U.S. DEPARTMENT *of* ENERGY

Office of Science (SC), Office of Critical Minerals and Energy Innovation (CMEI), Office of Environmental Management (EM), Office of Electricity (OE), Hydrocarbons and Geothermal Energy Office (HGEO), and Office of Nuclear Energy (NE)

Genesis Mission

The Genesis Mission: Transforming Science and Energy with AI

Notice of Request for Application (RFA) Number:
DE-FOA-0003612

RFA Type: Amendment 000002
Assistance Listings: 81.049

RFA Issue Date:	March 17, 2026
Submission Deadline for FY26 Phase I Applications:	April 28, 2026, at 11:59 PM Eastern
Submission Deadline for FY26 Phase II Letters of Intent:	April 28, 2026, at 5 PM Eastern
Submission Deadline for FY26 Phase II Applications:	May 19, 2026, at 11:59 PM Eastern
Submission Deadline for Phase II Applications resulting from FY26 Phase I Awards:	December 17, 2026, at 11:59 PM Eastern

Amendment 000002 is issued on April 17, 2026, with the following changes:

- Changed the type of application from strongly encourage collaborative applications to very strongly encourage a single application from a lead institution with proposed subawardee(s).

Amendment 000001 is issued on April 10, 2026, with the following changes:

- Added instructions for Phase II LOIs.
- Changed LOI responses from "not provided" to "at the discretion of DOE".
- Added instructions for Phase II applications.
- Added a small number of questions for merit reviewers to consider for Phase II applied technology applications.
- Added "per year" to "Envisioned as 3 to 5 times the Phase I award per year" in all cases where it is listed. Previously, it was listed in only one location.
- Added language that clarified that Phase II budgets both above and below the 3 to 5 times the Phase I award are allowed when appropriate.
- Added the possibility of a Phase II midterm review.
- Set a Phase II award start date that applicants can use when preparing budgets.
- Added program policy factor, "Availability of computational resources"
- Removed LM and IRP as participating offices from the following topic areas because they have no associated funding in this solicitation: 6-A, 12-E, 13-A. This resulted in focus area 12-E being removed.
- Added the statement: "Phase II applications will not be accepted in this focus area." to the following focus areas: 1-D, 1-E, 1-F, 2-E, 3-B, 3-C, 9-A, 10-A, 10-B, 12-F, 12-G, and 21-C.

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I. Basic Information

United States (U.S.) Department of Energy (DOE)
Office of Science (SC), Office of Critical Minerals and Energy Innovation (CMEI), Office of Environmental Management (EM), Office of Electricity (OE), Office of Nuclear Energy (NE), and Hydrocarbons and Geothermal Energy Office (HGEO)

Executive Summary

The DOE Office of Science (SC), Office of Critical Minerals and Energy Innovation (CMEI), Office of Environmental Management (EM), Office of Nuclear Energy (NE), Office of Electricity (OE), and Hydrocarbons and Geothermal Office (HGEO) hereby announce interest in receiving applications from interdisciplinary teams addressing the Genesis Mission National Science and Technology Challenges to accelerate scientific discovery and research and development (R&D) workflows using novel artificial intelligence (AI) models and frameworks. By achieving AI advantage, these teams will advance the DOE's mission and ensure America's security and prosperity by addressing energy, environmental, and nuclear challenges through science and technology. Teams are encouraged to leverage the extensive scientific and data resources of the DOE/National Nuclear Security Administration (NNSA), the National Laboratories, U.S. industry, and academia. The resulting AI models and workflows, if successful, may be integrated into the American Science Cloud.

DOE is soliciting new fiscal year (FY)26 Phase I small team and Phase II large team applications in the following topic areas: advanced manufacturing, biotechnology, critical materials, nuclear fission, nuclear fusion, quantum information science, semiconductors and microelectronics, discovery science, and energy (see specific focus areas in Section III Program Descriptions).

In addition, this RFA will remain available to allow the recipients of FY26 Phase I awards to apply for larger team Phase II awards. In a few weeks, DOE plans to amend the RFA to clarify the Letter of Intent (LOI) and application guidelines for FY26 Phase II awards. In FY27, DOE plans to amend the RFA or to issue an alternative funding opportunity to update the topic and focus areas to allow a second competition of Phase I small team applications and Phase II large team applications.

Additional applications for Phase I and Phase II may be submitted after the corresponding deadline listed on the cover of this RFA; however, DOE reserves the right to decline such applications without review.

1. Genesis Mission Consortium Members

Members of the Genesis Mission Consortium[1] are eligible to submit applications. Funding will be provided using DOE's Other Transaction Authority[2] (OTA). For awards under DOE's OTA, administrative provisions of this RFA may not be applicable to an applicant or applicant's subcontractor.

Please note that membership in the Genesis Mission Consortium is not required to apply to this RFA or to participate in selected projects.

Notes for applicants of all types:

Receipt of an award under this RFA does not grant membership or require membership in the Genesis Mission Consortium.

Applicants may propose non-domestic entities as subrecipients in their applications. Applicants are advised that successful applications that propose non-domestic entities as subrecipients include a detailed demonstration of how the proposed non-domestic subrecipients possess skills, resources, and abilities that do not exist among potential domestic subrecipients.

Funding Details

Expected total available funding	DOE anticipates a total of $293.76 million in prior and current fiscal year funds will be used to support awards under this RFA.
Expected number of awards	The exact number of Phase I and Phase II awards will depend on the number of meritorious applications and the availability of appropriated funds.
Expected dollar amount of individual awards	Phase I: $500,000 to $750,000 Phase II: Envisioned as 3 to 5 times the Phase I award per year.
Expected award project period	Phase I: 9 months; Phase II: 3 years.

Key Facts

RFA Title	The Genesis Mission: Transforming Science and Energy with AI
RFA Number	DE-FOA-0003612
Announcement Type	Amendment 000002
Assistance Listing	81.049
Statutory Authority	The programmatic authorizing statutes are:

[1] More information on the Genesis Mission Consortium is available at https://www.genesismissionconsortium.org/

[2] 42 U.S.C. § 7256(a), (g) (1993)

	U.S. Department of Energy Organization Act (codified as amended at 42 U.S.C. § 7256) (2020). Act of Jul. 4, 2025, Pub. L. No. 119-21, § 50404, 139 Stat. 500 (2025). Energy Policy Act of 2005, Pub. L. No. 109-58, §§ 901, 965, 119 Stat. 594 (2005). Energy Independence and Security Act of 2007, Pub. L. No. 110-140, §§ 618, 1304A, codified at 42 U.S.C. §§ 17197, 17384a National Quantum Initiative Act, Pub. L. No. 115-368, § 401, 132 Stat. 5100, 5105 (2018). The CHIPS and Science Act of 2022, Pub. L. No. 117-167, § 10731, 136 Stat. 1366 (2022).
Governing Regulations	Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards, codified at 2 C.F.R. § 200 (2024). U.S. Department of Energy Financial Assistance Rules, codified at 2 C.F.R. § 910 (2022). U.S. Department of Energy, Office of Science Financial Assistance Program Rule, codified at 10 C.F.R. § 605 (2014). U.S. Department of Energy Other Transaction Agreements Rule, codified at 2 C.F.R. § 930 (2025).

Key Dates

Key dates are printed on the cover of this RFA.

Submission Teaming Requirements

As described in this RFA, multi-institutional teams are required for responsive submissions to this RFA.

Agency Contact Information

Grants.gov Customer Support	1-800-518-4726 (toll-free) support@Grants.gov
Program Contact	GenesisMissionNOFO@science.doe.gov for all inquiries.

Informational Webinar/Office Hours

DOE held an informational webinar about this RFA on Thursday, March 26, 2026, at 3 PM Eastern. Information about future webinars and recordings and slides of past webinar are available at https://science.osti.gov/grants/FOAs/Genesis-Mission.

Recommendation

DOE encourages you to register in all systems as soon as possible. You are also encouraged to submit applications well before the deadline.

II. Eligibility

A. Eligible Applicants

All types of domestic applicants are eligible to apply, except nonprofit organizations described in section 501(c)(4) of the Internal Revenue Code of 1986 that engaged in lobbying activities after December 31, 1995.

Federally affiliated[3] entities must adhere to the eligibility standards below:

1. DOE/NNSA National Laboratories

DOE/NNSA National Laboratories are eligible to submit applications (either as a prime applicant or as a team member in a multi-institutional team) and may be proposed as subrecipient under another organization's(s) application. If recommended for funding as a prime, subrecipient, or a team member funding will be provided through the DOE Field-Work Proposal System and work will be conducted under the laboratory's contract with DOE. No administrative provisions of this RFA will apply to the laboratory or any laboratory subcontractor. If recommended for funding as a proposed subrecipient, the value of the proposed subaward will be removed from the prime applicant's award and will be provided to the laboratory through the DOE Field-Work Proposal System and work will be conducted under the laboratory's contract with DOE.

Laboratory-led project team members may receive funds preferably through an OTA award to another entity on the project team or through laboratory subcontracts. During award selection and negotiation, DOE may ask that one proposed subawardee submit their own application if intellectual property provisions and data sharing cannot be adequately ensured by the standard provisions of management and operating subcontracts, although the laboratory would remain the lead organization for the project. Additional instructions for securing authorization from the cognizant Contracting Officer are found in Section IX of this RFA.

DOE very strongly encourages the use of a prime -and-sub model in all situations.

2. Non-DOE/NNSA Federally Funded Research and Development Centers (FFRDCs)

Non-DOE/NNSA FFRDCs are eligible to submit collaborative applications (as a team member in a multi-institutional team) and may be proposed as subrecipients under another organization's(s) application. Non-DOE/NNSA FFRDCs are not eligible to lead a team, either using collaborative applications or as prime applicant. If recommended for funding as a proposed subrecipient, the value of the proposed subaward may be removed from the prime applicant's award and may be provided through an Inter-Agency Award to the FFRDC's sponsoring Federal Agency. Additional instructions for securing authorization from the

[3] Institutions that are not DOE/NNSA National Laboratories, a non-DOE/NNSA FFRDC, or another Federal agency are not Federally affiliated, even if they receive Federal funds or perform work under a Federal award or contract.

cognizant Contracting Officer are found in Section IX of this RFA.

DOE very strongly encourages the use of a prime-and-sub model in all situations.

3. Other Federal Agencies

Other Federal Agencies are eligible to submit applications (as a team member in a multi-institutional team) and may be proposed as subrecipients under another organization(s) application. Other Federal Agencies are not eligible to lead a team, either using collaborative applications or as a prime applicant. If recommended for funding as a proposed subrecipient, the value of the proposed subaward may be removed from the prime applicant's award and may be provided through an interagency agreement. Additional instructions for providing statutory authorization are found in Section IX of this RFA.

DOE very strongly encourages the use of a prime-and-sub model in all situations.

B. Cost Sharing

Applicants are expected to follow through on estimated cost share commitments proposed in their applications if selected for award negotiations.

Unless otherwise specified for the topic, cost sharing is not required for basic and applied research awarded under this RFA, except for profit entities. For-profit entities, whether prime recipients (lead organizations) or subrecipients (team members), are required to provide not less than 20 percent cost share for both basic and applied R&D activities and 50 percent of the total project costs for demonstration and commercial application tasks.[4]

This cost share is to be based on the portion of the total budget proposed by each for-profit entity and is required to be not less than 20 percent of the total allowable R&D costs of that entity. Applicants must include any required cost share in their proposed budget justification, if applicable, as described in Section IV.D. All cost share funding must originate from non-federal sources, unless otherwise permitted by law. Cost sharing amounts proposed in the budget justification are subject to validation during the period of performance and/or during closeout of the award. Some focus areas in this RFA have further instructions on cost share for applications submitted under that topic.

Additionally, demonstrations of institutional or third-party commitment to the proposed activity, as described in Section IV as an appending to the Project Narrative are strongly encouraged for all applications.

Examples of non-Federal contributions that may be considered as demonstrating institutional or third-party commitment include, but are not limited to, the following:

- The provision of space, facilities, equipment, or resources at no or reduced charge;
- The provision of release time for faculty;

[4] Energy Policy Act of 2005, Pub. L. 109-58, § 988.

- The provision of scholarship support for students;
- The waiver of facilities and administrative costs, in whole or in part; or
- Third party contributions (e.g., state, private entities, etc.).

The institutional commitment is not to be documented on the application's budget: institutional commitments are neither a formal nor a voluntary committed cost sharing, but it must be described in Appendix 7 of the Project Narrative.

Cost sharing and institutional commitments may not include the following:

- Revenues or royalties from the prospective operation of an activity beyond the time considered in the award;
- Proceeds from the prospective sale of an asset of an activity; or
- Other Federal awards.

Additionally, cost sharing may be required under a class patent waiver, if applicable, as discussed in Section IX.

Cost sharing is not required of DOE/NNSA National Laboratories, other Federal agencies, another Federal agency's FFRDC, or their subcontractors at any tier. DOE/NNSA National Laboratories, other Federal agencies, and another Federal agency's FFRDC may impose cost-sharing requirements on their contractors subject to their policies and procedures.

C. Eligible Individuals

DOE does not require that individuals be U.S. citizens or permanent residents to be proposed as a Principal Investigator (PI) or in any other role under an award, but all personnel working or proposed to work under an award must have the legal right to perform such work in the jurisdiction where the work will be performed. Individuals at any stage of their career may be proposed as a PI if they have the skills, knowledge, and resources necessary to carry out the proposed research.

D. Limitations on Submissions

LIMITATIONS ON INSTITUTIONS

Applicant institutions are limited to no more than one application as the prime recipient/lead institution per focus area for Phase I and Phase II applications combined. Phase II applications must list a primary focus area but will have the option to list secondary focus areas. The primary focus area will be used for determining limitations on institutional submissions.

There is no limitation to the number of applications for which the institution may be proposed as a subrecipient under another organization's application or a non-leading team member in a collaborative application.

Should DOE receive submissions in excess of the applicable limits, DOE reserves the right, in its sole discretion, to request additional or clarifying information to ascertain the

institution's intended submissions. Otherwise, DOE will consider the latest received submissions to be the institution's intended submissions.

Applications in excess of the limited number of submissions may be declined without review.

