

**FINANCIAL ASSISTANCE
FUNDING OPPORTUNITY ANNOUNCEMENT**



**U. S. Department of Energy
Office of Science
Office of Basic Energy Sciences**

Energy Frontier Research Centers

**Funding Opportunity Number: DE-FOA-0002204
Announcement Type: **Amendment 000002**
CFDA Number: 81.049**

FOA Issue Date:	November 13, 2019
Issue Date of Amendment 000002:	March 16, 2020
Letter of Intent Due Date:	Not Applicable (A Letter of Intent is not required or requested)
Pre-Application Due Date:	January 16, 2020 at 5:00 PM Eastern Time (A Pre-Application is required)
Pre-Application Response Date:	February 25, 2020 at 5:00 PM Eastern Time
Application Due Date:	April 21, 2020 at 11:59 PM Eastern Time

This amendment extends the deadline to accommodate disruptions from the COVID-19 outbreak.

Description of Amendment 000001: *(This description is only a summary of the changes made by this amendment. The entire Funding Opportunity Announcement (FOA), including the actual revisions made by Amendment No. 000001, should be carefully reviewed by all prospective applicants.)*

1. In Section I, under “Establishing Priority Research Directions for Basic Energy Science,” the previous link to the brochure summarizing the *Roundtable on Chemical Upcycling of Polymers* is replaced with a link to the full Roundtable report (Page 3 of this amended FOA).
2. In Section II.B, “Estimated Funding,” the total estimated funding level for the FOA is amended to reflect the FY 2020 appropriation that was passed after the FOA was issued (Page 11 of this amended FOA).
3. In Section IV.B.2, under “Pre-application Evaluation,” the estimated number of full applications that will be encouraged is amended to 30 to reflect the funding available in the FY 2020 congressional appropriation (Page 24 of this amended FOA).
4. In Section IV.C, under “Appendix 10: List of Collaborators,” instructions are amended to clarify that the collaborator list should be submitted as a single, consolidated list on a single tab in a single Excel file (Page 39-40 of this amended FOA).
5. In Section V.A, under “Initial Review Criteria,” the language has been amended to clarify that applications must address priority research opportunities or priority research directions described in one or more of the workshop reports listed in Section I (Page 57 of this amended FOA).

TABLE OF CONTENTS

UPDATES AND REMINDERS.....	I
SECTION I – FUNDING OPPORTUNITY DESCRIPTION.....	1
GENERAL INQUIRIES ABOUT THIS FOA	1
STATUTORY AUTHORITY	1
APPLICABLE REGULATIONS	1
SUMMARY	1
SUPPLEMENTARY INFORMATION	2
<i>DEFINITIONS</i>	8
SECTION II – AWARD INFORMATION.....	11
A. TYPE OF AWARD INSTRUMENT.....	11
B. ESTIMATED FUNDING	11
C. MAXIMUM AND MINIMUM AWARD SIZE.....	11
D. EXPECTED NUMBER OF AWARDS.....	12
E. PERIOD OF PERFORMANCE.....	12
F. TYPE OF APPLICATION.....	12
G. VALUE/FUNDING FOR DOE/NNSA NATIONAL LABORATORY CONTRACTORS AND NON-DOE/NNSA FFRDC CONTRACTORS.....	12
H. RESPONSIBILITY.....	13
SECTION III – ELIGIBILITY INFORMATION	14
A. ELIGIBLE APPLICANTS	14
B. COST SHARING.....	15
C. ELIGIBLE INDIVIDUALS.....	16
D. OTHER ELIGIBILITY REQUIREMENTS.....	16
SECTION IV – APPLICATION AND SUBMISSION INFORMATION	20
A. ADDRESS TO REQUEST APPLICATION PACKAGE.....	20
B. LETTER OF INTENT AND PRE-APPLICATION.....	20
C. APPLICATION CONTENT AND FORMS.....	27
D. SUBMISSIONS FROM SUCCESSFUL APPLICANTS.....	46
E. SUBMISSION DATES AND TIMES	47
F. INTERGOVERNMENTAL REVIEW.....	47
G. FUNDING RESTRICTIONS	48
H. OTHER SUBMISSION AND REGISTRATION REQUIREMENTS	48

SECTION V - APPLICATION REVIEW INFORMATION.....	57
A. CRITERIA	57
B. REVIEW AND SELECTION PROCESS	60
C. ANTICIPATED NOTICE OF SELECTION AND AWARD DATES	61
SECTION VI – AWARD ADMINISTRATION INFORMATION.....	62
A. AWARD NOTICES.....	62
B. ADMINISTRATIVE AND NATIONAL POLICY REQUIREMENTS.....	63
C. REPORTING	66
SECTION VII - QUESTIONS/AGENCY CONTACTS.....	67
A. QUESTIONS	67
B. AGENCY CONTACTS.....	67
SECTION VIII - OTHER INFORMATION	68
A. MODIFICATIONS	68
B. GOVERNMENT RIGHT TO REJECT OR NEGOTIATE.....	68
C. COMMITMENT OF PUBLIC FUNDS.....	68
D. PROPRIETARY APPLICATION INFORMATION	68
E. EVALUATION AND ADMINISTRATION BY NON-FEDERAL PERSONNEL.....	69
F. INTELLECTUAL PROPERTY DEVELOPED UNDER THIS PROGRAM.....	69
G. NOTICE OF RIGHT TO REQUEST PATENT WAIVER.....	69
H. NOTICE REGARDING ELIGIBLE/INELIGIBLE ACTIVITIES	70
I. ENVIRONMENTAL, SAFETY AND HEALTH (ES&H) PERFORMANCE OF WORK AT DOE FACILITIES.....	70
J. NATIONAL ENVIRONMENTAL POLICY ACT COMPLIANCE	70
K. AVAILABILITY OF FUNDS	71

UPDATES AND REMINDERS

PRE-APPLICATIONS

Pre-applications are required for all applications submitted in response to this Funding Opportunity Announcement (FOA). This is a different requirement than in previous Energy Frontier Research Centers FOAs, which required only a Letter of Intent. To be considered eligible for an award under this FOA, potential lead organizations are required to submit a pre-application in accordance with the instructions provided in Section IV.B.2, and to receive notification from DOE that they are allowed to submit a full proposal. Applications received from an applicant who has not submitted the required pre-application, or who has received notification from DOE that they are disallowed from submitting a full application, will be deemed non-responsive and will be rejected without further review.

RECOMMENDATION

The Office of Science encourages you to register in all systems as soon as possible. You are also encouraged to submit pre-applications and applications well before the deadline. (See Section IV. H OTHER SUBMISSION AND REGISTRATION REQUIREMENTS of this FOA).

AVOIDING ERRORS

The following advice is compiled from actual experiences of applicants for Office of Science financial assistance awards.

- Please ensure that the research narrative is comprised of one and only one PDF file, including all appendices, when it is attached to the SF-424(R&R) form.
- When using the Office of Science PAMS website at <https://pamspublic.science.energy.gov>, please avoid using the back-arrow button in your web browser to navigate.
- Please ensure that the application contains no personally identifiable information (PII).
- Please ensure that the budget is calculated using the applicable negotiated indirect cost and fringe benefit rates.

GRANTS.GOV WORKSPACE

Applications submitted through Grants.gov at <https://www.Grants.gov> may make use of the new online collaborative tool called “Workspace” to permit teams to simultaneously work on their application. More information is available at <https://www.grants.gov/web/grants/applicants/workspace-overview.html>.

RENEWAL APPLICATIONS

The Principal Investigator for any application submitted for a **renewal** (an addition of a project period) of an existing award will be required to submit a Renewal Proposal Products section through the Office of Science's PAMS website at <https://pamspublic.science.energy.gov>. The submitted product list will be sent for merit review as part of the application. The application will not be considered complete and cannot be sent for review until the product list has been submitted. **Note: EFRCs led by a DOE National Laboratory are not subject to this requirement.**

DATA MANAGEMENT PLAN

Applications submitted under this FOA are subject to the Office of Science Statement on Digital Data Management, published at <https://science.osti.gov/funding-opportunities/digital-data-management/>. Compliance with this statement is detailed in Part IV of this FOA.

ACKNOWLEDGMENT OF FEDERAL SUPPORT

The Office of Science published guidance about how its support should be acknowledged at <https://science.osti.gov/funding-opportunities/acknowledgements/>.

Section I – FUNDING OPPORTUNITY DESCRIPTION

GENERAL INQUIRIES ABOUT THIS FOA

Questions regarding the content of the FOA must be submitted through the FedConnect portal. You must register with FedConnect to respond as an interested party to submit questions, and to view responses to questions. It is recommended that you register as soon after release of the FOA as possible to have the benefit of all responses. More information is available on the FedConnect website (www.fedconnect.net).

Questions pertaining to the FedConnect registration process or the submission of questions through FedConnect should be directed by e-mail to support@FedConnect.net or by phone to the FedConnect Support Center at 1-800-899-6665.

STATUTORY AUTHORITY

Public Law 95-91, Department of Energy Organization Act
Public Law 109-58, Energy Policy Act of 2005

APPLICABLE REGULATIONS

Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards, codified at 2 CFR 200
U.S. Department of Energy Financial Assistance Rules, codified at 2 CFR 910
U.S. Department of Energy, Office of Science Financial Assistance Program Rules, codified at 10 CFR 605

SUMMARY

The Department of Energy's (DOE) Office of Basic Energy Sciences (BES) announces the call for Energy Frontier Research Centers (EFRC) proposals and encourages both new and renewal applications. Applications will be required to address priority research directions and opportunities identified in recent BES workshop and roundtable reports, the scientific grand challenges identified in the report *Directing Matter and Energy: Five Challenges for Science and the Imagination*, **and** the opportunities described in the report *Challenges at the Frontiers of Matter and Energy: Transformative Opportunities for Discovery Science*. All of these reports are described below. BES is soliciting proposals in four (4) topical areas: 1) Environmental Management (new and renewal proposals); 2) Quantum Information Science (new proposals only); 3) Microelectronics (new proposals only); and 4) Polymer Upcycling (new proposals only). Funding will be competitively awarded to the successful Energy Frontier Research Center applications selected by Federal officials, based on a rigorous merit review process as detailed in Section V of this Funding Opportunity Announcement (FOA).

SUPPLEMENTARY INFORMATION

Background

The mission of the Basic Energy Sciences (BES) program is to support fundamental research to understand, predict, and ultimately control matter and energy at the electronic, atomic, and molecular levels in order to provide the foundations for new energy technologies and to support DOE's mission emphases in energy, the environment, and national security. BES has long invested in innovative basic research to advance the DOE mission through BES's core research areas.

The EFRC program, initiated in 2009, brings together the skills, talents, and expertise of teams of scientists to perform energy-relevant, basic research with a scope and complexity beyond what is possible in standard single-investigator or small-group awards. These multi-investigator, multi-disciplinary centers enable, encourage, and accelerate transformative scientific advances for the most challenging topics in materials sciences, chemical sciences, geosciences, and biosciences. EFRCs conduct fundamental research focused on one or more grand challenges, transformative opportunities, and basic research needs identified in major strategic planning efforts by BES and the scientific community.

More information about the EFRC program can be found here:

<https://science.osti.gov/bes/efrc>

Establishing Priority Research Directions for Basic Energy Science

In 2002, the Basic Energy Sciences Advisory Committee (BESAC) invited leaders of the scientific community to a weeklong workshop to assess the scope of fundamental scientific research that must be considered to address the DOE mission. This resulted in the 2003 report, [*Basic Research Needs to Assure a Secure Energy Future*](#). Over the last decade and a half, that report inspired a series of “**Basic Research Needs**” workshops involving thousands of participants from universities, industry, and national laboratories, which established Priority Research Directions (PRDs) for basic energy science. In addition, in recent years BES has organized focused Roundtable Discussions that have led to reports that identify Priority Research Opportunities (PROs) in areas of strategic interest. Together, the reports from these workshops highlight the remarkable scientific evolution that has taken place during the past few decades. The resulting scientific challenges describe a new era of science in which researchers can design, manipulate, and ultimately control materials functionalities and chemical transformations.

This FOA solicits proposals for EFRCs that will address the PRDs/PROs identified in one or more of the following four (4) reports (listed in reverse chronological order):

- ***Roundtable on Chemical Upcycling of Polymers***

https://science.osti.gov/-/media/bes/pdf/BESat40/Polymer_Upcycling_Brochure.pdf

This Roundtable Report identified the following four Priority Research Opportunities (PROs) in the area of polymer upcycling:

- PRO 1: Master the mechanisms of polymer deconstruction/reconstruction
- PRO 2: Understand and discover integrated processes to upcycle mixed plastics
- PRO 3: Design next generation polymers for chemical circularity
- PRO 4: Develop novel tools to discover and control mechanisms for macromolecular transformations

NOTE: Applications in this topical area should propose research that *addresses at least two of these PROs*. Applications that focus only on a single PRO will be considered non-responsive and will be declined without review.

- ***Basic Research Needs for Microelectronics***

https://science.osti.gov/-/media/bes/pdf/reports/2019/BRN_Microelectronics_rpt.pdf

This BRN Report identified the following five Priority Research Directions (PRDs) in areas related to the development of future microelectronics:

- PRD 1: Flip the current paradigm: Define innovative material, device, and architecture requirements driven by applications, algorithms, and software
- PRD 2: Revolutionize memory and data storage
- PRD 3: Reimagine information flow unconstrained by interconnects
- PRD 4: Redefine computing by leveraging unexploited physical phenomena
- PRD 5: Reinvent the electricity grid through new materials, devices, and architectures

NOTE: This workshop was sponsored by the Offices of Basic Energy Sciences (BES), Advanced Scientific Computing Research (ASCR), and High Energy Physics (HEP). Applications must focus on science goals that are aligned with the BES mission in materials and chemical sciences. In addition, this workshop report identifies the need for a new “co-design ecosystem” in which diverse scientific disciplines inform and engage each other, with multi-directional information flow, to achieve orders of magnitude improvements in system-level performance. Applications responding to this topical area should embrace this goal, with particular emphasis on materials and chemistry; the physics of computing, communications, and power; and with a view toward devices, circuits, and component integration. System architecture, network design, algorithms, and software are typically outside the scope of the BES mission and therefore outside the scope of this FOA. However, EFRCs awarded in this area will be encouraged explore opportunities to coordinate with other funded activities, including the SciDAC Institutes (<https://www.scidac.gov/>) and other projects supported by ASCR, to ensure success of the co-design model.

In addition, DOE recognizes that fundamental microelectronics research can potentially benefit from strong public-private partnerships, and therefore applicants to this topical area are encouraged to consider opportunities to include industrial partners or collaborators in EFRC research.

- ***Roundtable on Opportunities for Basic Research for Next-Generation Quantum Systems***

https://science.osti.gov/-/media/bes/pdf/reports/2018/Quantum_systems.pdf

This Roundtable Report identified four Priority Research Opportunities (PROs) in the area of quantum systems. For the purposes of this FOA, BES is soliciting proposals that are responsive only to the following two PROs:

- PRO 3: Discover Novel Approaches for Quantum-to-Quantum Transduction
- PRO 4: Implement New Quantum Methods for Advanced Sensing and Process Control

NOTE: Applications that address only PRO 1 and/or PRO 2 from this report will be considered non-responsive to the FOA and will be declined without review. For both PRO 3 and PRO 4, applications must place emphasis on answering fundamental scientific questions aligned with the BES mission in materials and chemical sciences, not on developing devices or systems. In the case of PRO 4, applications should focus on sensing and process control research of relevance to the BES mission in materials sciences, chemical sciences, geosciences, and biosciences, and/or on future capabilities relevant to DOE x-ray, neutron, and nanoscience user facilities. Applications to construct beamlines, end stations, or related major equipment procurements will be considered non-responsive to the FOA and will be declined without review.

In addition, applicants should be aware of the DOE Advanced Scientific Computing Research (ASCR) quantum testbeds, including benchmarking, systems integration expertise, and potential testing capabilities for new qubit architectures that could accelerate their research. Information on these activities can be found here: https://science.osti.gov/~media/ascr/pdf/funding/2018/ASCR_Quantum_Information_Science_Awards_FY-2018.pdf

Applicants should also be aware of the ASCR Quantum Computing and Quantum Networking awards, which can be found here: https://science.osti.gov/-/media/ascr/pdf/funding/2019/ASCR_Quantum_Computing_and_Quantum_Networking_Awards_FY-2019.pdf

EFRCs awarded in this area will be encouraged to explore opportunities to coordinate with ASCR-funded efforts in quantum testbeds, quantum computing, and quantum networking.

- ***Basic Research Needs for Environmental Management***

[https://science.osti.gov/-](https://science.osti.gov/-/media/bes/pdf/reports/2016/Basic_Research_Needs_for_Environmental_Management_rpt.pdf)

[/media/bes/pdf/reports/2016/Basic_Research_Needs_for_Environmental_Management_rpt.pdf](https://science.osti.gov/-/media/bes/pdf/reports/2016/Basic_Research_Needs_for_Environmental_Management_rpt.pdf)

This report lays out key priority research directions (PRDs) that are most likely to have a dramatic future impact on cleanup and long-term storage of nuclear waste, including the following five that are relevant to this FOA:

- PRD 1: Elucidating and exploiting complex speciation and reactivity far from equilibrium
- PRD 2: Understanding and controlling chemical and physical processes at interfaces
- PRD 3: Harnessing physical and chemical processes to revolutionize separations
- PRD 4: Mechanisms of materials degradation in harsh environments
- PRD 5: Mastering hierarchical structures to tailor waste forms

NOTE: This workshop was sponsored by the Offices of Basic Energy Sciences (BES), Advanced Scientific Computing Research (ASCR), and Biological and Environmental Research (BER). Applications must focus on science goals that are aligned with the BES mission in materials science, chemical science, geoscience, and bioscience. Research related to Predictive Understanding of Subsurface System Behavior and Response to Perturbations (PRD 6), including contaminant fate and transport in subsurface geological environments, is outside the scope of this FOA.

