@hq.doe.gov](mailto:EERE-ExchangeSupport@hq.doe.gov).

1. Other Information
   1. FOA Modifications

Amendments to this FOA will be posted on the EERE Exchange website and the Grants.gov system. However, you will only receive an email when an amendment or a FOA is posted on these sites if you register for email notifications for this FOA in Grants.gov. EERE recommends that you register as soon after the release of the FOA as possible to ensure you receive timely notice of any amendments or other FOAs.

* 1. Government Right to Reject or Negotiate

EERE reserves the right, without qualification, to reject any or all applications received in response to this FOA and to select any application, in whole or in part, as a basis for negotiation or award.

* 1. Commitment of Public Funds

The Contracting Officer is the only individual who can make awards or commit the government to the expenditure of public funds. A commitment by anyone other than the Contracting Officer, either express or implied, is invalid.

* 1. Treatment of Application Information

Applicants should not include trade secrets or commercial or financial information that is privileged or confidential in their application unless such information is necessary to convey an understanding of the proposed project or to comply with a requirement in the FOA. Applicants are advised to not include any critically sensitive proprietary detail

If an application includes trade secrets or information that is commercial or financial, or information that is confidential or privileged, it is furnished to the Government in confidence with the understanding that the information shall be used or disclosed only for evaluation of the application. Such information will be withheld from public disclosure to the extent permitted by law, including the Freedom of Information Act. Without assuming any liability for inadvertent disclosure, EERE will seek to limit disclosure of such information to its employees and to outside reviewers when necessary for merit review of the application or as otherwise authorized by law. This restriction does not limit the Government’s right to use the information if it is obtained from another source.

Concept Papers, Full Applications, Replies to Reviewer Comments, and other submissions containing confidential, proprietary, or privileged information must be 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. Government is not liable for the disclosure or use of unmarked information, and may use or disclose such information for any purpose.

The cover sheet of the Concept Paper, Full Application, Reply to Reviewer Comments, or other submission must be marked as follows and identify the specific pages containing trade secrets, confidential, proprietary, or privileged information:

**Notice of Restriction on Disclosure and Use of Data:**

Pages [list applicable pages] of this document may contain trade secrets, confidential, proprietary, or privileged information that is exempt from public disclosure. Such information shall be used or disclosed only for evaluation purposes or in accordance with a financial assistance or loan agreement between the submitter and the Government. The Government may use or disclose any information that is not appropriately marked or otherwise restricted, regardless of source. [End of Notice]

The header and footer of every page that contains confidential, proprietary, or privileged information must be marked as follows: “Contains Trade Secrets, Confidential, Proprietary, or Privileged Information Exempt from Public Disclosure.” In addition, each line or paragraph containing proprietary, privileged, or trade secret information must be clearly marked with double brackets or highlighting.

* 1. Evaluation and Administration by Non-Federal Personnel

In conducting the merit review evaluation, the Go/No-Go Reviews and Peer Reviews, the government may seek the advice of qualified non-federal personnel as reviewers. The government may also use non-federal personnel to conduct routine, nondiscretionary administrative activities, including EERE contractors. The applicant, by submitting its application, consents to the use of non-federal reviewers/administrators. Non-federal reviewers must sign conflict of interest (COI) and non-disclosure acknowledgements (NDA) prior to reviewing an application. Non-federal personnel conducting administrative activities must sign an NDA.

* 1. Notice Regarding Eligible/Ineligible Activities

Eligible activities under this FOA include those which describe and promote the understanding of scientific and technical aspects of specific energy technologies, but not those which encourage or support political activities such as the collection and dissemination of information related to potential, planned or pending legislation.

* 1. Notice of Right to Conduct a Review of Financial Capability

EERE reserves the right to conduct an independent third party review of financial capability for applicants that are selected for negotiation of award (including personal credit information of principal(s) of a small business if there is insufficient information to determine financial capability of the organization).

* 1. Requirement for Full and Complete Disclosure

Applicants are required to make a full and complete disclosure of all information requested. Any failure to make a full and complete disclosure of the requested information may result in:

* The termination of award negotiations;
* The modification, suspension, or termination of a funding agreement;
* The initiation of debarment proceedings, debarment, or a declaration of ineligibility for receipt of federal contracts, subcontracts, and financial assistance and benefits; and
* Civil or criminal penalties.
  1. Retention of Submissions

EERE expects to retain copies of all Concept Papers, Full Applications, Replies to Reviewer Comments, and other submissions. No submissions will be returned. By applying to EERE for funding, applicants consent to EERE’s retention of their submissions.

* 1. Title to Subject Inventions

Ownership of subject inventions is governed pursuant to the authorities listed below:

* Domestic Small Businesses, Educational Institutions, and Nonprofits: Under the Bayh-Dole Act (35 U.S.C. § 200 et seq.), domestic small businesses, educational institutions, and nonprofits may elect to retain title to their subject inventions;
* All other parties: The federal Non-Nuclear Energy Act of 1974, 42. U.S.C. 5908, provides that the government obtains title to new inventions unless a waiver is granted (see below);
* Class Patent Waiver:

DOE has issued a class waiver that applies to this FOA. Under this class waiver, domestic large businesses may elect title to their subject inventions similar to the right provided to the domestic small businesses, educational institutions, and nonprofits by law. In order to avail itself of the class waiver, a domestic large business must agree that any products embodying or produced through the use of a subject invention first created or reduced to practice under this program will be substantially manufactured in the United States, unless DOE agrees that the commitments proposed in the U.S. Manufacturing Plan are sufficient.

* Advance and Identified Waivers: Applicants may request a patent waiver that will cover subject inventions that may be invented under the award, in advance of or within 30 days after the effective date of the award. Even if an advance waiver is not requested or the request is denied, the recipient will have a continuing right under the award to request a waiver for identified inventions, i.e., individual subject inventions that are disclosed to EERE within the timeframes set forth in the award’s intellectual property terms and conditions. Any patent waiver that may be granted is subject to certain terms and conditions in 10 CFR 784; and
* DEC: For Topic Area 2, Each applicant is required to submit a U.S. Manufacturing Plan as part of its application. If selected, the U.S. Manufacturing Plan shall be incorporated into the award terms and conditions for domestic small businesses and nonprofit organizations. DOE has determined that exceptional circumstances exist that warrants the modification of the standard patent rights clause for small businesses and non-profit awardees under Bayh-Dole to the extent necessary to implement and enforce the U.S. Manufacturing Plan. Any Bayh-Dole entity (domestic small business or nonprofit organization) affected by this DEC has the right to appeal it.
  1. Government Rights in Subject Inventions

Where prime recipients and subrecipients retain title to subject inventions, the U.S. government retains certain rights.

