

**DEPARTMENT OF ENERGY  
OFFICE OF SCIENCE  
BIOLOGICAL AND ENVIRONMENTAL RESEARCH**



**SYSTEMS BIOLOGY ENABLED RESEARCH ON THE ROLES OF  
MICROBIOMES IN NUTRIENT CYCLING PROCESSES**

**FUNDING OPPORTUNITY ANNOUNCEMENT (FOA) NUMBER:  
DE-FOA-0002059**

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<b>Submission Deadline for Pre-Applications:</b>	<b>March 13, 2019, 5 PM Eastern Time A Pre-Application is required.</b>
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<b>Submission Deadline for Applications:</b>	<b>May 17, 2019, 11:59 pm Eastern Time</b>

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## **UPDATES AND REMINDERS**

### RECOMMENDATION

The U.S. Department of Energy (DOE) Office of Science (SC) 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.

### PRE-APPLICATIONS

Pre-applications are required and should contain a concise description of the objectives and technical approach of the proposed research that makes clear how the proposed research is responsive to the FOA. The pre-application must include the names, institutional affiliations, and conflict of interest information of all senior personnel on the project.

### AVOIDING ERRORS

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

- Please ensure that the research narrative is comprised of one and only one Portable Document Format (PDF) file, including all appendices, when it is attached to the SF-424 (R&R) form.
- When using the 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> must be submitted through a “Workspace.” Workspace permits members of a team to simultaneously work on their application in an online collaborative environment. Application forms may exist as both online webforms and downloadable forms. More information is available at <https://www.grants.gov/web/grants/applicants/workspace-overview.html>.

### DATA MANAGEMENT PLAN

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

## ACKNOWLEDGMENT OF FEDERAL SUPPORT

SC published guidance about how its support should be acknowledged at <https://science.energy.gov/funding-opportunities/acknowledgements/>.

## **Section I – FUNDING OPPORTUNITY DESCRIPTION**

### **GENERAL INQUIRIES ABOUT THIS FOA SHOULD BE DIRECTED TO:**

#### **Technical/Scientific Program Contact:**

Dawn M. Adin  
301-903-0570  
dawn.adin@science.doe.gov

### **STATUTORY AUTHORITY**

Public Law 95-91, US 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 Rule, codified at 10 CFR 605

### **SUMMARY**

The DOE SC program in Biological and Environmental Research (BER) hereby announces its interest in receiving applications for research within the Genomic Science Program (GSP) (<http://genomicscience.energy.gov>) mission-space. This FOA solicits applications for: i.) systems biology studies on regulatory, metabolic, and signaling networks of microbes, microbial consortia, and microbe-plant interactions involved in biogeochemical cycling of nutrients; and ii.) development and application of –omics approaches to investigate microbial community processes involved in biogeochemical nutrient cycling in terrestrial ecosystems. All research supported from awards under this FOA is intended to benefit the public through increasing our understanding of the physical universe.

### **SUPPLEMENTARY INFORMATION**

GSP supports fundamental systems biology research to advance understanding of plants, microbes, and multispecies communities in energy and the environment. Exploring the translation of organisms' genomes into catalytic and structural macro molecules, regulatory systems, and metabolic pathways can shed new light on the mechanistic basis of biological processes and how these processes change in response to community interactions and shifting environmental regimes. By better understanding relationships between systems biology properties of microbial communities and environmental processes, GSP-supported research can help bridge biogeochemical cycle understanding from molecular- to ecosystem-scales.

Since the realization that soil was a heterogeneous system teeming with life, much work has involved teasing out who is there, what are they doing, what role each organism is playing independently and within the community, and what key processes are driven by these microbial communities that contribute to higher scale processes, including the movement and fate of nutrients in soils. These basic questions are still being asked today in terrestrial ecosystems and sedimentary environments due to the compositional heterogeneity of soils and the complexity of the microbial communities. Fortunately, increasingly sophisticated approaches for “meta-omics” (i.e. metagenomics, metatranscriptomics, metaproteomics, metabolomics, etc.) coupled to high resolution analytical technologies have offered new tools for investigating the functional properties of microbial communities. Along with -omics analyses, researchers have rapidly decreased the time it takes to isolate and analyze microbes and consortia from the environment, build genetic tools for their experimental manipulation, and construct predictive models of their metabolic and regulatory processes. These advances have facilitated more sophisticated studies on the roles played by individual microbes and the microbiomes they are a part of as key points of integration between major biogeochemical cycles (e.g. carbon, nitrogen, sulfur, phosphorus, etc.) in experimentally challenging environments (soils, sediments, permafrosts, etc.etc.) resulting in new insights on the influence of microbial processes at larger, aggregate scales.

Systems-level research supported by GSP emphasizes studies on the underlying principles of complex systems and facilitates scaling of concepts and data across multiple levels of biological organization. Applying this approach to understanding the roles of microbial communities in biogeochemical cycles provides opportunities to not only examine their functional attributes in the environment, but also to form and test hypotheses on underlying ecological principles. Such studies rely heavily on integrated multidisciplinary research that incorporates experimentation on model organisms and systems collection of observational data on communities and ecosystems, and application of data analytics and conceptual and numerical modeling to enable structural and functional understanding of complex systems that applies computational approaches across multiple spatial and temporal scales. These integrated studies provide opportunities to tease apart microbial network interactions as well as to assess species-specific and collective capabilities of the organisms contained within soil and sediment microbiomes.

Applications are solicited for –omics driven basic research on the contribution of prokaryotic and eukaryotic microbes and microbial communities to biogeochemical cycling in terrestrial soil and sedimentary ecosystems in the following areas:

- **Systems biology studies on regulatory, metabolic, and signaling networks of microbes, microbial consortia, and microbe-plant interactions involved in biogeochemical cycling of nutrients.** Proposed studies should focus on systems biology research using model microbes or microbial consortia that are relevant to biogeochemical cycling in terrestrial ecosystems. Experimental systems should be carefully chosen to facilitate development of microbial community-scale metabolic and regulatory models, examine fundamental ecological principles, and inform understanding of larger-scale biogeochemical processes in the environment of interest.

- **Development and application of –omics approaches to investigate microbial community processes involved in biogeochemical cycling in terrestrial and sedimentary ecosystems.** Applications should address the adaptation of genome-enabled techniques (e.g. metagenomics, metatranscriptomics, metaproteomics, community-scale metabolomics, etc.) to interrogate relevant processes of microbes in terrestrial environments, either at field sites or using model micro-/meso-cosms, and integrate resulting data into process understanding at the ecosystem scale. Applications are encouraged that target key microbe-mediated biogeochemical cycling processes in terrestrial systems to predict responses to shifts in temperature, precipitation, CO<sub>2</sub> concentration, or other environmental stressors.

**NOTE:** BER encourages the submission of innovative "high-risk/high-reward" research applications that address critical knowledge gaps and have the potential for high impact. The probability of success and the risk-reward balance will be considered when making funding decisions.

Applications focusing on model organisms or communities that are of limited relevance to understanding global- and regional-scale biogeochemical cycle processes are not encouraged. Applications primarily focused on agroecosystems are not encouraged for this FOA. Applications primarily focused on metagenomic sequencing are not encouraged for this FOA and should instead be directed to the DOE Joint Genome Institute's Community Sequencing Program (<https://jgi.doe.gov/user-program-info/community-science-program/overview-of-the-community-science-program/>). Applications for research that would result in incremental advances in our current understanding or technology are not encouraged. While macro-eukaryotes (insects, worms, etc.) are important members of the overall soil ecosystem, they should not be the primary focus of a proposal responding to this FOA. Multidisciplinary, integrative approaches supported by computational tools and analyses that iterate between laboratory and natural systems are strongly encouraged.

Information about the DOE GSP data release policy, with which awardees will be expected to comply, is available at <https://genomicscience.energy.gov/datasharing/index.shtml>. **Any application submitted without a data management plan will be returned without review.**

All applicants are required to submit an Appendix to the Project Narrative section describing past research funded by BER applicable to the application being submitted, including products produced. The Appendix should be titled "Progress from DOE-funded research" and should be appended immediately at the end of the Project Narrative. This section should be no longer than 3 pages and does not count towards the page limit of the Project Narrative. If no applicable previous DOE-funded research exists, this Appendix should only consist of a statement to that effect.

**Annual PI Meeting.** If a project is funded, beginning in the first year of funding, the PI will be required to attend an annual GSP Principal Investigator (PI) meeting, generally held in the Washington, D.C., area. One or more other project participants may also attend. Reasonable travel expenses may be included as part of the project budget.



## **OTHER SUPPLEMENTARY INFORMATION:**

The following programmatic areas within BER are at the interface with GSP's environmental microbiology portfolio.