Applications submitted in response to this FOA must propose scientific research that addresses PRDs/PROs identified in one or more of the four bold, bulleted reports listed on pages 3-5. Applications that address PRDs/PROs identified only in other reports NOT explicitly listed in this FOA will be considered non-responsive to the FOA and will be declined without review.

Science Grand Challenges and Transformative Opportunities

The BES mission to direct and control matter at the electronic, atomic, and molecular levels, requires new insights into the complexity that governs material properties and processes at the quantum level. A series of workshops in 2006 and 2007 examined the primary roadblocks to progress and resulted in the following BESAC report, which defined five **grand challenges** for science:

Directing Matter and Energy: Five Challenges for Science and the Imagination.

https://science.osti.gov/~media/bes/pdf/reports/files/Directing_Matter_and_Energy_rpt.pdf

In this report, a new era for energy science was posed in five **grand challenges**:

- *How do we control material processes at the level of electrons?*
- *How do we design and perfect atom- and energy-efficient synthesis of revolutionary new forms of matter with tailored properties?*

- *How do remarkable properties of matter emerge from complex correlations of the atomic or electronic constituents and how can we control these properties?*
- *How can we master energy and information on the nanoscale to create new technologies with capabilities rivaling those of living things?*
- *How do we characterize and control matter away – especially very far away – from equilibrium?*

In 2015, in response to a charge to revisit this 2007 grand challenge report, BESAC convened a committee of experts and issued the following report:

Challenges at the Frontiers of Matter and Energy: Transformative Opportunities for Discovery Science.

https://science.osti.gov/~media/bes/besac/pdf/Reports/Challenges_at_the_Frontiers_of_Matter_and_Energy_rpt.pdf

This report identified five **transformative opportunities** for discovery science:

- *Mastering Hierarchical Architectures and Beyond-Equilibrium Matter*
- *Beyond Ideal Materials and Systems: Understanding the Critical Roles of Heterogeneity, Interfaces, and Disorder*
- *Harnessing Coherence in Light and Matter*
- *Revolutionary Advances in Models, Mathematics, Algorithms, Data, and Computing*
- *Exploiting Transformative Advances in Imaging Capabilities across Multiple Scales*

Applications submitted in response to this FOA must propose research that addresses one or more of the grand challenges and that embodies one or more of the transformative opportunities.

Purpose and Objectives

To implement the scientific recommendations of the reports outlined above, BES is seeking new and renewal applications for EFRCs. Applicants must propose research that directly addresses priority research directions or priority research opportunities identified in one or more of the workshop/roundtable reports listed above. In addition, applications must address one or more of the grand challenges identified in *Directing Matter and Energy: Five Challenges for Science and the Imagination* while also leveraging one or more of the transformative opportunities outlined in *Challenges at the Frontiers of Matter and Energy: Transformative Opportunities for Discovery Science*.

Note: The purpose of the EFRC program does not include construction (including new buildings or additions to existing building), and costs for such activities will not be funded by awards resulting from this FOA. In addition, the focus of the EFRC program is on fundamental scientific research, therefore awards resulting from this FOA must not support applied research or technology development activities.

Management, Impact and Output

BES expects the EFRCs to accelerate scientific breakthroughs in areas relevant to the DOE mission by addressing problems with scope, complexity and risk that are beyond the capabilities of single investigator or small-group projects. BES's stewardship of the EFRC projects is an important feature of the program. A variety of methods are used to regularly assess the ongoing progress of the EFRCs, including annual progress reports, monthly phone calls between BES program managers and the EFRC Directors, periodic Directors' meetings, on-site visits by program managers, and in-person reviews by outside experts. BES also organizes biennial Principal Investigators' Meetings to facilitate collaboration and information exchange among the EFRCs. To date, all EFRCs have undergone a management and operations review during the first year of operation, as well as a mid-term scientific progress review approximately half way through each funding cycle; each of these reviews has included external peer reviewers.

The EFRCs should bring together a diverse group of world-class scientists from different disciplines to tackle challenging problems in new ways; to provide an environment that encourages high-risk, high-reward research that would not likely be done otherwise; to integrate synthesis, characterization, theory, and computation to accelerate the rate of scientific progress; to develop new, innovative experimental and theoretical tools that illuminate fundamental processes in unprecedented detail; and to create an enthusiastic, inter-disciplinary community of energy-focused scientists. Successful EFRCs will fully exploit this "team science" model, working closely together in an integrated, centrally managed center to address an energy-focused mission with well-defined 4-year scientific research goals.

The primary purpose of the EFRCs is to support integrated, multi-disciplinary teams of researchers performing fundamental science. Dissemination of results through peer-reviewed publications is a necessary measure of success. In addition, DOE anticipates that some EFRC basic research will have potential technological value. When appropriate, EFRCs are encouraged to file for patent protection. Recipients are also encouraged to explore opportunities to accelerate the transition of promising scientific results to technology development and commercial applications outside of the EFRC; **EFRC awards must not support applied research or technology development.**

More information about management of EFRCs can be found in this document:

<https://science.osti.gov/-/media/bes/efrc/pdf/history/other/EFRC-Ref---Good-Practices-2017-12-v2.pdf>

Open Science

The DOE Office of Science is dedicated to promoting the values of openness in Federally-supported scientific research, including, but not limited to, ensuring that research may be reproduced and that the results of Federally-supported research are made available to other researchers. These objectives may be met through any number of mechanisms including, but not limited to, data access plans, data sharing agreements, the use of archives and repositories, and the use of various licensing schemes.

Collaboration

Collaborative applications, e.g. submissions of identical proposals by different institutions, will not be accepted under this FOA except as described in Section II A, Type of Award Instrument. Group/team efforts must be submitted by the lead institution with subawards to teaming institutions as described below.

Definitions

Basic/Fundamental Research: Basic/Fundamental Research is defined as experimental or theoretical work undertaken primarily to acquire new knowledge of the underlying foundations of phenomena and observable facts. Basic/Fundamental research may include activities with broad or general applications in mind but should exclude research directed towards a specific application or requirement.

DOE/NNSA National Laboratories: DOE/NNSA National Laboratories are those laboratories defined as a National Laboratory by Section 2 (3) of the Energy Policy Act of 2005 (EPAct 05), which are listed below:

- (A) Ames Laboratory
- (B) Argonne National Laboratory
- (C) Brookhaven National Laboratory
- (D) Fermi National Accelerator Laboratory
- (E) Idaho National Laboratory
- (F) Lawrence Berkeley National Laboratory
- (G) Lawrence Livermore National Laboratory
- (H) Los Alamos National Laboratory
- (I) National Energy Technology Laboratory
- (J) National Renewable Energy Laboratory
- (K) Oak Ridge National Laboratory
- (L) Pacific Northwest National Laboratory
- (M) Princeton Plasma Physics Laboratory
- (N) Sandia National Laboratories
- (O) Savannah River National Laboratory
- (P) Stanford Linear Accelerator Center
- (Q) Thomas Jefferson National Accelerator Facility

EFRC Director: The EFRC Director is the lead Principal Investigator and must be employed or have an agreement in place to be hired by the lead organization (prime applicant/prime recipient) at the time of award. Each EFRC application must identify a single Director; no co-directorship is allowed. The EFRC Director will serve as the primary contact responsible for communications with the DOE Program Manager on behalf of all of the Principal Investigators in the EFRC. In consultation with the DOE Program Manager, the EFRC Director may delegate some informal technical discussions and information exchange to other members of the center. The EFRC Director should commit a substantial amount of his/her time to the EFRC.

Lead Organization: The lead organization is the prime applicant with whom DOE will enter into a prime award relationship. Any teaming arrangement must have only one designated lead organization that will submit a pre-application and an application on behalf of the team members. The lead organization must perform a greater percentage of the effort than any other partner organization or subawardee. The percentage of effort will be determined by reviewing the total budget for each participating organization as a percentage of proposed total project costs.

Merit Review: A thorough, consistent, and objective examination of applications based on pre-established criteria by persons who are independent of those submitting the application and who are knowledgeable in the field of endeavor for which support is requested.

Merit Review Panel (MRP): A group of reviewers who are selected by Federal officials based upon their expertise and professional qualifications in one or more of the scientific and technical fields involved in the applications.

New Application: A new application is: 1) An application for funding to create a new EFRC that has not previously received DOE funding; 2) An application for continued research from the same lead organization as a current EFRC but with a significant change in scientific research; or 3) An application to continue research performed under an existing EFRC but with a new lead organization. Successful new applications will be funded for an initial period up to four years.

Principal Investigator: A Principal Investigator is an individual designated by the lead organization to have the appropriate level of authority and responsibility to direct research supported by the award. The lead organization may designate multiple individuals as Principal Investigators who share the authority and responsibility for leading and directing the project, intellectually and logistically. When multiple Principal Investigators are named, each is responsible and accountable to the lead organization, or as appropriate, to a collaborating organization for the proper conduct of the project or program including the submission of all required reports. The presence of more than one Principal Investigator on an application or award diminishes neither the responsibility nor the accountability of any individual Principal Investigator.

Renewal Application: A renewal application is an application requesting additional funding for an existing EFRC for a period subsequent to that provided by a current award. Renewal applications compete for funds with all other peer-reviewed applications and must be developed as fully as though the applicant is applying for the first time. Renewal EFRC applications must be submitted by the same lead organization as the current EFRC for which renewal funding is requested, and should propose innovative research that builds upon and extends the work that has been done under the current EFRC award. Successful renewal applications will be funded for an additional period up to four years, which will be treated as an extension of the current project period.

Selection Official: The DOE official authorized to select applications for funding after considering the merit review findings, Federal officials' recommendations, program policy and management factors, and the amount of funds available.

Senior/Key Personnel: A senior/key person is any individual who contributes to the scientific development or execution of a project in a substantive, measurable way, whether or not they receive salaries or compensation under the grant. This definition includes, but is not limited to, the EFRC Director and the Principal Investigators. Senior/key personnel typically have doctoral or other professional degrees and a permanent position. Consultants may also be considered senior/key personnel if they meet this definition. For the EFRCs, effort "as needed" is not an acceptable level of involvement for Senior/Key Personnel.

Section II – AWARD INFORMATION

A. TYPE OF AWARD INSTRUMENT

DOE may award a field work authorization, an interagency agreement, or a grant under this FOA. A DOE field work authorization or other appropriate instrument will be awarded to a successful DOE/NNSA National Laboratory Contractor. Participation by non-DOE/NNSA Federal agencies and their Federally Funded Research and Development Center (FFRDC) Contractors as subawardees (team members) will be funded under an interagency agreement (see Section III. A. ELIGIBLE APPLICANTS). A grant will be awarded to any other successful entity including, but not limited to, universities, nonprofit organizations, and for-profit organizations.

DOE will consider funding multi-institution collaborations under this FOA (see “Team Arrangements” in Section III. D. OTHER ELIGIBILITY REQUIREMENTS).

B. ESTIMATED FUNDING

DOE expects to make multiple EFRC awards for a period of up to four years for each award. While this funding opportunity does not provide for multi-year appropriations, based on the FY 2020 appropriation¹ total funding of up to \$100,000,000 (\$25,000,000 annually funded per year) is expected to be available to support the awards from this FOA. DOE is under no obligation to pay for any costs associated with preparation or submission of applications. DOE reserves the right to fund, in whole or in part, any, all, or none of the applications submitted in response to this FOA.

Funding for all awards and future budget periods is contingent upon the availability of funds appropriated by Congress, which could be greater or less than the expected funding level stated above.

C. MAXIMUM AND MINIMUM AWARD SIZE

(See B. Estimated Funding section above.)

DOE anticipates that award sizes will range from \$2,000,000 per year to \$4,000,000 per year. The award sizes will depend on the merit review, the number of meritorious applications, and the availability of appropriated funds. For renewal proposals, notwithstanding the “Floor” identified below, DOE may consider limited-term renewal awards to allow for the completion of research projects and orderly closeout of EFRCs that do not merit long-term continued support. Annual funding for such awards could fall below the \$2,000,000 floor. Recognizing that new centers take some time to ramp up full operations, for new awards DOE may award less in Year 1 of the four-year project period than in subsequent years.

¹ <https://appropriations.house.gov/sites/democrats.appropriations.house.gov/files/HR%201865%20-%20Division%20C%20-%20EW%20SOM%20FY20.pdf>

Ceiling

\$4,000,000 per award per year (\$16,000,000 per award for a 4-year period)

Floor

\$2,000,000 per award per year (\$8,000,000 per award for a 4-year period)

D. EXPECTED NUMBER OF AWARDS

(See B. Estimated Funding section above.)

The exact number of awards will depend on the number of meritorious applications and the availability of appropriated funds. DOE reserves the right to fund, in whole or in part, any, all, or none of the applications submitted in response to this FOA.

E. PERIOD OF PERFORMANCE

(See B. Estimated Funding section above.)

Awards are expected to be made for a period of up to four years. For renewal proposals, DOE may consider limited-term renewal awards to allow for the completion of research projects and orderly closeout of EFRCs that do not merit long-term continued support. The duration of such awards would not exceed two years.

Continuation funding (funding for subsequent budget periods) is contingent on: (1) availability of funds appropriated by Congress and future year budget authority; (2) substantial progress towards meeting the objectives of the approved application; (3) submittal of required reports; and (4) compliance with the terms and conditions of the award. Additionally, funding for the final two years of the four-year project period will likely be contingent upon satisfactory completion of an extensive mid-term progress review, which may include an external peer review. BES will use the mid-term progress review to assess the productivity and impact of each EFRC and progress toward meeting the stated four-year scientific research goals.

F. TYPE OF APPLICATION

DOE will accept new and renewal applications under this FOA. Renewal applications will be accepted only for EFRCs that were initially funded in FY 2016 as a result of the EFRC Funding Opportunity Announcement DE-FOA-0001514 issued on February 8, 2016.

G. VALUE/FUNDING FOR DOE/NNSA NATIONAL LABORATORY CONTRACTORS AND NON-DOE/NNSA FFRDC CONTRACTORS

For grant awards, the value of, and funding for, a DOE/NNSA National Laboratory Contractor, a non-DOE/NNSA FFRDC Contractor, or another Federal agency's portion of the work will not be included in the award to the successful applicant. DOE will fund a DOE/NNSA National Laboratory contractor through the DOE field work authorization system or other appropriate process and will fund non-DOE/NNSA FFRDC Contractors and other Federal agencies through an interagency agreement in accordance with the Economy Act, 31 U.S.C. 1535, or other statutory authority.

H. RESPONSIBILITY

The successful prime applicant/awardee (lead organization) 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 lead organization and any team member, and/or subawardee.

If an award or subaward is made to a DOE/NNSA National Laboratory Contractor, all Disputes and Claims will be resolved in accordance with the terms and conditions of the DOE/NNSA National Laboratory Contractor's Management and Operating (M&O) contract, as applicable, in consultation between DOE and the lead organization.

If a subaward is made to another Federal agency or its FFRDC Contractor, all Disputes and Claims will be resolved in accordance with the terms and conditions of the interagency agreement in consultation between DOE and the lead organization.

Section III – ELIGIBILITY INFORMATION

A. ELIGIBLE APPLICANTS

1. INDIVIDUALS

U.S. citizens and lawful permanent residents are eligible to apply for funding as a prime recipient (lead organization) or subawardee (team member).

2. DOMESTIC ENTITIES

For-profit entities, educational institutions, and nonprofit entities² that are incorporated (or otherwise formed) under the laws of a particular State or territory of the United States are eligible to apply for funding as the lead organization or team member.

State, local, and tribal government entities are eligible to apply for funding as the lead organization or team member.

DOE/NNSA National Laboratory Contractors are eligible to apply for funding as the lead organization or team member, if their cognizant DOE/NNSA Contracting Officer provides written authorization. (See Section III. D for submission requirements.)

Non-DOE/NNSA FFRDCs and non-DOE Government Owned/Government Operated entities (GOGOs) are eligible to apply for funding as a team member, but are not eligible to apply as the lead organization. The cognizant Contracting Officer for the Federal agency sponsoring the FFRDC contractor must authorize in writing the participation of the FFRDC contractor on the proposed project. (See Section III. D for submission requirements.)

Federal agencies and instrumentalities (other than DOE) are eligible to apply for funding as a team member, but are not eligible to apply as the lead organization.

3. 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 lead organizations receiving funding under this FOA must be incorporated (or otherwise formed) under the laws of a State or territory of the United States. If a foreign entity applies for funding as a lead organization, it must designate in the pre-application and 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 lead organization. The pre-application and full application must state the nature

²Nonprofit 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.

of the corporate relationship between the foreign entity and domestic subsidiary or affiliate. Foreign entities may request a waiver of this requirement in the full application. See Section IV.C.7. for waiver request information. DOE has discretion to waive this requirement if it determines that it will further the purposes of this FOA and is otherwise in the interests of DOE.

A foreign entity, with or without a subsidiary or affiliate incorporated (or otherwise formed) under the laws of a state or territory of the United States, may receive funding as a team member.

4. INCORPORATED CONSORTIA

Incorporated consortia, which may include domestic and/or foreign entities, are eligible to apply for funding as the lead organization or team member. 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 DOE Contracting Officer. The Consortium Agreement must describe its:

- 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.

5. UNINCORPORATED CONSORTIA

Unincorporated consortia (team arrangements), which may include domestic and foreign entities, must designate one member of the consortium to serve as the prime recipient/consortium representative (lead organization). The prime recipient/consortium representative must be incorporated (or otherwise formed) under the laws of a State or territory of the United States.