* + - 1. Government Use License

The U.S. government retains a nonexclusive, nontransferable, irrevocable, paid-up license to practice or have practiced for or on behalf of the United States any subject invention throughout the world. This license extends to contractors doing work on behalf of the government.

* + - 1. March-In Rights

The U.S. government retains march-in rights with respect to all subject inventions. Through “march-in rights,” the government may require a prime recipient or subrecipient who has elected to retain title to a subject invention (or their assignees or exclusive licensees), to grant a license for use of the invention to a third party. In addition, the government may grant licenses for use of the subject invention when a prime recipient, subrecipient, or their assignees and exclusive licensees refuse to do so.

DOE may exercise its march-in rights only if it determines that such action is necessary under any of the four following conditions:

* The owner or licensee has not taken or is not expected to take effective steps to achieve practical application of the invention within a reasonable time;
* The owner or licensee has not taken action to alleviate health or safety needs in a reasonably satisfied manner;
* The owner has not met public use requirements specified by federal statutes in a reasonably satisfied manner; or
* The U.S. manufacturing requirement has not been met.

Any determination that march-in rights are warranted must follow a fact-finding process in which the recipient has certain rights to present evidence and witnesses, confront witnesses and appear with counsel and appeal any adverse decision. To date, DOE has never exercised its march-in rights to any subject inventions.

* 1. Rights in Technical Data

Data rights differ based on whether data is first produced under an award or instead was developed at private expense outside the award.

“Limited Rights Data”: The U.S. government will not normally require delivery of confidential or trade secret-type technical data developed solely at private expense prior to issuance of an award, except as necessary to monitor technical progress and evaluate the potential of proposed technologies to reach specific technical and cost metrics.

Government Rights in Technical Data Produced Under Awards: The U.S. government normally retains unlimited rights in technical data produced under government financial assistance awards, including the right to distribute to the public. However, pursuant to special statutory authority, certain categories of data generated under EERE awards may be protected from public disclosure for up to five years after the data is generated (“Protected Data”). For awards permitting Protected Data, the protected data must be marked as set forth in the awards intellectual property terms and conditions and a listing of unlimited rights data (i.e., non-protected data) must be inserted into the data clause in the award. In addition, invention disclosures may be protected from public disclosure for a reasonable time in order to allow for filing a patent application.

* 1. Copyright

The prime recipient and subrecipients may assert copyright in copyrightable works, such as software, first produced under the award without EERE approval. When copyright is asserted, the government retains a paid-up nonexclusive, irrevocable worldwide license to reproduce, prepare derivative works, distribute copies to the public, and to perform publicly and display publicly the copyrighted work. This license extends to contractors and others doing work on behalf of the government.

* 1. Export Control

The U.S. government regulates the transfer of information, commodities, technology, and software considered to be strategically important to the U.S. to protect national security, foreign policy, and economic interests without imposing undue regulatory burdens on legitimate international trade. There is a network of federal agencies and regulations that govern exports that are collectively referred to as “Export Controls”. To ensure compliance with Export Controls, it is the prime recipient’s responsibility to determine when its project activities trigger Export Controls and to ensure compliance.

Export Controls may apply to individual projects, depending on the nature of the tasks. When Export Controls apply, the recipient must take the appropriate steps to obtain any required governmental licenses, monitor and control access to restricted information, and safeguard all controlled materials. Under no circumstances may foreign entities (organizations, companies or persons) receive access to export controlled information unless proper export procedures have been satisfied and such access is authorized pursuant to law or regulation.

Applicants are advised that some of the results of the research conducted under this FOA are expected to be restricted for proprietary reasons and not published or shared broadly within the scientific community.

* 1. Personally Identifiable Information (PII)

All information provided by the applicant must to the greatest extent possible exclude PII. The term “PII” refers to information which can be used to distinguish or trace an individual's identity, such as their name, social security number, biometric records, alone, or when combined with other personal or identifying information which is linked or linkable to a specific individual, such as date and place of birth, mother’s maiden name. (See OMB Memorandum M-07-16 dated May 22, 2007, found at: <https://www.whitehouse.gov/sites/whitehouse.gov/files/omb/memoranda/2007/m07-16.pdf>

By way of example, applicants must screen resumes to ensure that they do not contain PII such as personal addresses, personal landline/cell phone numbers, and personal emails. **Under no circumstances should Social Security Numbers (SSNs) be included in the application**. Federal agencies are prohibited from the collecting, using, and displaying unnecessary SSNs. (See, the Federal Information Security Modernization Act of 2014 (Pub. L. No. 113-283, Dec 18, 2014; 44 U.S.C. §3551).

* 1. Annual Independent Audits

If a for-profit entity is a prime recipient and has expended $750,000 or more of DOE awards during the entity's fiscal year, an annual compliance audit performed by an independent auditor is required. For additional information, please refer to 2 C.F.R. § 910.501 and Subpart F.

If an educational institution, non-profit organization, or state/local government is a prime recipient or subrecipient and has expended $750,000 or more of federal awards during the non-federal entity's fiscal year, then a Single or Program-Specific Audit is required. For additional information, please refer to 2 C.F.R. § 200.501 and Subpart F.

Applicants and subrecipients (if applicable) should propose sufficient costs in the project budget to cover the costs associated with the audit. EERE will share in the cost of the audit at its applicable cost share ratio.

Appendix A – Cost Share Information

**Cost Sharing or Cost Matching**

The terms “cost sharing” and “cost matching” are often used synonymously. Even the DOE Financial Assistance Regulations, 2 CFR 200.306, use both of the terms in the titles specific to regulations applicable to cost sharing. EERE almost always uses the term “cost sharing,” as it conveys the concept that non-federal share is calculated as a percentage of the Total Project Cost. An exception is the State Energy Program Regulation, 10 CFR 420.12, State Matching Contribution. Here “cost matching” for the non-federal share is calculated as a percentage of the federal funds only, rather than the Total Project Cost.