LIMITATIONS ON PI

The PI on an application may also be listed as a senior or key personnel on an unlimited number of separate submissions but can be the lead PI on only one application. However, the PI on an awarded Phase I award may submit a Phase II proposal as part of the FY27 go/no-go decision process.

PIs must be in a permanent or indefinitely extensible position at the applicant institution, whether tenured, tenure-track, or a staff appointment. Individuals in term-limited appointments, whether as adjunct, visiting faculty, fellows, or similar appointments, are not eligible to be proposed as a PI. Individuals in part-time permanent positions are eligible to be proposed as a PI.

Individuals in a joint appointment are eligible to be proposed as a PI if work will be performed at the applicant institution and if the PI is a paid employee of the applicant institution. Individuals paid by another institution may not be named as the PI but may be named in other senior/key roles. A paid employee is one that is on the applicant institution's payroll, receiving wages and benefits in accordance with the applicant institution's normal wage and benefit practices, and whose position is not governed by any arrangement, agreement, or contract between the applicant institution and another institution.

Individuals receiving more than half of their salary and benefits from a DOE/NNSA National Laboratory may not be named as the PI in an application submitted by an applicant other than a DOE/NNSA National Laboratory, regardless of any arrangement between the employing Laboratory and the applicant institution.

E. Other Eligibility Requirements

In Phase I, applicants must propose small teams with partner institutions from at least two of the following categories: (1) DOE/NNSA National Laboratory or a Scientific User Facility[5], (2) Industry, and (3) Institute of Higher Education (IHE)/Non-profit/Other. In Phase II, applicants will be expected to propose large teams with at least one partner institution from categories (1) and (2). Inclusion of lead or partner institutions from category (3) are strongly encouraged but not required. To meet this requirement, partners must provide intellectual contributions to the proposed project but do not need to be funded by DOE.

[5] Office of Science Scientific User Facilities (https://science.osti.gov/User-Facilities) not located at a DOE/NNSA National Laboratory are included in this category.

It is envisioned that DOE funding for all industrial partners combined could be up to 20 percent of the total requested budget for specific project-relevant research efforts.

Additional Eligibility Requirements may be identified in the listing of topics in Section III of this RFA.

III. Program Description

A. Purpose

The DOE Office of Science (SC), Office of Critical Minerals and Energy Innovation (CMEI), Office of Environmental Management (EM), Office of Nuclear Energy (NE), Office of Electricity (OE), and Hydrocarbons and Geothermal Office (HGEO) hereby announce interest in receiving applications from interdisciplinary teams addressing the Genesis Mission National Science and Technology Challenges to accelerate scientific discovery and R&D workflows using novel AI models and frameworks. By achieving AI advantage, these teams will advance the DOE's mission and ensure America's security and prosperity by addressing energy, environmental, and nuclear challenges through science and technology. Teams are encouraged to leverage the extensive scientific and data resources of the DOE, the National Laboratories, U.S. industry, and academia. Any resulting AI models, workflows, and data, will be integrated into the larger Genesis Mission capabilities.

SUPPLEMENTARY INFORMATION

The Genesis Mission, as described in Executive Order 14363, is a dedicated, coordinated national effort that will unleash a new age of AI-accelerated innovation and discovery that can solve the most challenging problems of this century. Proposing teams are encouraged to read the full Executive Order and to bring their best ideas to advance the Genesis Mission.

The DOE's initial activities in support of Genesis Mission, fulfilling section Pub. L. No. 119-21 § 50404 and other aspects of DOE mission, include two core components: (1) The American Science Cloud (AmSC) is a collaborative cloud ecosystem for scientific research, data sharing, and analysis; and (2) The Transformational AI Models Consortium (ModCon) is curating data and building foundational, self-improving AI models for science. These efforts are collaborating with teams funded by the NNSA to build the Genesis Mission's American Science and Security Platform. Additional information on relevant Genesis Mission activities is included in DOE's December 10, 2025 AI for Science announcement.

To increase and enhance DOE's portfolio of activities in support of the Genesis Mission, this announcement seeks applications from interdisciplinary teams to address one of the challenges listed below. These challenges embody critical facets of the Genesis Mission National Science and Technology Challenges (Topics 1-17) and cross-cutting needs of the platform (Topics 18-21). By using AI models and novel frameworks to achieve an AI advantage, these teams will accelerate scientific discovery and advance the DOE's mission. Teams are encouraged to leverage the extensive scientific and data resources of the DOE, the National Laboratories, U.S. industry, and academia. Successful AI models and workflows developed under this effort may be integrated into AmSC, ModCon, and/or other key components of the Genesis Mission platform.

Phased Program Structure

Projects funded under this RFA are expected to propose an approach or cluster of related approaches that will be pursued in two phases:

Phase I: In the initial phase, teams will design and demonstrate a clear, tangible research workflow that incorporates AI with concrete evaluation of the potential for AI advantage. Success may include demonstrating increased predictive power or scientific insight from appropriately-curated data, more tightly coupling data and experiments to validate hypotheses, building new models and analyzing their impact on discovery speedup, identifying scaling metrics that show how performance improves with more data or computing resources, improving and speeding up experimental workflows (e.g., through automation or AI-informed parameters), or other proposed metrics that the team would like to be considered. The goal is to provide quantitative analysis of whether a proposed approach is on a trajectory toward a transformative scientific capability, justifying further investment.

Phase II: During the second phase, meritorious Phase I and new Phase II teams will pursue the promising directions identified during the first phase. DOE envisions a level of effort (including team size and budget) at three to five times the initial phase per year. Deviations above and below this level are expected and will be made when appropriate to the scope of work. Receipt of a Phase I award will not be a prerequisite for submitting a letter of interest and application for Phase II. If a team believes they have already achieved the goals of Phase I awards, they may apply directly for a Phase II award in FY26. However, it is anticipated that most FY26 awards will be Phase I.

Genesis Mission Consortium

The Genesis Mission Consortium, announced on February 6, 2026, is a public-private partnership that will support the strategic direction of the Genesis Mission, working collaboratively to rapidly advance progress in science, energy and other emerging technologies, and national security.

Consortium members intend to contribute computing power, AI tokens, technical expertise, and/or in-kind support to advance the Genesis Mission goals and build the community. The consortium will connect leading industry and academic organizations with DOE and the National Laboratories and their resources. It will identify high-value partnerships among members that catalyze data flows and promote novel data applications.

Critically, the consortium will also identify strategic partnerships between members and non-members for select opportunities, including this publicly available RFA. The consortium has a partnership initiative to help members and non-members collaborate for applications related to DOE Genesis Mission opportunities (without direction from DOE), including for this RFA. Potential applicants to this RFA are encouraged, but are not required, to engage with the consortium's partnership service to assist with team formation prior to application submission and/or during an award term. Please see the consortium's website for additional information. Membership in the consortium is not a pre-requisite for eligibility for funding under this RFA.

Applicants interested in leveraging the partnership service can do so by contacting the Genesis Mission Consortium. Please see the consortium's website for additional information on how to leverage the partnerships service (https://genesismissionconsortium.org/).

Note that applicants wishing to take advantage of the consortium's partnership service are encouraged to do so as soon as possible. Opportunities for the partnership service to effectively assist with partnership formation will become more limited within one week of the submission deadline.

Genesis Mission Integration

Each team will be part of the Genesis Mission and will contribute to the relevant components of the Genesis Mission in a coordinated fashion. A core philosophy of the Genesis Mission is that the whole is more than the sum of the parts, and specifically, that both specific developments (software, data, models, etc.) and best practices can be shared across the initiative. As described above, Genesis Mission funding to date has primarily focused on building a platform that will serve as a common resource for this sharing in addition to providing underlying resources for data storage and transfer, AI model training and inference, etc. All teams are expected to take advantage of the platform when practical, including by hosting data, models, and other artifacts on the platform along with metadata making those artifacts discoverable by, and reusable by, other appropriately authorized users.

The platform's capabilities are provided by DOE/NNSA National Laboratories and other Genesis Mission Consortium members, and the latest information on the current and expected capabilities of the platform will be available for all projects selected under this RFA. The Genesis Mission Consortium's partnership service can be used to help connect potential applicants with information and experts on the platform's capabilities.

Accordingly, each team is expected to participate in coordination activities across the Genesis Mission for data, models, and infrastructure, and will be expected to provide information on project requirements, needs, and best practices as requested by the Genesis Mission.

Topics and Focus Areas

Each applicant must address a topic and focus area given below. Phase I applications are limited to a single focus area. Phase II applications must identify a primary focus area but can also address secondary focus areas. The following focus areas are not accepting Phase II applications: 1-D, 1-E, 1-F, 2-E, 3-B, 3-C, 9-A, 10-A, 10-B, 12-F, 12-G, and 21-C. This requirement is listed in the relevant focus area descriptions. Cost share requirements are specific to each focus areas.

Note on funding or co-funding opportunities from the Office of Science-Advanced Scientific Computing Research (SC-ASCR) program:
Core components of ASCR's mission relevant to this RFA include advancing applied mathematics and computer science, including AI and quantum information science; concurrently advancing applied mathematics and computer science with disciplinary science in critical areas; and developing future generations of computing hardware and software tools for science and engineering in areas ranging from high-performance computing (HPC) through edge computing and laboratory/experimental automation. AI innovation is a priority for this RFA.
For consideration by ASCR, applications must clearly articulate how the proposed work will advance one or more aspects of ASCR's mission as described above. ASCR intends to work with all offices partnering on this RFA to identify promising co-funding opportunities in all focus areas listed below. Accordingly, focus areas listed below that ASCR is leading in multi-program topics are tagged with ASCR, but ASCR will consider co-funding relevant applications submitted in all areas.

CHALLENGE AREAS FOR APPLICATION FORMATION

1 - Reenvisioning Advanced Manufacturing and Industrial Productivity

Participating Offices: Office of Science-Basic Energy Sciences (SC-BES); Office of Critical Minerals and Energy Innovation (CMEI)-Industrial Technologies Office (CMEI-ITO); CMEI-Advanced Materials and Manufacturing Technologies Office (CMEI-AMMTO); CMEI-Alternative Fuels and Feedstocks Office (CMEI-AFFO); SC-Fusion Energy Sciences (SC-FES); SC-Advanced Scientific Computing Research (SC-ASCR)

Challenge: Bridging the gap between scientific discovery and commercially viable products and processes, known as the "valley of death", remains the biggest challenge in industrial manufacturing. The scaling, modification, or deployment of innovative materials and processes depends on a vast and complex parameter space, requiring the uncovering and integration of underlying physical and chemical principles that hold the key to the next U.S. manufacturing revolution.

AI Solution: Recent advancements in agentic and generative AI present opportunities to accelerate discovery and translational science. These new tools could navigate multi-scale and high-dimensional dynamic systems to find hidden relationships and uncover new manufacturing routes and products. AI can also enable end-to-end digital transformation of industrial manufacturing through integration of real-time data from machines, products, processes, and supply chains into manufacturing digital twins for continuous human-in-the-loop automated decision support and deployment of emerging advanced manufacturing technologies —including digital twins of the equipment to manufacture the products.

Justification: The DOE/NNSA National Laboratories co-locate world-leading expertise in the discovery, optimization, and scale-up of novel chemistry and materials for energy applications and in smart manufacturing, as well as operate cutting edge synthesis and characterization facilities and high-performance computing resources that lead to the next generation of advanced equipment. At the same time, DOE has a long history of partnering with

industry, which has helped cultivate data from industrial facilities. This creates an ideal environment to advance AI-driven manufacturing for U.S. industries today and in the future.

National Impact: Delivering innovations through an efficient, distributed, and adaptive platform capable of real-time decision making and end-to-end intelligence will profoundly transform how we create chemicals and materials foundational to industrial products and advanced energy technologies while strengthening supply chain resilience and competitiveness of American industry to create jobs and economic growth.

Focus Areas for FY26:

A. **Agentic AI-Driven Chemical Manufacturing (BES)**

Develop agentic-AI capable of reasoning, integrated with digital twins, and interacting with self-driving and self-adaptive chemical laboratories as a new scientific paradigm to investigate, predict, discover, and deploy new chemical processes, catalysts, and reaction modalities using domestic resources that will impact the production and distribution of large-scale critical chemical building blocks.

B. **AI-Driven Materials Processing (BES)**

Develop AI models to integrate datasets from multi-modal synthesis, characterization, and fabrication techniques with high-throughput simulations and predictive theory, leveraging the data-rich parameter space, including diverse synthetic methodologies and bottom-up to top-down approaches, to accelerate the transition from novel material discovery to rapid scale-up, integration, and deployment.

C. **AI-Enabled Manufacturing for Extreme Energy Systems (FES)**

Develop AI-driven digital twins for first-of-a-kind energy technologies, especially fusion energy systems, that connect physics, materials behavior, manufacturing processes, and systems-operations data and enable the design and fabrication of components as part of qualified and matured systems that outperform bespoke prototypes with limited operational ranges.

D. **Digitalization of Industrial Processes (ITO)**

PHASE II APPLICATIONS WILL NOT BE ACCEPTED IN THIS FOCUS AREA.

Expand use of physics-informed AI methods, digital twins, and advanced controls for processes and equipment across a variety of industrial sectors to optimize existing processes and technologies; design, develop, and evaluate innovative technology and process solutions; and enable real-time process control and dispatch of energy resources or feedstocks. This focus area solicits applications that are relevant to energy-intensive industries, including chemicals, cement and concrete, iron and steel, food and beverage, refining, and pulp and paper, as well as in technologies and processes that are common across multiple industrial sectors, such as process heating, membrane separations, load flexibility, onsite power generation, thermal energy storage, water supply, wastewater treatment, and process integration technologies. The proposed approaches should provide proof-of-concept and be generalizable to other industrial contexts with the ability to test, validate, and scale.

Potential applicants are strongly encouraged to include an industrial partner on the project team.

E. **AI-Enabled Smart Manufacturing (AMMTO)**

PHASE II APPLICATIONS WILL NOT BE ACCEPTED IN THIS FOCUS AREA.

Leverage AI-driven smart and secure manufacturing technologies across industrial facilities and enable manufacturing digital transformations. Develop Agentic-AI for manufacturing system level optimization and reasoning to simulate, train digital twins for modeling real-time hyper-realistic smart factory floor that includes the exact layout, equipment states, robot positions, advanced automation and control, and even virtual models of human workers.