Upon request, unincorporated consortia must provide the DOE Contracting Officer with a the same or similar documents as required of Incorporated Consortia the paragraph above and must also, upon written request, provide a written description of its internal governance structure and its internal rules to the DOE Contracting Officer. The Consortium Agreement must also contain the same description the Incorporated Consortia section above.

B. COST SHARING

Cost sharing is not required.

C. ELIGIBLE INDIVIDUALS

Individuals with the skills, knowledge, and resources necessary to carry out the proposed research as a Principal Investigator are invited to develop an application. Individuals from underrepresented groups as well as individuals with disabilities are encouraged to apply.

D. OTHER ELIGIBILITY REQUIREMENTS

Pre-Application

To be considered eligible for an award under this FOA, potential lead organizations are required to submit a pre-application in accordance with the instructions provided in Section IV.B.2, and to receive notification from DOE that they are allowed to submit a full proposal. Applications received from an applicant who has not submitted the required pre-application, or who has received notification from DOE that they are disallowed from submitting a full application, will be deemed non-responsive and will be rejected without further review.

The lead organization identified in an application must be the same lead organization identified in the required pre-application. **If an application is received for which the lead organization has changed since submission of the pre-application, then the application will be deemed non-responsive and will be rejected without further review.** The lead Principal Investigator (EFRC Director) should not be changed unless unavoidable and only minor edits should be made, if necessary, to the title of the project. If necessary, the applicant may make changes to other senior/key personnel and other participating institutions, although DOE discourages extensive changes.

Limitation on Number of Applications Submitted by a Lead Organization

An entity may not submit more than two applications as the lead organization. **If more than two applications are received from an institution, DOE will consider only the first two applications that match a qualified pre-application (as described below in Section IV.B.2). The remaining applications will be deemed non-responsive and rejected without further review.** However, there is no limitation on the number of applications in which a specific entity may participate as a subawardee (team member).

Limitation on Number of Applications Submitted by an EFRC Director

The EFRC Director is the lead Principal Investigator and must be employed or have an agreement in place to be hired by the lead organization. An individual may not be named as the EFRC Director on more than one application. Directors of existing EFRC awards that do not have project end dates in 2020 cannot be named as the EFRC Director on any application in response to this FOA. **If the proposed EFRC Director will not be employed by the lead organization, the application will be deemed non-responsive and will be rejected without further review. Further, if more than one application is received from an applicant identifying the same individual as the EFRC Director, DOE will consider only the**

application (if any) that matches a qualified pre-application (as described in Section IV.B.2). The remaining applications will be deemed non-responsive and rejected without further review. However, there is no restriction on the number of applications in which an individual may participate as a Principal Investigator or senior/key personnel.

Team Arrangements

Entities proposing as a team must designate a lead organization. Pre-applications and applications must be submitted on behalf of the team members by the lead organization and DOE will enter into a prime award relationship with the designated lead organization. Only one pre-application and one application is to be submitted for each team. The designated lead organization, i.e., the prime applicant, must perform a greater percentage of the effort than any other partner organization or subawardee. The percentage of effort will be determined by reviewing the total budget for each participating organization as a percentage of proposed total project costs. **If an application is received in which the lead organization is not performing a greater percentage of the effort than each of the other institutional partners, team members, or subawardees, as determined by the budget, the application will be deemed non-responsive and rejected without further review.**

Eligible/Ineligible Entities

If an application is received that includes an ineligible entity, or an employee of an ineligible entity performing activities as a team member and/or subawardee, the portion of the application attributed to that ineligible entity or employee of an ineligible entity will be deemed non-responsive and rejected without further review. Note, however, that otherwise ineligible entities are not precluded from serving as vendors of materials, supplies, equipment, and providing scientific and technical advisory services to a proposed EFRC, if they are acting purely in that role. Scientific and technical advisory services allow for the provision of scientific and technical expertise without actually performing research activities; examples of such services include serving as members of advisory committees and technical peer review panels or participation in scientific workshops or conferences.

DOE/NNSA National Laboratory Contractors

DOE/NNSA National Laboratory Contractor applicants are eligible to apply for funding as the lead organization or team member under this announcement if their cognizant DOE/NNSA Contracting Officer provides written authorization. This authorization should be submitted with the application as part of the Budget for DOE/NNSA National Laboratory Contractor File. [This is not required for the National Energy Technology Laboratory because it is a GOGO facility.] **Please note that failure to provide this authorization may result in rejection of a proposal without merit review.** If a DOE/NNSA National Laboratory Contractor is selected for award, or proposed as a team member, the proposed work will be authorized under the DOE field work authorization system or other appropriate process and performed under the laboratory Contractor's M&O contract, as applicable. The following wording is acceptable for the 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/NNSA assigned programs at the laboratory.”

Failure to submit the authorization with the application may result in rejection of the application without merit review.

Non-DOE/NNSA Federal Agencies and their FFRDC Contractors

Non-DOE/NNSA Federal agencies and their FFRDC contractors are not eligible for a prime award under this announcement, but may be proposed as a team member on another entity's application subject to the following guidelines:

The prime applicant must obtain written authorization for non-DOE/NNSA FFRDC participation. The cognizant Contracting Officer for the Federal agency sponsoring the FFRDC contractor must authorize in writing the participation of the FFRDC contractor on the proposed project and this authorization should be submitted with the application. The written authorization must also contain a determination that the use of a FFRDC contractor is consistent with the contractor's authority under its award and does not place the FFRDC contractor in direct competition with the private sector, in accordance with FAR Part 17.5. **Please note that failure to provide this authorization may result in rejection of a proposal without merit review.**

The following wording is acceptable for the 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 _(insert agency)_ assigned programs at the laboratory. This laboratory is authorized to perform the work proposed in the application submitted under DOE Funding Opportunity Announcement # DE-FOA-0002204 by the following statutory authority _(insert statute name, citation, and section)_ .”

Failure to submit the authorization with the application may result in rejection of the application without merit review.

Performance of Work in the United States

DOE requires all work performed by the prime recipient under funding agreements resulting from this FOA to be performed in the United States – i.e., a prime recipient must expend 100% of its total project costs in the United States.

This requirement does not apply to travel, to equipment, to materials and supply purchases, or to the use of user facilities. Like all proposed costs, proposed travel, equipment, and material and supply costs will be evaluated to determine whether the costs are necessary and appropriate for the conduct of the effort. Furthermore, it is the sense of the Congress that, to the greatest extent

practicable, all equipment and products purchased with funds made available under awards resulting from this FOA should be American-made.

Work funded as a subaward from the prime recipient may be performed outside of the United States.

Applicants may request a waiver of this requirement. To do so, applicants must include a written waiver request in the full application. DOE has discretion to waive this requirement if it determines that it will further the purposes of this FOA and is otherwise in the interests of DOE. See Section IV.C.7 of the FOA for waiver request information.

DATA MANAGEMENT PLAN:

A Data Management Plan as described in Section IV. “Application Contents and Forms” - Appendix 6, is required. Applications that do not have a Data Management Plan may be deemed nonresponsive and may not be reviewed.

Section IV – APPLICATION AND SUBMISSION INFORMATION

A. ADDRESS TO REQUEST APPLICATION PACKAGE

Application forms and instructions are available at Grants.gov. To access these materials, go to <https://www.grants.gov>, select “Apply for Grants”, and then select “Download Application Package.” Enter the CFDA number (81.049) and/or the funding opportunity number (DE-FOA-0002204) shown on the cover of this FOA and then follow the prompts to download the application package.

Applications submitted through www.FedConnect.net will not be accepted.

B. LETTER OF INTENT AND PRE-APPLICATION

1. Letter of Intent (LOI)

A Letter of Intent is not required or invited.

2. Pre-application

DUE DATE: JANUARY 16, 2020 AT 5:00 PM EASTERN TIME

ENCOURAGE/DISCOURAGE DATE: FEBRUARY 25, 2020 AT 5:00 PM EASTERN TIME

A Pre-Application is *required* for all applications. **Any application received for which there is not an associated pre-application in response to which DOE allowed a full application will be deemed non-responsive and will be rejected without further review.** In addition, the lead organization identified in the full application must be the same lead organization identified in the pre-application. **If an application is received for which the lead organization has changed since submission of the pre-application, the application will be deemed non-responsive and will be rejected without further review.** The Lead PI (EFRC Director) should not be changed unless unavoidable and only minor edits should be made, if necessary, to the title of the project. If necessary, the applicant may make changes to other senior/key personnel and other participating institutions, although DOE discourages extensive changes.

The pre-application should include a cover page with the following information:

- Pre-application Title (this is the EFRC Name)
- Lead Principal Investigator Name, Job Title, Email address (this is the EFRC Director)
- Lead Organization
- List of all Partner Organizations
- Funding Opportunity Announcement Number: DE-FOA-0002204

This cover page must be signed by an official of the lead organization who has the authority to commit institutional/entity support for the application and by the proposed EFRC Director. For DOE National Laboratory contractor applicants, the institutional/entity official who signs the cover page should be the Laboratory Director. For other applicants, the

official who signs the cover page should be someone who has authority over research activities for the entire institution/entity, such as the Vice President for Research, Chief Technology Officer, or the equivalent. **All applicants must provide both of these signatures on the pre-application cover page.** Applicants that fail to provide both signatures on the pre-application must provide a corrected pre-application with both signatures on or before January 30, 2020 in order for their pre-application to be considered.

The cover page should be followed by a narrative description of the mission, scientific goals, and research approaches, an potential scientific impact of the proposed EFRC, including at least the following elements:

- A clear and concise statement of the scientific mission of the proposed EFRC;
- An explicit set of four-year research goals designed to support that mission;
- A description of the research methods and approaches that will be used to achieve the goals of the EFRC;
- An explanation of the potential scientific impact of the proposed research and the need for an integrated, multi-disciplinary research team to conduct it;
- A discussion of how the proposed research is responsive to the objectives of this FOA. Specifically, to be responsive the research must address the priority research directions or opportunities identified in one or more of the *Basic Research Needs* and *Roundtable* reports listed in Section I of this FOA; address one or more of the grand challenges defined in the report *Directing Matter and Energy: Five Challenges for Science and the Imagination*; and embody one or more of the transformative opportunities defined in the report *Challenges at the Frontiers of Matter and Energy: Transformative Opportunities for Discovery Science*.

NOTE: As stated in Section I, pre-applications that propose research relevant to *Chemical Upcycling of Polymers* must identify **at least two** of the four PROs from that report in order to be responsive to the FOA.

This description of the proposed EFRC should not exceed five pages (excluding the cover page) when printed on 8.5 X 11 inch paper, with a minimum text font size no smaller than Times New Roman 12 point and margins no smaller than one inch on all sides. Any figures and references, if included, must fit within the five-page limit. If the pre-application exceeds five pages, only content on the first five pages will be read and considered.

In addition, following the five-page narrative, the pre-application should include the following four tables, which will not count toward the five-page limit:

Reports addressed by the pre-application

BRN/Roundtable Reports and PRD/PROs Addressed*	
BRN or Roundtable Report	PRD/PRO Addressed by pre-application

Grand Challenges (GC) and Transformative Opportunities (TO) Addressed**

* Should include all reports and PRD/PROs addressed by the pre-application, listed in priority order, with the primary report and PRD/PRO listed first followed by any secondary ones that are addressed. The applicable reports and PRD/PROs are listed in Section I of this FOA; no other reports or PRD/PROs should be included here. Each PRD/PRO should be included as a separate line in the Table, therefore if the pre-application addresses multiple PRD/PROs from a given report, that report should be listed multiple times.

** Should include at least one grand challenge and at least one transformative opportunity from the two BESAC reports listed in Section I of this FOA.

Senior/key personnel on the pre-application and institutional affiliations

Senior/Key Personnel Table – Institution Name (Last Name, First Name)***		
Last Name	First Name	Institution

*** Should include the names and institutional affiliations of all Senior/Key Personnel on the pre-application, including the Lead PI (EFRC Director).

Collaborators for senior/key personnel on the pre-application

Collaborator Table – Institution Name (Last Name, First Name)****		
Last Name	First Name	Institution

**** Should include co-authors over the past 48 months, graduate and postdoctoral advisors of the senior/key personnel, graduate students and postdoctoral associates who have been supervised by the senior/key personnel during the past 60 months, and any other current close associations of the senior/key personnel. This table should *exclude* all personnel at any of the institutions listed in the Senior/Key Personnel Table.

NOTE: Applicants should follow the exact format of the sample tables because the tabular information will be compiled across all pre-applications. This includes the elements listed below, as applicable to each table. For purposes of uniformity, Excel templates are provided through Grants.gov (“Related Documents” tab on the FOA page) and should be used in preparing these four tables, before converting to PDF for inclusion in the pre-application, as described above. These templates mirror the content and formatting of the sample tables provided above. **The applicant should also submit the original Excel files it used to create its tables via email to EFRC.FOA@science.doe.gov no later than January 16, 2020 at 5:00 PM Eastern Time. The subject line of the email should read “EFRC App Tables:” followed by the EFRC Director’s last name and the lead organization name, e.g. “EFRC App Tables: Jones, University of XYZ”.**

- Do not merge name or institution cells, even if individuals share the same institution.
- Do not change the order of the columns.
- For the Senior/Key Personnel and Collaborator Tables, do not include any additional information (e.g. “PI”, “Co-PI”, or footnote symbols) under “Last Name” and “First Name” and do not include departmental affiliations under “Institution.”
- If an individual has a joint appointment, separate the institutions with a “/” (i.e. “Univ of X / National Lab Y”).

Limitation on Number of Pre-Applications Submitted by Each Lead Organization

An entity may not submit more than two pre-applications as the lead organization. **If more than two qualified pre-applications are received from a lead organization, DOE will consider the first two qualified pre-applications received based on the PAMS date and time stamp. The remaining pre-applications will be deemed non-responsive and the applicant will not be allowed to submit full applications tied to those pre-applications.** However, there is no limitation on the number of pre-applications in which an entity may participate as a team member or subcontractor.

Limitation on Number of Pre-Applications Submitted by an EFRC Director

The EFRC Director is the lead Principal Investigator and must be employed or have an agreement in place to be hired by the lead organization in the event of award. An individual may not be named as the EFRC Director on more than one pre-application. Directors of existing EFRC awards that do not have project end dates in 2020 cannot be named as the EFRC Director on any application in response to this FOA. **If more than one qualified pre-application is received from an applicant identifying the same individual as the EFRC Director, DOE will consider the first qualified pre-application received based on the PAMS date and time stamp. The remaining pre-applications will be deemed non-responsive and the applicant will not be allowed to submit full applications tied to those pre-applications.** However, there is no restriction on the number of pre-applications in which an individual may participate as a PI or senior/key personnel.

Pre-Application Evaluation

For all pre-applications received by DOE an automated email will be sent to the lead Principal Investigator (EFRC Director) acknowledging receipt.

Federal Program Managers will evaluate all pre-applications using these criteria:

1. Responsiveness to the objectives and requirements of the FOA.
2. Scientific and technical merit.
3. Appropriateness of the proposed research approaches.
4. Likelihood of scientific impact.

This will be a comparative review with priority given to scientifically innovative and forward-looking basic research with the highest likelihood of success as full proposals. Applicants with the highest rated pre-applications will be allowed to submit full proposals; all others will be disallowed from submitting. DOE will communicate these decisions to the applicants by February 25, 2020. Applicants who are disallowed from submitting full proposals may request written feedback from the review, which will be provided only after awards have been announced. Topical diversity will be considered, with potential variation in the allow/disallow ratios among topical areas. DOE expects to allow approximately 30 full proposals, with the exact number based on the review. A sufficient number of full proposals will be allowed in each topical area to ensure a competitive merit review of the full proposals.

The pre-application must be submitted electronically through the DOE Office of Science Portfolio Analysis and Management System (PAMS) website:

<https://pamspublic.science.energy.gov/>. It is important that the pre-application be a single file with extension .pdf, .docx, or .doc. The Lead Principal Investigator, who is the EFRC Director, and anyone submitting on behalf of the Lead Principal Investigator must register for an account in PAMS prior to submitting a pre-application. **All Lead Principal Investigators and anyone submitting pre-applications on behalf of Lead Principal Investigators for a lead organization are encouraged to establish PAMS accounts as soon as possible to avoid submission delays.**

NOTE: In PAMS a “pre-application” is referred to as a “preproposal,” and the two terms are to be considered synonymous.

You may use the Internet Explorer, Firefox, Google Chrome, or Safari browsers to access PAMS.

Registering to PAMS is a two-step process; once you create an individual account, you must associate yourself with (“register to”) your institution. Detailed steps are listed below.

Create PAMS Account:

To register, click the “Create New PAMS Account” link on the website

<https://pamspublic.science.energy.gov/>.

- Click the “No, I have never had an account” link and then the “Create Account” button.

- You will be prompted to enter your name and email address, create a username and password, and select a security question and answer. Once you have done this, click the “Save and Continue” button.
- On the next page, enter the required information (at least one phone number and your mailing address) and any optional information you wish to provide (e.g., FAX number, website, mailstop code, additional email addresses or phone numbers, Division/Department). Click the “Create Account” button.
- Read the user agreement and click the “Accept” button to indicate that you understand your responsibilities and agree to comply with the rules of behavior for PAMS.

PAMS will take you to the “Having Trouble Logging In?” page. (If you have been an Office of Science merit reviewer or if you have previously submitted an application, you may already be linked to an institution in PAMS. If this happens, you will be taken to the PAMS home page.