**How Cost Sharing Is Calculated**

As stated above, cost sharing is calculated as a percentage of the Total Project Cost. FFRDC costs must be included in Total Project Costs. The following is an example of how to calculate cost sharing amounts for a project with $1,000,000 in federal funds with a minimum 20% non-federal cost sharing requirement:

* Formula: Federal share ($) divided by federal share (%) = Total Project Cost

Example: $1,000,000 divided by 80% = $1,250,000

* Formula: Total Project Cost ($) minus federal share ($) = Non-federal share ($)

Example: $1,250,000 minus $1,000,000 = $250,000

* Formula: Non-federal share ($) divided by Total Project Cost ($) = Non-federal share (%)

Example: $250,000 divided by $1,250,000 = 20%

**What Qualifies For Cost Sharing**

While it is not possible to explain what specifically qualifies for cost sharing in one or even a couple of sentences, in general, if a cost is allowable under the cost principles applicable to the organization incurring the cost and is eligible for reimbursement under an EERE grant or cooperative agreement, then it is allowable as cost share. Conversely, if the cost is not allowable under the cost principles and not eligible for reimbursement, then it is not allowable as cost share. In addition, costs may not be counted as cost share if they are paid by the federal government under another award unless authorized by federal statute to be used for cost sharing.

The rules associated with what is allowable as cost share are specific to the type of organization that is receiving funds under the grant or cooperative agreement, though are generally the same for all types of entities. The specific rules applicable to:

* FAR Part 31 for For-Profit entities, (48 CFR Part 31); and
* 2 CFR Part 200 Subpart E - Cost Principles for all other non-federal entities.

In addition to the regulations referenced above, other factors may also come into play such as timing of donations and length of the project period. For example, the value of ten years of donated maintenance on a project that has a project period of five years would not be fully allowable as cost share. Only the value for the five years of donated maintenance that corresponds to the project period is allowable and may be counted as cost share.

Additionally, EERE generally does not allow pre-award costs for either cost share or reimbursement when these costs precede the signing of the appropriation bill that funds the award. In the case of a competitive award, EERE generally does not allow pre-award costs prior to the signing of the Selection Statement by the EERE Selection Official.

**General Cost Sharing Rules on a DOE Award**

1. Cash Cost Share – encompasses all contributions to the project made by the recipient or subrecipient(s), for costs incurred and paid for during the project. This includes when an organization pays for personnel, supplies, equipment for their own company with organizational resources. If the item or service is reimbursed for, it is cash cost share. All cost share items must be necessary to the performance of the project.
2. In-Kind Cost Share – encompasses all contributions to the project made by the recipient or subrecipient(s) that do not involve a payment or reimbursement and represent donated items or services. In-Kind cost share items include volunteer personnel hours, donated existing equipment, donated existing supplies. The cash value and calculations thereof for all In-Kind cost share items must be justified and explained in the Cost Share section of the project Budget Justification. All cost share items must be necessary to the performance of the project. If questions exist, consult your DOE contact before filling out the In-Kind cost share section of the Budget Justification.
3. Funds from other federal sources MAY NOT be counted as cost share. This prohibition includes FFRDC subrecipients. Non-federal sources include any source not originally derived from federal funds. Cost sharing commitment letters from subrecipients must be provided with the original application.
4. Fee or profit, including foregone fee or profit, are not allowable as project costs (including cost share) under any resulting award. The project may only incur those costs that are allowable and allocable to the project (including cost share) as determined in accordance with the applicable cost principles prescribed in FAR Part 31 for For-Profit entities and 2 CFR Part 200 Subpart E - Cost Principles for all other non-federal entities.

**DOE Financial Assistance Rules 2 CFR Part 200 as amended by 2 CFR Part 910**

As stated above, the rules associated with what is allowable cost share are generally the same for all types of organizations. Following are the rules found to be common, but again, the specifics are contained in the regulations and cost principles specific to the type of entity:

1. Acceptable contributions. All contributions, including cash contributions and third party in-kind contributions, must be accepted as part of the prime recipient's cost sharing if such contributions meet all of the following criteria:
2. They are verifiable from the recipient's records.
3. They are not included as contributions for any other federally-assisted project or program.
4. They are necessary and reasonable for the proper and efficient accomplishment of project or program objectives.
5. They are allowable under the cost principles applicable to the type of entity incurring the cost as follows:
6. For-profit organizations. Allowability of costs incurred by for-profit organizations and those nonprofit organizations listed in Attachment C to OMB Circular A–122 is determined in accordance with the for-profit cost principles in 48 CFR Part 31 in the FAR, except that patent prosecution costs are not allowable unless specifically authorized in the award document. (v) Commercial Organizations. FAR Subpart 31.2—Contracts with Commercial Organizations; and
7. Other types of organizations. For all other non-federal entities, allowability of costs is determined in accordance with 2 CFR Part 200 Subpart E.
8. They are not paid by the federal government under another award unless authorized by federal statute to be used for cost sharing or matching.
9. They are provided for in the approved budget.
10. Valuing and documenting contributions
11. Valuing recipient's property or services of recipient's employees. Values are established in accordance with the applicable cost principles, which mean that amounts chargeable to the project are determined on the basis of costs incurred. For real property or equipment used on the project, the cost principles authorize depreciation or use charges. The full value of the item may be applied when the item will be consumed in the performance of the award or fully depreciated by the end of the award. In cases where the full value of a donated capital asset is to be applied as cost sharing or matching, that full value must be the lesser or the following:
12. The certified value of the remaining life of the property recorded in the recipient's accounting records at the time of donation; or
13. The current fair market value. If there is sufficient justification, the Contracting Officer may approve the use of the current fair market value of the donated property, even if it exceeds the certified value at the time of donation to the project. The Contracting Officer may accept the use of any reasonable basis for determining the fair market value of the property.
14. Valuing services of others' employees. If an employer other than the recipient furnishes the services of an employee, those services are valued at the employee's regular rate of pay, provided these services are for the same skill level for which the employee is normally paid.
15. Valuing volunteer services. Volunteer services furnished by professional and technical personnel, consultants, and other skilled and unskilled labor may be counted as cost sharing or matching if the service is an integral and necessary part of an approved project or program. Rates for volunteer services must be consistent with those paid for similar work in the recipient's organization. In those markets in which the required skills are not found in the recipient organization, rates must be consistent with those paid for similar work in the labor market in which the recipient competes for the kind of services involved. In either case, paid fringe benefits that are reasonable, allowable, and allocable may be included in the valuation.
16. Valuing property donated by third parties.
17. Donated supplies may include such items as office supplies or laboratory supplies. Value assessed to donated supplies included in the cost sharing or matching share must be reasonable and must not exceed the fair market value of the property at the time of the donation.
18. Normally only depreciation or use charges for equipment and buildings may be applied. However, the fair rental charges for land and the full value of equipment or other capital assets may be allowed, when they will be consumed in the performance of the award or fully depreciated by the end of the award, provided that the Contracting Officer has approved the charges. When use charges are applied, values must be determined in accordance with the usual accounting policies of the recipient, with the following qualifications:
19. The value of donated space must not exceed the fair rental value of comparable space as established by an independent appraisal of comparable space and facilities in a privately-owned building in the same locality.
20. The value of loaned equipment must not exceed its fair rental value.
21. Documentation. The following requirements pertain to the recipient's supporting records for in-kind contributions from third parties:
22. Volunteer services must be documented and, to the extent feasible, supported by the same methods used by the recipient for its own employees.
23. The basis for determining the valuation for personal services and property must be documented.