F. **Energy Material Manufacturing (AFFO)**

PHASE II APPLICATIONS WILL NOT BE ACCEPTED IN THIS FOCUS AREA.

Leveraging AI-enabled digital twins to optimize advanced synthesis and roll-to-roll processes ubiquitous in the production of energy materials and solid electrolyte-based electrochemical devices with complex properties and geometries, e.g., fuel cells. These digital twins will integrate multi-physics models, real-time sensor fusion, and metrology data to achieve comprehensive monitoring, predictive analysis, and closed-loop control in complex, high-dimensional manufacturing environments. The goal is to accelerate the end-to-end digital transformation of these processes, addressing challenges like data latency and incompleteness, ultimately driving high-volume manufacturing, commercialization, and significant cost reduction for advanced energy material and device production. Work efforts should include hardware and software/algorithm development and demonstration as necessary toward the technical objective of the application. Applications are expected to be primarily DOE/NNSA National Laboratory led and executed.

2 - Scaling the Biotechnology Revolution

Participating Offices: Office of Science-Biological and Environmental Research (SC-BER); Office of Critical Minerals and Energy Innovation-Alternative Fuels and Feedstocks Office (CMEI-AFFO); SC-Advanced Scientific Computing Research (SC-ASCR)

Challenge: Designing biology on demand to innovate in biotechnology and re-establish U.S. leadership will require accurately defining the essential governing principles—from atoms to molecules to organisms to ecosystems and back. However, the nonlinear complexity of biological systems and long, costly development cycles hinder biotechnological innovations, impeding the delivery of crucial biofuels, biochemicals, and bioproducts vital for American economic prosperity and energy independence.

AI Solution: AI will integrate and interpret genomics, multi-omics, imaging, dynamics, and phenomics data into embedded models to establish genotype–phenotype relationships, identify causal control points, and guide autonomous experimentation. This will advance AI's ability to reason about long causal chains under uncertainty, integrate across multiple scales, and

learn from sparse, noisy data. Tools like digital twins could be used to derisk process development, optimization, integration, and scale-up, thereby speeding up industrial production of biofuels, biochemicals, and bioproducts by orders of magnitude.

Justification: DOE is uniquely positioned to leverage its world-class molecular and genomic capabilities of the Lawrence Berkeley National Laboratory's (LBNL) Joint Genome Institute, the Pacific Northwest National Laboratory's Environmental Molecular Sciences Laboratory, the specialized feedstock and conversion capabilities of the Idaho National Laboratory's Biomass Feedstock National User Facility, the National Laboratory of the Rockies' Integrated Biochemical Refinement Facility & Process Development Unit, and the LBNL Advanced Biofuels/Bioproducts Process Development Unit facilities and high-performance computing. These DOE assets, combined with AI tools and digital twins, will enable predictive design of biological processes, products, and systems and rapid scale-up of biomanufacturing.

National Impact: Accelerating AI-driven biotechnology will position the U.S. to establish leadership in the biotechnology revolution by rapidly advancing the continuum from discovery to biomanufacturing scale-up, in areas spanning energy, bio-based domestic sources of critical minerals and materials, health, agriculture, and biosecurity, and will drive economic growth and job creation across the Nation.

Focus Areas for FY26:

A. **Biomolecular Science (BER)**

Determine fundamental principles connecting protein structure with function. The structural characterization of biomolecules, integrated with genomics and other 'omics technologies, is crucial for functional analysis of biological systems and the acceleration of biosystems design applications underpinning biotechnology innovation. Recent advancements in AI tools for protein structure prediction have been transformative, offering new insights into biomolecular structure. Further development is desirable using new integrative approaches spanning diverse instruments and platforms, scalable automated workflows, and advanced AI models to explore the fundamental linkages between biomolecular structure and function. Innovative AI capabilities are requested for biomolecular design by integrating structural data from diverse platforms to drive novel concepts in enzyme improvement and function. This includes enhancing protein structure prediction tools, integrating genomics/omics with biomolecular structure to elucidate function, and addressing gaps in metabolic pathway analyses for microorganisms and plants. A key focus is on overcoming current limitations in understanding the connection between biomolecular structure and function governing molecular interactions, and molecular dynamics to advance foundational principles for biosystems design.

B. **Genotype to Phenotype (BER)**

Link genomic, biomolecular, metabolic and environmental factors to predict emergent phenotypic outcomes within microbes and plants in a systematic way that incorporates non-linear, stochastic networks. Biological systems operate through complex networks where genetics interact with various external influences. The

objective is to pioneer advanced artificial intelligence models designed to understand and optimize microbes and feedstock crops, for enhanced domestic production of sustainable fuels, chemicals, and materials. This involves strategically leveraging diverse multi-modal data, encompassing multi-omics, and environmental datasets. By integrating these data sources, AI models could elucidate the intricate mechanisms through which genetic variations within the feedstock crops and microbial communities, alongside dynamic environmental factors and interaction with the surrounding ecosystem, collectively impact their emergent phenotypic outcomes. Additionally, a key target is to develop AI innovations that significantly reduce data requirements, enabling more efficient model training and reducing context-dependent predictions of phenotypic outcomes directly in field settings. This will deepen the understanding of complex biological systems, thereby driving significant innovations in biotechnology.

C. **Predictive Engineering of Microbial Communities (BER)**

Develop a complete understanding of how genetic variation and environmental dynamics determine the behavior and interactions within and among microbial populations. Engineered microbiomes could be leveraged for advancing biomanufacturing, resource extraction, enhanced plant health, and other DOE relevant applications. AI will accelerate predictive microbiome engineering by enhancing our understanding of how genetic variation and environmental dynamics determine the behavior and interactions within and among microbial populations. Applications should focus on AI tools to elucidate the function of genetic dark matter that dominates metagenome data, how to predict novel metabolic pathways, and to identify/engineer interspecies metabolic networks. Also of interest are comprehensive AI-driven models to predict microbiome gene expression across the phylogenetic spectrum and under a broad set of conditions to drive the engineering of community function for a range of environmental, biotechnology and biomanufacturing applications.

D. **Bio Design (BER)**

Utilize advances in fundamental predictive principles to design, control, optimize and incorporate multiple traits within plants and microorganisms. The standard strategy for engineering biology follows the so-called Design-Build-Test-Learn (DBTL) iterative cycle. The incorporation of innovative AI approaches can dramatically accelerate this process not only by facilitating the discovery of new molecular mechanisms and harnessing them for engineering purposes, but also by enabling accurate prediction of the behavior of engineered organisms. Having enough functional, AI-ready data, along with new predictive AI approaches to parse the data will ultimately eliminate the need for testing and learning, effectively transforming the DBTL approach into a “design and build” (DB) paradigm. To advance DBTL towards this DB paradigm change, applications should generate/analyze high-throughput multi-omics and other AI-ready data from DOE-relevant plant or microbial systems to train, develop and deploy innovative AI approaches for bioengineering. These advances will enhance prediction of engineering outcomes and accelerate discovery of broadly compatible, precisely tunable genome engineering tools and practices.

E. **AI-Enabled Biological Reaction Engineering, Bioreactor Design, Process Scale-up and Integration (AFFO)**

PHASE II APPLICATIONS WILL NOT BE ACCEPTED IN THIS FOCUS AREA.

Develop AI/digital twin models to streamline R&D, predict and address the challenges and complexities involved in the biological system, bioreactor design, and process scale-up and integration to enable cost-effective production of biofuels, biochemicals, and bioproducts. Technology areas for AI models include but are not limited to: algal and/or bacterial strain development for enhanced traits, productivity, and/or novel capabilities; building microbial communities to targeted specifications; closed-loop autonomous biosystem design; precise prediction, control, and performance optimization of bioreactors and cultivation systems that enhances mass/heat transfer, mixing, cell viability, and product yield; addressing cost and reliability challenges in biological process scale-up and integration; upgrading of biochemically formed molecules into high quality high value final products via thermo-catalytic process. Applications should consider integrating experimental data and information at laboratory, pilot, and/or industry relevant scales. Applications should create and assemble data repository for AI model development, evaluate and establish necessary digital model framework for baselining and validation with their own data. Applications should develop metrics to demonstrate the proof-of-concept of the proposed AI-driven approaches and quantify the acceleration of biotechnology and biomanufacturing. The examples of metrics include but are not limited to: prediction accuracy, real-time autonomous control decision, process stability and robustness, product yield, cell viability and stability, batch-to-batch variability, process/reactor downtime, resource efficiency, data quality and integrity, model adaptability to new condition/products, computational cost to train and run the AI models, cost savings, accelerated design and scale-up, time-to-market reduction, etc.

3 – Securing America's Critical Minerals Supply

Participating Offices: Office of Critical Minerals and Energy Innovation (CMEI)-Analysis and Strategy Office (ASO); CMEI-Advanced Materials and Manufacturing Technologies Office (CMEI-AMMTO); CMEI-Advanced Mining and Minerals Production Technologies Office (CMEI-AMMPTO); SC-Basic Energy Sciences (SC-BES); SC-Biological and Environmental Research (SC-BER); SC-Advanced Scientific Computing Research (SC-ASCR)

Challenge: America's dependence on foreign supply chains for critical minerals and materials (CMM) threatens national security, economic competitiveness, and the deployment of technologies essential for energy independence. Domestic critical mineral production is expensive, complex, and time-consuming, in part because of the many steps to identify, extract, refine, and concentrate from complex, heterogeneous sources across critical mineral supply chains.

AI Solution: AI will revolutionize the entire critical minerals supply chain and development of alternative materials by integrating geophysical data, other fundamental science data, process optimization, cost estimation, and economic modeling into one connected system.

Solving this challenge demands an AI that can reason scientifically, can understand complex structure-property relationships, and can design alternatives with different compositions. Physics-based AI offers advanced predictive capabilities to identify alternatives and understand processes underlying critical mineral availability, recovery, refinement, and replacement.

Justification: DOE's existing minerals characterization datasets (e.g., METALLIC, CMI Hub), combined with DOE/NNSA National Laboratory expertise and DOE-supported efforts in materials science, chemistry, geosciences, biology, process engineering, and economic modeling, could enable acceleration from the years-long mineral development timelines to rapid resource assessment and production optimization. Further, use of AI could reveal new strategies to replace and/or eliminate the need for CMMs in some materials and chemical processes.

National Impact: This effort will reduce reliance on adversarial nations, expand America's mineral resource base, maximize production profitability, and strengthen supply chain resilience for technologies essential to national security and economic prosperity.

Focus Areas for FY26:

A. **Resource Mapping and Development (AMMPTO)**

Accelerate expansion of America's mineral resource base by combining cutting-edge geophysical and chemical data with AI-powered process prediction and cost estimation to derisk projects, leveraging existing minerals characterization datasets from existing DOE/NNSA National Laboratory efforts (e.g., METALLIC, CMI Hub).

B. **AI-Enabled Materials Discovery and Engineering (AMMTO)**

PHASE II APPLICATIONS WILL NOT BE ACCEPTED IN THIS FOCUS AREA.

Deploy automated discovery platforms to accelerate material discovery, manufacturing, and qualification through closed-loop systems that integrate hypothesis, experiment, validation, and manufacturing, reducing demand for critical minerals.

C. **Economic Modeling and Market Analysis (ASO)**

PHASE II APPLICATIONS WILL NOT BE ACCEPTED IN THIS FOCUS AREA.

Implement ATHENA (AI-Toolkit for Holistic Economic Network Analysis) to synthesize critical mineral supply and demand datasets, enabling scenario analysis of policy interventions and geopolitical disruptions on critical mineral markets and critical materials supply chains informed by relevant third-party datasets (Benchmark Minerals Intelligence, Bloomberg BNEF, S&P Global, and potentially others).

D. **Extraction and Processing Technologies (AMMPTO, AMMTO)**

Develop AI-enhanced technologies for domestic extraction, mid-stream processing, refining, and recycling of critical minerals to establish complete domestic supply chain capabilities, leveraging existing minerals processing data from existing DOE/NNSA National Laboratory efforts (e.g., METALLIC/PROMMIS).

E. **Geological Finders/Keepers (BES, BER)**

(i) Develop AI models that integrate geophysical, advanced sensing, and soil system Insights of fluid dynamics and interfacial interactions with the geochemistry of

mineral/interface interactions to predict the location and extraction of CMMs from the subsurface and from unconventional sources such as mine tailings. Expand lab-scale model systems to incorporate real-world field-scale heterogeneous systems.

(ii) Develop AI capabilities that integrate geophysical, advanced remote sensing, and subsurface system insights to locate, characterize, recover, and extract CMM from surface soils/water, the subsurface/groundwater, plants, and waste streams. Through the use of AI, utilize a wide range of systems approaches to study field sites, including the integration of hydrologic and geochemical findings with microbial genomics and rhizosphere processes into a range of reactive transport models to cover scales from molecular to regional. Expand lab-scale model systems to incorporate real-world, field-scale heterogeneous systems, incorporating mechanistic and quantitative knowledge across the range of interfacial processes and advanced translation of AI-ready data into numerical models for projections of recovery options.

F. **Connections for Isolation (BES)**

Utilize AI models to identify chemical drivers that significantly improve the separation of CMMs from heterogeneous mixtures, incorporating knowledge of properties at multiple length and time scales, quantum through macroscopic properties, molecular interactions, and energy exchanges.

G. **Biological Pathways to CMM (BER)**

Employ AI-guided discovery of microbes, proteins, peptides, and pathways within a biological system or as a component of a biohybrid approach to significantly improve the efficiency of CMM recovery, separations, and refinement for industrial use. Use AI to decode the molecular-level rules of how microbes interact with minerals to enhance CMM extraction. The unique properties of biological molecules and organisms may present novel opportunities to recover CMMs from dilute substrates. Applications should focus on ways to leverage AI to understand the molecular-level rules of microbe-mineral-plant interactions, including the analysis of experimental and computational data to delineate the fundamental molecular mechanisms of mineral interaction, uptake, translocation, and biological sequestration. Also of interest are AI tools to design and engineer enhanced plant and microbial bio-recovery systems via engineering of novel proteins, peptides, or metabolic pathways to improve CMM selectivity, recovery rates, and tolerance to harsh industrial conditions. This might include ways to engineer CMM affinity from molecules to organism in plants and across the microbial phylogenetic spectrum.