- **Systems Biology for Sustainable Bioenergy:** The DOE-BER BSSD GSP portfolio in sustainable bioenergy is focused on omics-driven basic research aimed at enabling the integrated development of sustainable bioenergy feedstock systems in terrestrial environments within the ecosystem context. The development of integrative, physiology-based models to attain a systems-level understanding of the plant-soil-microbiome ecosystem and identify key parameters of bioenergy plant sustainability is encouraged. The emphasis is on key variables such as genomic properties of biofuel crops and relevant biological processes (e.g., rhizosphere community functions, soil carbon stabilization, nutrient cycling, and greenhouse gas production) that enable quantitative, accurate prediction of plant performance and ecosystem processes under changing environments.
- **Terrestrial Ecosystems Science:** The Terrestrial Ecosystems Science portfolio is a subprogram of the Environmental System Science (ESS) activity within the Climate and Environmental Sciences Division (CESD) of BER. The goal of the TES program is to improve the representation of terrestrial ecosystem processes in Earth system models, thereby improving the quality of complex Earth and environmental model projections that focus on ecosystems and terrestrial processes that are globally important, climatically or environmentally sensitive, and comparatively understudied or underrepresented in Earth system models. Research carefully couples experimental and observational data on terrestrial ecosystem processes with models to identify key uncertainties in model projections by collecting new data knowledge to address these uncertainties thereby advancing the sophistication of the models and therefore the confidence in the projections. More broadly, the priority research areas for the TES include: belowground ecosystems, terrestrial-aquatic interfaces, Arctic and Boreal systems, coupled biogeochemical transformations and fluxes, and the role of disturbances in ecological systems.
- **Subsurface Biogeochemistry Research:** The Subsurface Biogeochemistry Research (SBR) portfolio is part of the ESS activity within the CESD of BER. The goal of the SBR program is to advance a robust predictive understanding of how watersheds function as integrated hydro-biogeochemical systems and how these systems respond to perturbations caused by changes in water availability and quality, contaminant transformation and release, nutrient cycling, land use, vegetative cover, and snowmelt timing. The five priority research objectives of the program are to: 1) quantify how biological behavior, abiotic-biotic interactions, and molecular transformations control the mobility of contaminants, nutrients and critical biogeochemical elements; 2) quantify and predict how hydrology drives fine-scale biogeochemical processes in surface-subsurface systems; 3) translate biogeochemical behavior across relevant molecular to watershed scales to accurately and tractably predict flows of water, nutrients, and contaminants; 4)

identify, quantify, and predict watershed responses to natural and anthropogenic perturbations and shifts to new states; and 5) translate predictive understanding of watershed system function and evolution into near- and long-term environmental and energy strategies.

Applications that focus on research that may be perceived to overlap with one of these programs need to provide details within the application that describes how the application is responsive to this specific FOA.

**Availability of User Facilities and Other Specialized Resources:** DOE has responsibility for programs and facilities that offer unique and complementary resources that support research in a wide variety of science areas. Applicants are encouraged to consider utilization or collaboration with DOE-funded facilities that have existing and dedicated financial support, thereby leveraging ongoing infrastructure investments, archived samples, User Facilities, and long-term data sets when developing their applications.

For Joint Genome Institute (JGI) and Environmental Molecular Sciences Laboratory (EMSL) capabilities (see table below), applicants should assess whether the project’s needs are within reasonable requests for the respective User Facility and reach out to the respective user program coordinator if the request might be considered large. Awarded projects will receive prioritized consideration for use of JGI capabilities, subject to an assessment of technical feasibility by the facility.

For use of a DOE-funded field site, applicants are required to provide a letter of support to be included with the proposal from the site/capability coordinators/managers to determine if the proposed research complements ongoing research at the site and the site managers would support the access and/or use if selected for an award. This documentation should be in the form of a letter of agreement, signed by an individual with authority to commit the expertise/resources of the collaborating institution/project/program, and submitted with the application. These letters of support can be included in the “Appendix 7 (Other Attachment).”

Examples of available user facilities and other specialized resources include:

<p><b><u>Environmental Molecular Sciences Laboratory (EMSL)</u></b></p>	<p>The Environmental Molecular Sciences Laboratory (EMSL) (<a href="http://www.emsl.pnl.gov/">http://www.emsl.pnl.gov/</a>) located at the Pacific Northwest National Laboratory, is a DOE Office of Science User Facility (<a href="https://science.energy.gov/user-facilities/">https://science.energy.gov/user-facilities/</a>). EMSL empowers scientific discovery of the mechanisms and dynamics that drive biological and environmental processes and interactions by providing users access to premier instruments for experimental research as well as high performance computing (HPC) and a variety of software codes for a range of modeling and simulation studies. Experimental capabilities available include: advanced chemical imaging/microscopy of dynamic inter- and intracellular processes;</p>
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	<p>nanoSIMS; computed x-ray tomography; high-resolution mass spectrometry and NMR spectroscopy for transcriptomics, metabolomics, and proteomics; plant/soil/subsurface growth chambers; and software and associated hardware for molecular dynamics, metabolic process and multi-scale modeling/simulation as well as data analytics. These and other experimental and computational capabilities are available at no charge through a user proposal process (<a href="https://www.emsl.pnl.gov/emslweb/proposal-opportunities">https://www.emsl.pnl.gov/emslweb/proposal-opportunities</a>). Applicants are also encouraged to explore the Facilities Integrating Collaborations for User Science (FICUS) initiative between JGI and EMSL (<a href="https://www.emsl.pnl.gov/emslweb/facilities-integrating-collaborations-user-science-ficus">https://www.emsl.pnl.gov/emslweb/facilities-integrating-collaborations-user-science-ficus</a>), through which capabilities at both user facilities can be combined and accessed with one proposal.</p>
<p><b><u>Environmental Systems Science – Data Infrastructure for a Virtual Ecosystem (ESS-DIVE)</u></b></p>	<p>ESS-DIVE is a data archive for Earth and environmental science data that is funded by the Data Management program within CESD. Maintained and managed at LBNL, ESS-DIVE archives and publicly shares data obtained from observational, experimental, and modeling research that are funded by the SBR and TES programs. ESS-DIVE allows data contributors to obtain digital object identifiers (DOIs) that can be used to cite and track usage of the data. For more information, see: <a href="http://ess-dive.lbl.gov/">http://ess-dive.lbl.gov/</a>.</p>
<p><b><u>High Performance Computing Centers</u></b></p>	<p>The DOE Office of Science supports leadership and high performance computing User Facilities, which provide compute cycles and data storage through a proposal process to the scientific community. These resources include the Molecular Science Computing (MSC) capability at EMSL (<a href="http://www.emsl.pnl.gov/capabilities/computing/">http://www.emsl.pnl.gov/capabilities/computing/</a>), the National Energy Research Scientific Computing Center (NERSC) at the Lawrence Berkeley National Laboratory (<a href="http://www.nersc.gov">http://www.nersc.gov</a>), the Argonne Leadership Computing Facility at Argonne National Laboratory (<a href="https://www.alcf.anl.gov/">https://www.alcf.anl.gov/</a>) and the Oak Ridge Leadership Computing Facility at Oak Ridge National Laboratory (<a href="https://www.olcf.ornl.gov/">https://www.olcf.ornl.gov/</a>).</p>

<p><b><u>Joint Genome Institute (JGI)</u></b></p>	<p>The Joint Genome Institute (JGI) in Walnut Creek, California, is a DOE Office of Science User Facility that provides the scientific community access to state of the art genomic sequencing and analysis capabilities, as well as modest amounts of DNA synthesis and metabolomics capabilities, for microbial, plant, microbial community, and other (non-pathogen) targets. In all cases, the aim of the JGI is to provide to the national and international scientific community information on the genome-derived “parts lists” that support further discovery (<a href="http://www.jgi.doe.gov">http://www.jgi.doe.gov</a>). These resources are available at no charge through a user proposal process (see <a href="https://proposals.jgi.doe.gov/">https://proposals.jgi.doe.gov/</a>). Applicants are also encouraged to explore the Facilities Integrating Collaborations for User Science (FICUS) initiative between JGI and EMSL, through which capabilities at these (and potentially other) User Facilities can be combined and accessed with one proposal (<a href="https://jgi.doe.gov/user-program-info/community-science-program/how-to-propose-a-csp-project/emsl">https://jgi.doe.gov/user-program-info/community-science-program/how-to-propose-a-csp-project/emsl</a>)</p>
<p><b><u>DOE Systems Biology Knowledgebase (KBase)</u></b></p>	<p>The U.S Department of Energy Systems Biology Knowledgebase (KBase) (<a href="http://www.kbase.us">www.kbase.us</a>) is an open-source software and data platform designed to meet the grand challenge of systems biology—predicting and designing biological function from the biomolecular (small scale) to the ecological (large scale). KBase is available for anyone to use, and enables researchers to collaboratively generate, test, compare, and share hypotheses about biological functions; perform large-scale analyses on scalable computing infrastructure; and combine experimental evidence and conclusions that lead to accurate models of plant and microbial physiology and community dynamics. The KBase platform has (1) extensible analytical capabilities (2) a web-browser-based user interface that supports building, sharing, and publishing reproducible and well-annotated analyses with integrated data; (3) access to extensive computational resources; and (4) a software development kit allowing the community to add functionality to the system. Science done within KBase is featured peer-reviewed publications (<a href="http://kbase.us/publications">http://kbase.us/publications</a>) and the KBase Narratives associated with these experiments are available to be copied, re-run and extended by all.</p>