Appendix B – Sample Cost Share Calculation for Blended Cost Share Percentage

The following example shows the math for calculating required cost share for a project with $2,000,000 in federal funds with four tasks requiring different non-federal cost share percentages:

|  |  |  |  |
| --- | --- | --- | --- |
| Task | Proposed Federal Share | Federal Share % | Recipient Share % |
| Task 1 (R&D) | $1,000,000 | 80% | 20% |
| Task 2 (R&D) | $500,000 | 80% | 20% |
| Task 3 (Demonstration) | $400,000 | 50% | 50% |
| Task 4 (Outreach) | $100,000 | 100% | 0% |

Federal share ($) divided by federal share (%) = Task Cost

Each task must be calculated individually as follows:

Task 1

$1,000,000 divided by 80% = $1,250,000 (Task 1 Cost)

Task 1 Cost minus federal share = non-federal share

$1,250,000 - $1,000,000 = $250,000 (non-federal share)

Task 2

$500,000 divided 80% = $625,000 (Task 2 Cost)

Task 2 Cost minus federal share = non-federal share

$625,000 - $500,000 = $125,000 (non-federal share)

Task 3

$400,000 / 50% = $800,000 (Task 3 Cost)

Task 3 Cost minus federal share = non-federal share

$800,000 - $400,000 = $400,000 (non-federal share)

Task 4

Federal share = $100,000

Non-federal cost share is not mandated for outreach = $0 (non-federal share)

The calculation may then be completed as follows:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Tasks | $ Federal Share | % Federal Share | $ Non-Federal Share | % Non-Federal Share | Total Project Cost |
| Task 1 | $1,000,000 | 80% | $250,000 | 20% | $1,250,000 |
| Task 2 | $500,000 | 80% | $125,000 | 20% | $625,000 |
| Task 3 | $400,000 | 50% | $400,000 | 50% | $800,000 |
| Task 4 | $100,000 | 100% | $0 | 0% | $100,000 |
| Totals | $2,000,000 |  | $775,000 |  | $2,775,000 |

Blended Cost Share %

Non-federal share ($775,000) divided by Total Project Cost ($2,775,000) = 27.9% (non-federal)

Federal share ($2,000,000) divided by Total Project Cost ($2,775,000) = 72.1% (federal)

Appendix C – Waiver Requests and Approval Processes: 1. Foreign Entity Participation as the Prime Recipient; and 2. Performance of Work in the United States (Foreign Work Waiver)

1. **Waiver for Foreign Entity Participation as the Prime Recipient**

As set forth in Section III.A.iii., all prime recipients receiving funding under this FOA must be incorporated (or otherwise formed) under the laws of a state or territory of the United States and have a physical location for business operations in the United States. To request a waiver of this requirement, an applicant must submit an explicit waiver request in the Full Application.

Overall, the applicant must demonstrate to the satisfaction of EERE that it would further the purposes of this FOA and is otherwise in the economic interests of the United States to have a foreign entity serve as the prime recipient. A request to waive the *Foreign Entity Participation as the prime recipient* requirement must include the following:

* Entity name;
* The rationale for proposing a foreign entity to serve as the prime recipient;
* Country of incorporation and the extent, if any, the entity is state owned or controlled;
* A description of the project’s anticipated contributions to the US economy;
  + How the project will benefit U.S. research, development and manufacturing, including contributions to employment in the U.S. and growth in new markets and jobs in the U.S.;
  + How the project will promote domestic American manufacturing of products or services;
* A description of how the foreign entity’s participation as the prime recipient is essential to the project;
* A description of the likelihood of Intellectual Property (IP) being created from the work and the treatment of any such IP; and
* Countries where the work will be performed (Note: if any work is proposed to be conducted outside the U.S., the applicant must also complete a separate request for waiver of the Performance of Work in the United States requirement).

EERE may require additional information before considering the waiver request.

The applicant does not have the right to appeal EERE’s decision concerning a waiver request.

1. **Waiver for Performance of Work in the United States (Foreign Work Waiver)**

As set forth in Section IV.J.iii., all work under EERE funding agreements must be performed in the United States. This requirement does not apply to the purchase of supplies and equipment, so a waiver is not required for foreign purchases of these items. However, the prime recipient should make every effort to purchase supplies and equipment within the United States. There may be limited circumstances where it is in the interest of the project to perform a portion of the work outside the United States. To seek a waiver of the Performance of Work in the United States requirement, the applicant must submit an explicit waiver request in the Full Application. A separate waiver request must be submitted for each entity proposing performance of work outside of the United States.

Overall, a waiver request must demonstrate to the satisfaction of EERE that it would further the purposes of this FOA and is otherwise in the economic interests of the United States to perform work outside of the United States. A request to waive the *Performance of Work in the United States* requirement must include the following:

* The rationale for performing the work outside the U.S. (“foreign work”);
* A description of the work proposed to be performed outside the U.S.;
* An explanation as to how the foreign work is essential to the project;
* A description of the anticipated benefits to be realized by the proposed foreign work and the anticipated contributions to the US economy;
  + The associated benefits to be realized and the contribution to the project from the foreign work;
  + How the foreign work will benefit U.S. research, development and manufacturing, including contributions to employment in the U.S. and growth in new markets and jobs in the U.S.;
  + How the foreign work will promote domestic American manufacturing of products or services;
* A description of the likelihood of Intellectual Property (IP) being created from the foreign work and the treatment of any such IP;
* The total estimated cost (DOE and recipient cost share) of the proposed foreign work;
* The countries in which the foreign work is proposed to be performed; and
* The name of the entity that would perform the foreign work.

EERE may require additional information before considering the waiver request.

The applicant does not have the right to appeal EERE’s decision concerning a waiver request.

Appendix D – Data Management Plans

A data management plan (“DMP”) explains how data generated in the course of the work performed under an EERE award will be shared and preserved.