4 - Delivering Nuclear Energy that is Faster, Safer, Cheaper

Participating Offices: Office of Nuclear Energy (NE); Office of Science-Advanced Scientific Computing Research (SC-ASCR)

Challenge: Nuclear power plants and facilities have historically been challenged by long development timelines and burgeoning costs, limiting America's ability to deliver affordable, resilient, and reliable energy as demand continues to grow—particularly from AI data centers.

AI Solution: This initiative will accelerate nuclear energy deployment by using AI to design, license, manufacture, construct, and operate reactors with human-in-the-loop workflows, enabling at least 2x schedule acceleration and greater than 50 percent operational cost reductions. To meet these goals, DOE will develop through this RFA a suite of explainable AI solutions including surrogate models, agentic workflows, autonomous labs, and digitals twins. For example, for reactor operations, we will use digital twin systems with AI components that will interpret complex operational data in real time.

Justification: DOE's combination of national laboratory nuclear expertise, test facilities (e.g. Idaho National Laboratory's Advanced Test Reactor, Transient Reactor Test Facility, Fuel Conditioning Facility, Hot Fuel Examination Facility, and Collaborative Computing Center; Oak Ridge National Laboratory's High Flux Isotope Reactor; Argonne National Laboratory's Mechanisms Engineering Test Loop Facility), decades of operational data, regulatory partnerships, industry partners, and extensive computational ecosystem uniquely position it to accelerate reactor deployment.

National Impact: This moonshot will provide Americans more affordable energy while reducing human error, strengthening national security, and directly supporting U.S. energy dominance with multi-billion-dollar cost savings per gigawatt of generating capacity.

Focus Areas for FY26:

The Office of Nuclear Energy seeks proof of concept demonstrations and gated, outcome-driven applications that leverage AI technologies to measurably accelerate nuclear engineering and licensing pipelines in support of urgent national energy security and clear firm power deployment objectives. Applications should demonstrate quantifiable reductions in cost, schedule, and regulatory uncertainty while maintaining rigorous standards for traceability, verification and validation, configuration control, and human oversight appropriate for high consequence systems. Collaborative, focused teams involving U.S. laboratories, reactor developers, reactor operators, and relevant industry partners will leverage collective expertise, ensure interoperability, and secure data governance, and define clear transition pathways from demonstration to deployable capability that maximizes real world impacts.

A. Accelerated Nuclear Power Plant Design and Licensing: Create an automated process to enable rapid design, including safe and secure autonomous monitoring and control of plant operations, licensing considerations, and rapid deployment of advanced nuclear technologies using AI.

INDUSTRY COST SHARE: Required (20 percent for R&D and 50 percent for Demonstration)

To accelerate the deployment of advanced nuclear technologies, applications are sought to develop and demonstrate AI enabled tools that streamline nuclear reactor design and licensing under human authority. This call invites concepts that leverage AI to automate and enhance the preparation and review of safety and regulatory documentation, harmonize regulatory requirements, and integrate reasoning engines with multidisciplinary engineering workflows spanning requirements definition, analysis,

multiphysics modeling, and design synthesis. Proposed efforts should enable rapid exploration of component level analysis, subassembly analysis, balance of plant to the full operation of the reactor; and optimization of reactor configurations for diverse applications and tighter integration between design and licensing processes to reduce, cost, schedule and regulatory uncertainty.

B. **Autonomous Power Plant Operations: Develop AI digital twin systems that interpret plant operational data in real time, detect anomalies, and recommend preemptive actions to maintain safety and operational performance.**

INDUSTRY COST SHARE: Required (20 percent for R&D and 50 percent for Demonstration)

Applications are sought to develop AI digital twin systems for autonomous power plant operations, with a focus on small modular reactors (SMRs) and microreactors. This includes leveraging AI/machine learning (ML) to enhance existing sensor technologies and to develop novel instrumentation that fills identified measurement gaps, enabling more accurate, reliable, and integrated data streams that strengthen digital twin fidelity and real-time decision support. Applications that leverage DOE/NNSA National Laboratory resources and advanced statistical control algorithms to demonstrate safer, more efficient, and responsive autonomous reactors and include a focus for developing provable cyber assurance for security and threats are encouraged.

C. **AI-Assisted Manufacturing and Construction: Support site selection, born certified manufacturing, construction, supply chain reliability, and factory modular production methods with AI technologies.**

INDUSTRY COST SHARE: Required (20 percent for R&D and 50 percent for Demonstration)

Applications that leverage AI, predictive analytics, and automated delivery of a nuclear ready component or construction ready support, including advanced manufactured components, and qualification processes, for capacity expansion and reactor demonstration, i.e., certified and licensable, will be considered. Applications that will accelerate the availability of U.S.-based SMR technologies into domestic and international markets and fortify the SMR supply chain, including supplier development and component fabrication for deployment are desired.

D. **Autonomous Research and Development: Condense nuclear material research and qualification timeframes using AI-driven pipelines for modeling, characterization, evaluation, and qualification, while integrating decades of global historical irradiation data.**

INDUSTRY COST SHARE: Required (20 percent for R&D and 50 percent for Demonstration)

Reactor deployment and continued operation rely on the utilization of qualified structural and fuel materials and AI tools that significantly reduce the time and cost to qualify new materials and manufacturing methods for nuclear energy deployment, leveraging autonomous R&D, AI-driven pipelines for discovery and characterization, coordination with standard and regulatory organizations, and curated irradiation data are sought. Specific topics that address AI-driven generation of irradiation and other

environmental effects (e.g., corrosion) testing protocols, autonomous AI platforms for hot cell laboratories, sensor systems, and time-dependent property predictions from low sample sizes and standardized microscopy analysis are encouraged.

E. **Accelerated Fuel Cycle Facility Design and Licensing to Secure the Domestic Fuel Supply: Create automated processes to enable rapid design, licensing considerations, and accelerated deployment of advanced fuel cycle technologies using AI.**

INDUSTRY Cost Share: Required (20 percent for R&D and 50 percent for Demonstration)

To accelerate the deployment of advanced nuclear fuel cycle technologies, applications are sought to develop and demonstrate AI enabled tools that streamline fuel cycle facility (e.g., mining, conversion, enrichment, deconversion) deployment and licensing under human authority. This call invites concepts that leverage AI to automate and enhance the preparation and review of safety and regulatory documentation, harmonize regulatory requirements, and integrate reasoning engines with multidisciplinary engineering workflows spanning requirements definition, analysis, modeling, and design synthesis.

To improve the availability and utilization of high assay low enriched uranium (HALEU), proposals are sought that develop and implement AI capabilities, including machine learning and large language models, to enhance HALEU production processes, distribution logistics, data integration, and lifecycle decision-making

To accelerate the domestic supply of uranium, including domestic uranium exploration and extraction, proposals are sought to implement machine learning and advanced data analytics for methodologies to automate and improve the accuracy of geological data analysis, encompassing the integration of diverse well field geospatial, geophysical, and geochemical data, training and development of predictive models, enhanced spectral interpretation, operational optimization, and real-time decision-making.

To accelerate the deployment of advanced nuclear fuels to provide abundant energy, proposals are sought that implement AI tools to execute nuclear fuel irradiation experiments that, in real time, integrate instrumented tests with digital twins to demonstrate methodologies that accelerate fuel development and qualification.

To ensure effective usage of materials by closing the nuclear fuel cycle, proposals are sought for AI/ML models which can optimize coupled reprocessing flowsheets and waste disposal systems in terms of plant economics, waste costs, and waste minimization. In addition, proposals are sought which use artificial intelligence to identify materials, minerals, or glasses which have promise as advanced waste forms for chloride or fluoride-bearing wastes.

F. **AI-Assisted Site Characterization: Accelerate waste disposition site characterization through AI Modeling.**

INDUSTRY COST SHARE: Requires (20 percent for R&D and 50 percent for Demonstration)

Proposals that leverage the collation, evaluation, and analysis of large data sets from multiple data sources, including but not limited to USGS, state geologic surveys, and the oil and gas industry to create detailed cross-section extrapolations and 3D models to enable DOE to conduct a subsurface fatal flaw analysis of the feasibility of a potential site for waste disposition of used nuclear fuel and/or reprocessed fuel waste streams.

G. **AI-Assisted End Disposition Design: Concept Design for Disposal of Used Nuclear Fuel and Reprocessed Fuel Waste Streams.**

INDUSTRY COST SHARE: Requires (20 percent for R&D and 50 percent for Demonstration)

Given a combination of reprocessed fuel, high-level waste, and used nuclear fuel, DOE is interested in proposals that use AI to design a licensable mined geologic repository in one of the three main geological media, specifically shale, salt and granite. Proposals should take into account the current and future used nuclear fuel inventory and incorporate the use of deep boreholes as a disposition pathway for high-level waste.

H. **Development, Utilization and/or Adoption of AI and ML Tools to Support the Efficient Review, Classification and Release of Legacy Documents to the Nuclear Industry**.

INDUSTRY COST SHARE: Requires (20 percent for R&D and 50 percent for Demonstration)

The information contained in legacy documents has the potential to shorten technology development life cycles and reduce costs by allowing the nuclear industry to leverage existing work. However, the existing DOE processes for enabling access to legacy documents are challenged by the time, effort and cost associated with identifying, reviewing and appropriately marking the documents (e.g., export-controlled information (ECI)). This focus area encourages the development, utilization and/or adoption of AI and ML tools that would enable DOE National Laboratories, plants and sites to significantly reduce the time and costs associated with reviewing and appropriately marking legacy documents for efficient release to the nuclear industry.

Cost Share and additional Program Requirements:

- **R&D:** Projects focusing on research and development related to advanced nuclear reactor technologies or AI applications for nuclear systems require a **20 percent industry cost share**.
- **Demonstration:** Projects involving the demonstration of nuclear reactor prototypes, AI-driven operational enhancements, or other relevant technologies require a **50 percent industry cost share**.
- **Nuclear Energy Sector Team Member Requirement:** Applications must include a nuclear sector team member (either as a prime or sub-recipient) capable of providing real operational data essential for the development, demonstration, and validation of the proposed technology. This team member must be located in the United States and could include, but is not limited to:

- **Nuclear Reactor Vendors and Suppliers:** Companies involved in the design, construction, and operation of nuclear reactors.
- **Engineering, Procurement, and Construction (EPC) contractor:** Responsible for building and delivering a full nuclear power plant.
- **Operators of Nuclear Power Plants or other Fuel Cycle Facilities:** Entities managing existing nuclear facilities.
- **Federal Funding Research and Development Centers (FFRDCs):** Especially those with a focus on nuclear energy research and development, collaborating with nuclear reactor vendors.
- **Utilities with Nuclear Assets:** Investor-owned electric utilities or public power entities that operate nuclear power plants.
- **AI Companies specializing in Nuclear Applications:** Firms developing AI solutions for nuclear safety, efficiency, or advanced reactor control systems, partnered with a nuclear energy provider.
- **Regional Transmission Organizations/Independent System Operators (RTOs/ISOs):** Where the proposed technology directly impacts grid integration of nuclear energy.
- **Electric wire owning and/or operating entities:** If the demonstration involves grid-scale integration of nuclear energy solutions.

5 - Accelerating Delivery of Fusion Energy

Participating Offices: Office of Science-Fusion Energy Sciences (SC-FES); SC-Advanced Scientific Computing Research (SC-ASCR); Office of Nuclear Energy (NE)

Challenge: Realizing fusion energy on the grid requires coordinated progress across six tightly coupled challenge areas defined in the Fusion Science and Technology Roadmap.[6] Isolated, device-specific trial-and-error approaches cannot manage these interdependencies at the scale, complexity, or pace required to meet national energy objectives.

AI Solution: AI enables physics-constrained digital twins that integrate plasma, nuclear, materials, and system behavior within a unified predictive framework, allowing performance and engineering trade-offs, failure modes, and design margins to be evaluated consistently in simulation and experiment. An AI-Fusion Digital Convergence Platform (DCP) will integrate novel algorithms in HPC codes, foundation models for plasma and materials science, physics- and chemistry-informed neural networks, surrogate models, and digital twins for whole-facility modeling and real-time control across the six Roadmap challenge areas. The DCP will accelerate infrastructure development, shorten innovation cycles, and support a competitive U.S. fusion ecosystem. The DCP also advances foundational plasma science and technology.

Justification: DOE uniquely brings together fusion facilities, national laboratories, leadership-class computing, data stewardship, and public-private partnerships to build and operate a trusted, national-scale AI platform that integrates data, models, and experiments across

[6] The Fusion Science and Technology Roadmap is available at https://www.energy.gov/fusion-energy.

the fusion ecosystem. That platform will leverage large-scale domestic and international fusion facilities and fusion materials and technology infrastructure including high-heat-flux testbeds, tritium and blanket test stands and loops, irradiation facilities, and in situ and in operando materials characterization capabilities across both public and private sectors to meet Fusion Roadmap milestones.

National Impact: The DCP would accelerate delivery of fusion energy as a source of firm, scalable baseload power, strengthening U.S. energy security and competitiveness.

Focus Areas for FY26:

A. **Structural Materials (FES)**
Centralize material characterization datasets and train AI models to support the engineering, design, development, and qualification of materials that can withstand the high neutron flux, thermal loads, and environmental stresses of a fusion power plant.
(i) Multiscale, Multiphysics Modeling: Developing high-quality databases and models that can connect femtosecond, atomistic interpretations to lifetime-scale, bulk descriptions of materials.
(ii) Materials Qualification, Manufacturing, and Design: Development of high-quality databases and models that can discover novel materials and/or material architectures for the structural components of fusion pilot plants. Develop tools which can aid in the definition of relevant code cases to certify/license fusion reactor materials

B. **Plasma-Facing Materials (FES)**
The Plasma-Facing Materials area is interested in applications addressing the same challenges described in the Structural Materials focus area. Additionally, deploy digital twins of heat and plasma exposure facilities to support the characterization of physical and mechanical properties, manufacturing, and qualification of materials that directly interact with the plasma and face the most extreme temperatures, neutron fluxes, and stresses.
(i) Multiscale Modeling and Materials Qualification, Manufacturing, and Design: As described in the above section, but for plasma-facing materials instead.
(ii) Divertor design and optimization: Development of novel divertor concepts that maximize performance in fusion-relevant conditions, including burning plasmas.
(iii) Pedestal Prediction: Development of capabilities that predict the performance of the edge plasma region, built from a wealth of experimental data, simulations, and first-principles modeling.
(iv) Core-edge Integration (including wall components): Development of models that connect core heating performance with operation in the plasma edge that mitigates thermal loads, or employs novel surfaces (e.g., liquid metals), on plasma-facing components.