<p><b><u>Neutron Beam Facilities</u></b></p>	<p>DOE provides the scientific community access to high flux neutron sources that are capable of providing structural and chemical information often unavailable using other technologies. DOE has two such facilities at the Oak Ridge National Laboratory, the Spallation Neutron Source (SNS; <a href="http://neutrons.ornl.gov/sns/">http://neutrons.ornl.gov/sns/</a>) and the High Flux Isotope Reactor (HFIR; <a href="https://neutrons.ornl.gov/hfir/">https://neutrons.ornl.gov/hfir/</a>). Use of the neutron sources is available at no charge through a user proposal process. For more information about the BER-supported structural biology resources at the synchrotron and neutron facilities, visit: <a href="http://www.BERStructuralBioPortal.org">http://www.BERStructuralBioPortal.org</a>.</p>
<p><b><u>Next Generation Ecosystem Experiment – Arctic (NGEE-Arctic)</u></b></p>	<p>DOE supports process studies and modeling to assess carbon cycle dynamics in high-latitude terrestrial ecosystems. The NGEE Arctic project focuses on permafrost ecology in a warming Arctic, and how associated changes in biogeochemical processes and vegetation dynamics will affect feedbacks to the climate system. Fundamental knowledge gained in these investigations will improve representation of ecosystem dynamics, subsurface biogeochemistry, and atmosphere processes in regional and global models, and improve predictions of climate change in tundra ecosystems. Field sites for the NGEE Arctic project exist at locations in Alaska. More information on the study and information for contacting NGEE Arctic project staff to discuss collaborative research are described on the project web site (<a href="http://ngee.ornl.gov/">http://ngee.ornl.gov/</a>).</p>
<p><b><u>Next Generation Ecosystem Experiment – Tropics (NGEE-Tropics)</u></b></p>	<p>The Next Generation Ecosystem Experiment - Tropics (NGEE-Tropics) supports modeling and process-based studies for tropical forest ecosystems. Research is focused on three primary integration areas: ecosystem responses to drought and high temperature stress; forest disturbance-recovery processes; and forest-atmosphere water, carbon, and energy fluxes at landscape to regional scales. Scientific advances in these areas result in improved Earth system model representation of vegetation dynamics, coupled biogeochemical cycles, and feedbacks to Earth’s climate system. NGEE-Tropics field sites are located in Puerto Rico, Panama, and the Brazilian Amazon. Additional information on NGEE-Tropics activities, the collaborative team, and institutional partners can be found on the project’s website (<a href="https://ngee-tropics.lbl.gov/">https://ngee-tropics.lbl.gov/</a>).</p>
<p><b><u>Spruce and Peatland Responses Under Changing</u></b></p>	<p>DOE supports an experiment to assess the response of northern boreal and peatland ecosystems to increases in temperature and elevated atmospheric CO<sub>2</sub> concentrations. The SPRUCE experiment</p>

<p><b><u>Environments (SPRUCE)</u></b></p>	<p>is being operated for a planned decade of operation (2016-2025) at the Marcell Experimental Forest in northern Minnesota. More information on the study, a listing of currently funded collaborators, and the method for contacting SPRUCE project staff is described on the project web site (<a href="http://mnspruce.ornl.gov/">http://mnspruce.ornl.gov/</a>). Interested collaborators must discuss potential research interests with project participants to avoid duplication of effort and to ensure available space within the SPRUCE footprint. SPRUCE is already hosting an abundance of funded cooperative research efforts focused on peat matrix processes (e.g., microbial community responses including metagenomic analyses, methane biogeochemistry and process, etc.), and may not be able to accommodate other research in this area at this time. The SPRUCE project is looking for new collaborators using state of the art approaches for assessing cold hardiness characteristics of vegetation to supplement an already extensive network of participants.</p>
<p><b><u>Synchrotron Light Sources</u></b></p>	<p>DOE provides the scientific community access to synchrotron light sources that are capable of providing structural and chemical information often unavailable with conventional sources of x- rays. Use of each synchrotron light source is available at no charge through its user proposal process. Information about each DOE synchrotron User Facility can be found at: Argonne National Laboratory (<a href="http://www.aps.anl.gov/">http://www.aps.anl.gov/</a>); Brookhaven National Laboratory (<a href="http://www.bnl.gov/ps/">http://www.bnl.gov/ps/</a>); Lawrence Berkeley National Laboratory (<a href="http://www.als.lbl.gov/">http://www.als.lbl.gov/</a>); and Stanford Synchrotron Radiation Laboratory (<a href="http://www-ssrl.slac.stanford.edu/index.html">http://www-ssrl.slac.stanford.edu/index.html</a>). For more information about the BER-supported biology resources at the synchrotron and neutron facilities, visit: <a href="http://www.BERStructuralBioPortal.org">http://www.BERStructuralBioPortal.org</a>.</p>

### **Multi-Institutional Collaborations**

In addition to single-investigator applications, multi-disciplinary and inter-institutional collaborations are encouraged, especially in cases where the proposed effort cannot be effectively undertaken by a single investigator. Collaborative teams can include all types of institutions: universities, industry, non-profit organizations, other Federal Agencies, and Federally Funded Research and Development Centers (FFRDCs), which include the DOE/NNSA National Laboratories.

**Collaborative teams must clearly designate a lead PI and institution, and must include a project management section in the lead PI’s application that clearly describes the roles, proposed activities and deliverables for each collaborator at each institution.** Note that a

well-thought-out research plan and its associated budget(s) should leave no confusion about which PI and institution will be the lead and which will do each of the planned parts of the research. DOE/NNSA National Laboratory employees and other Federal Agencies' or their FFRDCs' employees are not eligible to be the lead PI of the collaborative team project. **The lead PI/institution must submit budgetary information for each of the funded Co-PIs on the application cover page, as explained in Section IV. Part D.2 and does not count towards the proposal page limit.** Applications that do not include these required elements will be declined without review.

Multi-institution teams led by eligible institutions (see Section III) are, for the purpose of application to this FOA, of two types:

- **Teams that include only university, academic, other non-profit institutions, industry, and/or DOE/NNSA National Laboratories.** Such teams should submit a **single** application from the lead institution. The lead institution's budget must include all subaward budgets.
- **Teams that include non-DOE Federal Agencies or their FFRDC's.** The lead institution and each non-DOE Federal Agency or Agencies or their FFRDCs must each submit separate but identical applications **except** for the budget and SF-424 form as detailed below. These types of applications must clearly indicate they are part of a collaborative project/group, and the lead institution and each non-DOE Federal Agency and/or their FFRDC's must submit an application through its own sponsored research office. Each application within the collaborative group, including the title, the narrative, and all required appendices and attachments, must be **identical** with the following exceptions:
  - Each application must contain a correct SF-424 (R&R) cover page for the submitting institution only.
  - Each application must contain a unique budget and budget justification corresponding to the expenditures for that application's submitting institution only.
    - The lead institution's budget should include all subaward budgets and budget justifications EXCEPT those of any collaborating non-DOE Federal Agencies.
  - After submission, the various applications associated with a collaborative group will be combined into a single document for merit review that consists of the common, identical application materials combined with a set of detailed budgets from the partner institutions. Thus, it is very important that every application in the collaborative group be identical (including the title) with the exception of the budget and budget justification pages. The non-DOE Federal Agency or agencies will be funded by an interagency agreement rather than a grant.
  - Each application belonging to a collaborative group must have the same title in Block 11 of the SF 424 (R&R) form.

Multi-institution team applications should show clear scientific leadership from the submitting institution while reflecting an appropriate level of effort from the collaborating DOE/NNSA National Laboratories, other non-DOE Federal Agencies, and/or their FFRDC's. Collaborators from DOE/NNSA National Laboratories, other non-DOE Federal Agencies, and their FFRDC's must contribute specific and unique capabilities/expertise that fill critical voids needed for the proposed research. The combined budgets corresponding to all collaborators from DOE/NNSA

National Laboratories, other non-DOE Federal agencies, and their FFRDC's may not exceed 50 percent of the total budget.