Register to Your Institution:

- Click the link labeled “Option 2: I know my institution and I am here to register to the institution.” (Note: If you previously created a PAMS account but did not register to an institution at that time, you must click the Institutions tab and click the “Register to Institution” link.)
- PAMS will take you to the “Register to Institution” page.
- Type a word or phrase from your institution name in the field labeled, “Institution Name like,” choose the radio button next to the item that best describes your role in the system, and click the “Search” button. A “like” search in PAMS returns results that contain the word or phrase you enter; you do not need to enter the exact name of the institution, but you should enter a word or phrase contained within the institution name. (If your institution has a frequently used acronym, such as ANL for Argonne National Laboratory or UCLA for the Regents of the University of California, Los Angeles, you may find it easiest to search for the acronym under “Institution Name like.” Many institutions with acronyms are listed in PAMS with their acronyms in parentheses after their names.)
- Find your institution in the list that is returned by the search and click the “Actions” link in the Options column next to the institution name to obtain a dropdown list. Select “Add me to this institution” from the dropdown. PAMS will take you to the “Institutions – List” page.
- If you do not see your institution in the initial search results, you can search again by clicking the “Cancel” button, clicking the Option 2 link, and repeating the search.
- If, after searching, you think your institution is not currently in the database, click the “Cannot Find My Institution” button and enter the requested institution information into PAMS. Click the “Create Institution” button. PAMS will add the institution to the system, associate your profile with the new institution, and return you to the “Institutions – List” page when you are finished.

Submit Your Pre-application (referred to as a “preproposal” in PAMS):

- Create your pre-application outside the system and save it as a file with extension .docx, .doc, or .pdf. Make a note of the location of the file on your computer so you can browse for it later from within PAMS.
- Log into PAMS and click the Proposals tab. Click the “View / Respond to Funding Opportunity Announcements” link and find the current announcement in the list. Click the

“Actions/Views” link in the Options column next to this announcement to obtain a dropdown menu. Select “Submit Preproposal” from the dropdown.

- On the Submit Preproposal page, select the institution from which you are submitting this preproposal from the Institution dropdown. If you are associated with only one institution in the system, there will only be one institution in the dropdown.
- Note that you must select one and only one Principal Investigator (PI) per preproposal (the EFRC Director); to do so, click the “Select PI” button on the far right side of the screen. Find the appropriate PI from the list of all registered users from your institution returned by PAMS. (Hint: You may have to sort, filter, or search through the list if it has multiple pages.) Click the “Actions” link in the Options column next to the appropriate PI to obtain a dropdown menu. From the dropdown, choose “Select PI.”
- If the PI for whom you are submitting does not appear on the list, it means he or she has not yet registered in PAMS. For your convenience, you may have PAMS send an email invitation to the PI to register in PAMS. To do so, click the “Invite PI” link at the top left of the “Select PI” screen. You can enter an optional personal message to the PI in the “Comments” box, and it will be included in the email sent by PAMS to the PI. You must wait until the PI registers before you can submit the preproposal. Save the preproposal for later work by clicking the “Save” button at the bottom of the screen. It will be stored in “My Preproposals” for later editing.
- Enter a title for your preproposal.
- Select the appropriate technical contact from the Program Manager dropdown.
- To upload the preproposal file into PAMS, click the “Attach File” button at the far right side of the screen. Click the “Browse” (or “Choose File” depending on your browser) button to search for your file. You may enter an optional description of the file you are attaching. Click the “Upload” button to upload the file.
- At the bottom of the screen, click the “Submit to DOE” button to save and submit the preproposal to DOE.
- Upon submission, the PI will receive an email from the PAMS system <PAMS.Autoreply@science.doe.gov> acknowledging receipt of the preproposal.

You are encouraged to register for an account in PAMS at least a week in advance of the pre-application submission deadline so that there will be no delays with your submission.

For help with PAMS, click the “External User Guide” link on the PAMS website, <https://pamspublic.science.energy.gov/>. You may also contact the PAMS Help Desk, which can be reached Monday through Friday, 9AM – 5:30 PM Eastern Time. Telephone: (855) 818-1846 (toll free) or (301) 903-9610, email: sc.pams-helpdesk@science.doe.gov. All submission and inquiries about this Funding Opportunity Announcement should reference **DE-FOA-0002204**.

C. APPLICATION CONTENT AND FORMS

APPLICATION PREPARATION

You must download the application package, application forms and instructions, and related documents from Grants.gov at <http://www.grants.gov/>.

Section IV.H.2. provides Grants.gov registration, submission, and receipt instructions.

You must complete the mandatory forms and any applicable optional forms [e.g., Disclosure of Lobbying Activities (SF-LLL)] in accordance with the instructions on the forms and the additional instructions below.

Files that are attached to the forms must be in Adobe Portable Document Format (PDF) unless otherwise specified in this FOA. Attached PDF files must be plain files consisting of text, numbers, and images without editable fields, signatures, passwords, redactions, or other advanced features available in some PDF-compatible software. Do not attach PDF portfolios.

Please note the following restrictions that apply to the names of all files attached to your application:

- Please limit file names to 50 or fewer characters
- Do not attach any documents with the same name. All attachments should have a unique name.
- Please use only the following UTF-8 characters when naming your attachments: A-Z, a-z, 0-9, underscore, hyphen, space, period, parenthesis, curly braces, square brackets, ampersand, tilde, exclamation point, comma, semi colon, apostrophe, at sign, number sign, dollar sign, percent sign, plus sign, and equal sign. Attachments that do not follow this rule may cause the entire application to be rejected or cause issues during processing.

Personally Identifiable Information: Do not include sensitive personally identifiable information such as a Social Security Number, date of birth, or city of birth anywhere within the application package, including within any of the appendices. Do not include information not needed by a merit reviewer.

Letters of Recommendation: Letters of recommendation are discouraged and will not be reviewed by DOE.

1. SF424 (R&R)

Complete this form first to populate data in other forms. Complete all the required fields in accordance with the pop-up instructions on the form. The list of certifications and assurances referenced in Field 17 is available on the DOE Financial Assistance Forms Page at <http://energy.gov/management/office-management/operational-management/financial-assistance/financial-assistance-forms> under Certifications and Assurances.

DUNS AND EIN NUMBERS (FIELDS 5 AND 6)

The DUNS and EIN number fields on the SF-424 (R&R) form are used in PAMS to confirm the identity of the individual or organization submitting an application.

- Enter each number as a nine-digit number.
- Do not use hyphens or dashes.
- The Office of Science does not use the twelve-digit EIN format required by some other agencies.

TYPE OF APPLICATION (FIELD 8)

A **new** application is one in which DOE support for the proposed research is being requested for the first time. A **renewal** application requests additional funding for a period of time following a current award. If the application requests a significant change in the scope of work, please consult with the DOE contact identified in this FOA to determine if the application should be considered new or a renewal. Please see the additional definitions in Section II, F., Type of Application, for additional guidance.

The Office of Science does not make use of the Continuation or Revision options.

Please answer “yes” to the question “Is this application being submitted to other agencies?” if substantially similar, identical, or closely related research objectives are being submitted to another Federal agency. Indicate the agency or agencies to which the similar objectives have been submitted.

2. Research and Related Other Project Information

a. Complete questions 1 through 6.

NOTE CONCERNING QUESTION 4.A AND 4.B

If any environmental impact, positive or negative, is anticipated, indicate “yes” in response to question 4.a., “potential impact – positive or negative - on the environment.” Disclosure of the impact should be provided in response to question 4.b. First indicate whether the impact is positive or negative and then identify the area of concern (e.g., air, water, exposure to radiation, etc.). Should the applicant have any uncertainty, they should check “yes.”

DOE understands the phrase in field 4.a., “potential impact ... negative” to apply if the work described in the application could potentially have any of the impacts listed in (1) through (5) of 10 CFR 1021, Appendix B, Conditions that Are Integral Elements of the Classes of Action in Appendix B. (<http://www.ecfr.gov>)

Additionally, for actions which could have any other adverse impacts to the environment or have any possibility for adverse impacts to human health (e.g., use of human subjects, Biosafety Level 3-4 laboratory construction/operation, manufacture or use of certain nanoscale materials which are known to impact human health, or any activities involving transuranic or high level radioactive waste, or use of or exposure to any radioactive materials beyond de minimis levels), applicants should indicate a “negative” impact on the environment.

Lastly, 1) if there would be extraordinary circumstances (i.e., scientific or public controversy) related to the significance of environmental effects (10 CFR 1021.410 (b)(2)), 2) if the work is connected to other actions with potentially significant impacts (10 CFR 1021.410 (b)(3), or 3) if the work is related to other nearby actions with the potential for cumulatively significant impacts (10 CFR 1021.410 (b)(3)), applicants should indicate a “negative” impact on the environment.

b. Attach Files:

The file attachments must comply with the following instructions:

PROJECT SUMMARY/ABSTRACT (FIELD 7 ON THE FORM)

The project summary/abstract is a summary of the proposed activity suitable for distribution to the public and sufficient to permit potential reviewers to identify conflicts of interest. It must be a self-contained document that includes the EFRC title, the EFRC Director name and institutional affiliation, other Principal Investigators and senior/key personnel and their institutional affiliations, the objectives of the project, a description of the project, including methods to be employed, and the potential impact of the project (i.e., benefits, outcomes). The project summary must not exceed 1 page when printed using standard 8.5” by 11” paper with 1” margins (top, bottom, left and right) with font not smaller than Times New Roman 12 point. To attach a Project Summary/Abstract, click “Add Attachment.”

- Do not include any proprietary or sensitive business information.
- DOE may use the abstract to prepare public reports about supported research.

DOE COVER PAGE (PART OF PROJECT NARRATIVE ATTACHED TO FIELD 8 ON THE FORM)

The project narrative should begin with a cover page that will not count toward the project narrative page limitation. The cover page should include the following items:

- The Project Title (EFRC Name) [This should match or closely match the project title in the pre-application]
- Lead Organization: [This must match the pre-application]
- Lead Organization City/State:
- Lead PI (EFRC Director) name, title, telephone number, email: [Lead PI must match the Lead PI identified in the pre-application, unless a change was unavoidable]
- Lead Organization Administrative Point of Contact name, telephone number, email:

- FOA Number: **DE-FOA-0002204**
- DOE/Office of Science Program Office: Basic Energy Sciences
- PAMS pre-application (pre-proposal) tracking number:
- List of all partner institutions on the application:

The lead organization must be the same lead organization as identified in the required pre-application. **If an application is received for which the lead organization has changed since submission of the pre-application, then the application will be deemed non-responsive and will be rejected without further review. If an application is received that is associated with a pre-application for which submission of a full application was not allowed, then the application will be rejected without further review.** The lead PI should not be changed unless unavoidable and only minor edits should be made, if necessary, to the title of the project. If necessary, the applicant may make changes to the other senior/key personnel and other participating institutions, although DOE discourages extensive changes.

On separate pages, as a supplement to the cover page, the application should include the following four tables, which will not count toward the page limit for the Project Narrative:

Reports addressed by the application

BRN/Roundtable Reports and PRD/PROs Addressed*	
BRN or Roundtable Report	PRD/PRO Addressed

Grand Challenges (GC) and Transformative Opportunities (TO) Addressed**

* Should include all reports and PRD/PROs addressed by the application, listed in priority order, with the primary report and PRD/PRO listed first followed by any secondary ones that are addressed. The applicable reports and PRD/PROs are listed in Section I of this FOA; no other reports or PRD/PROs should be included here. Each PRD/PRO should be included as a separate line in the Table, therefore if the application addresses multiple PRD/PROs from a given report, that report should be listed multiple times.

** Should include at least one grand challenge and at least one transformative opportunity from the two BESAC reports listed in Section I of this FOA.

Senior/key personnel on the application and institutional affiliations

Senior/Key Personnel Table – Institution Name (Last Name, First Name)***		
Last Name	First Name	Institution

*** Should include the names and institutional affiliations of all Senior/Key Personnel on the application, including the Lead PI (EFRC Director).

Summary budget

Summary budget information for lead institution and all partner institutions****					
Institution Name	Year 1 Budget (\$K)	Year 2 Budget (\$K)	Year 3 Budget (\$K)	Year 4 Budget (\$K)	Total Budget
Institution 1 (Lead org.)					
Institution 2					
Total Budget					

**** Should include all partner institutions, including the lead institution, whether or not the institution is proposed to receive DOE funds under the award. Include the total costs (\$ in thousands) of the budget request in each year for each institution and totals for all rows and columns.

NOTE: Applicants should follow the exact format of the sample tables because the tabular information will be compiled across all applications. This includes the elements listed below, as applicable to each table. For purposes of uniformity, Excel templates are provided through Grants.gov (“Related Documents” tab on the FOA page) and should be used in preparing these four tables, before converting to PDF for inclusion in the application, as described above. These templates mirror the content and format of the sample tables provided above. **The applicant should also submit the original Excel files it used to create its tables via email to EFRC.FOA@science.doe.gov no later than April 21, 2020 at 11:59 PM Eastern Time. The subject line of the email should read “EFRC App Tables:” followed by the EFRC Director’s last name and the prime applicant name, e.g. “EFRC App Tables: Jones, University of XYZ”.**

- Do not merge name or institution cells, even if individuals share the same institution.
- Do not change the order of the columns.
- For the Senior/Key Personnel Table do not include any additional information (e.g. “PI”, “Co-PI”, or footnote symbols) under “Last Name” and “First Name” and do not include departmental affiliations under “Institution.”

- For the Senior/Key Personnel Table, if an individual has a joint appointment, separate the institutions with a “/” (i.e. “Univ of X / National Lab Y”).
- For the Summary Budget Table, provide the total costs (\$ in thousands) of the budget request in each year for each institution and totals for all rows and columns.

Important Instructions to the Sponsored Research Office of Submitting Institutions: The DOE Office of Science requires that you create one single PDF file that contains the DOE Cover Page, project narrative, biographical sketch, current and pending support, bibliography and references cited, facilities and other resources, equipment, data management plan, and other attachments. This single PDF file must be attached in Field 8 on the Grants.gov form. Do not attach any of the items listed in this paragraph separately in any other field in Grants.gov. If you do, these additional attachments will not become part of the application in PAMS.

PROJECT NARRATIVE (FIELD 8 ON THE FORM)

The Project Narrative **must not exceed 40 pages** of scientific and technical information, including charts, graphs, maps, photographs, and other pictorial presentations, when printed using standard 8.5” by 11” paper with 1 inch margins (top, bottom, left, and right). The font must not be smaller than Times New Roman 12 point. **If the Project Narrative exceeds 40 pages, only the first 40 pages will be reviewed and considered.** This page limit does not apply to the Cover Page, Tables (see above), any Table of Contents (optional, but if included should be limited to one page), Budget Page(s), Budget Justification, biographical material, publications and references, and appendices, each of which may have its own page limit. Headers/footers containing page numbers and project titles/logos may be inserted within the required 1” margins. Do not include any Internet addresses (URLs) that provide supplementary or additional information that constitutes a part of the application. See Section VIII.D, for instructions on how to mark proprietary application information. To attach a Project Narrative, click “Add Attachment.”

The contents of the Project Narrative are specified in order to ensure that the merit reviewers have the necessary information to conduct proper evaluations. All Project Narratives must include the following three sections:

I. Introduction and Background This section should place the proposed EFRC in the context of the scientific field in which it would operate by including the following (as well as any other information deemed important by the applicant):

- Briefly sketch the background leading to the application, including any preliminary studies that are relevant, critically evaluate existing knowledge, and specifically identify the scientific knowledge gaps that the proposed research is intended to fill;
- Clearly and concisely articulate the scientific mission of the proposed EFRC and identify a set of integrated four-year research goals designed to support that mission;
- Explain the importance of the proposed research described in the application and its potential scientific impact;

- For renewal applications, include a summary of the research progress made by the EFRC since the start of the last project period in August 2016 that is relevant to the proposed research. For new applications, applicants may provide a comparable description of research performed by the senior/key personnel that is relevant to the proposed research. **NOTE:** For renewal proposals, applicants should not significantly change the overall field of scientific research of the current EFRC, but DOE strongly encourages renewal applicants to propose innovative research that builds upon and extends the work that has been done under the current EFRC award. DOE will not give preference to renewal proposals over new proposals in the award selection process.

II. Proposed Research Applicants must provide detailed information about the proposed scientific research for the EFRC. This section should present a tightly integrated research program aimed at achieving the four-year scientific goals stated in the Introduction. Applicants may determine the detailed content and organization of this section, but are encouraged to include at least the following information:

- Describe a balanced and comprehensive program of basic research that, as needed, supports experimental, theoretical, and computational efforts and the development of new capabilities and approaches in these areas; include a description of the open science questions to be addressed, a detailed research plan, an assessment of the potential scientific impact of the research, and an explanation of how the research plan will meet the four-year scientific goals of the EFRC;
- Explain how success of the proposed research *requires* an integrated, collaborative EFRC approach;
- Describe how the research proposed for the EFRC addresses the priority research directions or opportunities identified in one or more of the *Basic Research Needs or Roundtable* reports listed in Section I of this FOA;
- Describe how the research proposed for the EFRC addresses one or more of the grand challenges defined in the report *Directing Matter and Energy: Five Challenges for Science and the Imagination*;
- Describe how the research proposed for the EFRC embodies one or more of the transformative opportunities defined in the report *Challenges at the Frontiers of Matter and Energy: Transformative Opportunities for Discovery Science*;
- Describe the role and intellectual contribution of the EFRC Director and all other senior/key personnel on the application;
- Briefly outline the resources available to the proposed EFRC including access to existing research space, instrumentation, computational capabilities, and other facilities both within the EFRC partner institutions and external to the EFRC;
- Describe plans for the proposed EFRC to develop and/or utilize unique facilities, capabilities, or approaches to address the scientific goals.