For both Topic Areas, cut and paste the following as the first paragraph of your DMP:

For any publication that includes results of the project, the underlying research data will be made available according to the policies of the publishing media. Where no such policy exists, the recipient will indicate on the publication a means for requesting and digitally obtaining the underlying research data. This includes the research data necessary to validate any results, conclusions, charts, figures, images in the publications.

For Topic Area 1 only:

Describe how data collected by the awardee for this project will be supplied in near real-time to project partners for help with quality control. This includes data for input into National Oceanic and Atmospheric Administration (NOAA) National Weather Prediction (NWP) models.

Describe how you will upload project-generated data and metadata to the A2e Data Archive and Portal, or [DAP](https://a2e.energy.gov/about/dap), following that system’s protocols. The DAP, funded by DOE’s Office of Energy Efficiency and Renewable Energy, has been established to collect, preserve, and disseminate data and metadata for projects under WETO. By providing data to the DAP, projects can meet the Data Management Plan requirements as described in “A2e Data Archive and Portal (DAP) Data Management Guidelines” (available at <https://a2e.energy.gov/docs/program/A2e-dap-DMP_PI_guidance.docx>). It is recommended that awardees engage the A2e DAP team as soon as the project is initiated. Currently, each project is guaranteed long-term archival preservation of up to 10 TB of data. Data archival requirements that exceed 10 TB can be negotiated. Describe how data sets collected during the testing will be archived in the DAP for comparison to past and future tests, as well as to create a unique climatology database to aid in wind resource assessments.

Describe how you will collect and format data, archive it, and conduct appropriate quality assurance/quality control, including:

* Estimation of the amount of data to be generated under the project
* Interoperability of data and a plan for sharing and disseminating data in a broadly applicable format. Existing, accepted community standards should be used where possible.

Describe your proposed processes for sharing data among partners, DOE, and the public. Where wind plant SCADA (Supervisory Control and Data Acquisition) data is relevant, please discuss how such data will be shared.

For Topic Area 2 only:

Describe how you will collect data and make it available to DOE and its National Laboratories, and the public for up to five years after the project end date for use in further research. If the advancement is part of a larger offshore wind installation, describe how the data delivered to DOE will include the baseline data and the validated data. For example:

* If project development funds are used to support a new installation technique , data delivered to DOE should include baseline and innovative techniques data, i.e. cycle times, noise emitted, cost savings, etc.
* If project development funds are used to support a new controls strategy, data delivered to DOE should include performance data for the baseline turbine(s) and the innovative turbines over the course of pertinent load conditions.
* If project development funds are used to support a new O&M strategy , data regarding baseline O&M and innovative O&M should be provided, i.e. availability, number of trips to the turbines, etc.
* Describe how you will demonstrate cost reduction for offshore wind, based on projected commercial-scale implementation of the technology or methodology, and how you will provide and disseminate data collected from the follow-on demonstration of the technology.

Appendix E – Glossary

Applicant – The lead organization submitting an application under the FOA.

Continuation application – A non-competitive application for an additional budget period within a previously approved project period. At least ninety (90) days before the end of each budget period, the Recipient must submit to EERE its continuation application, which includes the following information:

* + 1. A report on the Recipient’s progress towards meeting the objectives of the project, including any significant findings, conclusions, or developments, and an estimate of any unobligated balances remaining at the end of the budget period. If the remaining unobligated balance is estimated to exceed 20 percent of the funds available for the budget period, explain why the excess funds have not been obligated and how they will be used in the next budget period.
    2. A detailed budget and supporting justification if there are changes to the negotiated budget, or a budget for the upcoming budget period was not approved at the time of award.
    3. A description of any planned changes from the negotiated Statement of Project Objectives or Milestone Summary Table.

Cooperative Research and Development Agreement (CRADA) – a contractual agreement between a national laboratory contractor and a private company or university to work together on research and development. For more information, see <https://www.energy.gov/gc/downloads/doe-cooperative-research-and-development-agreements>

Federally Funded Research and Development Centers (FFRDC) - FFRDCs are public-private partnerships which conduct research for the United States government. A listing of FFRDCs can be found at <http://www.nsf.gov/statistics/ffrdclist/>.

Go/No-Go Decision Points – A decision point at the end of a budget period that defines the overall objectives, milestones and deliverables to be achieved by the recipient in that budget period. As of a result of EERE’s review, EERE may take one of the following actions: 1) authorize federal funding for the next budget period; 2) recommend redirection of work; 3) discontinue providing federal funding beyond the current budget period; or 4) place a hold on federal funding pending further supporting data.

Project – The entire scope of the cooperative agreement which is contained in the recipient’s Statement of Project Objectives.

Recipient or “Prime Recipient” – A non-federal entity that receives a federal award directly from a federal awarding agency to carry out an activity under a federal program. The term recipient does not include subrecipients.

Subrecipient – A non-federal entity that receives a subaward from a pass-through entity to carry out part of a federal program; but does not include an individual that is a beneficiary of such program. A subrecipient may also be a recipient of other federal awards directly from a federal awarding agency. Also, a DOE/NNSA and non-DOE/NNSA FFRDC may be proposed as a subrecipient on another entity’s application. See section III.E.ii.

**FOA Specific Definitions**

**"Balancing Authority (BA)"** is the responsible entity that integrates resource plans ahead of time, maintains load-interchange-generation balance within a BA area, and supports interconnection frequency in real-time.

**“Foundational Forecasting model”** is an operational larger-scale weather forecast model. This model is the foundation from which other models are run (i.e. wind plant scale models from private companies utilize the foundational forecast model as input).

**“High-Resolution Rapid Refresh (HRRR) model”** is the core forecast model for the proposed Project that runs in rapid refresh mode through re-initializing a new set of runs every hour at 3-km horizontal resolution over the Contiguous United States (CONUS) in a research mode by NOAA/ESRL. (Note: NOAA/NWS plans to implement a version of the HRRR model into NCEP operations in 2014, but ESRL will continue to run advanced experimental versions of the HRRR and RAP model/assimilation systems toward subsequent improvement of NCEP operational versions.)

**“NAM Rapid Refresh (NAMRR)”** is an experimental forecast model for the proposed project that runs in rapid refresh mode through performing an analysis and subsequent forecast at hourly intervals with both the 12-km North American domain as well as a 3-km nest domain, which covers the contiguous United States. Each hour, forecasts go out to 18 hours, and at 00, 06, 12, and 18 UTC forecasts are extended to 36-84 hours, depending on the desired configuration.