C. **Advancing Confinement Approaches (FES)**
Apply AI and machine learning within real-time plasma control systems and between successive experimental pulses to create, sustain, and optimize fusion-relevant plasma scenarios, including using autonomous methods, with the goal of achieving fusion-relevant confinement regimes and sustained energy output. For IFE, develop physics-informed AI

surrogates and HPC workflows for targets and drivers, and apply real-time operational feedback loops and inter-shot analysis frameworks.

(i) Plant/plasma State Optimization (Digital Twin): Development tools for control and prediction of turbulence and stability that operate concurrently with plasma discharges, forming bi-directional data flows. Development tools for driver-target coupling, plasma instabilities reduction, and fusion gain optimization.

(ii) High-Fidelity Plant Design: Development of models for the design, construction, and logistics of a Fusion Pilot Plant Facility.

(iii) Scenario Planning and Operations Co-pilot: Development of predictive tools that optimize plasma performance and facility configuration to support efficient facility operation.

D. **Fuel Cycle and Tritium Processing (FES, NE)**

Curate test loop data and develop AI models that track, forecast, and optimize tritium separation, storage, inventory, and accountancy across components and systems to enable fuel self-sufficiency and mature supporting technologies such as permeation barriers and detritiation systems. Tritium storage, processing, and permeation: Development of models of the nuclear effects associated with tritium handling. Advanced Component Manufacturing: Development of models for the design and engineering of tritium-related components.

(i) Regulatory Analysis: Development of models that navigate the regulation requirements for the handling of tritium.

E. **Tritium Breeding Blankets (FES, NE)**

Build a standardized database for thermophysical corrosion, tritium-related effects, and mechanical properties; and deploy multi-physics AI models to advance blanket concepts (e.g., solid, liquid, molten salt).

(i) Plasma-blanket interactions: Development of models that predict the effects of plasma transients on breeding blankets.

(ii) Tritium Breeding Optimization: Development of models that maximize the tritium breeding ratio for a Fusion Pilot Plant concept.

(iii) Neutronics: Development of models for neutron interactions with blankets and materials.

F. **Fusion Plant Engineering and System Integration (FES)**

Launch a centralized, standards-based data repository for experimental data and whole plant simulations, connecting AI, HPC, and digital twin capabilities to key fusion facilities in public and private sectors to advance balance-of-plant technologies such as power conversion and plant-wide control systems, as well as remote maintenance and robotics.

(i) Remote Maintenance: Development of digital tools that provide warnings for end-of-cycle components, flagging potential issues before breakdown.

(ii) Robotics: Development of automatons for maintenance of systems and assembly that may otherwise be impossible for human technicians.

(iii) Facility Construction: Development of models that plan the entire lifecycle of Fusion Pilot Plant construction before breaking ground.

G. **Plasma Science and Technology (FES)**
This area is interested in AI and machine learning techniques to enhance control, analyze large datasets, automate detection and prediction, and accelerate experimental throughput and discovery in plasma science and technology.

(i) Apply AI and ML methods to magnetic reconnection (multiple X-line kinetic reconnection) process which occurs in most of the space (solar and magnetospheric) and laboratory magnetic fusion plasmas. Automate detection, classification, and analysis of complex, transient plasma regions and structures in three dimensions such as plasmoids within large-scale simulation, laboratory, and observational data to identify magnetic reconnection events in real-time, improve efficiency, the understanding of the reconnection rate and how magnetic energy converts to particle energy, and the ability to predict future events.

(ii) Apply AI and ML methods to create autonomous, optimized industrial plasma-based systems that revolutionize applications across advanced manufacturing, healthcare, and agriculture. Efforts will develop a predictive, mechanistic understanding of complex physical processes such as plasma-mediated chemistry, plasma-surface interactions, plasma-assisted processes, and plasma-soft matter interactions. These AI-driven insights will be used to design and control novel plasma synthesis techniques with high precision and repeatability. The overall end goal is to drastically increase the industrial impact of these technologies, lower their complexity, and break down existing barriers to broader adoption.

(iii) Apply AI and ML at LaserNetUS facilities by enabling real-time optimization and autonomous control of complex laser systems to accelerate experimental throughput and discovery in areas of high-energy-density physics.

6 - Transforming Nuclear Restoration and Revitalization

Participating Offices: Office of Environmental Management (EM); SC-Advanced Scientific Computing Research (SC-ASCR)

Challenge: DOE's environmental cleanup mission faces an estimated $540 billion liability over eight decades with ~90 million gallons of highly radioactive tank waste requiring treatment and numerous assets requiring disposition that impedes site remediation and restoration crucial for revitalization of American energy, security, and innovation.

AI Solution: A multimodal AI foundation model will be trained on DOE EM's unparalleled 30+ years of operational data from unique nuclear processing facilities to predict scale-dependent behavior across lab, pilot, and full-scale systems. DOE/NNSA National laboratory experts will leverage Genesis Mission supercomputing capabilities and partner with industry experts for accelerated simulation architecture in development of the AI models. The goal is to use AI to enable mission acceleration to meet EM’s 2040 vision with significant liability reduction.

Justification: DOE EM's unique data assets from designing and operating large-scale facilities at complex sites (e.g., the Defense Waste Processing Facility and the Salt Waste Processing Facility at the Savannah River Site (SRS)), combined with the capabilities provided by the industry partners, will enable development of scale-bridging AI models that safely and efficiently address deployment challenges (e.g., the Waste Treatment and Immobilization Plant at the Hanford Site) no other institutions can leverage. The multimodal AI foundation model can significantly improve the efficiency and effectiveness of tank waste remediation efforts at Hanford, ultimately accelerating the path to site remediation and revitalization.

National Impact: This transformation will compress deployment timelines and accelerate nuclear remediation, thereby enabling renewed use of nuclear materials (for energy and medical applications) and infrastructure for American energy dominance.

Focus Areas for FY26:

This topic area represents a collaboration between EM and ASCR, and accordingly, all applications in response to the following focus areas should be responsive to the ASCR co-funding requirements noted in the Program Description section above the Challenges section.

A. **EM AI R&D Roadmap Implementation (EM-3.2, ASCR)**

INDUSTRY COST SHARE: Required (Up to 50 percent cost share with industry partners, including in kind, depending on specific scope of work the partner will perform)

Coordinate AI investments across EM sites by identifying and prioritizing needs, converting historical data into standardized formats, and evaluating multi-modal data assets for AI applications. The ability to clean, standardize, and prepare vast multi-modal data repositories – along with the intelligent retrieval, synthesis, and transfer of that information into functional knowledge and mathematical representations – is central to accelerating environmental management decision-making. Examples include environmental characterization, detailed process sampling, remediation, monitoring, and site/facility operations datasets. The data must be well documented allowing for harmonization across formats and time horizons to support advanced analytic applications and informed decision making across the EM's complex operations and interim needs at other DOE sites with similar challenges. In parallel, develop integrated knowledge management systems for training of the next-generation workforce.

B. **Scale-Bridging AI Foundation Model (EM-3.2, ASCR)**

INDUSTRY COST SHARE: Required (Up to 50 percent cost share with industry partners, including in kind, depending on specific scope of work the partner will perform)

Develop a multimodal AI model using EM operational data, accelerated simulation toolkits, and Genesis Mission supercomputing resources to predict scale-dependent behavior. This focus area will develop a multimodal AI foundation model designed to transform nuclear waste management by utilizing integrated data analytics and an accelerated simulation architecture to address the complex non-linearities of large-scale treatment processes. Powered by the Genesis Mission supercomputing resources and synthesized from over 30 years of unparalleled EM multi-modal data—including bench-scale experiments, engineering designs, and real-time instrumentation from SRS and Hanford—the platform will learn transferable representations to predict scale-

dependent behaviors across lab, pilot, and full-scale systems. This predictive framework will validate chemical flowsheets and optimize throughput to meet critical treatment milestones, effectively creating a closed-loop cycle that compresses decade-long deployment timelines. The multimodal AI foundation model can significantly improve the efficiency and effectiveness of tank waste remediation efforts at Hanford, ultimately accelerating the path to site remediation and revitalization.

C. **Treatment Process Optimization (EM-3.2, ASCR)**

INDUSTRY COST SHARE: Required (Up to 50 percent cost share with industry partners, including in kind, depending on specific scope of work the partner will perform)

Implement AI-driven optimization of waste treatment facility throughputs to achieve completion milestones at EM sites such as SRS and Hanford. This focus area aims at optimization and/or real-time operation of dynamic process controls (e.g., for tank waste treatment flowsheets, groundwater remedial systems, informing conditions for decontamination and decommissioning, and nuclear material separation or isotope recovery). Optimization and adaptive control of dynamic process systems – particularly when limited, sparse, and heterogeneous training data are available – are vital to ensuring safe, efficient, and resilient operations, especially for real-time decision-making or support. This includes the use of AI-driven surrogate models, reinforcement learning, and hybrid physics-data frameworks, and the development of digital twins that assimilate sensor data from specific sites for scenario testing, early warning, and optimizing remediation processes, waste disposition, and facility operations under uncertainty.

7 - Discovering Quantum Algorithms with AI

Participating Offices: Office of Science-Advanced Scientific Computing Research (SC-ASCR); SC-Basic Energy Sciences (SC-BES); SC-High Energy Physics (SC-HEP); SC-Nuclear Physics (SC-NP); SC-Fusion Energy Sciences (SC-FES)

Challenge: Discovering new quantum algorithms is an exceptionally difficult challenge due to the number of potential quantum operations and is highly counter-intuitive for human researchers to navigate. U.S. leadership in the emerging quantum computing revolution will require accelerating the design and development of quantum algorithms (including those that capitalize on the convergence of classical HPC, AI, and quantum computers) that demonstrate scientific utility and a provable quantum advantage.

AI Solution: Novel AI could discover new quantum algorithms by automating and optimizing their design and translating them into applications without requiring prior domain knowledge. Furthermore, AI-powered platforms can translate high-level problem descriptions in natural language into executable quantum circuits, making algorithm design more accessible to researchers from various fields. AI could help establish scientific workflows that leverage the interplay of classical and quantum resources, managing data flow and executing complex computations across platforms.

Justification: There is strong evidence that quantum computers and algorithms will offer solutions to computational problems with high impact to the scientific community, beyond

the limits of classical HPC and AI. DOE hosts the most complete suite of scientific computing capabilities and these advances in quantum capability will enable computations that are classically intractable.

National Impact: The discovery of new quantum algorithms will have broad applications to science domains, such as fusion sciences, high energy physics, nuclear physics, materials science, and chemistry, with proposed commercial applications for the acceleration of drug, material, and chemical discovery. This technological leap would not only bolster the Nation's economy and security but also provide tools to address some of the most challenging scientific and societal problems.

Focus Areas for FY26:

A. **Application-aware Error Correction (ASCR)**
Use AI to find efficient error correction for specific scientific applications and co-design algorithms and hardware to identify and correct the errors that significantly impact the final scientific result.

B. **Computational Tools for Fault Tolerant Quantum Computational Science (ASCR)**
Use AI and formal verification methods to develop novel, reduced complexity quantum algorithmic primitives and compilation tools that can be used to deliver scientific quantum advantage.

C. **Hybrid Quantum-Classical Optimization Algorithms (BES)**
Use agentic AI workflows in quantum chemistry and materials sciences beyond iterative parameter space searches for variational solvers across platforms, including distributed execution on application needs. Use AI driven surrogate models to accelerate quantum time evolution and many-body simulations by learning efficient representations.

D. **Quantum Algorithms for Nonlinear Plasma Physics (FES)**
Develop quantum algorithms suitable for nonlinear plasma physics problems and apply them to facilitate configuration development and optimization of fusion devices.

E. **Quantum Advantage for Nuclear and Hadronic Systems (NP, HEP)**
Use AI to determine the quantum computation advantage in nuclear and hadronic systems typically described through lattice quantum chromodynamics. Enable solutions using quantum algorithms that demand AI to tackle the challenges of chiral symmetry breaking, confinement, relativistic kinematics, and infinite degrees of freedom.

8 - Realizing Quantum Systems for Discovery

Participating Offices: Office of Science-Basic Energy Sciences (SC-BES); SC-High Energy Physics (SC-HEP); SC-Advanced Scientific Computing Research (SC-ASCR); SC-Nuclear Physics (SC-NP)

Challenge: Quantum systems for quantum computing, quantum sensing, and quantum communication are poised to revolutionize discovery science by enabling unprecedented capabilities in modeling, simulation, and measurement. The use of current quantum systems is severely limited by their fragility, scalability, and integration into existing infrastructure. The inherent challenge is the lack of understanding and control of the complex cause-and-effect relationships within a quantum system.

AI Solution: AI has shown its ability to process vast amounts of multimodal data, to recognize complex patterns and relationships, and to learn adaptively how to handle dynamic and unpredictable environments. This ability makes AI uniquely suited to help understand and control the delicate nature of complex quantum systems. In quantum computing, AI will assist in real-time noise mitigation, adaptive error detection and correction, and system optimization and design. In quantum sensing, AI will optimize quantum entanglement, increase sensitivity, and control multi-sensor quantum networks. In quantum communication, AI will dynamically optimize multi-node quantum network design and control. New AI approaches are needed for making real-time decisions under quantum uncertainty, learning control policies when observation is costly and destructive, predicting behavior from incomplete information, and adapting to drift in real-time.

Justification: DOE is home to five National Quantum Information Research Centers in the U.S. working on overcoming limitations in quantum computing, quantum sensing, and quantum communication. The existing ecosystem is ideally suited to develop AI solutions to enable full quantum control.

National Impact: The AI enabled understanding and control of complex quantum systems will accelerate the deployment of quantum technologies and accelerate their utilization for currently intractable challenges in scientific discovery and technology development.

Focus Areas for FY26:

A. **AI for Quantum Systems Design (BES)**

Develop and apply AI frameworks to uncover the underlying causal relationships that influence the performance of quantum systems to develop improved designs and refined processes for the synthesis and fabrication of these devices.