Instructions for preparing applications along with submission information (for lead institutions and non-DOE Federal Agencies) are included in Section IV, Part C, below. As outlined above, applications for multi-investigator projects at multiple institutions also must present a well-defined management structure and coordination/communication plan for integrating participating investigators. Applications that do not include these required elements will be declined without review.

Reference table for collaborative application submissions\*:

		<b>Collaborating Institution</b>		
		<b>Universities, Academic, Industry, and/or Other Institutions</b>	<b>DOE National Lab</b>	<b>Non-DOE Federal Agency and/or their FFRDCs</b>
<b>Lead Submitting Institution</b>	<b>Universities, Academic, Industry, and/or Other Institutions</b>	The lead institution submits one application with collaborating institutions as subawards. The lead institution must include on the application cover page a summary table displaying the budget amounts requested for all project participants.  Institutions collaborating with the lead institution do not submit a separate application.	The lead institution includes DOE Lab budget sheets and justifications as a subaward. The lead institution must include on the application cover page a summary table displaying the budget amounts requested for all project participants.  The DOE Lab does not submit a separate application.	The lead institution does not include the non-DOE Federal Agency as a subaward. The lead institution must include on the application cover page a summary table displaying the budget amounts requested for all project participants.  The non-DOE Federal Agency and/or its FFRDC must submit a separate application, identical to the lead institution's application <b>except</b> for the budget, budget justification, and SF-424 form.
	<b>Non-DOE Federal Agency</b>	A non-DOE Federal Agency cannot serve as a lead institution.	A non-DOE Federal Agency cannot serve as a lead institution.	A non-DOE Federal Agency cannot serve as a lead institution.
	<b>DOE National Laboratory</b>	A DOE Lab cannot serve as a lead institution.	A DOE Lab cannot serve as a lead institution.	A DOE Lab cannot serve as a lead institution.



\* Applicants with questions regarding collaborations and how to submit are strongly encouraged to contact the technical/scientific program contact for this FOA.

### **Open Science**

SC 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.

The use of the phrase “open-source” does not refer to any particular licensing arrangement, but is to be understood as encompassing any arrangement that furthers the objective of openness.

## **Section II – AWARD INFORMATION**

### **A. TYPE OF AWARD INSTRUMENT**

DOE anticipates awarding grants under this FOA.

DOE will consider funding multi-institution collaborations under this FOA only if DOE/NNSA National Laboratories, other Federal agencies, or their FFRDC contractors are collaborating institutions.

### **B. ESTIMATED FUNDING**

It is anticipated that a total of no more than \$36 million in current fiscal year and anticipated future year appropriated funds will be available to support awards un this FOA. Up to \$12 million will be available for multiple awards to be made in Fiscal Year 2019, with an additional anticipated \$12 million available per year, up to three years, contingent on the availability of appropriated funds. Multiple year funding is expected. Applications may request support for up to three years, with future-year support contingent on the availability of funds, progress of the research, and programmatic needs.

DOE is under no obligation to pay for any costs associated with the preparation or submission of an application. DOE reserves the right to fund, in whole or in part, any, all, or none of the applications submitted in response to this FOA.

### **C. MAXIMUM AND MINIMUM AWARD SIZE**

The award size will depend on the number of meritorious applications and the availability of appropriated funds.

#### **Ceiling**

\$1,250,000 per year

#### **Floor**

\$250,000 per year

### **D. EXPECTED NUMBER OF AWARDS**

Approximately 10 to 12 awards are expected.

The exact number of awards will depend on the number of meritorious applications and the availability of appropriated funds.

### **E. ANTICIPATED AWARD SIZE**

It is anticipated that award sizes may range from \$250,000 per year to \$1,250,000 per year.

The award size will depend on the number of meritorious applications and the availability of appropriated funds.

## **F. PERIOD OF PERFORMANCE**

Research Awards are expected to be made for a period of two or three years as befitting the project.

Continuation funding (funding for the second and subsequent budget periods) is contingent on: (1) availability of funds appropriated by Congress and future year budget authority; (2) progress towards meeting the objectives of the approved application; (3) submission of required reports; and (4) compliance with the terms and conditions of the award.

## **G. TYPE OF APPLICATION**

DOE will only accept new applications under this FOA.

## **H. 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/National Nuclear Security Administration (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.

## **I. 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 applicant and any team member, and/or subawardee.

If an award is made to a DOE/NNSA National Laboratory, all disputes and claims will be resolved in accordance with the terms and conditions of the DOE/NNSA National Laboratory's management and operating (M&O) contract, as applicable, in consultation between DOE and the prime awardee.

If an award 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 prime awardee.

## Section III – ELIGIBILITY INFORMATION

### A. ELIGIBLE APPLICANTS

All types of institutions are eligible to apply as the prime applicant (lead institution), except DOE/NNSA National Laboratories, other non-DOE Federal Agencies, Federally Funded Research and Development Center (FFRDC) Contractors, and nonprofit organizations described in section 501(c)(4) of the Internal Revenue Code of 1986 that engaged in lobbying activities after December 31, 1995.

Individual applicants or applicants that are not domestic organizations should be advised that:

- Individual applicants are unlikely to possess the skills, abilities, and resources to successfully accomplish the objectives of this FOA. Individual applicants are encouraged to address this concern in their applications and to demonstrate how they will accomplish the objectives of this FOA.
- Non-domestic applicants are advised that successful applications from non-domestic applicants include a detailed demonstration of how the applicant possesses skills, resources, and abilities that do not exist among potential domestic applicants.

#### *DOE/NNSA National Laboratory Contractors*

DOE/NNSA National Laboratory Contractor applicants are not eligible for a prime award under this FOA, but may be proposed as a team member on another entity's application if their cognizant DOE/NNSA Contracting Officer provides written authorization. This authorization should be submitted with the application as part of the Budget Justification for DOE/NNSA National Laboratory Contractor File. [This is not required for the National Energy Technology Laboratory because it is a Government Owned/Government Operated (GOGO).] **Please note that failure to provide this authorization may result in rejection of an application prior to 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.”

#### *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 FOA, 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 an application prior to 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-0002059 by the following statutory authority (insert statute name, citation, and section) .”

## **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 (PI) are invited to work with their organizations to develop an application for assistance. Individuals from underrepresented groups as well as individuals with disabilities are always encouraged to apply for assistance.

## **D. OTHER ELIGIBILITY REQUIREMENTS**

**Any application submitted without a data sharing and digital data management plan will be returned without review.**

**Collaborative teams must clearly designate a lead PI and institution, and must include a project management section in the lead PI’s application that clearly describes the roles, proposed activities and deliverables for each collaborator at each institution.** Note that a well-thought-out research plan and its associated budget(s) should leave no confusion about which PI and institution will be the lead and which will do each of the planned parts of the research. DOE/NNSA National Laboratory employees and other Federal Agencies’ or their FFRDCs’ employees are not eligible to be the lead PI of the collaborative team project. **The lead PI/institution must submit budgetary information for each of the funded Co-PIs on the application cover page, as explained in section IV. Part D.2 and does not count towards the proposal page limit.** Applications that do not include these required elements will be declined without review.

## **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-0002059) shown on the cover of this FOA and then follow the prompts to download the application package.

Applications submitted through [www.FedConnect.net](http://www.FedConnect.net) will not be accepted.

### **B. LETTER OF INTENT AND PRE-APPLICATION**

#### **1. Letter of Intent**

Not applicable.

#### **2. Pre-application**

PRE-APPLICATION DUE DATE

March 13, 2019, 5:00 pm Eastern Time

ENCOURAGE/DISCOURAGE DATE

March 21, 2019

A pre-application is required and must be submitted by March 13, 2019, 5:00 pm Eastern Time.

Pre-applications will be reviewed for responsiveness of the proposed work to the research topics identified in this FOA. DOE will send a response by email to each applicant encouraging or discouraging the submission of a full application by March 21, 2019. Applicants who have not received a response regarding the status of their pre-application by this date are responsible for contacting the program to confirm this status.

**Applications that have not been encouraged by DOE may be declined without merit review.**

The pre-application attachment must include, at the top of the first page, the following information:

Title of Pre-application  
PI Name, Job Title  
Institution  
PI Phone Number, PI Email Address  
FOA Number: DE-FOA-0002059

This information must be followed by a clear and concise description of the objectives and technical approach of the proposed research. The pre-application may not exceed three pages, with a minimum text font size of 11 point and margins no smaller than one inch on all sides. Figures and references, if included, must fit within the three-page limit. Pre-applications that exceed the three-page limit will not be reviewed. It is the responsibility of the applicant to include sufficient information in the pre-application to enable evaluation of responsiveness to this announcement.