III. EFRC Management Plan Applicants must provide a clear, substantive overview of the management and organization of the proposed EFRC. Applicants may determine the detailed content and organization of this section, but are encouraged to include at least the following information:

- Describe a strategy and plan for developing and operating the EFRC, establishing and maintaining an integrated research team, guiding the scientific directions, and ensuring that the stated scientific research goals are met;
- Define an organizational structure that clearly delineates the roles and responsibilities of senior/key personnel and describes the means of providing internal and external oversight and guidance for scientific direction of the research program, including but not limited to a scientific advisory committee (required), executive committees, or their equivalent;
- Discuss the relevant experience of the lead organization, the EFRC Director, and other senior/key personnel in program and personnel management of diverse teams of scientific and technical professionals for projects of comparable complexity and magnitude;
- Define a proposed mechanism by which EFRC leadership will periodically evaluate the success/failure of the various components of the center;
- Define a proposed mechanism by which research thrusts within the EFRC will be reconfigured and resources redistributed, including the possibility of ending activities and starting new ones, in response to key scientific challenges, promising developments, or lack of progress;
- Describe a proposed process for making decisions about EFRC-generated publications and intellectual property;
- If needed, present a well-defined plan to use state-of-the-art technology and frequent virtual meetings to enable and support meaningful, efficient long distance collaboration;
- Include a brief (less than one page) overview of environmental, safety, and health practices and oversight at each participating institution, including any required permits, licenses, and approvals that must be obtained.
- More information about management of EFRCs can be found in this document: <https://science.osti.gov/-/media/bes/efrc/pdf/history/other/EFRC-Ref---Good-Practices-2017-12-v2.pdf>

APPENDIX 1: BIOGRAPHICAL SKETCHES

Provide a biographical sketch for the EFRC Director, all Principal Investigator(s), and each additional senior/key person listed in Section A on the R&R Budget form, or proposed as a subawardee or consultant, if they meet the definition of a senior/key person. The designation of multiple Principal Investigators, including Principal Investigators employed by partner institutions, is allowed.

The biographical information (curriculum vitae) for each person should not exceed three pages when printed on 8.5” by 11” paper with 1 inch margins (top, bottom, left, and right) with font not smaller than Times New Roman 12 point and must include the following information:

Education and Training: Undergraduate, graduate and postdoctoral training provide institution, major/area, degree, and year.

Research and Professional Experience: Beginning with the current position list, in chronological order, professional/academic positions with a brief description.

Publications: Provide a list of up to 10 publications most closely related to the proposed project. For each publication, identify the names of all authors (in the same sequence in which they appear in the publication), the article title, book or journal title, volume number, page numbers, year of publication, and website address if available electronically. Patents, copyrights, and software systems developed may be provided in addition to or substituted for publications.

Synergistic Activities: List no more than five professional and scholarly activities related to the effort proposed.

Identification of Potential Conflicts of Interest or Bias in Selection of Reviewers: Provide the following information in this section:

Collaborators and Co-editors: List in alphabetical order all persons **outside of the Principal Investigator's home institution**, including their current organizational affiliation, who are, or who have been, collaborators or co-authors with the Principal Investigator on a research project, book or book article, report, or paper during the 48 months preceding the submission of this application. For publications or collaborations with more than 10 authors or participants, only list those individuals in the core group with whom the Principal Investigator interacted on a regular basis while the research was being done. If there are no collaborators to report, state "None." This information, excluding collaborators from collaborating institutions included in this application, is duplicated in tabular form in Appendix 10.

Graduate and Postdoctoral Advisors and Advisees: List the names and current organizational affiliations of the Principal Investigator's graduate advisor(s) and principal postdoctoral sponsor(s). Also, list the names and current organizational affiliations of graduate students and postdoctoral associates that the Principal Investigator has supervised during the past five years.

Advisory Committees. List all advisory committees on which the Principal Investigator serves, including the name of the institution and department.

EFRC Director Statement of Employment: Documentation must be submitted providing evidence that the proposed EFRC Director is an employee or will become an employee of the prime applicant upon award of an EFRC. The statement of employment is limited to one page and must be signed by both the EFRC Director and an authorized representative of the lead organization. This document is not included in the three page limit for each biographical sketch.

EFRC Director Individual Commitment Statement: The EFRC Director should provide a signed statement that reflects his/her commitment to this project, including the level of time

commitment. This letter of commitment is limited to one page and is not included in the three-page limit for each biographical sketch.

- Provide “BIOGRAPHICAL SKETCHES” as Appendix 1 to the project narrative within the same file. Do not attach a separate file.
- This appendix will not count in the Project Narrative page limitation.

APPENDIX 2: CURRENT AND PENDING SUPPORT

Provide individual lists of all current and pending support (both Federal and non-Federal) for the EFRC Director, each of the Principal Investigators, all additional senior/key personnel, and subawardees, for ongoing projects and pending applications. List all sponsored activities or awards requiring a measurable commitment of effort, whether paid or unpaid. For each award, indicate whether it is funded or pending, the organization providing the support or from which the funding is requested, the title of the award (and the identification number, if appropriate), the award period, the total award amount for the entire award period (including indirect costs) and the number of person-months per year to be devoted to the project by the Principal Investigator or senior/key person. A brief description of how the funded/requested research differs from this application must be included for each entry. Concurrent submission of an application to other organizations for simultaneous consideration will not prejudice its review.

- Provide “CURRENT AND PENDING SUPPORT” as Appendix 2 to the project narrative within the same file. Do not attach a separate file.
- This appendix will not count in the project narrative page limitation.

APPENDIX 3: BIBLIOGRAPHY & REFERENCES CITED

Provide a bibliography of any references cited in the Project Narrative. Each reference must include the names of all authors (in the same sequence in which they appear in the publication), the article and journal title, book title, volume number, page numbers, and year of publication. For research areas where there are routinely more than ten coauthors of archival publications, an abbreviated style may be used such as the Physical Review Letters (PRL) convention for citations (listing only the first author). For example, a paper may be listed as, “A Really Important New Result,” A. Aardvark et. al. (MONGO Collaboration), PRL 999. Include only bibliographic citations. Applicants should be especially careful to follow scholarly practices in providing citations for source materials relied upon when preparing any section of the application.

- Provide “BIBLIOGRAPHY & REFERENCES CITED” as Appendix 3 to the project narrative within the same file. Do not attach a separate file.
- This appendix will not count in the Project Narrative page limitation.

APPENDIX 4: FACILITIES, EQUIPMENT, & OTHER RESOURCES

This information is used to assess the capability of the organizational resources, including subawardee resources, available to perform the effort proposed. Identify the facilities to be used (Laboratory, Animal, Computer, Office, Clinical and Other). If appropriate, indicate their

capacities, pertinent capabilities, relative proximity, and extent of availability to the project. List major items of equipment already available for this project and, if appropriate, identify location and pertinent capabilities. Describe only those resources that are directly applicable to the proposed work. Describe other resources available to the project (e.g., machine shop, electronic shop) and the extent to which they would be available to the project. For proposed investigations requiring access to experimental user facilities maintained by institutions other than the applicant, please provide a document from the facility manager confirming that the researchers will have access to the facility.

- Provide “FACILITIES, EQUIPMENT, & OTHER RESOURCES” as Appendix 4 to the project narrative within the same file. Do not attach a separate file.
- This appendix will not count in the Project Narrative page limitation.

APPENDIX 5: ADDITIONAL FUNDING

Discuss any additional funding and contributions-in-kind for the proposed project, including, but not limited to, optional cost sharing. Cost-sharing is not required. If there is no additional funding, contributions-in-kind, or cost sharing, state “None.”

- Provide “ADDITIONAL FUNDING” as Appendix 5 to the project narrative within the same file. Do not attach a separate file.
- This appendix will not count in the Project Narrative page limitation.

APPENDIX 6: DATA MANAGEMENT PLAN

Provide a Data Management Plan (DMP) that addresses the following requirements:

1. DMPs should describe whether and how data generated in the course of the proposed research will be shared and preserved. If the plan is not to share and/or preserve certain data, then the plan must explain the basis of the decision (for example, cost/benefit considerations, other parameters of feasibility, scientific appropriateness, or limitations discussed in #4). At a minimum, DMPs must describe how data sharing and preservation will enable validation of results, or how results could be validated if data are not shared or preserved.
2. DMPs should provide a plan for making all research data displayed in publications resulting from the proposed research open, machine-readable, and digitally accessible to the public at the time of publication. This includes data that are displayed in charts, figures, images, etc. In addition, the underlying digital research data used to generate the displayed data should be made as accessible as possible to the public in accordance with the principles stated in the Office of Science Statement on Digital Data Management (<https://science.osti.gov/funding-opportunities/digital-data-management/>). This requirement could be met by including the data as supplementary information to the published article, or through other means. The published article should indicate how these data can be accessed.
3. DMPs should consult and reference available information about data management resources to be used in the course of the proposed research. In particular, DMPs that explicitly or implicitly commit data management resources at a facility beyond what is conventionally

made available to approved users should be accompanied by written approval from that facility. In determining the resources available for data management at Office of Science User Facilities, researchers should consult the published description of data management resources and practices at that facility and reference it in the DMP. Information about other Office of Science facilities can be found in the additional guidance from the sponsoring program.

4. DMPs must protect confidentiality, personal privacy, Personally Identifiable Information, and U.S. national, homeland, and economic security; recognize proprietary interests, business confidential information, and intellectual property rights; avoid significant negative impact on innovation, and U.S. competitiveness; and otherwise be consistent with all applicable laws, and regulations. There is no requirement to share proprietary data.

DMPs will be reviewed as part of the research proposal merit review process. Applicants are encouraged to consult the Office of Science website for further information and suggestions for how to structure a DMP: <https://science.osti.gov/funding-opportunities/digital-data-management/>

- Provide “DATA MANAGEMENT PLAN” as Appendix 6 to the Project Narrative within the same file. Do not attach a separate file; and
- This appendix will not count in the Project Narrative page limitation.

APPENDIX 7: STATEMENT OF CONFLICT OF INTEREST

At the time of submission, the applicant shall include information identifying potential, apparent, or actual organizational and individual conflicts of interest and proposed mitigation. This shall include the applicant, their team members, and senior/key personnel named in the application. Negative responses are also required. Prior to award, DOE reserves the right to require the submission of a Conflict of Interest Management Plan describing the applicant’s approach to managing conflicts of interest.

- Provide “STATEMENT OF CONFLICT OF INTEREST” as Appendix 7 to the project narrative within the same file. Do not attach a separate file.
- This appendix will not count in the Project Narrative page limitation.

APPENDIX 8: ORGANIZATIONAL LETTERS OF COMMITMENT

A single organizational letter of commitment is required from each organization participating as a team member. Each organizational letter of commitment is limited to one page and must be current, signed, and dated by a person authorized to commit the participating organization to a legally binding agreement for this project.

- Provide “ORGANIZATIONAL LETTERS OF COMMITMENT” as Appendix 8 to the project narrative within the same file. Do not attach a separate file.
- This appendix will not count in the Project Narrative page limitation.

APPENDIX 9: PUBLICATION LIST (RENEWAL APPLICATIONS ONLY)

For renewal applications for which the prime recipient (lead organization) is a DOE/NNSA National Laboratory Contractor, include a list of all archival journal publications that resulted from EFRC funded research since the start of the prior project period in August 2016.

For renewal applications for which the prime recipient (lead organization) is not a DOE/NNSA National Laboratory Contractor, this requirement will be met through the submission of a Renewal Proposal Products section through the PAMS website as described in “Updates and Reminders” under “Renewal Applications”. Therefore, such applicants are not required to submit Appendix 9.

Appendix 9 is not required for any new applications.

- Provide “PUBLICATION LIST” as Appendix 9 to the project narrative within the same file. Do not attach a separate file.
- This appendix will not count in the Project Narrative page limitation.

APPENDIX 10: LIST OF COLLABORATORS

In tabular form following the example below, provide a list of collaborators for all senior/key personnel, including co-authors over the past 48 months, graduate and postdoctoral advisors of the senior/key personnel, graduate students and postdoctoral associates that have been supervised by the senior/key personnel during the past 60 months, and any other current close associations of the senior/key personnel. **The table should exclude all personnel at any of the institutions participating in this application.**

Collaborator Table – Institution Name (Last Name, First Name)		
Last Name	First Name	Institution

NOTE: Applicants should follow the exact format of the sample table for Appendix 10 because the tabular information will be compiled across all applications. This includes the elements listed below. For purposes of uniformity, an Excel template is provided through Grants.gov (“Related Documents” tab on the FOA page) and should be used in preparing this table, before converting to PDF for submission. This template mirrors the content and formatting of the sample table provided above. **The applicant should also submit the original Excel file it used to create its table for Appendix 10 via email to EFRC.FOA@science.doe.gov no later than April 21, 2020 at 11:59 PM Eastern Time. The subject line of the email should read “EFRC App Tables:” followed by the EFRC Director’s last name and the prime applicant name, e.g. “EFRC App Tables: Jones, University of XYZ”.**

- This file should be submitted as a single, consolidated collaborator list for all senior/key personnel, on a single tab in a single Excel file, with just a single header at the top. Do not submit multiple collaborator files or use multiple tabs within a single file.
 - Do not merge name or institution cells, even if individuals share the same institution.
 - Do not change the order of the columns.
 - Do not include any additional information (e.g. “PI”, “Co-PI”, or footnote symbols) under “Last Name” and “First Name”.
 - Do not include departmental affiliations under Institutions.
 - If an individual has a joint appointment, separate the institutions with a “/” (i.e. “Univ of X / National Lab Y”).
- Provide “LIST OF COLLABORATORS” as Appendix 10 to the project narrative within the same file. Do not attach a separate file.
 - This appendix will not count in the Project Narrative page limitation.

APPENDIX 11: OTHER ATTACHMENT

If you need to elaborate on your responses to questions 1-6 on the “RESEARCH AND RELATED Other Project Information” document, please provide the Other Attachment information as an appendix to your project narrative. **Information not easily accessible to a reviewer may be included in this appendix, but do not use this appendix to circumvent the page limitations of the application. Reviewers will be instructed to ignore any information that appears to be an attempt to circumvent the page limitations of the application.**

- Provide “OTHER ATTACHMENT” as Appendix 11 to the project narrative within the same file. Do not attach a separate file.
- This appendix will not count in the Project Narrative page limitation.

Do not attach any of the requested appendices described above as files for fields 9, 10, 11, or 12. Follow the above instructions to include the information as appendices to the project narrative file. These appendices will not count toward the project narrative’s page limitation.

3. Research and Related Budget

Complete the Research and Related Budget form in accordance with the instructions on the form (Activate Help Mode to see instructions) and the following instructions. You must complete a separate budget for each year of support requested. The form will generate a cumulative budget for the total project period. You must complete all the mandatory information on the form before the NEXT PERIOD button is activated. You may request funds under any of the categories listed as long as the item and amount are necessary to perform the proposed work, meet all the criteria for allowability under the applicable Federal cost principles, and are not prohibited by the funding restrictions in this FOA (See Section IV, G).

Note: If a DOE/NNSA National Laboratory Contractor is proposed to provide any portion

of work, the applicant must also provide the information requested in the paragraph entitled “Budget for DOE/NNSA National Laboratory or Contractor” under 4. R&R Subaward Budget Attachment(s) Form.