**“Numerical Weather Prediction (NWP)”** is a computer forecast or prediction based on equations governing the motions and the forces affecting motion of fluids. The equations are based, or initialized, on specified weather or climate conditions at a certain place and time.

**“Rapid Refresh (RAP) model”** is a second key NOAA forecast model for the proposed Project that runs in rapid refresh mode through re-initializing a new set of runs every hour at 13-km horizontal resolution over North America in an operational mode by NOAA/NWS/NCEP and in an advanced research mode by NOAA/ESRL. (Note: ESRL will continue to run advanced experimental versions of the RAP and HRRR model/assimilation systems toward subsequent improvement of the NCEP operational version.)

**“Weather Research and Forecasting (WRF) model”** is a next-generation mesoscale numerical weather prediction system designed to serve both atmospheric research and operational forecasting needs (<http://wrf-model.org>). It features two dynamical cores, a data assimilation system, and a software architecture allowing for parallel computation and system extensibility. The model serves a wide range of meteorological applications across scales ranging from meters to thousands of kilometers.

Appendix F – Definition of Technology Readiness Levels

|  |  |
| --- | --- |
| TRL 1: | Basic principles observed and reported |
| TRL 2: | Technology concept or application formulated |
| TRL 3: | Analytical and experimental critical function or characteristic proof of concept |
| TRL 4: | Component or breadboard validation in a laboratory environment |
| TRL 5: | Component or breadboard validation in a relevant environment |
| TRL 6: | System/subsystem model or prototype demonstration in a relevant environment |
| TRL 7: | System prototype demonstration in an operational environment |
| TRL 8: | Actual system completed and qualified through test and demonstrated |
| TRL 9: | Actual system proven through successful mission operations |

Appendix G – List of Acronyms

|  |  |
| --- | --- |
| COI | Conflict of Interest |
| DEC | Determination of Exceptional Circumstances |
| DMP | Data Management Plan |
| DOE | Department of Energy |
| DOI | Digital Object Identifier |
| EERE | Energy Efficiency and Renewable Energy |
| FAR | Federal Acquisition Regulation |
| FFATA | Federal Funding and Transparency Act of 2006 |
| FOA | Funding Opportunity Announcement |
| FOIA | Freedom of Information Act |
| FFRDC | Federally Funded Research and Development Center |
| GAAP | Generally Accepted Accounting Principles |
| IPMP | Intellectual Property Management Plan |
| M&O | Management and Operating |
| MPIN | Marketing Partner ID Number |
| MYPP | Multi-Year Program Plan |
| NDA | Non-Disclosure Acknowledgement |
| NEPA | National Environmental Policy Act |
| NNSA | National Nuclear Security Agency |
| OMB | Office of Management and Budget |
| OSTI | Office of Scientific and Technical Information |
| PII | Personal Identifiable Information |
| R&D | Research and Development |
| RFI | Request for Information |
| RFP | Request for Proposal |
| SAM | System for Award Management |
| SOPO | Statement of Project Objectives |
| SPOC | Single Point of Contact |
| TIA | Technology Investment Agreement |
| TRL | Technology Readiness Level |
| UCC | Uniform Commercial Code |
| WBS | Work Breakdown Structure |
| WP | Work Proposal |

Appendix H – Topic Area 1 Federal Capabilities and Prospective Roles

**DOE FFRDC Capabilities and Roles**

**Department of Energy National Laboratories**

The Energy Department's 17 National Labs tackle the critical scientific challenges of our time -- from combating climate change to discovering the origins of our universe. They address large scale, complex research and development challenges with a multidisciplinary approach that places an emphasis on translating basic science to innovation. Four of these laboratories, Argonne National Laboratory (ANL), Lawrence Livermore National Laboratory (LLNL), the National Renewable Energy Laboratory (NREL), and Pacific Northwest National Laboratory (PNNL) will be funded directly by DOE to engage in this project. Each of these laboratories executes a broad portfolio of research that provides a rich opportunity for synergy across disciplines. ANL carries out research in physics, chemistry, biological sciences, energy storage, high-performance computing, national security, engines and alternative fuels, environmental science, and nuclear energy. LLNL’s portfolio includes nuclear weapons stockpile stewardship, nuclear nonproliferation, high-performance computing, national security, biology, energy research, climate science, additive manufacturing, lasers, and high-energy-density physics. NREL executes research and development programs in renewable energy and energy efficiency research and development, including energy systems integration, solar, wind, renewable fuels and vehicle systems, buildings, geothermal, energy sciences, computational sciences, and energy analysis. PNNL is a scientific research and development laboratory with international leadership in chemistry, earth sciences, and data analytics to address key challenges in energy resiliency and national and homeland security.

**DOE FFRDC Capabilities**

The four National Laboratories have extensive experience in the scientific design, planning and execution of large field campaigns including the deployment of sophisticated observational systems, data management, and analysis. Collectively, DOE FFRDC staff offer deep expertise in measurement system physics for in situ sensors, including turbulence, and for both passive and active remote sensing systems, including profiling and scanning lidars and radars. In addition to measurement physics, lab staff are authorities on the structure and physics of the atmospheric boundary layer, including theoretical foundations of subgrid-scale parameterizations for mesoscale and microscale models. Staff at all of the FFRDCs are experienced in using and developing mesoscale models, particularly the WRF model, and in using microscale (CFD) models for detailed simulations of turbulence in waked and other flows. Many of the staff are also engaged in developing techniques to effectively numerically couple mesoscale and microscale models. Much of the modeling work is carried out on high-performance computing systems supported by DOE at the labs. HPC resources may be accessed either through collaboration with FFRDC staff or through a formal proposal process associated with a DOE-funded project. An important additional capability of National Laboratory researchers is the quantification of uncertainty in the models through the application of formal UQ techniques.

In addition to theoretical, numerical, and observational boundary layer research capabilities, DOE supports the Data Archive and Portal for management of instrumental and numerical data generated by WETO-funded projects. The DAP is operated following current best practices in data management. The DAP provides protocols to data generators so that data are easy for other users to discover and download. The DAP also provides data visualization, the ability to accept streaming data, and can securely manage proprietary data sets.