The pre-application must also include a list of the names and institutional affiliations of all participating investigators, including collaborators and consultants on the proposed project. For each funded investigator, provide a table consisting of collaborative co-investigators including collaborators and co-authors of the past 48 months, co-editors of the past 24 months, graduate and postdoctoral advisors/advisees, and close associations. For publications or collaborations with more than 10 authors or participants, investigators only have a COI with those individuals in the core group with whom they interacted with on a regular basis while the research was being done. This table of participants and collaborators will not count toward the page limit for the pre-application.

Example table for collaborators, co-authors, co-editors, graduate and postdoctoral advisors/advisees, and close associations:

<b>Full Last Name</b>	<b>Full First Name</b>	<b>Institution/Organization (Please spell out)</b>	<b>PI/Co-PI (on application)</b>
Smith	Alison	University of State, City	Brown, Angela

#### PRE-APPLICATION REVIEW

Those pre-applications that are encouraged will be used to help SC begin planning for the full application peer review process. SC’s intent in discouraging submission of certain full applications is to save the time and effort of applicants in preparing and submitting full applications not responsive to this FOA.

The PI will be automatically notified when the pre-application is encouraged or discouraged. The DOE SC Portfolio Analysis and Management System (PAMS) will send an email to the PI from [PAMS.Autoreply@science.doe.gov](mailto:PAMS.Autoreply@science.doe.gov), and the status of the pre-application will be updated at the PAMS website <https://pamspublic.science.energy.gov/>.

#### PRE-APPLICATION SUBMISSION

It is important that the pre-application be a single file with extension .pdf, .docx, or .doc. The filename must not exceed 50 characters. The pre-application must be submitted electronically through the DOE SC Portfolio Analysis and Management System (PAMS) website

<https://pamspublic.science.energy.gov/>. The PI and anyone submitting on behalf of the PI must register for an account in PAMS before it will be possible to submit a pre-application. All PIs and those submitting pre-applications on behalf of PIs are encouraged to establish PAMS accounts as soon as possible to avoid submission delays.

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

Please see Section I., Part 4. DOE SC PAMS, below, for instructions about how to register in PAMS.

### **Submit Your Pre-Application:**

- Create your pre-application (called a preproposal in PAMS) 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 PI per preproposal; 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](mailto: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 preproposal submission deadline so that there will be no delays with your submission.

**WARNING:** The PAMS website at <https://pampspublic.science.energy.gov> will permit you to edit a previously submitted pre-application in the time between your submission and the deadline. If you choose to edit, doing so will remove your previously submitted version from consideration. If you are still editing at the time of the deadline, you will not have a valid submission. Please pay attention to the deadline.

For help with PAMS, click the “External User Guide” link on the PAMS website, <https://pampspublic.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](mailto:sc.pams-helpdesk@science.doe.gov). All submissions and inquiries about this FOA should reference **DE-FOA-0002059**.

Pre-applications submitted outside PAMS will not be considered. Pre-applications may not be submitted through Grants.gov or www.FedConnect.net.

## **C. GRANTS.GOV APPLICATION SUBMISSION AND RECEIPT PROCEDURES**

This section provides the application submission and receipt instructions for applications to SC. Please read the following instructions carefully and completely.

### **1. Electronic Delivery**

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

### **2. How to Register to Apply through Grants.gov**

a. Instructions: Read the instructions below about registering to apply for SC 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.

Organizations must have a Data Universal Numbering System (DUNS) Number, active System for Award Management (SAM) registration, and Grants.gov account to apply for grants. If individual applicants are eligible to apply for this funding opportunity, then you may begin with step 3, Create a Grants.gov Account, listed below.

Creating a Grants.gov account can be completed online in minutes, but DUNS and SAM registrations may take several weeks. Therefore, an organization's registration should be done in sufficient time to ensure it does not impact the entity's ability to meet required application submission deadlines.

Complete organization instructions can be found on Grants.gov here:

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

1) *Obtain a DUNS Number*: All entities applying for funding, including renewal funding, must have a 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>

2) *Register with SAM*: All organizations applying online through Grants.gov must register with SAM at <https://www.sam.gov>. 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>

3) *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>

4) *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>

5) *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>

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

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

b. *Electronic Signature*: When applications are submitted through Grants.gov, the name of the organization applicant with the AOR role that submitted the application is inserted into the signature line of the application, serving as the electronic signature. The EBiz POC **must** authorize people who are able to make legally binding commitments on behalf of the organization as a user with the AOR role; **this step is often missed and it is crucial for valid and timely submissions.**

### **3. How to Submit an Application to SC 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 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 SC with tracking your issue and understanding background information on the issue.

#### **4. 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 SC 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 SC.

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.

## D. CONTENT AND APPLICATION FORMS

### APPLICATION PREPARATION

You must submit the application through Grants.gov at <https://www.grants.gov/>, using either the online webforms or downloaded forms. (Additional instructions are provided in [Section IV, Part C](#) of this FOA.)

You are required to use the compatible version of Adobe Reader software to complete a [Grants.gov](#) Adobe application package. To ensure you have the [Grants.gov](#) compatible version of Adobe Reader, visit the software compatibility page at <https://www.grants.gov/web/grants/applicants/adobe-software-compatibility.html>.

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 PDF files 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 use PDF portfolios or binders.

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 must have a unique name.
- Please use only the following 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.

### LETTERS

Letters of collaboration from unfunded collaborators should also be included, if applicable, and should be placed in Appendix 7 (Other Attachments). These letters should state the intention to participate in the proposed research, with a brief description of the activities to be undertaken by the collaborator. Do not submit general letters of support as these are not used in making funding decisions and can interfere with the selection of peer reviewers.

### RESUBMISSION OF APPLICATIONS

Applications submitted under this FOA may be withdrawn from consideration by using the PAMS website at <https://pamspublic.science.energy.gov>. Applications may be withdrawn at any

time between when the applicant submits the application and when DOE makes the application available to merit reviewers. Such withdrawals take effect immediately and cannot be reversed. Please exercise due caution.

After an application is withdrawn, it may be resubmitted, if this FOA is still open for the submission of applications. Such resubmissions will only count as one submission if this FOA restricts the number of applications from an applicant.

Note that there may be a delay between the application's submission in Grants.gov and when it is available to be withdrawn in PAMS. SC will usually consider the last submission, according to its Grants.gov timestamp, to be the intended version. Please consult with your program manager to resolve any confusion about which version of an application should be considered.

#### IMPROPER CONTENTS OF APPLICATIONS

Applications submitted under this FOA will be stored in controlled-access systems, but they may be made publicly available if an award is made. As such, it is critical that applicants follow these guidelines:

- Do not include information subject to any legal restriction on its open distribution, whether classified, export control, or unclassified controlled nuclear information.
- Do not include sensitive and protected personally identifiable information, including social security numbers, birthdates, citizenship, marital status, or home addresses. Pay particular attention to the content of biographical sketches and curriculum vitae.
- Do not include letters of support from Federal officials.
- Do not include letters of support on Federal letterhead. Letters that are not letters of support (such as letters confirming access to sites, facilities, equipment, or data; or letters from cognizant contracting officers) may be on Federal letterhead.
- Clearly mark all proprietary or trade-secret information.

#### CHANGE OF AWARDEE INSTITUTION

If an awardee chooses to relinquish an award made under this FOA to permit the transfer of the award to a new institution, the new institution must submit an application under the then-available SC "annual" or "open" FOA.

#### **1. SF-424 (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 <https://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 Employer Identification Number (EIN) 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.
- SC does not use the twelve-digit EIN format required by some other agencies.
- SC does not use the DUNS+4 format.

## 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.

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

Complete questions in fields 1 through 6 of the SF-424 Research and Related Other Project Information form.

### **Note regarding 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.

The bulk of your application will consist of files attached to the Research and Related Other Project Information form. The files 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. Provide the name of the applicant, the project title, the PI and the PI’s institutional affiliation, any coinvestigators 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. A sample is provided below:

A Really Great Idea

A. Smith, Lead Institution (Principal Investigator)  
A. Brown, Institution 2 (Co-Investigator)  
A. Jones, Institution 3 (Co-Investigator)

Text of abstract

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 11 point. To attach a Project Summary/Abstract, click “Add Attachment.”

If an application is recommended for award, the project summary will be used in preparing a public abstract about the award. Award abstracts and titles form a Government document that describes the project and justifies the expenditure of Federal funds in light of the DOE and SC mission statements at <https://energy.gov/mission> and <https://science.energy.gov/about/>.