Budget Fields

Section A Senior/Key Person	For each Senior/Key Person, enter the requested information. List personnel, base salary (annual), the number of months that person will be allocated to the project, requested salary fringe benefits, and the total funds requested for each person. The requested salary must be the product of the base salary and the effort. Include a written narrative in the budget justification that justifies the need for requested personnel.
Section B Other Personnel	List personnel, the number of person-months that person will be allocated to the project, requested salary fringe benefits, and the total funds requested for each person. Include a written narrative in the budget justification that fully justifies the need for requested personnel.
Section C Equipment	For the purpose of this budget, equipment is designated as an item of property that has an acquisition cost of \$5,000 or more and an expected service life of more than one year. If institutional policies provide for a lower threshold of capitalization costs, the designation of an item as equipment on the budget must be consistent with those policies. (Note that this designation applies for proposal budgeting only and differs from the DOE definition of capital equipment.) List each item of equipment separately and justify each in the budget justification section. Do not aggregate items of equipment. Allowable items ordinarily will be limited to research equipment and apparatus not already available for the conduct of the work. General-purpose office equipment is not eligible for support unless primarily or exclusively used in the actual conduct of scientific research. Indicate the basis for the cost estimate (quotes from vendors or suppliers, past experience of similar items, or some other basis).
Section D Travel	Travel to Canada or to Mexico is considered domestic travel. In the budget justification, list each trip’s destination, dates, estimated costs including transportation and subsistence, number of staff traveling, the purpose of the travel, and how it relates to the project. Indicate the basis for the cost estimate (quotes from vendors or suppliers, past experience of similar items, or some other basis). To qualify for support, attendance at meetings or conferences must enhance the investigator’s capability to perform the research, plan extensions of it, or disseminate its results. Domestic travel is to be justified separately from foreign travel.
Section E Participant/Trainee Support Costs	If applicable, submit training support costs. Educational projects that intend to support trainees (precollege, college, graduate and post graduate) must list each trainee cost that includes stipend levels and

	<p>amounts, cost of tuition for each trainee, cost of any travel (provide the same information as needed under the regular travel category), and costs for any related training expenses. Participant costs are those costs associated with conferences, workshops, symposia or institutes and breakout items should indicate the number of participants, cost for each participant, purpose of the conference, dates and places of meetings and any related administrative expenses.</p> <p>Indicate the basis for the cost estimate (quotes from vendors or suppliers, past experience of similar items, or some other basis).</p>
<p>Section F Other Direct Costs</p>	<ul style="list-style-type: none"> • Materials and Supplies: Enter total funds requested for materials and supplies in the appropriate fields. In the budget justification, list general categories such as glassware, and chemicals, including an amount for each category (items not identified under “Equipment”). Categories less than \$1,000 are not required to be itemized. State the basis for the cost estimate (quotes from vendors or suppliers, past experience of similar items, or some other basis). • Publication Costs: Enter the total publication funds requested. The application budget may request funds for the costs of documenting, preparing, publishing or otherwise making available to others the findings and products of the work conducted under the award. In the budget justification, include supporting information. State the basis for the cost estimate (quotes from vendors or suppliers, past experience of similar items, or some other basis). • Consultant Services: Enter total funds requested for all consultant services. In the budget justification, identify each consultant, the services he/she will perform, total number of days, daily or hourly rate, travel costs, and total estimated costs. State the basis for the cost estimate (quotes from vendors or suppliers, past experience of similar items, or some other basis). • ADP/Computer Services: Enter total funds requested for ADP/Computer Services. The cost of computer services, including computer-based retrieval of scientific, technical and education information may be requested. In the budget justification, include the established computer service rates at the proposing organization if applicable. Indicate the basis for the cost estimate (quotes from vendors or suppliers, past experience of similar items, or some other basis). • Subawards/Consortium/Contractual Costs: Enter total costs for all subawards/consortium organizations and other contractual costs proposed for the project. In the budget justification, justify the details. SEE SECTION 4. • Equipment or Facility Rental/User Fees: Enter total funds requested for Equipment or Facility Rental/User Fees. In the budget

	<p>justification, identify each rental/user fee and justify. Indicate the basis for the cost estimate (quotes from vendors or suppliers, past experience of similar items, or some other basis).</p> <ul style="list-style-type: none"> • Alterations and Renovations: Enter total funds requested for Alterations and Renovations. In the budget justification, itemize by category and justify the costs of alterations and renovations, including repairs, painting, removal or installation of partitions, shielding, or air conditioning. Where applicable, provide the square footage and costs. • Other: Add text to describe any other Direct Costs not requested above. Enter costs associated with “Other” item(s). Use the budget justification to further itemize and justify.
Section G Direct Costs	This represents Total Direct Costs (Sections A through F)
Section H Other Indirect Costs	Enter the Indirect Cost information for each field. Only four general categories of indirect costs are allowed/requested on this form, attach a separate sheet if needed. Include the cognizant Federal agency and contact information if using a negotiated rate agreement.
Section I Total Direct and Indirect Costs	This is the total of Sections G and H

BUDGET JUSTIFICATION (FIELD L ON THE FORM)

Provide the required supporting information for the following costs (See R&R Budget instructions): equipment; domestic and foreign travel; participant/trainees; materials and supplies; publication; consultant services; ADP/computer services; subaward/consortium/contractual; equipment or facility rental/user fees; alterations and renovations; and indirect cost type. Provide any other information you wish to submit to justify your budget request. **Attach a single budget justification file for the entire project period in Field L.** The file automatically carries over to each budget year.

4. R&R Subaward Budget Attachment(s) Form

Budgets and Budget Justification for Subawardees:

You must provide a separate R&R budget and budget justification for each subawardee, including but not limited to DOE/NNSA National Laboratory Contractors and non-DOE/NNSA Federal Agencies and their FFRDC Contractors.

Download the R&R Budget Attachment from the R&R SUBAWARD BUDGET FORM and e-mail it to each subawardee that is required to submit a separate budget. After the subawardee has e-mailed its completed budget back to you, attach it to one of the blocks provided on the form. Use up to 10 letters of the subawardee’s name (plus .pdf) as the file name (e.g., ucla.pdf or energyres.pdf).

If the project involves more subawardees than there are places in the SUBAWARD BUDGET ATTACHMENT(S) FORM, the additional subaward budgets may be saved as PDF files and

appended to the Budget Justification attached to Field L.

Ensure that any files received from subawardees are the PDF files extracted from the SUBAWARD BUDGET ATTACHMENT(S) FORM. Errors will be created if a subawardee sends a prime applicant a budget form that was not extracted from the application package.

The budget justification(s) for any subawardee(s) should include the same information supporting each proposed cost that is required of prime awardees in their budget justification, as specified in the table under “Research and Related Budget”, above .

If a subaward is being proposed to a non-DOE/NNSA FFRDC Contractor, the required authorization by the cognizant Contracting Officer for the Federal sponsoring agency, as required in Section III.D. OTHER ELIGIBILITY REQUIREMENTS, should be submitted. Submit this letter as a part of the subawardee budget justification.

Budget for DOE/NNSA National Laboratory Contractor:

If a DOE/NNSA National Laboratory contractor is to perform *any* portion of the work, as the lead organization or as a team member, the DOE/NNSA National Laboratory Contractor should provide with the application:

1. **A DOE Field Work Proposal in accordance with the requirements in DOE Order 412.1A, Work Authorization System.**

This order and a sample of the DOE Field Work Proposal (FWP) form are available at <https://www.directives.doe.gov/directives-documents/400-series/0412.1-BOrder-a-chg1-AdmChg/>. For purposes of satisfying this requirement, applicants are required to submit the DOE FWP face and budget pages (pages 1 and 2 of the sample form) with the application as part of the Budget for DOE/NNSA National Laboratory Contractor file. Furthermore, the information requested in blocks 1. through 15. and 17. through 19. of the sample FWP must be furnished with the application. The remainder of the information requested in blocks 16., 20., and 21. of the sample form will be required to be submitted through the DOE Work Authorization System by the successful applicant after selection.

2. **The required cognizant Federal Contracting Officer approval authorizing the participation of the DOE/NNSA National Laboratory as described in Section III.D OTHER ELIGIBILITY REQUIREMENTS.**

This information is required in addition to the budgetary information requested herein (R&R Budget, R&R Subaward Budget, and Budget Justification, as applicable). Attach this letter as part of the budget justification for applicable prime awardees or subawardees.

5. Project/Performance Site Location(s)

Indicate the primary site where the work will be performed. If a portion of the project will be

performed at any other site(s), identify the site location(s) in the blocks provided.

Note that the Project/Performance Site Congressional District is entered in the format of the 2 digit state code followed by a dash and a 3 digit Congressional district code, for example VA-001. Hover over this field for additional instructions.

Use the Next Site button to expand the form to add additional Project/Performance Site Locations.

6. Disclosure of Lobbying Activities (SF-LLL)

If applicable, complete SF-LLL. Applicability: If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence 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 in connection with the grant/cooperative agreement, you must complete and submit SF-LLL, "Disclosure Form to Report Lobbying".

7. Waiver Request- (a) Foreign Entities and (b) Performance of Work in the United States

As set forth in Section III, all lead organizations receiving funding under this FOA must be incorporated (or otherwise formed) under the laws of a State or territory of 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. Section III further requires that all work by the lead organization under funding agreements be performed in the United States – i.e., a prime recipient must expend 100% of its total project cost in the United States, except as noted in Section III. D., "*Performance of Work in the United States*".

To seek a waiver of either requirement, the applicant must submit a waiver request in the full application, which includes the following information: entity name, country (or state) of incorporation, description of the work to be performed by that entity, and the location where the work will be performed. If the applicant is seeking a waiver to have a foreign entity serve as the prime recipient, the applicant must explain why it is necessary to have a foreign entity serve as the prime recipient. If the applicant is seeking a waiver of the "Performance of Work in the United States" requirement, the applicant must explain why it is necessary to have the work performed outside of the United States. All waiver requests should explain how the waiver would further the purposes of this FOA and otherwise serve the interests of DOE. The Contracting Officer may require additional information before considering the waiver request. Attach the waiver request as a part of the budget justification for any prime awardee or subawardee proposing work outside the United States.

8. Summary of Required Forms/Files

Your application must include the following items:

Name of Document	Format	Attach to
SF 424 (R&R)	Form	N/A
RESEARCH AND RELATED Other Project Information	Form	N/A
Project Summary/Abstract	PDF	Field 7
Project Narrative, including required appendices	PDF	Field 8
Cognizant Federal Contracting Officer Approval, if applicable	PDF	Part of budget justification
Waiver Request, if applicable	PDF	Part of budget justification
RESEARCH & RELATED BUDGET	Form	N/A
Budget Justification	PDF	Field L
R&R SUBAWARD BUDGET ATTACHMENT(S) FORM	Form	N/A
Subawardee Budget Justification	PDF	Field L
PROJECT/PERFORMANCE SITE LOCATION(S)	Form	N/A
SF-LLL Disclosure of Lobbying Activities, if applicable	Form	N/A

The applicant should also submit the original Excel files it used to create its tables for the cover page supplement and Appendix 10 via email to EFRC.FOA@science.doe.gov no later than April 21, 2020 at 11:59 PM Eastern Time. **The subject line of the email should read “EFRC App Tables:” followed by the EFRC Director’s last name and the prime applicant name, e.g. “EFRC App Tables: Jones, University of XYZ”.**

D. SUBMISSIONS FROM SUCCESSFUL APPLICANTS

If selected for award, DOE reserves the right to request additional or clarifying information for any reason deemed necessary, including, but not limited to:

- Indirect cost information
- Other budget information
- Representation of Limited Rights Data and Restricted Software, if applicable
- Commitment Letter from Third Parties Contributing to Cost Sharing, if applicable
- Environmental Data

E. SUBMISSION DATES AND TIMES

1. Pre-application Due Date

January 16, 2020 at 5:00 PM Eastern Time

You are encouraged to transmit your pre-application well before the deadline.

2. Application Due Date

April 21, 2020 at 11:59 PM Eastern Time

You are encouraged to transmit your application well before the deadline.

2. Late Submissions

DOE has accepted late submissions only in very rare circumstances when applicants have been unable to make timely submissions because of DOE/national technological disruptions or significant natural disasters. Other circumstances do not justify late submissions.

Unacceptable justifications include, but are not limited to, the following:

- Failure to begin submission process early enough.
- Failure to provide sufficient time to complete the process.
- Failure to understand the submission process.
- Failure to understand the deadlines for submissions.
- Failure to satisfy prerequisite registrations.
- Unavailability of administrative personnel.
- Delays in or unavailability of institutional offices.

APPLICANTS AND THEIR INSTITUTIONS ARE RESPONSIBLE FOR UNDERSTANDING THE SUBMISSION PROCESS AND BEGINNING IT WITH SUFFICIENT TIME TO ACCOMMODATE REASONABLY FORESEEABLE INCIDENTS, CONTINGENCIES, AND DISRUPTIONS. APPLICANTS ARE STRONGLY ENCOURAGED TO PLAN TO COMPLETE SUBMISSION AT LEAST ONE DAY PRIOR TO THE SUBMISSION DEADLINE, TO ALLOW TIME FOR UNEXPECTED DELAYS.

Applicants must contact the DOE Contact listed in Section VII.B. of this FOA to request acceptance of a late submission. Such requests must include documentation demonstrating that the applicant attempted to complete the full submission process well before the deadline, but was prevented by technological disruptions not within the control of the applicant.

F. INTERGOVERNMENTAL REVIEW

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

G. FUNDING RESTRICTIONS

Funding for all awards and future budget periods is contingent upon the availability of funds appropriated by Congress for the purpose of this program and the availability of future-year budget authority.

Costs for new construction (including new buildings or additions to existing buildings) will not be allowed in the EFRC award.

Cost Principles: Costs must be allowable, allocable and reasonable in accordance with the applicable Federal cost principles referenced in 2 CFR 200 as modified by 2 CFR 910 (DOE Financial Assistance Regulation).

Pre-award Costs: Recipients may charge to an award resulting from this FOA pre-award costs that were incurred within the ninety (90) calendar day period immediately preceding the effective date of the award, if the costs are allowable in accordance with the applicable Federal cost principles referenced in 2 CFR 200 as modified by 2 CFR 910 (DOE Financial Assistance Regulation). Recipients must obtain the prior approval of the Contracting Officer for any pre-award costs that are for periods greater than this 90 day calendar period. Pre-award costs are incurred at the applicant's risk. DOE is under no obligation to reimburse such costs if the applicant does not receive an award or if the award is made for a lesser amount than the applicant expected.

H. OTHER SUBMISSION AND REGISTRATION REQUIREMENTS

1. Systems to Register In

Applicants must complete a series of registrations and enrollments to submit applications in response to this FOA. Applicants not currently registered with SAM and grants.gov should allow **at least 4 weeks** to complete these requirements.

Applicants should start the process as soon as possible.

Applicants may not be able to use their preferred Internet browser: Each system has its own requirements.

Applicants must obtain a DUNS number as described under "Grants.gov Application Submission and Receipt Procedures", below.

Applicants must register with the System for Award Management (SAM) as described under "Grants.gov Application Submission and Receipt Procedures", below.

Applicants must provide a Taxpayer Identification Number (TIN) to complete their registration

in SAM.gov. An applicant's TIN is an Employer Identification Number (EIN) assigned by the Internal Revenue Service (IRS). In limited circumstances, a Social Security Number (SSN) assigned by the Social Security Administration (SSA) may be used as a TIN. You may obtain an EIN from the IRS at <https://www.irs.gov/businesses/small-businesses-self-employed/apply-for-an-employer-identification-number-ein-online>.

DOE discourages the use of a SSN as a TIN. You are encouraged to obtain a TIN from the Internal Revenue Service (IRS) using the website listed above.

Applicants must register with FedConnect at www.fedconnect.net. The full, binding version of assistance agreements will be posted to FedConnect.

Recipients must register with the Federal Funding Accountability and Transparency Act Subaward Reporting System at <https://www.frs.gov>. This registration must be completed before an award may be made: you are advised to register while preparing your application.

2. Grants.gov Application Submission and Receipt Procedures

This section provides the application submission and receipt instructions for applications to the Office of Science. Please read the following instructions carefully and completely. Please ensure that you have read the applicable instructions, guides, help notices, frequently asked questions, and other forms of technical support on Grants.gov.

a. Electronic Delivery

The Office of Science is participating in the Grants.gov initiative to provide the grant community with a single site to find and apply for grant funding opportunities. The Office of Science requires applicants to submit their applications online through Grants.gov.

b. How to Register to Apply through Grants.gov

1) Instructions: Read the instructions below about registering to apply for Office of Science funds. Applicants should read the registration instructions carefully and prepare the information requested before beginning the registration process. Reviewing and assembling the required information before beginning the registration process will alleviate last-minute searches for required information.

The registration process can take up to four weeks to complete. Therefore, registration should be done in sufficient time to ensure it does not impact your ability to meet required application submission deadlines.

If individual applicants are eligible to apply for this grant funding opportunity, then you may begin with step c, Create a Grants.gov Account, listed below.

Organization applicants can find complete instructions here:
<https://www.grants.gov/web/grants/applicants/organization-registration.html>

a) Obtain a DUNS Number: All entities applying for funding, including renewal funding, must have a Data Universal Numbering System (DUNS) number from Dun & Bradstreet (D&B). Applicants must enter the DUNS number in the data entry field labeled "Organizational DUNS" on the SF-424 form.

For more detailed instructions for obtaining a DUNS number, refer to:

<https://www.grants.gov/web/grants/applicants/organization-registration/step-1-obtain-duns-number.html>

b) Register with SAM: In addition to having a DUNS number, organizations applying online through Grants.gov must register with the System for Award Management (SAM). All organizations must register with SAM in order to apply online. Failure to register with SAM will prevent your organization from applying through Grants.gov. SAM registration must be renewed annually.

For more detailed instructions for registering with SAM, refer to:

<https://www.grants.gov/web/grants/applicants/organization-registration/step-2-register-with-sam.html>

c) Create a Grants.gov Account: The next step is to register an account with Grants.gov. Follow the on-screen instructions or refer to the detailed instructions here:

<https://www.grants.gov/web/grants/applicants/registration.html>

d) Add a Profile to a Grants.gov Account: A profile in Grants.gov corresponds to a single applicant organization the user represents (i.e., an applicant) or an individual applicant. If you work for or consult with multiple organizations and have a profile for each, you may log in to one Grants.gov account to access all of your grant applications. To add an organizational profile to your Grants.gov account, enter the DUNS Number for the organization in the DUNS field while adding a profile. For more detailed instructions about creating a profile on Grants.gov, refer to: <https://www.grants.gov/web/grants/applicants/registration/add-profile.html>

e) EBiz POC Authorized Profile Roles: After you register with Grants.gov and create an Organization Applicant Profile, the organization applicant's request for Grants.gov roles and access is sent to the EBiz POC. The EBiz POC will then log in to Grants.gov and authorize the appropriate roles, which may include the AOR role, thereby giving you permission to complete and submit applications on behalf of the organization. You will be able to submit your application online any time after you have been assigned the AOR role. For more detailed instructions about creating a profile on Grants.gov, refer to:

<https://www.grants.gov/web/grants/applicants/registration/authorize-roles.html>

f) Track Role Status: To track your role request, refer to:

<https://www.grants.gov/web/grants/applicants/registration/track-role-status.html>

2) Electronic Signature: When applications are submitted through Grants.gov, the name of the organization's AOR that submitted the application is inserted into the signature line of the

application, serving as the electronic signature. The EBiz POC must authorize individuals who are able to make legally binding commitments on behalf of the organization as an AOR; this step is often missed and it is crucial for valid and timely submissions.

c. How to Submit an Application to the Office of Science via Grants.gov

Grants.gov applicants can apply online using Workspace. Workspace is a shared, online environment where members of a grant team may simultaneously access and edit different webforms within an application. For each funding opportunity announcement (FOA), you can create individual instances of a workspace.

Below is an overview of applying on Grants.gov. For access to complete instructions on how to apply for opportunities, refer to:

<https://www.grants.gov/web/grants/applicants/apply-for-grants.html>

1) Create a Workspace: Creating a workspace allows you to complete it online and route it through your organization for review before submitting.