B. **AI for Control of Quantum System (HEP, NP)**

Implement AI-based methods in control systems to dramatically improve the real-time control of practical quantum systems, including automating and optimizing calibration, tuning, noise mitigation, error correction, and readout processes, providing accurate, practical, and scalable quantum control to a wide variety of potential users.

C. **AI for Quantum Imaging and Sensing (HEP, NP)**

Integrate AI into multi-qubit quantum sensing applications for extreme sensitivity in both the laboratory and field environments to enhance and optimize the design, fabrication, and operation of sensors based on the quantum properties of superconductors, semiconductors, atoms, or other physical substrates.

D. **AI for Quantum Computing and Networking (ASCR)**

Leverage AI to mitigate decoherence in qubits, develop and implement effective quantum error correction codes, control quantum processing units, and ensure the scalability of quantum processors and network systems.

9 - Recentering Microelectronics in America

Participating Offices: Office of Science-Basic Energy Sciences (SC-BES); SC-Advanced Scientific Computing Research (SC-ASCR); Office of Critical Minerals and Energy Innovation-Advanced Materials and Manufacturing Technologies (CMEI-AMMTO); SC-High Energy Physics (SC-HEP); SC-Fusion Energy Sciences (SC-FES)

Challenge: Microelectronics powers all aspects of our lives, including AI, but America faces intense global competition in critical microelectronics applications, including ultra-energy-efficient semiconductors for AI computing, power electronics, and communication networks. Microelectronics faces a tremendous scientific and technological challenge: designing and engineering the next generation of Beyond Moore microelectronic devices and platforms that push the boundaries of miniaturization, processing speed, power consumption, thermal management, and operations environment.

AI Solution: An AI-driven full-stack co-design ecosystem will enable faster innovation cycles, de-risk new ultra-efficient manufacturing processes and component designs, and accelerate materials and manufacturing R&D, thereby leapfrogging foreign semiconductor technology. Frontier AI coupled with heterogenous and multiscale data that is accessible via federated learning techniques will accelerate microelectronics research by revealing the critical relationships and tradeoffs between materials, devices, and workflows.

Justification: For decades, DOE has been at the leading edge of microelectronics research, both as a consumer and as an engine of scientific innovation with expertise in advanced materials, nanofabrication, and quantum-related technologies such as cryogenics, enabling many of the technological breakthroughs adopted by industry.

National Impact: Microelectronics continues to be at the heart of technological innovation, and every American will benefit from recentering leadership of the industry in the U.S. This effort will ensure sustained U.S. leadership in the global semiconductor landscape, enabling the rapid growth of domestic data centers, advancing beyond Moore's law for AI computing and national security applications, and securing other technological advantages—such as global leadership in 6G communication networks essential for economic prosperity and national security.

Focus Areas for FY26:

A. **Angstrom (sub-1-nm) Scale Microelectronics Manufacturing (AMMTO)**

PHASE II APPLICATIONS WILL NOT BE ACCEPTED IN THIS FOCUS AREA.

Accelerate lab-scale approaches for beyond-Moore and beyond-EUV and other Angstrom-scale fabrication for advanced node logic through AI-enabled nano and microfabrication. Of particular interest are approaches that enable greater design flexibility than current advanced node technology.

B. **Materials and Architectures for Non-von Neuman Computing Devices (BES)**

Leverage AI to accelerate research on emerging organic and inorganic material candidates, including 2D materials and materials exhibiting quantum effects or properties, to advance radically different computational paradigms and overcome bottlenecks in efficiency and performance.

C. **AI-Driven Architecture Design (ASCR)**

Develop and apply AI-based methodologies to model, prototype, integrate hardware and software development in the design of next-generation computing architectures, enabling optimization of complex hardware/software interactions, multi-scale systems modeling, and identification of highly efficient, application-specific computing architectures.

D. **3D non-volatile compute-in-memory technology (ASCR)**

Utilize AI-driven codesign to revolutionize research, development, and prototyping on emerging technologies and materials and enable back-end-of-line integration of 3D non-volatile memory for electronic, optoelectronic, or photonic computing applications.

E. **Physics-Based Circuit Design, Simulation, and Emulation (ASCR)**

Leverage AI to link material composition, geometry, and operating conditions to defect evolution and device performance, accelerating time consuming and computationally intense processes and enabling non-intuitive optimization and greater design flexibility for physics-based circuit design, simulation, and emulation, including electronic design automation (EDA).

F. **Microelectronics in Harsh Environments (HEP)**

Integrate AI into the design and validation of robust devices and facilitate the efficient operation of devices that process high data volumes in harsh environments where there is no possibility of replacement or service.

G. **Plasma-Enabled Microelectronics Manufacturing (FES)**

Leverage AI to revolutionize the design, control, and optimization of plasma-based processes for manufacturing advanced microelectronics that push the boundaries of feature size and geometry and accelerate the discovery and implementation of optimal and repeatable plasma synthesis conditions.

H. **Power Electronics and Communication Networks (ASCR)**

Deploy AI-driven design and manufacturing approaches for advanced (e.g., wide bandgap and ultra-wide bandgap) power electronics and advanced communication network (e.g. 6G and advanced wireless) technologies.

I. **Low-temperature Electronics for Sensors and Computation (ASCR, HEP)**

Low-temperature (mK up to 120K) electronics, including cryogenic CMOS and superconducting logic, promises efficient, high-speed, and low-cost computing to address Genesis Mission needs in edge computing and AI accelerators, but bottlenecks in design, density, scaling, fabrication, and integration have prevented practical realization of these benefits. Research applications may focus on EDA for superconducting digital logic, analog and digital superconducting electronics for sensors or for classical control of quantum computers, superconducting neuromorphic, AI, and control circuits, distributed superconducting computing architectures, or cryogenic CMOS.

J. **Transform Neuromorphic Computing Connectivity, Communication, and System Hardware Integration (ASCR)**

Significant connectivity and communication challenges exist in tackling practical integration of neuromorphic computing hardware at scale and with instrumentation for scientific computing. Multi-scale connectivity, relevant circuit motifs from connectome data and efficient encoding schemes should be leveraged and appropriately translated to neuromorphic circuits. Advances in this critical domain will enable the design of high-bandwidth and massively parallel connectivity across emerging neuromorphic processing units.

10 - Securing U.S. Leadership in Data Centers

Participating Offices: Office of Critical Minerals and Energy Innovation-Industrial Technologies Office (CMEI-ITO); Office of Electricity (OE); Office of Science-Advanced Scientific Computing Research (SC-ASCR)

Challenge: Winning the AI race will require accelerating the process of developing and deploying new data center technologies and energy management strategies to provide the extreme compute power for AI advancements, while ensuring secure, reliable, and affordable energy for consumers.

AI Solution: By leveraging AI, digital twins, and cyber-physical testbeds, we can rapidly de-risk advanced data center technologies and their grid integration, accelerating the time to deployment and supporting stakeholder needs including data center operators, equipment providers, communities, and utilities. AI can accelerate physics-based models to enable real-time digital twins, explore millions of deployment scenarios, and optimize under a unique constraint surface.

Justification: This project leverages DOE's capacity to convene data center and utility stakeholders, the DOE/NNSA National Laboratories' research expertise in both load flexibility and computing, and their unique cyber-physical testbed facilities. Specifically, the DOE already supports the Center of Expertise for Data Center Energy at Lawrence Berkeley National Lab, which can provide resources, including a variety of data sets on data center energy use, to aid this effort.

National Impact: By ensuring a robust capacity to develop cutting edge data center technologies and load management strategies, we will solidify U.S. intellectual and economic leadership in AI, driving prosperity and security while maintaining secure, reliable, and affordable energy for consumers.

Focus Areas for FY26 and 27

A. **Data Center Load Flexibility (ITO)**

PHASE II APPLICATIONS WILL NOT BE ACCEPTED IN THIS FOCUS AREA.

Develop and demonstrate AI models that can analyze, design, and orchestrate smart, grid-aware load flexibility techniques, such as software-level workload management, infrastructure-level cooling modulation, onsite generation or storage resource activation, or innovative power electronics technologies, to transform the operations of data centers by enabling them to be responsive to real-time grid conditions. Proposed approaches should have the ability to assess load flexibility interventions, both independently and in tandem, through scenario modeling, and to, ultimately, reduce data center peak demands, stabilize load fluctuations, mitigate harmonics, or demonstrate load shifting while maintaining reliable access to power for intensive compute applications. Approaches that are generalizable to other large loads are encouraged.

B. **Data Center Thermal Management (ITO)**

PHASE II APPLICATIONS WILL NOT BE ACCEPTED IN THIS FOCUS AREA.

Apply AI-based tools and approaches to advance the state-of-the-art in data center thermal management technologies at the chip-, rack-, and facility-level that reliably enable peak performance and efficient operation for current AI and computing chipsets and future higher-powered chipsets. The proposed approaches should demonstrate improvements in cooling efficiency in data centers and/or show promise of reductions in data center power and direct and indirect water use.

11 - Achieving AI-Driven Autonomous Laboratories

Participating Offices: Office of Science-Basic Energy Science (SC-BES); SC-Advanced Scientific Computing Research (SC-ASCR); SC-Fusion Energy Sciences (SC-FES)

Challenge: The pace of scientific discovery is fundamentally constrained by the traditional, human-driven experimental process and the availability of non-deterministic AI-driven control tools to implement complex experimental designs in combinatorially large design parameter spaces. These bottlenecks slow the cycle of hypothesis, experimentation, and discovery, leading to inefficient use of critical national assets and delaying scientific breakthroughs. Automating at least some parts of the scientific experimental scheme will both increase the volume of data produced for improved AI models and improve the repeatability of experiments.

AI Solution: Artificial intelligence will be integrated directly into the experimental workflow and data analysis, combining robotics, edge AI, real-time analysis and intelligent feedback, hypothesis generation, and data curation/sharing.

Justification: These AI-driven laboratories will allow scientists to explore complex phenomena at an unprecedented rate and scale and are critical to achieving the Genesis Mission goals. DOE's user facilities and long-standing National Laboratories have the infrastructure, capabilities, and expertise to serve as the nucleus for innovation with this type of high throughput discovery.

National Impact: Accelerating discovery through AI-driven laboratories will directly advance U.S. scientific leadership and economic competitiveness. This capability will speed up the development of novel materials and molecules for energy, next-generation computing, national security, and biotechnology. Like other challenges, it will also solidify the Nation's position at the forefront of AI and scientific innovation, create a new paradigm for 21st-century research, and train a future workforce fluent in the integration of AI, data science, and experimentation.

Focus Areas for FY26:

A. **Advanced Robotics for Dynamic Laboratory Environments (ASCR)**

Develop the foundational computational and algorithmic capabilities required for robotics and other embodied AI systems to navigate and perform tasks within these unstructured, complex settings, and tying them to high-performance computing systems and AI supercomputers. This involves creating novel AI and applied mathematics frameworks for real-time perception, path planning, and manipulation under uncertainty, creating digital twins to train AI, optimize designs, and, ultimately, reduce the cost of scientific discovery. Building upon recent advances in humanoid and other multi-purpose robotics systems, develop control algorithms that enable robots to safely interact with scientific instruments and manage experimental workflows for high-risk/low-throughput and repetitive tasks, improving time-to-result and reducing human intervention The goal is to establish a robust, cross-cutting software and algorithmic stack that can be broadly deployed across the DOE/NNSA laboratory complex, transforming research facilities into more adaptive and efficient discovery platforms with reusable capabilities that generalize across SC and DOE priority areas and DOE HPC platforms.

B. **AIOps - AI for Network Operations (ASCR)**

Tools and technologies are needed that enable the use of AI for research network operations (AIOps) to maintain reliability and resilience in autonomous laboratory settings while increasing capacity and capability to support AI-driven science. The Applicant is encouraged to include domain science expertise in the proposed team. The proposed solution must be demonstrated within the first project phase to scale for use in more than one of the science domains that SC Programs steward and can address one or more of the following: 1) AI-enabled curation of multi-modal network operations data, making these data ready for use in AIOps tailored to the priorities of high-performance research networks that support complex workflows and may engage multiple experimental and observational scientific user facilities as well as modeling and simulation data. The solution must include tagging of science project information to enable domain science-aware network operations. must enable correlation of data that describe the same research network event, even if derived from different data sources,

and must ensure appropriate protection of sensitive data. 2) AI-driven predictive analysis that anticipates the network requirements of multi-facility integrated science workflows to inform the workflow initial design and identify and implement real-time proactive network mitigations that ensure domain-science specific network performance requirements remain satisfied while the workflow executes. The solution must identify research network service interdependencies to characterize the wider effects of local network changes or component failures, and must detect, and conduct root-cause analysis of, anomalous network behavior encountered during workflow execution.

C. **AI-Accelerated Science: Correlation to Understanding (BES)**

The power of AI **could** be extended beyond automated data collection and processing, identification of correlations, and optimization of study variables to enable rapid, autonomous generation of scientific knowledge from integrated data. Key to transforming the pace of basic energy science **is the high priority goal** to demonstrate AI-enabled identification of phenomena or correlations in high-throughput data that are not **consistent with or otherwise predicted** by current scientific models and generation of a plausible new explanation as a testable hypothesis in a truly closed-loop process for advancing science. AI-assisted identification of scientific gaps and subsequent hypothesis generation would enable an optimization of the research direction and amplify the increased pace of scientific discovery possible from automation of laboratory tasks alone.

D. **AI-Enabled Diagnostics and Remote Handling (FES)**

Remote handling of irradiated wall material, maintenance of diagnostics, and replacement of tiles can be performed with AI-driven robots. Feedback control will be an integral part of maintaining a fusion power plant as edge AI can rapidly accelerate the data processing, stability analysis, and prediction of performance required to confine plasmas, minimize damage to the experiment, and deliver stable reactor conditions.

E. **Accelerate the design and prototyping of neuromorphic computing circuit primitives for robotic embodied physical artificial intelligence (ASCR)**

Revolutionizing neuromorphic computing requires understanding the computational components and principles, e.g., neurons, dendritic trees, and local plasticity, that underpin the brain's functionality and robustness for performing autonomous tasks. These biological primitives must be translated into functionally equivalent circuits that could be implemented, validated, and embodied within autonomous robotic computing systems that can learn and adapt to perform tasks. Novel neuromorphic circuits based on current and emerging technologies guided by neuroscience-inspired functionality need to be engineered to realize high-performing computational systems.