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



DOE COVER PAGE

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

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

- The project title:
- Applicant/Institution:
- Street Address/City/State/Zip:
- Lead PI Postal Address:
- Lead PI name, telephone number, email:
- Administrative Point of Contact name, telephone number, email:
- Funding Opportunity FOA Number: DE-FOA-0002059
- DOE/SC Program Office: Biological and Environmental Research
- DOE/SC Program Office Technical Contact: Dawn M. Adin
- PAMS Pre-application tracking number:
- Project keywords: (up to five keywords describing the proposed research):

<b>Budget Breakdown by Individual Participating Institutions</b>						
	<b>Investigator Name(s)</b>	<b>Institution</b>	<b>Year 1 Budget</b>	<b>Year 2 Budget</b>	<b>Year 3 Budget</b>	<b>Total Budget (per institution)</b>
Lead PI						
Co-PI						
Co-PI						
Co-PI						

Example budget table (\$ in thousands)

(NOTE: All collaborators, including subawardees, DOE/NNSA National Laboratories, and non-DOE Federal Agencies and their FFRDCs should be included in the above table even if they will be funded separately.)

**Important Instructions to the Sponsored Research Office of Submitting Institutions:** SC 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 15 pages** of 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 11 point. Merit reviewers will only consider the number of pages specified in the first sentence of this paragraph. This page limit does not apply to the Cover Page, Budget Page(s), Budget Justification, biographical material, publications and references, and appendices, each of which may have its own page limit.

Do not include any Internet addresses (URLs) that provide supplementary or additional information that constitutes a part of the application. Merit reviewers are not required to access Internet sites; however, Internet publications in a list of references will be treated identically to print publications. See Section VIII, Part D for instructions on how to mark proprietary application information. To attach a Project Narrative, click “Add Attachment.”

**Background/Introduction:** Explanation of the importance and relevance of the proposed work as well as a review of the relevant literature.

**Proposed Research and Methods:** Identify the hypotheses to be tested (if any) and details of the methods to be used including the integration of experiments with theoretical and computational research efforts. **Collaborative teams must clearly designate a lead PI and institution, and must include a project management section in this section of the lead PI’s application that clearly describes the roles, proposed activities and deliverables for each collaborator at each institution.** Note that a well-thought-out research plan and its associated budget(s) should leave no confusion about which PI and institution will be the lead and which will do each of the planned parts of the research. DOE/NNSA National Laboratory employees and other Federal Agencies’ or their FFRDCs’ employees are not eligible to be the lead PI of the collaborative team project.

**Timetable of Activities:** Timeline for all major activities including milestones and deliverables.

**Project Objectives:** This section should provide a clear, concise statement of the specific objectives/aims of the proposed project.

The Project Narrative comprises the research plan for the project. It should contain enough background material in the Introduction, including review of the relevant literature, to demonstrate sufficient knowledge of the state of the science. The major part of the narrative should be devoted to a description and justification of the proposed project, including details of the methods to be used. It should also include a timeline for the major activities of the proposed project, and should indicate which project personnel will be responsible for which activities. There should be no ambiguity about which personnel will perform particular parts of the project, and the time at which these activities will take place.

**Progress from DOE-funded Research:**

All applicants are required to submit an Appendix to the Project Narrative section describing past research funded by BER applicable to the application being submitted, including products produced. The Appendix should be titled “Progress from DOE-funded research” and should be appended immediately at the end of the Project Narrative. This section should be no longer than

3 pages and does not count towards the page limit of the Project Narrative. If no applicable previous DOE-funded research exists, this Appendix should only consist of a statement to that effect.

**Do not attach any of the requested appendices described below as files for fields 9, 10, 11, and 12 in Grants.gov. Follow the below instructions to include the information as appendices in the single, bundled project narrative file.**

#### APPENDIX 1: BIOGRAPHICAL SKETCH

Provide a biographical sketch for the PI and each senior/key person listed in Section A on the R&R Budget form.

As part of the sketch, provide information that can be used by reviewers to evaluate the PI's potential for leadership within the scientific community. Examples of information of interest are invited and/or public lectures, awards received, scientific program committees, conference or workshop organization, professional society activities, special international or industrial partnerships, reviewing or editorship activities, or other scientific leadership experiences.

- Provide the biographical sketch information as an appendix to your project narrative.
- Do not attach a separate file.
- The biographical sketch appendix will not count in the project narrative page limitation.
- The biographical information (curriculum vitae) for each person must not exceed 2 pages when printed on 8.5" by 11" paper with 1 inch margins (top, bottom, left, and right) with font not smaller than 11 point and must include:

The biographical information (curriculum vitae) must include the following items within its page limit:

- **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. An abbreviated style such as the Physical Review Letters (PRL) convention for citations (list only the first author) may be used for publications with more than 10 authors.
- **Synergistic Activities:** List no more than 5 professional and scholarly activities related to the effort proposed.

In addition, the biographical sketch must include information to permit DOE to identify individuals who are conflicted with or potentially biased (favorably or unfavorably) against the investigator. Include a section entitled “**Identification of Potential Conflicts of Interest or Bias in Selection of Reviewers**” that will not count in a page limit. Provide the following information in this section:

- **Collaborators and Co-editors:** List in alphabetical order all persons, including their current organizational affiliation, who are, or who have been, collaborators or co-authors with you on a research project, book or book article, report, abstract, 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 PI interacted on a regular basis while the research was being done. Also, list any individuals who are currently, or have been, co-editors with you on a special issue of a journal, compendium, or conference proceedings during the 24 months preceding the submission of this application. If there are no collaborators or co-editors to report, state “None.”
- **Graduate and Postdoctoral Advisors and Advisees:** List the names and current organizational affiliations of your graduate advisor(s) and principal postdoctoral sponsor(s). Also, list the names and current organizational affiliations of your graduate students and postdoctoral associates.

**Personally Identifiable Information:** Do not include sensitive and protected personally identifiable information including social security numbers, birthdates, citizenship, marital status, or home addresses. Do not include information that a merit reviewer should not make use of.

#### APPENDIX 2: CURRENT AND PENDING SUPPORT

Provide a list of all current and pending support (both Federal and non-Federal) for the PI and senior/key persons, including subawardees, for ongoing projects and pending applications. List all sponsored activities or awards requiring a measurable commitment of effort, whether paid or unpaid.

For every activity, list the following items:

- The sponsor of the activity or the source of funding
- The award or other identifying number
- The title of the award or activity
- The total cost or value of the award or activity, including direct and indirect costs. For pending proposals, provide the total amount of requested funding.
- The award period (start date – end date).
- The person-months of effort per year being dedicated to the award or activity
- Briefly describe the research being performed and explicitly identify any overlaps or synergies with the proposed research.

Provide the Current and Pending Support as an appendix to your project narrative. Concurrent submission of an application to other organizations for simultaneous consideration will not prejudice its review.

- 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, you may use an abbreviated style such as the Physical Review Letters (PRL) convention for citations (listing only the first author). For example, your 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 the Bibliography and References Cited information as an appendix to your project narrative.

- Do not attach a separate file.
- This appendix will not count in the project narrative page limitation.

#### APPENDIX 4: FACILITIES & 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. 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. Please provide the Facility and Other Resource information as an appendix to your project narrative.

- Do not attach a separate file.
- This appendix will not count in the project narrative page limitation.

#### APPENDIX 5: EQUIPMENT

List major items of equipment already available for this project and, if appropriate identify location and pertinent capabilities. Provide the Equipment information as an appendix to your project narrative.

- 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.energy.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 SC 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 SC 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 overall SC research proposal merit review process.

Applicants are encouraged to consult the SC website for further information and suggestions for how to structure a DMP: <https://science.energy.gov/funding-opportunities/digital-data-management>. This appendix should not exceed 3 pages 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).

- Do not attach a separate file.
- This appendix will not count in the project narrative page limitation.

## APPENDIX 7: OTHER ATTACHMENT

If you need to elaborate on your responses to questions 1-6 on the “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 are not required to consider information in this appendix.

- 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, and 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.**
- **Do not attach any files to fields 9, 10, 11, or 12.**

### 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, Part H).

The following advice will improve the accuracy of your budget request:

- Funds requested for personnel (senior, key, and other) must be justified as the product of their effort on the project and their institutional base salary.
- Funds requested for fringe benefits must be calculated as the product of the requested salary and, if present, the negotiated fringe benefit rate contained in an institution’s negotiated indirect cost rate agreement.
- Funds requested for indirect costs must be calculated using the correct indirect cost base and the negotiated indirect cost rate.
- You are encouraged to include the rate agreement used in preparing a budget as a part of the budget justification.