**DOE FFRDC Potential Areas of Engagement**

The DOE laboratories that will engage in this project will be extending to the offshore environment previous work in improving mesoscale models for wind resource characterization and in coupling those models to the microscale. This includes potentially deploying a subset of the equipment in Table 1 as resources allow. With the exception of the DOE lidar buoys, DOE FFRDC instruments are primarily designed for deployment on land or on an existing stable, powered platform. For this project, it is most likely that they would be deployed onshore at collaboratively determined locations near the coast to improve sampling of upstream conditions. DOE FFRDCs also plan to extend previous model improvement efforts to the offshore environment. The primary mesoscale model used by the FFRDCs for resource characterization is WRF, with microscale coupling focusing on WRF-LES and the ExaWind (formerly Nalu) CFD model. In addition, current laboratory air-sea interaction studies are making use of WaveWatch III and SWAN. The FFRDCs would plan to coordinate their modeling efforts with the FOA awardee, to share their modeling and boundary layer expertise, and to maximize access to DOE high-performance computing facilities.

**NOAA Capabilities and Roles**

**National Oceanic and Atmospheric Administration (NOAA)**

The NOAA Office of Oceanic and Atmospheric Research (OAR) and National Weather Service (NWS) seek to improve the observation, characterization, and prediction of atmospheric processes and weather in the lower atmosphere (called the planetary boundary layer, or PBL). Improvements in NOAA’s capability to make accurate weather predictions in the PBL will benefit the entire wind industry, as operational NOAA weather forecast products provided by the NWS are the basis for most commercial wind forecast service providers serving the industry.

***NOAA’s Earth System Research Laboratory (ESRL)***

*ESRL* has extensive experience and capabilities in numerical weather prediction model and data assimilation development, high-performance computing, boundary-layer science and the understanding of atmospheric processes in the PBL, and in the deployment and use of state-of-the-art sensing systems to observe and characterize the atmosphere and its evolution. For this project, ESRL will collaborate with the awardee to support the project by deploying atmospheric profiling instrumentation and in-situ meteorological instrumentation, and analyze these and other datasets provided by the project to investigate atmospheric processes at work in coastal regions and over the water that impact wind energy generation using off-shore turbines. ESRL will use these insights to improve the representation of these processes in the high-resolution rapid refresh (HRRR[[2]](#footnote-3)) numerical weather prediction (NWP) model. The HRRR model used operationally by NWS to provide hourly-initialized weather forecasts out to 36 hours (soon 48 h) from the model initialization time; these forecast products are made available to the general public including the wind forecast industry. The operational HRRR is updated approximately every two years; thus, any model improvements made by ESRL will result improved forecasts for the wind industry to create improved power predictions.

***ESRL Observational Experience and Expertise***

ESRL scientists and engineers have a broad range of expertise and experience in observing the atmosphere with various remote sensing and in-situ instruments. In particular, ESRL is able to measure profiles of horizontal wind speed and direction, profiles of vertical motion, turbulence, temperature and humidity profiles, precipitation properties, height of the PBL, downwelling and upwelling solar and infrared radiative fluxes, surface fluxes of latent and sensible heat and momentum flux, basic meteorology (i.e., temperature, humidity, pressure, and wind below 10 m), and much more. ESRL scientists have deployed these instruments in dozens of different field experiments to address a wide range of scientific questions, and thus have broad expertise in planning, conducting, and maintain these instruments and characterizing the uncertainties in these observations. The NOAA instruments that could be deployed as part of this wind resource characterization experiment is provided in Table 1; however, the exact instrument complement will depend on overall goals of the campaign and availability of both the instruments and funding.

ESRL scientists have used these observations to develop new insights into a broad range of atmospheric processes including interactions between the atmosphere and the surface (both over land and ocean), how changes in the components of the surface energy budget affect the turbulent nature of the PBL and thus the wind profile and vice versa, how changes in stability affect the wind profile and vice versa, the interaction between precipitation and wind profile (e.g., via evaporative cold pool development), land-sea circulations, etc. ESRL scientists have worked collaboratively with scientists in DOE, other federal agencies, universities, and private companies to develop strategies and concrete plans to address pressing scientific questions. This includes the development of deployment plans for field campaigns, the optimal selection and use of different observational tools to make the critical observations in a synergistic manner, and the execution of the analysis strategy to achieve the goals of the field campaign.

***ESRL Numerical Weather Prediction Expertise***

As indicated above, ESRL is the NOAA laboratory that develops and improves the HRRR weather forecast model. The HRRR model must represent all of the processes at work in the PBL and above that influence weather prediction. As such, ESRL includes experts in the numerical representation of the physical processes in the PBL, the representation of clouds and cloud processes, interactions between the earth’s surface and the atmosphere, and more. These experts are working to improve the model parameterizations, using observations such as those mentioned above from both long-term observations and dedicated field campaigns, in order to provide improved predictions of winds in the boundary layer at all time scales and during all types of different weather events. These improvements translate into improvements in the winds over the turbine rotor layer that are critical for the wind industry’s needs.

NWP models have to be initialized with the current weather conditions in order to predict the weather. Observations from a wide range of data sources (e.g., satellite, weather balloon observations, surface meteorology, meteorological observations from commercial aircraft, etc.) are assimilated into the weather prediction model to initialize it. ESRL scientists are working to develop improved assimilation techniques both to better use current observations and to assimilate new observations that might be deployed as part of a long-term field campaign.

***ESRL Model Verification Expertise***

Observations are used in multiple ways to improve NWP models. They are used to characterize the atmospheric state and its evolution, and to develop insights into atmospheric processes. They are also used to initialize the model using data assimilation techniques. The third way is to verify the accuracy of the forecast from the NWP model. ESRL staff have developed a range of different tools that allow observations from various sources to be used to verify the accuracy of HRRR forecasts of wind. These tools are used by the model developers to identify shortcomings in the model and its physical representation of the PBL and gain insight into what processes need to be improved. These verification tools are also used to quantify the improvements in the forecasts made over time, what changes in the model led to these improvements, and how these improvements depend on meteorological regime. These verification tools also include the ability to quantify the improvement of the model in predicting both up and down ramp events.

***Possible NOAA ESRL Provided Observational Services***

NOAA may provide the following services as part of the public/private partnership, based upon a rating system to identify and establish priorities and the availability of both the instrumentation and funding.

Enhanced surface-based observations could be collected to observe wind and stability profiles, turbulent motions, surface fluxes, and surface meteorology. These observations could be used for process-oriented studies, model initialization via assimilation if appropriate, and model verification. The HRRR model will provide forecasts of wind magnitude and direction over the lowest several hundred meters of the PBL relevant for wind energy forecasts (i.e., over the rotor level). The observations deployed could be used to identify and verify ramp events and other rapid changes in wind profiles.

A rating system for expending resources on instrumentation will be based on the following:

* Relevance of measurements to goals of this program and NOAA objectives.
* Relevance of multiple HRRR model simulations to program goals.
* Operation costs, including availability of in-kind participant contributions.
* Accuracy and robustness of measurement data.