2) Complete a Workspace: Add participants to the workspace, complete all the required forms, and check for errors before submission.

a) Adobe Reader: If you decide not to apply by filling out webforms you can download individual PDF forms in Workspace so that they will appear similar to other Standard forms. The individual PDF forms can be downloaded and saved to your local device storage, network drive(s), or external drives, then accessed through Adobe Reader.

NOTE: Visit the Adobe Software Compatibility page on Grants.gov to download the appropriate version of the software at: <https://www.grants.gov/web/grants/applicants/adobe-software-compatibility.html>

b) Mandatory Fields in Forms: In the forms, you will note fields marked with an asterisk and a different background color. These fields are mandatory fields that must be completed to successfully submit your application.

c) Complete SF-424 Fields First: The forms are designed to fill in common required fields across other forms, such as the applicant name, address, and DUNS number. To trigger this feature, an applicant must complete the SF-424 information first. Once it is completed, the information will transfer to the other forms.

3) Submit a Workspace: An application may be submitted through workspace by clicking the Sign and Submit button on the Manage Workspace page, under the Forms tab. Grants.gov recommends submitting your application package at least 24-48 hours prior to the close date to provide you with time to correct any potential technical issues that may disrupt the application submission.

4) Track a Workspace: After successfully submitting a workspace package, a Grants.gov Tracking Number (GRANTXXXXXXXX) is automatically assigned to the package. The number will be listed on the Confirmation page that is generated after submission.

For additional training resources, including video tutorials, refer to:
<https://www.grants.gov/web/grants/applicants/applicant-training.html>

Applicant Support: Grants.gov provides applicants 24/7 support via the toll-free number 1-800-518-4726 and email at support@grants.gov. For questions related to the specific grant opportunity, contact the number listed in the application package of the grant you are applying for.

If you are experiencing difficulties with your submission, it is best to call the Grants.gov Support Center and get a ticket number. The Support Center ticket number will assist the Office of Science with tracking your issue and understanding background information on the issue.

d. Timely Receipt Requirements and Proof of Timely Submission

Proof of timely submission is automatically recorded by Grants.gov. An electronic date/time stamp is generated within the system when the application is successfully received by Grants.gov. The applicant AOR will receive an acknowledgement of receipt and a tracking number (GRANTXXXXXXXX) from Grants.gov with the successful transmission of their application. Applicant AORs will also receive the official date/time stamp and Grants.gov Tracking number in an email serving as proof of their timely submission.

When the Office of Science successfully retrieves the application from Grants.gov, and acknowledges the download of submissions, Grants.gov will provide an electronic acknowledgment of receipt of the application to the email address of the applicant with the AOR role. Again, proof of timely submission shall be the official date and time that Grants.gov receives your application. Applications received by Grants.gov after the established due date for the program will be considered late and will not be considered for funding by the Office of Science.

Applicants using slow internet, such as dial-up connections, should be aware that transmission can take some time before Grants.gov receives your application. Again, Grants.gov will provide either an error or a successfully received transmission in the form of an email sent to the applicant with the AOR role. The Grants.gov Support Center reports that some applicants end the transmission because they think that nothing is occurring during the transmission process. Please be patient and give the system time to process the application.

3. DOE Office of Science Portfolio Analysis and Management System (PAMS)

After you submit your application through Grants.gov, the application will automatically transfer into the Portfolio Analysis and Management System (PAMS) for processing by the DOE Office

of Science. Many functions for grants and cooperative agreements can be done in PAMS, which is available at <https://pamspublic.science.energy.gov>.

You will want to “register to” your application: a process of linking yourself to the application after it has been submitted through Grants.gov and processed by DOE.

You must register in PAMS to submit a pre-application (referred to as a “preproposal” in PAMS).

You may use the Internet Explorer, Firefox, Google Chrome, or Safari browsers to access PAMS.

Notifications sent from the PAMS system will come from the PAMS email address <PAMS.Autoreply@science.doe.gov>. Please make sure your email server/software allows delivery of emails from the PAMS email address to yours.

Registering to PAMS is a two-step process; once you create an individual account, you must associate yourself with (“register to”) your institution. Detailed steps are listed below.

1. CREATE PAMS ACCOUNT:

To register, click the “Create New PAMS Account” link on the website <https://pamspublic.science.energy.gov/>.

- Click the “No, I have never had an account” link and then the “Create Account” button.
- You will be prompted to enter your name and email address, create a username and password, and select a security question and answer. Once you have done this, click the “Save and Continue” button.
- On the next page, enter the required information (at least one phone number and your mailing address) and any optional information you wish to provide (e.g., FAX number, website, mailstop code, additional email addresses or phone numbers, Division/Department). Click the “Create Account” button.
- Read the user agreement and click the “Accept” button to indicate that you understand your responsibilities and agree to comply with the rules of behavior for PAMS.
- PAMS will take you to the “Having Trouble Logging In?” page. (If you have been an Office of Science merit reviewer or if you have previously submitted an application, you may already be linked to an institution in PAMS. If this happens, you will be taken to the PAMS home page.)

2. REGISTER TO YOUR INSTITUTION:

- Click the link labeled “Option 2: I know my institution and I am here to register to the institution.” (Note: If you previously created a PAMS account but did not register to an institution at that time, you must click the Institutions tab and click the “Register to Institution” link.)
- PAMS will take you to the “Register to Institution” page.

- Type a word or phrase from your institution name in the field labeled, “Institution Name like,” choose the radio button next to the item that best describes your role in the system, and click the “Search” button. A “like” search in PAMS returns results that contain the word or phrase you enter; you do not need to enter the exact name of the institution, but you should enter a word or phrase contained within the institution name. (If your institution has a frequently used acronym, such as ANL for Argonne National Laboratory or UCLA for the Regents of the University of California, Los Angeles, you may find it easiest to search for the acronym under “Institution Name like.” Many institutions with acronyms are listed in PAMS with their acronyms in parentheses after their names.)
- Find your institution in the list that is returned by the search and click the “Actions” link in the Options column next to the institution name to obtain a dropdown list. Select “Add me to this institution” from the dropdown. PAMS will take you to the “Institutions – List” page.
- If you do not see your institution in the initial search results, you can search again by clicking the “Cancel” button, clicking the Option 2 link, and repeating the search.
- If, after searching, you think your institution is not currently in the database, click the “Cannot Find My Institution” button and enter the requested institution information into PAMS. Click the “Create Institution” button. PAMS will add the institution to the system, associate your profile with the new institution, and return you to the “Institutions – List” page when you are finished.

For help with PAMS, click the “External User Guide” link on the PAMS website, <https://pamspublic.science.energy.gov/>. You may also contact the PAMS Help Desk, which can be reached Monday through Friday, 9AM – 5:30 PM Eastern Time. Telephone: (855) 818-1846 (toll free) or (301) 903-9610, email: sc.pams-helpdesk@science.doe.gov. All submission and inquiries about this Funding Opportunity Announcement should reference **DE-FOA-0002204**.

4. Viewing Submitted Applications

Each grants.gov application submitted to the DOE Office of Science (SC) automatically transfers into PAMS and is subsequently assigned to a program manager. At the time of program manager assignment, the three people listed on the SF-424 (R&R) cover page will receive an email with the subject line, “Receipt of Proposal 0000xxxxxx by the DOE Office of Science.” These three people are the Principal Investigator (Block 14), Authorized Representative (Block 19), and Point of Contact (Block 5). In PAMS notation, applications are known as proposals, the Principal Investigator is known as the PI, the Authorized Representative is known as the Sponsored Research Officer/Business Officer/Administrative Officer (SRO/BO/AO), and the Point of Contact is known as the POC.

There will be a period of time between the application’s receipt at Grants.gov and its assignment to a DOE Office of Science program manager. Program managers are typically assigned two weeks after applications are due at Grants.gov: please refrain from attempting to view the proposal in PAMS until you receive an email providing the assignment of a program manager.

Once the email is sent, the PI, SRO/BO/PO, and POC will each be able to view the submitted proposal in PAMS. Viewing the proposal is optional.

You may use the Internet Explorer, Firefox, Google Chrome, or Safari browsers to access PAMS.

Following are two sets of instructions for viewing the submitted proposal, one for individuals who already have PAMS accounts and one for those who do not.

If you already have a PAMS account, follow these instructions:

1. Log in to PAMS at <https://pamspublic.science.energy.gov/>.
2. Click the “Proposals” tab and click “Access Previously Submitted Grants.gov Proposal.”
3. Enter the following information:
 - Proposal ID: Enter the ten-digit PAMS proposal ID, including the leading zeros (e.g., 00002xxxxx). Do not use the Grants.gov proposal number. Use the PAMS number previously sent to you in the email with subject line, “Receipt of Proposal ...”.
 - Email (as entered in Grants.gov application): Enter your email address as it appears on the SF424(R&R) Cover Page.
 - Choose Role: Select the radio button in front of the role corresponding to the SF-424 (R&R) cover page. If your name appears in block 19 of the SF-424 (R&R) cover page as the authorizing representative, select “SRO/BO/AO (Sponsored Research Officer/Business Officer/Administrative Officer).” If your name appears in block 14 of the SF424 R&R cover page as the PI, select “Principal Investigator (PI).” If your name appears in block 5 of the SF424 R&R as the point of contact, select “Other (POC).”
4. Click the “Save and Continue” button. You will be taken to your “My Proposals” page. The grants.gov proposal will now appear in your list of proposals. Click the “Actions/Views” link in the options column next to this proposal to obtain a dropdown list. Select “Proposal” from the dropdown to see the proposal. Note that the steps above will work only for proposals submitted to the DOE Office of Science since May 2012.

If you do not already have a PAMS account, follow these instructions:

1. To register, click the “Create New PAMS Account” link on the website <https://pamspublic.science.energy.gov/>.
2. Click the “No, I have never had an account” link and then the “Create Account” button.
3. You will be prompted to enter your name and email address, create a username and password, and select a security question and answer. Once you have done this, click the “Save and Continue” button.
4. On the next page, enter the required information (at least one phone number and your mailing address) and any optional information you wish to provide (e.g., FAX number, website, mailstop code, additional email addresses or phone numbers, Division/Department). Click the “Create Account” button.
5. Read the user agreement and click the “Accept” button to indicate that you understand your responsibilities and agree to comply with the rules of behavior for PAMS.
6. You will be taken to the Register to Institution page. Select the link labeled, “Option 1: My institution has submitted a proposal in Grants.gov. I am here to register as an SRO, PI, or POC (Sponsored Research Officer, Principal Investigator, or Point of Contact).”
7. Enter the following information:
 - Proposal ID: Enter the ten-digit PAMS proposal ID, including the leading zeros (e.g., 00002xxxxx). Do not use the Grants.gov proposal number. Use the PAMS number

- previously sent to you in the email with subject line, “Receipt of Proposal ...”.
- Email (as entered in Grants.gov proposal): Enter your email address as it appears on the SF424(R&R) Cover Page.
 - Choose Role: Select the radio button in front of the role corresponding to the SF-424 (R&R) cover page. If your name appears in block 19 of the SF-424 (R&R) cover page as the authorizing representative, select “SRO/BO/AO (Sponsored Research Officer/Business Officer/Administrative Officer).” If your name appears in block 14 of the SF424 R&R cover page as the PI, select “Principal Investigator (PI).” If your name appears in block 5 of the SF424 R&R as the point of contact, select “Other (POC).”
8. Click the “Save and Continue” button. You will be taken to your “My Proposals” page. The grants.gov proposal will now appear in your list of proposals. Click the “Actions/Views” link in the options column next to this proposal to obtain a dropdown list. Select “Proposal” from the dropdown to see the proposal.

If you were listed as the PI on a prior submission but you have not previously created an account, you may already be listed in PAMS. If this is the case, you will be taken to the PAMS home page after agreeing to the Rules of Behavior. If that happens, follow the instructions listed above under “If you already have a PAMS account...” to access your grants.gov proposal.

The steps above will work only for proposals submitted to the DOE Office of Science since May 2012.

For help with PAMS, click the “External User Guide” link on the PAMS website, <https://pamspublic.science.energy.gov/>. You may also contact the PAMS Help Desk, which can be reached Monday through Friday, 9 AM – 5:30 PM Eastern Time. Telephone: (855) 818-1846 (toll free) or (301) 903-9610, Email: sc.pams-helpdesk@science.doe.gov. All submission and inquiries about this Funding Opportunity Announcement should reference **DE-FOA-0002204**.

Section V - APPLICATION REVIEW INFORMATION

A. CRITERIA

1. Initial Review Criteria

Prior to a comprehensive merit evaluation, DOE will perform an initial review in accordance with 10 CFR 605.10(b) to determine that (1) the applicant is eligible for the award; (2) the applicant submitted a pre-application and was allowed to submit a full application; (3) the information required by the FOA has been submitted; (4) all mandatory requirements are satisfied; and (5) the proposed project is responsive to the objectives of this funding opportunity announcement. In particular, to be responsive to the objectives of this FOA, the scientific research proposed in the application must satisfy the following three requirements:

- (a) address priority research opportunities or priority research directions described in one or more of the *Roundtable* or *Basic Research Needs* workshop reports listed in Section I;
- (b) address one or more of the grand challenges identified in the BESAC report *Directing Matter and Energy: Five Challenges for Science and the Imagination*; and
- (c) address one or more of the transformative opportunities identified in the BESAC report *Challenges at the Frontiers of Matter and Energy: Transformative Opportunities for Discovery Science*.

Failure to provide any information required by the FOA may cause an application to fail the initial review. DOE reserves the right to contact applicants to request the correction of minor omissions if an application is otherwise responsive to the requirements and objectives of the FOA.

Applications that fail to satisfy all initial review criteria will not be forwarded for merit review and will be rejected without further review.

2. Merit Review Criteria

Applications will be subjected to scientific merit review (peer review) and will be evaluated by Merit Review Panels against the following seven criteria, the first five of which will be weighted more heavily than the final two:

SCIENTIFIC AND/OR TECHNICAL MERIT OF THE PROPOSED RESEARCH

DOE will instruct merit reviews to consider the following in their evaluation:

- How innovative and novel the proposed research is.
- Whether the application contains clearly defined four-year scientific research goals for the EFRC and whether the proposed research program likely to meet these goals.
- If successful, what significant impact the EFRC is likely to have on the field of scientific research in which it will be operating.; in the longer term, what impact success in achieving the scientific goals could have on future energy technologies.

- How balanced and comprehensive the basic research plan presented in the application is and to what extent it supports experimental, theoretical, and computational efforts.
- For renewal applications only, to what extent the scientific progress made by the EFRC since the beginning of the last project period in 2016 has been commensurate with the level of support. Consider, for example, if and how the scientific results achieved by the center have significantly impacted the field in which the center is operating.

APPROPRIATENESS OF THE PROPOSED METHOD OR APPROACH

DOE will instruct merit reviews to consider the following in their evaluation:

- How well does the application justify the need for a well-integrated, collaborative EFRC? Consider, for example, whether the stated goals could be achieved by similar researchers working independently, or whether the research challenges to be addressed are those that are likely to be overcome most efficiently by a centrally managed, well-integrated team.
- Are the strategy and the plan for the development and operation of the proposed EFRC appropriate? Consider, for example, whether the applicants have demonstrated the need for an EFRC approach involving multiple senior/key personnel, the means for achieving an integrated EFRC, and plans for leadership and guidance for the scientific and technical direction.
- How appropriate are the proposed scientific methods and approaches detailed in the proposal, and how likely are they to achieve the stated scientific goals of the EFRC?

STRENGTH OF THE EFRC MANAGEMENT PLAN

DOE will instruct merit reviews to consider the following in their evaluation:

- How effectively has the applicant presented a comprehensive management plan that includes a strong lead organization, a leadership structure with clear roles and responsibilities, and a qualified and empowered EFRC Director?
- What clearly defined mechanisms does the applicant present to evaluate success/failure and to reconfigure research thrusts as needed? Consider, for example, how effectively the applicant has established procedures for overcoming key scientific challenges and shifting research directions and resources away from under-productive or low-priority activities and toward promising new directions.
- Is the Data Management Plan suitable for the proposed research, and to what extent does it make the data available and useful to the scientific community?
- Are environmental, safety, and health issues responsibly anticipated and addressed?

SYNERGY AMONG THE PRINCIPAL INVESTIGATORS, INCLUDING COHESION AND INTEGRATION OF THE RESEARCH ACTIVITIES

DOE will instruct merit reviews to consider the following in their evaluation:

- To what extent is close coordination and collaboration among the researchers on the application proposed, and how likely is it that the scientific challenges identified in the application will be addressed only through such interactions?

- How well do the components of the proposed EFRC research represent the necessary elements to achieve the stated goals of the center, rather than simply a collection of loosely connected research projects?
- What evidence is presented in the application to indicate that the proposed team of researchers is likely to work together in a cohesive and integrated manner?

COMPETENCY OF APPLICANT’S PERSONNEL AND ADEQUACY OF PROPOSED RESOURCES

DOE will instruct merit reviews to consider the following in their evaluation:

- What evidence does the application present that the lead organization and the EFRC Director have proven records of success in program and personnel management of diverse teams of scientific and technical professionals for projects of comparable complexity and magnitude?
- To what extent do the applicant’s senior/key personnel have proven records of research in the disciplines needed for success in this project?
- Is the proposed access to existing research space, instrumentation, and experimental and computational facilities at the lead and partner institutions likely to meet the needs of the proposed EFRC? If needed, do the applicants articulate plans for access to research capabilities and resources outside of the EFRC, including national user facilities?