If you are proposing indirect costs and do not already have an Indirect Cost Rate Agreement with your Cognizant Federal Agency or documentation of rates accepted for estimating purposes by DOE or another Federal agency, it is recommended that you begin preparing an Indirect Cost Rate Proposal to be submitted, upon request, to the DOE contract specialist/grants management specialist who will evaluate your application if you are selected for award.

For your convenience in preparing an Indirect Cost Rate proposal, a link to applicant resources, including indirect rate model templates, has been provided below:

<https://science.energy.gov/sbir/applicant-resources/grant-application/>.

### Budget Fields

Section A Senior/Key Person	For each Senior/Key Person, enter the requested information. List personnel, base salary, 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 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. (Note that this designation applies for proposal budgeting only and differs from the DOE definition of capital equipment.) List <b>each</b> 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.
Section D Travel	For purposes of this section only, 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 amounts, cost of tuition for each trainee, cost of any travel (provide the



	<p>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"> <li>• <b>Materials and Supplies:</b> Enter total funds requested for materials and supplies in the appropriate fields. In the budget justification, indicate 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. Indicate the basis for the cost estimate (quotes from vendors or suppliers, past experience of similar items, or some other basis).</li> <li>• <b>Publication Costs:</b> Enter the total publication funds requested. The proposal 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. Indicate the basis for the cost estimate (quotes from vendors or suppliers, past experience of similar items, or some other basis).</li> <li>• <b>Consultant Services:</b> 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, travel costs, and total estimated costs. Indicate the basis for the cost estimate (quotes from vendors or suppliers, past experience of similar items, or some other basis).</li> <li>• <b>ADP/Computer Services:</b> 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).</li> <li>• <b>Subawards/Consortium/Contractual Costs:</b> Enter total costs for all subawards/consortium organizations and other contractual costs proposed for the project. In the budget justification, justify the details.</li> <li>• <b>Equipment or Facility Rental/User Fees:</b> Enter total funds requested for Equipment or Facility Rental/User Fees. In the budget</li> </ul>

	<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"> <li>• <b>Alterations and Renovations:</b> 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.</li> <li>• <b>Other:</b> 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.</li> </ul>
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, so please consolidate 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.

You may wish to include the indirect cost rate agreement as a part of the budget justification.

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

**Budgets for Subawardees:** You must provide a separate R&R budget and budget justification for each subawardee. Download the R&R Budget Attachment from the R&R SUBAWARD BUDGET ATTACHMENT(S) FORM and either e-mail it to each subawardee that is required to submit a separate budget or use the collaborative features of Workspace. After the subawardee has either e-mailed its completed budget back to you or completed it within Workspace, 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). Filenames must not exceed 50 characters.

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. Applicants should consult their local information technology (“IT”) support resources for any necessary assistance in converting the forms downloaded from Grants.gov into plain PDF files that can be combined into one non-Portfolio PDF file (the Budget Justification).

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.

Note: If an application proposes subawards to a DOE National Laboratory, a Federal agency, or another Federal agency’s FFRDC, the value of such proposed subawards will be deducted from any resulting award: Those classes of organizations must be paid directly by SC. However, the details of such proposed budgets are an essential for understanding and analyzing the proposed research.

### 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. Summary of Required Forms/Files

Your application must include the following items:

<b>Name of Document</b>	<b>Format</b>	<b>Attach to</b>
<b>SF 424 (R&amp;R)</b>	Form	N/A
<b>RESEARCH AND RELATED Other Project Information</b>	Form	N/A
Project Summary/Abstract	PDF	Field 7
Project Narrative, including required appendices	PDF	Field 8
<b>RESEARCH &amp; RELATED BUDGET</b>	Form	N/A
Budget Justification	PDF	Field L
<b>R&amp;R SUBAWARD BUDGET</b>	Form	N/A

<b>Name of Document</b>	<b>Format</b>	<b>Attach to</b>
<b>ATTACHMENT(S) FORM</b> (if applicable)		
Subawardee Budget Justification (if applicable)	PDF	Field L
<b>PROJECT/PERFORMANCE SITE LOCATION(S)</b>	Form	N/A
<b>SF-LLL Disclosure of Lobbying Activities</b> , if applicable	Form	N/A

## **E. 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
- Name and phone number of the Designated Responsible Employee for complying with national policies prohibiting discrimination (See 10 CFR 1040.5)
- Representation of Limited Rights Data and Restricted Software, if applicable
- Commitment Letter from Third Parties Contributing to Cost Sharing, if applicable
- Environmental Information

Applicants that are not institutions of higher education, that request indirect costs, and that do not already have an Indirect Cost Rate Agreement with their Cognizant Federal Agency or documentation of rates accepted for estimating purposes by DOE or another Federal agency, are advised to begin preparing an Indirect Cost Rate Proposal for submission, upon request, to the DOE contract specialist/grants management specialist who will evaluate your application if you are selected for award.

## **F. SUBMISSION DATES AND TIMES**

### **1. Letter of Intent Due Date**

Not applicable

### **2. Pre-application Due Date**

March 13, 2019, 5:00 pm Eastern Time  
(A pre-application is required)

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

### **3. Application Due Date**

May 17, 2019, 11:59 pm Eastern Time

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

### **4. Late Submissions**

Applications received after the deadline will not be reviewed or considered for award unless it can be shown that an extreme, unpredictable, and unavoidable event prevents timely submission.

Delays in submitting pre-applications and applications may be unavoidable. DOE has accepted late submissions when applicants have been unable to make timely submissions because of widespread technological disruptions or significant natural disasters. DOE has made accommodations for incapacitating or life-threatening illnesses and for deaths of immediate family members. Other circumstances may or may not justify late submissions. Unacceptable justifications include 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.
- An upper respiratory infection (a “cold”) the week of the deadline.

You are responsible for beginning the submission process in sufficient time to accommodate reasonably foreseeable incidents, contingencies, and disruptions.

Applicants must contact the Program Office/Manager listed in this FOA to discuss the option of a late submission. Contacting the Program Office/Manager after the deadline may reduce the likelihood that a request will be granted.

DOE notes that not all requests for late submission will be approved.

### **G. INTERGOVERNMENTAL REVIEW**

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

### **H. FUNDING RESTRICTIONS**

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.

**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 for any reason the applicant does not receive an award or if the award is made for a lesser amount than the applicant expected.

## **I. 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.

You should start the process as soon as possible.

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

Applicants must obtain a DUNS number at <https://fedgov.dnb.com/webform>.

Applicants must register with SAM at <https://www.sam.gov/SAM/>. If you had an active registration in the Central Contractor Registry (CCR), you should have an active registration in SAM. More information about SAM registration for applicants is found at [https://www.sam.gov/sam/transcript/Quick\\_Guide\\_for\\_Grants\\_Registrations.pdf](https://www.sam.gov/sam/transcript/Quick_Guide_for_Grants_Registrations.pdf). SAM maintains a complete user guide at [https://www.sam.gov/sam/SAM\\_Guide/SAM\\_User\\_Guide.htm](https://www.sam.gov/sam/SAM_Guide/SAM_User_Guide.htm).

Applicants must provide a Taxpayer Identification Number (TIN) to complete their registration in SAM.gov. An applicant's TIN is an 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 IRS using the website listed above.

Applicants must register with FedConnect at [www.fedconnect.net](http://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.fdrs.gov>. This registration must be completed before an award may be made: you are advised to register while preparing your application.

## **2. Registering in Grants.gov**

Applicants must register with grants.gov, following the instructions at <https://www.grants.gov/web/grants/applicants/registration.html>.

## **3. Where to Submit an Application**

You must submit the application through Grants.gov at <https://www.grants.gov/>, using either the online webforms or downloaded forms. (Additional instructions are provided in Section IV A of this FOA.)

Submit electronic applications through the “Apply for Grants” function at [www.grants.gov](http://www.grants.gov). If you have problems completing the registration process or submitting your application, call grants.gov at 1-800-518-4726 or send an email to [support@grants.gov](mailto:support@grants.gov).

Please ensure that you have read the applicable instructions, guides, help notices, frequently asked questions, and other forms of technical support on grants.gov.

## **4. DOE SC 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 SC. 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 or a letter of intent.

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](mailto: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 SC 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](mailto:sc.pams-helpdesk@science.doe.gov). All submissions and inquiries about this FOA should reference DE-FOA-0002059.

## 5. Viewing Submitted Applications

Each grants.gov application submitted to the DOE 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 PI (Block 14), Authorized Representative (Block 19), and Point of Contact (Block 5). In PAMS notation, applications are known as proposals, the PI 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 SC 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 SC 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 SC 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](mailto:sc.pams-helpdesk@science.doe.gov). All submissions and inquiries about this FOA should reference **DE-FOA-0002059**.