12 - Designing Materials with Predictable Functionality

Participating Offices: Office of Science-Basic Energy Science (BES); SC-Advanced Scientific Computing Research (SC-ASCR); SC-Fusion Energy Sciences (SC-FES); Office of

Critical Minerals and Energy Innovation-Advanced Materials and Manufacturing Technologies Office (CMEI-AMMTO); CMEI-Industrial Technologies Office (CMEI-ITO); CMEI-Alternative Fuels and Feedstocks Office (CMEI-AFFO)

Challenge: Accelerating materials innovation will enable rapid deployment of advanced energy and industrial technologies that are essential for American competitiveness, from structural materials to materials for energy storage to other functional materials for advanced technologies. The identification and commercialization of new materials with transformative properties that dramatically improve performance, energy efficiency, reliability, and resilience, however, is a time- and resource-intensive process due to the inherent complexity of materials science and the practical limitations of traditional simulations, synthesis, and characterization techniques that still require significant trial and error.

AI Solution: The convergence of current and emerging AI technology with the growing availability of large, curated datasets may be a tipping point for materials discovery, design, and qualification. The development of physics-aware AI frameworks that exploit the complementary strengths of foundation models, deep learning, computer vision, generative AI, and agentic AI will enable entirely new capabilities for materials design that iteratively couple prediction, synthesis, characterization, and analysis to yield closed-loop learning systems that are interpretable, trustworthy, and capable of bridging large scales in space and time. The ultimate goal of inverse design (designing materials for given property specifications) requires advanced experimental and simulation capabilities as well as AI reasoning and explainability.

Justification: DOE's suite of world leading and unique experimental and computational capabilities for materials research, including X-ray light sources, neutron scattering facilities (and their associated characterization equipment), nanoscale science research centers, materials databases, and exascale computers, is collectively the most comprehensive and performant in the world. These capabilities, along with the availability of very large materials data sets coupled with sustained investments in the development of AI-enabled physics-informed models, has positioned DOE to take a leadership role in implementing the materials by design vision.

National Impact: Tight integration of AI into the materials discovery-to-product workflow could significantly reduce time to market in manufacturing—from many years to decades down to months to a few years. This acceleration will dramatically reduce development timelines for critical technologies including batteries, energy systems, structural and functional materials, strengthening American technological leadership and enabling faster deployment of innovations that create jobs and strengthen economic and national security.

Focus Areas for FY26:

A. **Functional to Quantum Materials (BES)**

Develop physics-aware AI frameworks and foundation models necessary to orchestrate high-throughput computation, high-fidelity simulations, and automated synthesis and characterization to enable fundamental understanding of functional, quantum and emergent properties on the atomistic and electronic level to predict and realize specific physical properties that are currently inaccessible but required to advance

lossless power transmission, energy-efficient computing, advanced sensing, ultrafast switches, and quantum devices.

B. **Structural Materials (BES, FES, AMMTO)**

Develop interpretable AI models and agentic experimental workflows, grounded in advanced computational tools and scientific methods, to discover, understand, and manipulate the complex interactions governing materials behavior under stress and other extreme environments and to enable controlled design of mechanical behavior.

C. **Biomolecular Materials (BES)**

Establish AI frameworks that integrate atomic and molecular modeling across scales and bridge biological and chemical data to realize a "design to order" paradigm for new biological molecules and hierarchical structures suited to extreme environments.

D. **Plasma-Facing Materials (FES)**

Deploy AI-enabled digital twins of heat and plasma exposure facilities to support the characterization of physical and mechanical properties, manufacturing, and qualification of materials that directly interact with fusion energy plasmas and face some of the most extreme temperatures, neutron fluxes, and environmental stresses on Earth.

E. **Removed**

F. **AI-Enabled Materials Discovery, Development, and Qualification (AMMTO)**

PHASE II APPLICATIONS WILL NOT BE ACCEPTED IN THIS FOCUS AREA.

Deploy automated discovery platforms to accelerate identification and design of novel manufacturable energy materials across critical materials, high-temperature structural materials, semiconductor materials, and energy storage materials. Develop closed-loop autonomous systems that integrate hypothesis generation, experimental validation, and manufacturing process through AI-driven frameworks. Implement rapid prototyping and characterization paired with AI-enabled prediction to compress traditional multi-year qualification processes.

G. **Electrochemical Energy Conversion Catalyst Discovery and Scale up (AFFO)**

PHASE II APPLICATIONS WILL NOT BE ACCEPTED IN THIS FOCUS AREA.

This topic solicits projects using AI to accelerate the search for platinum group metal (PGM) free oxygen reduction catalysts for electrochemical energy conversion devices. The current state of the art materials require multi-step synthesis routes often based on the pyrolysis of metal organic framework materials typically followed by metal substitution(s) to yield atomically dispersed metal sites in carbon frameworks. These synthesis routes are intricate, time-consuming, and difficult to control -often yielding differing electrochemical performance despite 'identical' syntheses and making material performance prediction difficult prior to synthesis and testing and manufacturing/scale-up high-risk. This topic seeks applications focused on materials performance prediction and AI-guided materials synthesis to both improve repeatability for existing catalysts and to

develop new, higher performance PGM-free oxygen reduction catalysts. Applications are expected to be primarily lab led with IHE participation.

13 - Enhancing Particle Accelerators for Discovery

Participating Offices: Office of Science-High Energy Physics (SC-HEP); SC-Basic Energy Sciences (SC-BES); SC-Nuclear Physics (SC-NP); SC-Fusion Energy Sciences (SC-FES); SC-Advanced Scientific Computing Research (SC-ASCR)

Challenge: Modern particle accelerators are complex, requiring extensive human intervention that leads to high operating costs, operational variability, suboptimal experiment optimization, and inadequate data integration. Further, the physical limitations of existing accelerator technologies slow progress in pushing the limits of resolution in space, time, and energy. Transforming accelerator-based facilities into highly efficient, autonomous, and more productive capabilities requires a tight integration of AI with design and operation.

AI Solution: Predicting chaotic beam dynamics, in which small perturbations cascade into major problems, could push AI to develop new capabilities in multi-scale temporal reasoning, physics-constrained learning, and robust uncertainty quantification. AI-driven digital twins that simulate complete beam dynamics in real time could dramatically reduce tuning time. Collectively, facility-based AI will become adaptive and self-updating, significantly boosting performance, efficiency, and scientific output.

Justification: DOE stewards one of the largest suites of accelerator-based experimental facilities in the world, with extensive operational data and a large, highly skilled workforce. The optimization of the Nation's large-scale scientific infrastructure through AI-enabled design and the elimination of operational bottlenecks and cost inefficiencies will maximize the Nation's return on current and future infrastructure investments, revealing entirely new paradigms for scientific research through human-AI teaming and accelerating discovery.

National Impact: Accelerator-based facilities have been central to many of the most important discoveries of the 20th and 21st centuries. Integrating AI into accelerator design and optimization will increase the pace of future breakthroughs, enabling a deeper understanding of the universe, the development of new energy and computing technologies, and the creation of new techniques for the diagnosis and treatment of disease.

Focus Areas for FY26:

A. **AI-driven Accelerator Facilities (BES, HEP, NP)**

Enable and deploy AI systems that provide real-time operational advice, automate control functions, enhance beam stability, reduce beam tuning time, predict equipment failure, detect faults, and optimize performance for both large and small-scale accelerator facilities currently operating or under construction. Scope includes the development and deployment of high-fidelity AI-driven "digital twins" of these particle accelerators to enable a sophisticated simulation and design environment and AI systems that can mitigate cost and risk of accelerator facilities under construction.

B. **Integration of Digital Twins for Fusion Systems and Actuators (FES)**

Establish real-time control of nuclear fusion systems and facilities, leveraging the massive concurrency of experimental data and high-fidelity simulation results to monitor stability and provide feedback control for critical fusion technology for tokamaks, stellarators, and inertial fusion devices

14 - Unifying Physics from Quarks to the Cosmos

Participating Offices: Office of Science-High Energy Physics (SC-HEP); SC-Nuclear Physics (SC-NP); SC-Advanced Scientific Computing Research (SC-ASCR)

Challenge: The universe obeys only one set of rules, and scientists have hundreds of experiments targeting parts of that one set. Experiments range over distance scale (31 orders of magnitude), cost ($100k to >$1B), duration (fractions of a second to decades), and human investment (few to thousands). We need a way to integrate the disparate experimental results with theoretical knowledge to accelerate discovery.

AI Solution: High energy physics and nuclear physics form a unique foundation to build AI reasoning models at unprecedented scale. Developing AI that simultaneously learns from particle collisions, nuclear decays, and cosmological surveys will require breakthroughs in multi-modal learning and the ability to derive insights rather than merely recognize patterns. An AI that internalizes the Standard Model could accelerate analysis by orders of magnitude, identify anomalies pointing to new physics, and propose theoretical extensions consistent with all data - a leap from pattern matching to physics reasoning.

Justification: DOE uniquely possesses the confluence of world-class scientific talent, stewardship of cutting-edge facilities, unparalleled access to experimental data, and a critical national mission to effectively address this challenge. These facilities, alongside a broad portfolio of programs that explore the fundamental constituents and forces of the universe and delve into the nature of atomic nuclei, underscore DOE's singular ability to conduct large-scale, long-term, and high-impact scientific research.

National Impact: The acceleration of discovery, particularly in areas involving vast datasets from cutting-edge experiments, means we could reach breakthroughs much faster than previously possible, impacting our technological capabilities and quality of life in unforeseen ways. Questions such as “Why is there more matter than antimatter?” “What is the nature of dark matter?” and “How do protons generate mass and spin?” address the nature of reality, and answering questions through advanced AI could have profound shifts in our philosophical and scientific understanding of the cosmos and our place within it.

Focus Areas for FY 2026:

A. **Foundation Models of Particle Interactions and Cosmic Physics (HEP, NP):**

Develop and curate the essential data of nuclear and particle experimental efforts, critical to train foundation models of particle interactions and cosmology to accelerate new breakthroughs in our understanding of the universe. Data and models may include

the future Electron-Ion Collider, cosmic observations, underground and accelerator-based experiments as well as synthesizing different modalities of data from across multiple large-scale sky surveys to understand nuclear astrophysics, dark energy, dark matter, and the physics of the early Universe. Successful scope will seamlessly span experimental and theoretical inputs across the pinch points of analysis pipelines from detector-level through to final scientific artifacts, along with the output of advanced theoretical calculations. Discovery science potential will be maximized by addressing such technical challenges as sparse-data domains and real-time data acquisition of high-dimensional petabyte-scale datasets with associated scalability challenges and interpreting the experimental signals using theoretical knowledge.

B. AI Accelerated DUNE Science (HEP)

Develop AI methods that significantly speed up and enhance the DUNE science program, reducing the time needed for the collaboration to publish neutrino oscillation measurements, significantly improving the sensitivity to neutrinos from core-collapse supernova, and developing new flagship measurements that will enhance the DUNE science goals.

C. Expedited Discovery from High Complexity and Petabyte-Scale Datasets (HEP, NP)

Partner domain expertise with data science and industry to develop AI methods and techniques capable of drawing robust scientific insight from increasingly complex and/or petabyte-scale datasets. Enable deeper insights by directly connecting datasets with theoretical parameters for uncertainty-aware reasoning to leverage the high-dimensionality of particle physics datasets. Scope will address the critical slowdown problem in Lattice QCD, automate big-data analysis, achieve new levels of experimental precision and theoretical calculation, and significantly improve understanding of the universe and particle interactions. AI-assisted design to maximize experimental sensitivity to fundamental parameters of interest or that significantly reduces costs of proposed or current projects and can be implemented in the next three to five years, is also of interest.

15 - Predicting U.S. Water for Energy

Participating Offices: Office of Science-Biological and Environmental Research (SC-BER); SC-Advanced Scientific Computing Research (SC-ASCR); Critical Minerals and Energy Innovation – Integrated Energy Systems Office (CMEI - IESO)

Challenge: Water availability is essential for expanding production and utilization of energy, as well as the Nation's health and security. However, there are fundamental scientific gaps in our understanding of terrestrial and atmospheric systems that limit our ability to predict water resources, especially on the time scale of weeks to years.

AI Solution: AI capable of multi-scale temporal reasoning could tackle three inter-related grand challenges: cloud physics, surface and subsurface water flows, and the broader hydrologic cycle. AI could improve, accelerate, and couple exascale-class modeling systems through advances in model initialization, and develop surrogates trained on DOE's atmospheric

and terrestrial observations and laboratory data, at a fraction of the computational cost of existing models. AI-based model diagnostics for enhanced analysis could refine a model-observational system aligned with decision-making needs.

Justification: DOE is the only agency with AI expertise, advanced computing, and integrated modeling capabilities (e.g., the DOE Energy Exascale Earth System Model, or E3SM), and infrastructure for field research necessary to meet the challenge of providing accurate information on surface and ground-water availability on the time scales of weeks to years.

National Impact: Solutions to these longstanding science challenges will radically improve America's ability to anticipate water supply in the context of changing water availability, demands, energy technologies, and ambitions for energy expansion.

Focus Areas for FY 2026:

A. **Cloud Microphysics and Atmospheric Turbulence (BER, IESO)**

Develop and apply AI capabilities that integrate theory, field observations, and laboratory research to represent complex non-linear multi-scale interactions governing atmospheric microphysics and turbulence that are important to the formation, phase, and intensity of precipitation. This topic includes development of physics-constrained AI-enabled models that address current challenges in prediction of cloud and precipitation microphysical processes, precipitation-relevant atmospheric aerosol processes, atmospheric turbulence, and/or cloud dynamics; cutting-edge AI-enabled laboratory experiments in microphysics and turbulence; and application of novel AI-driven analysis techniques to extract undiscovered insight into microphysics, precipitation, and turbulence in existing atmospheric field data sets.