REASONABLENESS AND APPROPRIATENESS OF THE PROPOSED BUDGET

DOE will instruct merit reviews to consider the following in their evaluation:

- Is the requested operating budget and the distribution of the funds among research tasks/themes and partners reasonable for the planned scientific program? Comment on any budget items that are not well justified or appear anomalous.
- Does the budget include adequate support for the appropriate personnel to carry out the proposed research?
- Are the equipment needs adequately identified, and costs for needed new instrumentation or upgrades realistically estimated?
- Are all subcontracts, travel, student costs and other ancillary expenses adequately estimated and justified?

DEVELOPMENT AND/OR UTILIZATION OF UNIQUE FACILITIES, CAPABILITIES OR APPROACHES

DOE will instruct merit reviews to consider the following in their evaluation:

- To what extent does the proposed research rely on the use of unique facilities at the applicants’ home institutions or at United States or international user facilities?
- What new facilities, capabilities, or approaches have the applicants proposed to develop in order to achieve the stated scientific goals? Comment on the uniqueness of these advances and the impact that they are likely to have on the EFRC and its field of research.

B. REVIEW AND SELECTION PROCESS

1. Merit Review

Applications that pass the initial review for eligibility and responsiveness to the FOA will be subjected to formal merit review and will be evaluated based on the criteria stated above in Section V.A.2. Merit reviewers will be asked to comment on both strengths and weaknesses of each proposal with respect to each of the seven merit review criteria.

Following completion of the merit review, a team of Federal officials will review the applications and the evaluations of the Merit Review Panels, summarize the Merit Review Panel members' independent evaluations of the applications submitted, and recommend the application of the program policy factors, as appropriate. The evaluation process may include consideration of any of the program policy factors listed in B.2. External peer reviewers are selected with regard to both their scientific expertise and the absence of conflict-of-interest issues. Both Federal and non-Federal reviewers may be used, and submission of an application constitutes agreement that this is acceptable to the investigator(s) and the submitting institution.

2. Selection

The Selection Official will consider the findings of the Merit Review Panels and the recommendations of Federal officials, as well as the following program policy factors:

Program Policy Factors

- Delineation of the scope of the proposed EFRC research from other research activities in which the principal investigators are involved, particularly those supported by DOE and by other federal agencies.
- Relevance of the proposed activity to BES priorities.
- Ensuring an appropriate balance of activities within BES programs.
- Diversity of research activities that will address the scientific grand challenges, transformative opportunities, and basic research needs as articulated in the BESAC and BES workshop reports listed in Section I of this FOA.
- Relationship of the proposed EFRC to other research programs in DOE, including but not limited to the core research activities within the BES Materials Sciences and Engineering Division and Chemical Sciences, Geosciences and Biosciences Division.
- Potential for developing synergies between the proposed EFRC and other EFRCs or other ongoing BES research activities.
- For renewal applications, progress made by the EFRC during the preceding project period and the impact of the research.

As part of the selection process, DOE reserves the right to seek clarifications in writing from those applications deemed to have the highest scientific merit in order to facilitate the selection process.

3. Discussions and Award

The Government may enter into discussions with a selected applicant for any reason deemed necessary, including but not limited to the following: (1) the budget is not appropriate or reasonable for the requirement; (2) only a portion of the application is selected for award; (3) the Government needs additional information to determine that the recipient is capable of complying with the requirements in 2 CFR 200 as modified by 2 CFR 910 (DOE Financial Assistance Regulation); and/or (4) special terms and conditions are required. Failure to resolve satisfactorily the issues identified by the Government will preclude award to the applicant.

C. ANTICIPATED NOTICE OF SELECTION AND AWARD DATES

DOE anticipates notifying the applicants selected for award in July 2020 and making awards by August 2020.

Section VI – AWARD ADMINISTRATION INFORMATION

A. AWARD NOTICES

1. Notice of Selection

Selected Applicants Notification: DOE will notify applicants selected for award. This notice of selection is not an authorization to begin performance. (See Section IV.G with respect to the allowability of pre-award costs.)

Non-selected Notification: Organizations whose applications have not been selected will be advised as promptly as possible. This notice will explain why the application was not selected.

2. Notice of Award

If a selected applicant is not a DOE/NNSA National Laboratory Contractor, other Federal Agency, or Non- DOE/NNSA FFRDC Contractor, an Assistance Agreement issued by the Contracting Officer is the authorizing award document. It normally includes, either as an attachment or by reference, the following items: (1) Special Terms and Conditions; (2) 2 CFR part 200, as amended by 2 CFR part 910, DOE Financial Assistance Regulation, and 10 CFR part 605, the Office of Science Financial Assistance Program; (3) Application as approved by DOE; (4) the Government-wide Research Terms and Conditions, and DOE Agency Specific Requirements; (5) National Policy Assurances To Be Incorporated As Award Terms; (6) Budget and (7) Federal Assistance Reporting Checklist, which identifies the reporting requirements; and (8) Intellectual Property Provisions.

For grants and cooperative agreements made to universities, non-profits and other entities subject to Title 2 CFR, research awards made under this funding opportunity will be subject to the government-wide Research Terms and Conditions published at https://www.nsf.gov/pubs/policydocs/rtrc/rtrcoverlay_march17.pdf and the DOE Agency Specific Standard Research Terms and Conditions published at https://www.nsf.gov/pubs/policydocs/rtrc/agencyspecifics/doe_417.pdf. These Terms and Conditions will be incorporated in the award by reference.

If a selected applicant is a DOE/NNSA National Laboratory Contractor, DOE will fund the DOE/NNSA National Laboratory Contractor through the DOE field work authorization system or other appropriate process. DOE/NNSA National Laboratories Contractors participating as team members of other selected applicants' projects will be funded by field work authorization or other appropriate process.

Non-DOE/NNSA FFRDC Contractors and other Federal agencies, if part of a selected applicant's project, will be funded under an interagency agreement.

B. ADMINISTRATIVE AND NATIONAL POLICY REQUIREMENTS

1. Administrative Requirements

The administrative requirements for DOE grants and cooperative agreements are contained in 2 CFR 200 as modified by 2 CFR 910 (DOE Financial Assistance Regulation).

For grants and cooperative agreements made to universities, non-profits and other entities subject to Title 2 CFR, research awards made under this funding opportunity will be subject to the government-wide Research Terms and Conditions published at https://www.nsf.gov/pubs/policydocs/rtrtcoverlay_march17.pdf and the DOE Agency Specific Standard Research Terms and Conditions published at https://www.nsf.gov/pubs/policydocs/rtrtcoverlay_march17.pdf. These Terms and Conditions will be incorporated in the award by reference.

DUNS AND SAM REQUIREMENTS

Additional administrative requirements for DOE grants and cooperative agreements are contained in 2 CFR 25 (See: <https://www.ecfr.gov>). Prime awardees must keep their data at the System for Award Management (SAM) current at <http://www.sam.gov>. SAM is the government-wide system that replaced the Central Contractor Registry (CCR). If you had an active registration in the CCR, you have an active registration in SAM. Subawardees at all tiers must obtain DUNS numbers and provide the DUNS to the prime awardee before the subaward can be issued.

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 are contained in 2 CFR 170. (See: <https://www.ecfr.gov>). Prime awardees must register with the new FSRs database and report the required data on their first tier subawardees. Prime awardees must report the executive compensation for their own executives as part of their registration profile SAM

PROHIBITION ON LOBBYING ACTIVITY

By accepting funds under this award, you agree 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 USC 1913. This restriction is in addition to those prescribed elsewhere in statute and regulation.

2. National Policy Assurances

The National Policy Assurances To Be Incorporated As Award Terms are located at <http://energy.gov/management/office-management/operational-management/financial-assistance/financial-assistance-forms> under Award Terms.

3. Terms and Conditions

The DOE Special Terms and Conditions for Use in Most Grants and Cooperative Agreements are located at <http://energy.gov/management/office-management/operational-management/financial-assistance/financial-assistance-forms> under Award Terms.

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

4. Additional Conditions

CONFERENCE SPENDING (FEBRUARY 2015)

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.

CORPORATE FELONY CONVICTION AND FEDERAL TAX LIABILITY REPRESENTATIONS (MARCH 2014)

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

- It is **not** a corporation that has been convicted of a felony criminal violation under any Federal law within the preceding 24 months,
- 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.

PUBLICATIONS

The recipient is expected to publish or otherwise make publicly available the results of the work conducted under any award resulting from this Funding Opportunity Announcement. Publications and other methods of public communication describing any work based on or

developed under an award resulting from this Funding Opportunity Announcement must contain an acknowledgment of DOE Office of Science support. The format for such acknowledgments is provided at <http://science.energy.gov/funding-opportunities/acknowledgements/>. The author's copy of any peer-reviewed manuscript accepted for funding must be announced to DOE's Office of Scientific and Technical Information and made publicly available in accordance with the instructions contained in the Reporting Requirements Checklist incorporated in all Assistance Agreements.

NONDISCLOSURE AND CONFIDENTIALITY AGREEMENTS ASSURANCES (JUNE 2015)

(1) By entering into this agreement, the undersigned attests that the awardee listed in Block 5 of the Assistance Agreement **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 contractors 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) The undersigned further attests that the awardee listed in Block 5 of the Assistance Agreement **does not and will not** use any Federal funds to implement or enforce any nondisclosure and/or confidentiality policy, form, or agreement it uses unless it contains the following provisions:

a. *“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.”*

b. The limitation above shall not contravene requirements applicable to Standard Form 312, Form 4414, or any other form issued by a Federal department or agency governing the nondisclosure of classified information.

c. Notwithstanding 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.

C. REPORTING

Reporting requirements are identified on the Federal Assistance Reporting Checklist, DOE F 4600.2, attached to the award agreement. The checklist is available at <http://energy.gov/management/office-management/operational-management/financial-assistance/financial-assistance-forms> under Award Forms.

Section VII - QUESTIONS/AGENCY CONTACTS

A. QUESTIONS

Questions relating to the Grants.gov registration process, system requirements, how an application form works, or the submittal process must be directed to Grants.gov at 1-800-518-4726 or support@grants.gov. DOE cannot answer these questions. Please contact the Grants.gov help desk only for questions related to grants.gov.

For help with PAMS, click the “External User Guide” link on the PAMS website, <https://pamspublic.science.energy.gov/>. You may also contact the PAMS Help Desk, which can be reached Monday through Friday, 9 AM – 5:30 PM Eastern Time. Telephone: (855) 818-1846 (toll free) or (301) 903-9610, Email: sc.pams-helpdesk@science.doe.gov. All submission and inquiries about this FOA should reference **DE-FOA-0002204**.

Please contact the PAMS help desk for technological issues with the PAMS system.

Questions regarding the content of this FOA **must** be submitted through the FedConnect portal. You must register with FedConnect and respond as an interested party to submit questions, and to view responses to questions. It is recommended that you register as soon after release of the FOA as possible to have the benefit of all responses. More information is available at <https://www.fedconnect.net>.

Due to the time required to provide complete and accurate answers to questions, all questions **must** be submitted through FedConnect no later than **12:00 Noon Eastern Time on March 26, 2020**. DOE will not respond to questions submitted after the designated time.

DOE will try to respond to questions within 3 business days, unless a similar question and answer have already been posted.

B. AGENCY CONTACTS

Grants.gov Customer Support	800-518-4726 (toll-free) support@grants.gov
PAMS Customer Support	855-818-1846 (toll-free) 301-903-9610 sc.pams-helpdesk@science.doe.gov
DOE Contact	Cedric Thomas Cedric.Thomas@science.doe.gov
International Applicant Support Contact	606-545-5035

Section VIII - OTHER INFORMATION

A. MODIFICATIONS

Notices of any modifications to this FOA will be posted on Grants.gov and the FedConnect portal. You can receive an email when a modification or an FOA message is posted by registering with FedConnect as an interested party for this FOA. It is recommended that you register as soon after release of the FOA as possible to ensure you receive timely notice of any modifications or other FOAs. More information is available at <http://www.fedconnect.net>.

B. GOVERNMENT RIGHT TO REJECT OR NEGOTIATE

DOE 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 and/or award.

C. COMMITMENT OF PUBLIC FUNDS

(a) A DOE financial assistance award is valid only if it is in writing and is signed, either in writing or electronically, by a DOE Contracting Officer. A commitment by other than the Contracting Officer, either explicit or implied, is invalid.

(b) Recipients are free to accept or reject the award. A request to draw down DOE funds constitutes the Recipient's acceptance of the terms and conditions of this Award.

D. PROPRIETARY APPLICATION INFORMATION

Patentable ideas, trade secrets, proprietary or confidential commercial or financial information, disclosure of which may harm the applicant, should be included in an application only when such information is necessary to convey an understanding of the proposed project. The use and disclosure of such data may be restricted, provided the applicant includes the following legend on the first page of the project narrative and specifies the pages of the application which are to be restricted:

“The data contained in pages _____ of this application have been submitted in confidence and contain trade secrets or proprietary information, and such data shall be used or disclosed only for evaluation purposes, provided that if this applicant receives an award as a result of or in connection with the submission of this application, DOE shall have the right to use or disclose the data herein to the extent provided in the award. This restriction does not limit the Government’s right to use or disclose data obtained without restriction from any source, including the applicant.”

To protect such data, each line or paragraph on the pages containing such data must be specifically identified and the page marked with a legend similar to the following:

“The following contains proprietary information that (name of applicant) requests not be released to persons outside the Government, except for purposes of review and evaluation.”

E. EVALUATION AND ADMINISTRATION BY NON-FEDERAL PERSONNEL

In conducting the merit review evaluation, 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. The applicant, by submitting its application, consents to the use of non-Federal reviewers/administrators. Non-Federal reviewers must sign conflict of interest and non-disclosure agreements prior to reviewing an application. Non-Federal personnel conducting administrative activities must sign a non-disclosure agreement.

F. INTELLECTUAL PROPERTY DEVELOPED UNDER THIS PROGRAM

Patent Rights: The Government will have certain statutory rights in an invention that is conceived or first actually reduced to practice under a DOE award. The Federal Non-Nuclear Energy Act of 1974, 42 USC 5908 provides that title to such inventions vests in the United States, except where 35 USC 202 provides otherwise for nonprofit organizations or small business firms. However, the Secretary of Energy may waive all or any part of the rights of the United States subject to certain conditions. (See “Notice of Right to Request Patent Waiver” in paragraph G, below.)

Rights in Technical Data: Normally, the Government has unlimited rights in technical data developed under a DOE agreement. Delivery or third party licensing of proprietary software or data developed solely at private expense will not normally be required except as specifically negotiated in a particular agreement to satisfy DOE’s own needs or to insure the commercialization of technology developed under a DOE agreement.

G. NOTICE OF RIGHT TO REQUEST PATENT WAIVER

Applicants may request a waiver of all or any part of the rights of the United States in inventions conceived or first actually reduced to practice in performance of an agreement as a result of this FOA, in advance of or within 30 days after the effective date of the award. Even if such advance waiver is not requested or the request is denied, the recipient will have a continuing right under the award to request a waiver of the rights of the United States in identified inventions, i.e., individual inventions conceived or first actually reduced to practice in performance of the award. Any patent waiver that may be granted is subject to certain terms and conditions in 10 CFR 784. For more information, see <http://energy.gov/gc/services/technology-transfer-and-procurement/office-assistant-general-counsel-technology-transf-1>

Domestic small businesses and domestic nonprofit organizations will receive the patent rights clause at 2 CFR Part 910, Appendix A of Subpart D, titled “Patent Rights (Small Business and Nonprofit Organizations)”. This clause permits domestic small business and domestic nonprofit organizations to retain title to subject inventions. Therefore, small businesses and nonprofit organizations do not need to request a waiver.

H. NOTICE REGARDING ELIGIBLE/INELIGIBLE ACTIVITIES

Eligible activities under this program 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.

I. ENVIRONMENTAL, SAFETY AND HEALTH (ES&H) PERFORMANCE OF WORK AT DOE FACILITIES

Performance of Work at DOE Facilities

With respect to the performance of any portion of the work under this award which is performed at a DOE-owned or controlled site, the recipient agrees to comply with 10 CFR 851, Worker Safety and Health Program, and with all other ES&H requirements of the operator of such site. By submitting an application, the recipient understands this work is subject to DOE safety and health oversight with the ability to assess fines for non-compliance. The recipient shall apply this provision to all subawardees at any tier.

Federal, State, and Local Requirements

With respect to the performance of any portion of the work under this award, the recipient agrees to comply with all applicable local, state, and Federal ES&H regulations. The recipient shall apply this provision to all sub awardees at any tier.

J. NATIONAL ENVIRONMENTAL POLICY ACT COMPLIANCE

If question 4.a. on the “Research and Related Other Project Information” document indicates “potential impact on the environment”, or if DOE’s own review indicates it, DOE may ask the applicant to provide additional information on those impacts in order to prepare an environmental critique/synopsis per 10 CFR 1021.216. Note that this pre-award environmental critique/synopsis process would be separate from the preparation of a NEPA document such as an environmental impact statement (EIS) or an environmental assessment (EA). If DOE determines the latter documentation is necessary, this process would need to be completed, funded by and with the participation of the awardee, prior to them taking any action on the proposed project that could have adverse environmental effects or that could limit the choice of reasonable alternatives. The inability to satisfy the NEPA requirements after an award would result in cancellation of the award. Note that in most cases, even where potential impact on the environment exists, preparation of such NEPA documents is rarely necessary, but DOE has the expectation that the Applicant will disclose the potential, which would serve to initiate dialog with DOE if necessary.

K. AVAILABILITY OF FUNDS

Funds are not presently available for this award. The Government's obligation under this award is contingent upon the availability of appropriated funds from which payment for award purposes can be made.

Funding for all awards and future budget periods are contingent upon the availability of funds appropriated by Congress for the purpose of this program and the availability of future-year budget authority.

No legal liability on the part of the Government for any payment may arise until funds are made available to the contracting officer for this award and until the awardee receives notice of such availability, to be confirmed in writing by the contracting officer.