## **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 information required by the FOA has been submitted; (3) all mandatory requirements are satisfied; (4) the proposed project is responsive to the objectives of the funding opportunity announcement, and (5) the proposed project is not duplicative of programmatic work.

Applications that fail to pass the initial review will not be forwarded for merit review and will be eliminated from further consideration.

#### **2. Merit Review Criteria**

Applications will be subjected to scientific merit review (peer review) and will be evaluated against the following criteria, listed in descending order of importance as found in 10 CFR 605.10 (d), the Office of Science Financial Assistance Program Rule.

- Scientific and/or Technical Merit of the Project;
- Appropriateness of the Proposed Method or Approach;
- Competency of Applicant's Personnel and Adequacy of Proposed Resources; and
- Reasonableness and Appropriateness of the Proposed Budget.

Note that 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.

The questions below are provided to the merit reviewers to elaborate the criteria established by regulation:

#### **SCIENTIFIC AND/OR TECHNICAL MERIT OF THE PROPOSED RESEARCH**

- What is the scientific innovation of proposed research?
- What is the likelihood of achieving valuable results?
- How might the results of the proposed work impact the direction, progress, and thinking in relevant scientific fields of research?
- How does the proposed work compare with other efforts in its field, both in terms of scientific and/or technical merit and originality?
- Is the Data Management Plan suitable for the proposed research and to what extent does it support the validation of research results?

#### APPROPRIATENESS OF THE PROPOSED METHOD OR APPROACH

- How logical and feasible are the research approaches?
- Does the proposed research employ innovative concepts or methods?
- Are the conceptual framework, methods, and analyses well justified, adequately developed, and likely to lead to scientifically valid conclusions?
- Does the applicant recognize significant potential problems and consider alternative strategies?

#### COMPETENCY OF APPLICANT'S PERSONNEL AND ADEQUACY OF PROPOSED RESOURCES

- What is the past performance and potential of the Principal Investigator (PI)?
- How well qualified is the research team to carry out the proposed research?
- Are the research environment and facilities adequate for performing the research?
- Does the proposed work take advantage of unique facilities and capabilities?

#### REASONABLENESS AND APPROPRIATENESS OF THE PROPOSED BUDGET

- Are the proposed budget and staffing levels adequate to carry out the proposed research?
- Is the budget reasonable and appropriate for the scope?

## **B. REVIEW AND SELECTION PROCESS**

### **1. Merit Review**

Applications that pass the initial review will be subjected to a formal merit review and will be evaluated based on the criteria codified at 10 CFR 605.10(d) in accordance with the guidance provided in the "Office of Science Merit Review System for Financial Assistance," which is available at: <https://science.energy.gov/grants/policy-and-guidance/merit-review-system/>.

### **2. Program Policy Factors**

The Selection Official may consider any of the following program policy factors in making the selection, listed in no order of significance:

- Availability of funds
- Relevance of the proposed activity to SC priorities
- Ensuring an appropriate balance of activities within SC programs
- Fostering the development of a diverse cadre of supported researchers
- Probability of success and risk-reward balance
- Performance under current awards

### **3. Selection**

The Selection Official will consider the findings of the merit review and may consider any of the Program Policy Factors described above.

### **4. Review of Risk**

Pursuant to 2 CFR 200.205, DOE will conduct an additional review of the risk posed by applications submitted under this FOA. Such review of risk will include:

- Technical merit of the application,
- Reports and findings from audits performed under 2 CFR 200 or OMB Circular A-133, and
- Systems maintained under 2 CFR 180.

DOE may make use of other publicly available information and the history of an applicant's performance under DOE or other Federal agency awards.

Applicants with no prior performance of DOE awards may be asked to provide information about their financial stability and their ability to comply with the management standards of 2 CFR 200.

#### **REPORTING OF MATTERS RELATED TO RECIPIENT INTEGRITY AND PERFORMANCE (DECEMBER 2015)**

DOE, prior to making a Federal award with a total amount of Federal share greater than the simplified acquisition threshold, is required to review and consider any information about the applicant that is in the designated integrity and performance system accessible through SAM (currently FAPIIS) (see 41 U.S.C. 2313); The applicant, at its option, may review information in the designated integrity and performance systems accessible through SAM and comment on any information about itself that a Federal awarding agency previously entered and is currently in the designated integrity and performance system accessible through SAM; DOE will consider any written comments by the applicant, in addition to the other information in the designated integrity and performance system, in making a judgment about the applicant's integrity, business ethics, and record of performance under Federal awards when completing the review of risk posed by applicants as described in §200.205 Federal awarding agency review of risk posed by applicants.

### **5. 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**

It is anticipated that the award selection will be completed by June 2019. It is expected that awards will be made in Fiscal Year 2019.

DOE is interested in seeing projects supported under this FOA begin work by September 1, 2019.

## **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, Part H 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**

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) Applicable program regulations, if any; (3) Application as approved by DOE; (4) 2 CFR 200 as modified by 2 CFR 910 (DOE Financial Assistance Regulation); (5) National Policy Assurances To Be Incorporated As Award Terms; (6) Budget Summary; (7) Intellectual Property Provisions; and (8) Federal Assistance Reporting Checklist, which identifies the reporting requirements.

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/rtr/rtrcoverlay\\_march17.pdf](https://www.nsf.gov/pubs/policydocs/rtr/rtrcoverlay_march17.pdf) and the DOE Agency Specific Standard Research Terms and Conditions published at [https://www.nsf.gov/pubs/policydocs/rtr/agencyspecifics/doe\\_417.pdf](https://www.nsf.gov/pubs/policydocs/rtr/agencyspecifics/doe_417.pdf). These Terms and Conditions will be incorporated in the award by reference.

### **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).

#### **NONDISCLOSURE AND CONFIDENTIALITY AGREEMENTS REPRESENTATIONS (JUNE 2015)**

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

(1) It **does not and will not** require its employees or contractors to sign internal nondisclosure or confidentiality agreements or statements prohibiting or otherwise restricting its employees or 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) It **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.

## REGISTRATION 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 in SAM current at <https://www.sam.gov/SAM/>. 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 (FFATA) 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 in 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. Terms and Conditions

The DOE Special Terms and Conditions for Use in Most Grants and Cooperative Agreements are located at <https://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:  
<https://energy.gov/gc/standard-intellectual-property-ip-provisions-financial-assistance-awards>

## 3. National Policy Assurances

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

## 4. Statement of Substantial Involvement

Not applicable.

## 5. 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 FOA. Publications and other methods of public communication describing any work based on or developed under an award resulting from this FOA must contain an acknowledgment of SC support. The format for such acknowledgments is provided at <https://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 (OSTI) and made publicly available in accordance with the instructions contained in the Reporting Requirements Checklist incorporated in all Assistance Agreements.

## 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 <https://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](mailto:support@grants.gov). DOE cannot answer these questions. Please only contact the grants.gov help desk 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, 9AM – 5:30 PM Eastern Time. Telephone: (855) 818-1846 (toll free) or (301) 903-9610, Email: [sc.pams-helpdesk@science.doe.gov](mailto:sc.pams-helpdesk@science.doe.gov). All submission and inquiries about this FOA should reference **DE-FOA-0002059**. Please contact the PAMS help desk for technological issues with the PAMS system.

Questions regarding the specific program areas and technical requirements may be directed to the technical contacts listed for each program within the FOA or below. Please contact the program staff with all questions not directly related to the grants.gov or PAMS systems.

### **B. AGENCY CONTACTS**

Grants.gov Customer Support	800-518-4726 (toll-free) <a href="mailto:support@grants.gov">support@grants.gov</a>
PAMS Customer Support	855-818-1846 (toll-free) 301-903-9610 <a href="mailto:sc.pams-helpdesk@science.doe.gov">sc.pams-helpdesk@science.doe.gov</a>
Program Manager Scientific Contact	Dawn M. Adin 301-903-0570 <a href="mailto:dawn.adin@science.doe.gov">dawn.adin@science.doe.gov</a>

## **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 <https://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.

(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 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 agreement 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. 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 created 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 <https://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 37 CFR 401.14, i.e., the implementation of the Bayh-Dole Act. 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. 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. 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.

## **J. ENVIRONMENTAL, SAFETY AND HEALTH (ES&H) 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 all state and Federal ES&H regulations, and with all other ES&H requirements of the operator of such site.

Prior to the performance on any work at a DOE-Owned or controlled site, the recipient shall contact the site facility manager for information on DOE and site specific ES&H requirements.

The recipient shall apply this provision to all subawardees at any tier.

## **K. 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.

## **L. NATIONAL ENVIRONMENTAL POLICY ACT (NEPA) 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. Note that in most cases, even when additional information is requested, 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. The inability to satisfy the NEPA requirements after an award would result in cancellation of the award.