Observational data from NOAA’s instruments will be archived within the DOE Atmosphere to Electrons (A2E) data archive. The data will be quality controlled, and sufficient metadata will be included with both the observations so that users will understand how the data were generated, known issues with the observations, instrument and site configuration, and uncertainty estimates as appropriate.

***Possible NOAA ESRL Provided Modeling Services***

The 3-km High-Resolution Rapid Refresh (HRRR) model, and its 13-km resolution version (the Rapid Refresh (RAP) model), will be the primary NWP forecast models for this study.   The RAP is an hourly updating assimilation and model forecast system, capable of assimilating many types of observations, including near-surface and aircraft *in-situ* observations as well as radar reflectivity and satellite radiances. The RAP produces 39-h forecasts 4 times per day, with 21-h forecasts for the other model initialization times, using the Advanced Research version of the Weather Research and Forecast (WRF-ARW) model over a domain that covers all of North America.  The 3-km HRRR is closely coupled to the RAP.  It is also initialized every hour by combining a 1-h old RAP 13km analysis with a unique analysis / initialization procedure tailored to the 3-km resolution of the HRRR using current radar and other observational data also assimilated in the ongoing RAP cycle.  The HRRR also uses RAP lateral boundary conditions.  The HRRR produces 36-h forecasts 4 times per day, with 18-h forecasts for the other initialization times, over a domain covering the CONUS and immediately adjacent land and ocean areas. In particular, the HRRR domain covers the eastern seaboard of the United States (see Figure 1 shown below).

Advanced versions of these models are currently being run in a research mode by ESRL.  New versions of the RAP and HRRR became operational in July 2018 at the NWS; these models had important updates that resulted from research during the WFIP2 program. Updated versions of these models will become operational in the summer of 2020.

The recipient could utilize output from the HRRR forecasting model to predict wind power generation. This could be accomplished through value-added post-processing or for initializing higher-resolution simulations.  To better understand the improvement in the HRRR model forecast skill at the end of this off-shore research program, a full year of model forecasts will be evaluated by NOAA scientists as a function of ocean surface conditions, meteorological parameters, and meteorological conditions (e.g. cold front, summer convection, convective or stable boundary layer, etc.).  Detailed case studies can be provided for forecast “busts,” where the model did not provide accurate predictions or provided erroneous predictions, and for data denial experiments. NOAA and the awardee may collaborate on this effort, and provide parallel analyses of wind power production. HRRR output fields will also be stored in the A2E data archive, thereby making the model fields available to both team members and the larger community.

NOAA’s activities to improve the operational off-shore wind forecasts will fall into three main areas. It is hoped that the awardee will work with NOAA scientists on these topics.

First, NOAA will use the special observations collected during this program to verify the operational HRRR forecasts and identify cases that are not well forecasted and that are important to wind farm operations and utility integration of wind power.

Second, case studies will be conducted, wherein the HRRR model will be rerun with modifications to key physical parameterizations (e.g., turbulence, etc.) in an attempt to improve upon the forecast errors.

Third, the most significant model improvements as well as the sum of all model improvements will further be tested in limited retrospective data denial experiments over the full HRRR CONUS domain in order to ensure robust improvements for general weather prediction as well as the off-shore focus in this project.  These HRRR retrospective simulations will provide quantification of the improvements made to the HRRR for off-shore wind prediction as part of this project, which will be realized operationally by the NWS during the next release of the HRRR.

All of the project scientists will benefit from the ability to openly share all data amongst partners.  Data sets collected during the experiment will be archived for comparison to past and future experiments, as well as create a unique climatology database to aid in wind resource assessments.  Data collected over the life of the project should be made available for archive at a DOE facility.

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|  | *Figure 1: The spatial domains of the RAP (13-km resolution) in white and the HRRR (3-km resolution) in green.* |

Appendix I – Supporting Documents

U.S. Department of Energy and Bureau of Ocean Energy Management 2016. “National Offshore Wind Strategy”. <https://www.energy.gov/sites/prod/files/2016/09/f33/National-Offshore-Wind-Strategy-report-09082016.pdf>.

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U.S. Department of Energy 2019. “Workshop on Research Needs for Wind Resource Characterization: Summary Report.” U.S. DOE, 120 pp. <https://www.energy.gov/sites/prod/files/2019/11/f68/OWRS-workshop-report-11112019-2.pdf>.

U.S. Department of Energy 2012. “2011 Offshore Resource Assessment and Design Conditions Public Meeting: Summary Report.” U.S. DOE, 60 pp. <https://www.energy.gov/sites/prod/files/2013/12/f5/radc_public_meeting_9-14-11.pdf>.

Shaw, W.J., Berg, L.K., Cline, J., Draxl, C., Djalalova, I., Grimit, E.P., Lundquist, J.K., Marquis, M., McCaa, J., Olson, J.B. and Sivaraman, C., 2019. The Second Wind Forecast Improvement Project (WFIP2): General Overview. *Bulletin of the American Meteorological Society*, *100*(9), pp.1687-1699.

1. Opportunity zones were added to the Internal Revenue Code by section 13823 of the Tax Cuts and Jobs Act of 2017, codified at 26 U.S.C. 1400Z-1. The list of designated Qualified Opportunity Zones can be found in IRS Notices [2018-48 (PDF)](https://www.irs.gov/pub/irs-drop/n-18-48.pdf) and [2019-42 (PDF)](https://www.irs.gov/pub/irs-drop/n-19-42.pdf).  Further, a visual map of the census tracts designated as Qualified Opportunity Zones may also be found at [Opportunity Zones Resources](https://www.cdfifund.gov/Pages/Opportunity-Zones.aspx). Also see, [frequently asked questions](https://www.irs.gov/newsroom/opportunity-zones-frequently-asked-questions) about Qualified Opportunity Zones. [↑](#footnote-ref-2)
2. The HRRR is the current operational high-resolution rapidly updated weather prediction model run by the NWS to provide 0 to 36 hr forecasts for the Nation. NOAA is currently working to create a unified numerical weather prediction modeling system which will use a different dynamic core. It is anticipated that this new high-resolution forecast model, which will be called the Rapid Refresh Forecast System (RRFS) will use the same physics components as the HRRR. Thus, improvements in the HRRR will translate directly to improvements in the RRFS. For sake of clarity, we will refer to HRRR throughout this document, with the understanding that we are referring to both the HRRR and the RRFS. [↑](#footnote-ref-3)