B. **Water and Energy (BER)**

The predictive understanding of surface and groundwater is crucial for ensuring sufficient water for energy production and for protecting energy infrastructure from floods. The core scientific objective is to use advanced AI techniques to create a coupled surface-groundwater model that improves hydrologic process understanding and informs prediction of water availability. Topics of interest include the creation of integrative models that utilize data of varying levels of complexity including multi-source observational data and high-resolution model outputs; the advancement of a hierarchy of models and multi-modeling capabilities ranging from process-based models to Foundation models; the development of transferable, hybrid modeling capabilities so that advances in one region can be translated to another; and robust model evaluation capabilities. The applications to this research area must incorporate use cases to develop and test a new integrative framework focused on regional energy needs and flood resilience.

C. **Weeks to Years Prediction (BER)**

Leverage the power of generative and explainable AI to accelerate, refine, and analyze the DOE Energy Exascale Earth System Model (E3SM) and complementary

data-driven and hybrid AI models to provide skillful regional predictions of water at the seasonal to multi-year time scales needed to inform energy system planning and operations. Topics of interest include development of AI-driven techniques for coupled model initialization, development of hybrid AI-physical models to improve process components of coupled models or nonlinear natural modes of variability and associated teleconnections that impact precipitation, coupling of E3SM and foundation models, and AI emulators and downscaling techniques to produce hyperlocal information for domestic energy providers.

16 - Scaling the Grid to Power the American Economy

Participating Offices: Office of Electricity (OE); Office of Critical Minerals and Energy Innovation (CMEI); Office of Science-Biological and Environmental Research (SC-BER); SC-Advanced Scientific Computing Research (SC-ASCR)

Challenge: The electric grid faces reliability challenges and infrastructure limitations as it struggles to accommodate dramatic increases in electricity demand from data centers, manufacturing, and electrification while maintaining affordable power for Americans.

AI Solution: AI, using deep and reinforcement learning techniques on newly integrated big data sources, will reduce uncertainty, improve insights, and speed processes in grid planning, interconnection, operations, and security. This effort aims to enable 20-100x faster decision-making and at least 10 percent improvement in electricity cost and reliability.

Justification: The utility sector has critical grid data but a low risk tolerance, limited ability to develop new technology, and regional focus. Technology suppliers have innovative solutions but may lack access to robust operational technology test environments to integrate and validate their systems. DOE can leverage integrated energy system expertise, computational facilities, testbed infrastructure, and strong partnerships with grid operators to bring these capabilities together and develop validated, deployable AI solutions for the grid**.**

National Impact: AI-enabled modernization will deliver more reliable power at lower cost to American homes and businesses while strengthening energy security through faster deployment of grid capabilities and improved resilience against threats.

Focus Areas for FY 2026:

A. **Grid Modeling and Analysis (OE, CMEI-IESO, SC-ASCR)**

INDUSTRY COST SHARE: 20 percent cost share for R&D activities/50 percent cost share for demonstration activities. Submissions must include a demonstration component of at least 20 percent of the effort.

Submissions under this focus area will leverage AI to improve modeling and analysis to yield more comprehensive and robust tools for grid planners to understand the impacts of different upgrades, interventions, or courses of action on grid behavior. Of particular interest are applications focusing on:

(i) Developing and demonstrating a foundational power system model with self-improvement capabilities to support AI-enabled applications for grid operations and infrastructure planning. A grid foundational model is a holistic, multi-modal AI representation of the entire electric power system, trained on vast and diverse datasets including grid topology, real-time operational data, market dynamics, environmental factors, and historical events. The model will learn, understand, and predict complex grid behaviors, continuously refine its performance, adapt to new challenges, and provide optimal insights and solutions for grid operations and long-term infrastructure planning.
(ii) Developing and demonstrating AI-driven model copilot tools—for example, agentic interfaces for rapid scenario analysis and system planning support to stage, execute, and interpret analysis in conventional power flow software tools.

Projects in this focus area should include rigorous statistical characterization of uncertainties to enable more robust, risk-aware, and reliable grid management, which is especially crucial with increasing stochasticity from dynamic loads.

ADDITIONAL PARTNERSHIP REQUIREMENTS: Submissions to this focus area must include an electricity sector team member (either as a prime or sub recipient) that can provide real data as part of the development, demonstration, and validation of the proposed technology. The team member must be located in the United States and could include, but is not limited to: rural electric cooperatives; utilities owned by a political subdivision of a state, such as a municipally owned electric utility; utilities owned by any agency, authority, corporation, or instrumentality of one or more political subdivisions of a state; investor-owned electric utilities; regional transmission operators/independent system operators; electric aggregators; or electric wire owning and/or operating entities.

B. Grid Operations Optimization (OE, CMEI-IESO, SC-ASCR)

INDUSTRY COST SHARE: 20 percent cost share for R&D activities/50 percent cost share for demonstration activities. Submissions must include a demonstration component of at least 20 percent of the effort.

Submissions in this focus area will use AI to fundamentally enhance the operational efficiency, stability, and responsiveness of the grid. The applications should develop and deploy AI-augmented measurement of grid dynamics, identify anomalies and vulnerabilities, and provide advanced data analytics, situational awareness, and decision support tools for operators, resulting in more optimized, reliable, and cost-effective grid operations. Projects in this area should leverage real-time physical grid data and OT network traffic to provide situational awareness of emerging grid conditions, with embedded AI-enabled logic making real-time, optimized recommendations for grid control, resource dispatch, and risk mitigation. These tools should implement transparency to allow operators to understand and validate these recommendations.

ADDITIONAL PARTNERSHIP REQUIREMENTS: Submissions to this focus area must include an electricity sector team member (either as a prime or sub recipient) that can provide real data as part of the development, demonstration, and validation of the

proposed technology. The team member must be located in the United States and could include, but is not limited to: rural electric cooperatives; utilities owned by a political subdivision of a state, such as a municipally owned electric utility; utilities owned by any agency, authority, corporation, or instrumentality of one or more political subdivisions of a state; investor-owned electric utilities; regional transmission operators/independent system operators; electric aggregators; or electric wire owning and/or operating entities.

C. Uncertainty Quantification (SC-BER, SC-ASCR, OE, CMEI-IESO)

Submissions to this focus area will investigate the sources of uncertainty in grid planning and operational models, including multi-sector inputs, and seek to understand how AI can expand or reduce those uncertainties. Examples include (a) external forcings on the power grid and feedback loops in multi-sector energy models and (b) the impact of differential privacy to protect data in federated learning models on outcome uncertainty.

17- Unleashing Subsurface Strategic Energy Assets

Participating Offices: Office of Hydrocarbons and Geothermal Energy (HGEO); Office of Science-Biological and Environmental Research (SC-BER); SC-Advanced Scientific Computing Research (SC-ASCR); SC-Basic Energy Sciences (SC-BES)

Challenge: Delivering cost-effective energy from the Earth's subsurface entails the use of heterogeneous reservoirs, dominated by fractures. Tools capable of predicting reservoir behavior and the interactions of complex biogeochemical, mechanical, and hydrologic processes are critical to the development of innovative, cost-effective extraction of subsurface energy sources, including unconventional oil and gas, geothermal, and coal bed methane.

AI Solution: Developing AI capable of reasoning under extreme uncertainty, integrating heterogeneous data types (i.e., seismic, geochemical, biological, hydrologic), and building predictive models of systems that cannot be directly observed has broad applicability to any domain requiring inference from indirect evidence. For subsurface science, AI that connects molecular-scale mechanisms to field-scale resource availability will transform the field from descriptive to predictive. DOE's vast biological, geochemical, geomechanical, and hydrologic data sets can be combined with high performance modeling capabilities, laboratory analytics, and a suite of AI technologies, including surrogate models, physics-informed machine learning, and digital twins to enhance engineering evaluation and control of the subsurface during characterization, drilling, stimulation, and production.

Justification: DOE's laboratory complex includes a vast array of data, modeling, and analytical capabilities (e.g., SMART multi-lab Initiative suite of tools and ML-based surrogate models; NETL's EDX Discover; LBNL's TOUGH simulation suite; Los Alamos National Laboratory's GeoDTi design tool; Lawrence Livermore National Laboratory's GEOS software; and PFLOTRAN and ATS models), that supports extensive research and operational activities in subsurface environments, and are uniquely positioned to apply AI to accelerate development of models that emulate microbial, mineral, and fluid interactions across molecular to field scales. Efforts will assemble, train, and analyze information from vast data libraries, experiments, and operational sensors, to produce subsurface transport models and digital twins to enhance

reservoir characterization, enable real-time reservoir simulation, and address uncertainty to increase hydrocarbon resource recovery and unlock geothermal resources.

National Impact: Understanding subsurface complexities and stored energy sources is key to securing the Nation's energy future and will reduce the costs of recovery for oil, gas, and heat, reduce costs of power to U.S. consumers, re-shore manufacturing, and enhance U.S. competitiveness.

Focus Areas for FY 2026:

A. **Chemical and Hydrologic Transport in Subsurface (BER)**

To improve understanding and prediction of subsurface processes, AI can be utilized to incorporate vast amounts of data, including molecular-scale interactions and field-scale resource availability, with mechanistic and process-based predictive models of hydrological, geochemical, ecological, and biological processes occurring from soil pores to the subsurface/deeper bedrock. Responsive applications will use AI to incorporate mechanistic and quantitative knowledge of molecular processes occurring in the subsurface/rhizosphere/soil pores. DOE's datasets, combined with modeling and AI technologies will be crucial to enable development of a hierarchy of models that incorporate microbial, mineral, and fluid interactions to enhance reservoir characterization and resource recovery.

B. **Evolution of Fractures in the Upper Crust (BES)**

Develop and use AI to advance geophysical understanding of subsurface processes that characterize fractures in the upper crust associated with enhanced geothermal systems and hydrocarbon recovery.

C. **Control of Subsurface Fractures (HGEO)**

Use multivariate and multiscale data, high-performance computing, and machine learning & AI to measure and evaluate the interaction of natural and induced fractures before, during and after stimulation. Assess methods to rapidly analyze data from geo-physical, mechanical, and chemical sensors with other field data and numerical models, generating rapid predictions to support real-time decisions that will improve the recovery factor and cost effectiveness of unconventional hydrocarbon and geothermal energy from existing and marginal resources. Supported by the Office of Oil and Gas and Office of Geothermal.

In addition to the Genesis Mission Science and Technology Challenges of National Importance provided above, applications addressing one of the focus areas in the following topics will be considered.

18 - HPC Code Curation, Translation, and Development for Accelerated Scientific Discoveries

Participating Offices: Office of Science-Advanced Scientific Computing Research (SC-ASCR), Office of Critical Minerals and Energy Innovation-Advanced Materials and Manufacturing Technologies (CMEI-AMMTO)

Challenge: Modern scientific advancements are heavily reliant on large-scale modeling, simulation, and analysis codes. The present development and porting of these complex applications are protracted and labor-intensive, often requiring years and extensive teams of computational scientists, applied mathematicians, and performance engineers. This inefficiency diverts critical expertise from scientific innovation and hinders rapid response to national needs. While commercial AI coding tools exist, they currently lack the trustworthiness, understanding of scientific principles, and ability to produce verified, reproducible, and uncertainty-quantified results necessary for robust scientific applications.

AI Solution: A transformative opportunity exists to leverage artificial intelligence to fundamentally alter the software development process for high-performance computing (HPC). By learning from decades of DOE codes, compiler traces, and performance data, AI systems can actively assist in generating, optimizing, and verifying scientific software. This AI-assisted development will accelerate discovery, enable rapid response to emerging national needs, and empower computational scientists to focus more fully on scientific inquiry rather than the intricacies of code development. This involves fundamental advancements in programming tools through innovations in multimodality, tool use, deeper reasoning and planning, memory, and external interaction. The ultimate goal is to establish an autonomous scientific code development platform that unifies reasoning-scale foundation models, neuro-symbolic agents, compiler/autotuning models, and workflow orchestration systems to generate, port, and optimize codes across diverse architectures. The proposed solution should be generalizable, provide a proof of concept, validation, and scalability.

Justification: The Department of Energy has an extensive repository of scientific codes, compiler traces, and performance data from its supercomputing facilities and research activities. This rich dataset, combined with the expertise within DOE/NNSA laboratories (e.g., in supercomputing systems, applied mathematics and algorithms, exascale applications, compilers and performance tools), provides a unique foundation for training AI systems. These systems will incorporate physics- and mathematics-informed foundation models to ensure numerical correctness and reproducibility. By integrating these resources, DOE is uniquely positioned to lead the development of AI that can transform the end-to-end process of developing and optimizing HPC codes, making it more efficient and robust. This will maximize the return on investment in leadership computing facilities and improve resilience to future hardware evolution.

National Impact: Accelerating the development and optimization of HPC scientific codes will drive breakthroughs across multi-scale physics, materials science, chemistry, fusion energy, and biology by significantly reducing the time lag from theoretical concepts to scalable simulations. This will enhance the nation's scientific competitiveness, enable faster solutions to

critical energy and national security challenges, and establish a new paradigm of "AI-generated computational science" widely applicable across disciplines.

Focus Areas for FY 2026:

A. **AI-Driven Code Porting and Optimization (ASCR)**

Develop and demonstrate AI systems capable of parsing existing DOE flagship application codes, identifying performance bottlenecks, and automatically generating optimized code for specific leadership-class computing facilities (LCFs), emphasizing GPU optimization and other heterogeneous and accelerated architectures.

B. **Automated Scientific Problem-to-Code Generation (ASCR)**

Integrate AI capabilities to translate high-level scientific problem descriptions into governing equations, select scalable numerical algorithms, and produce performant, documented code for new scientific problems.

C. **Neuro-Symbolic Agents for Code Development (ASCR)**

Advance the development of neuro-symbolic agents that combine neural network capabilities with symbolic reasoning to improve code generation, algorithm selection, and performance prediction, specifically for scientific and engineering codes.

D. **Performance Prediction and Feedback Loops (ASCR)**

Develop graph-based performance predictors and surrogate models that map code and intermediate representations with hardware features to predict performance and diagnose bottlenecks, incorporating continuous learning from performance feedback for iterative improvement.

E. **Trustworthy AI for Scientific Software (ASCR)**

Ensure the development of AI tools that provide numerical correctness guarantees, reproducibility, provenance tracking, interpretable performance diagnostics, and uncertainty quantification to guide risk-aware decision-making.

F. **Multi-Modal Data Integration for Code Intelligence (ASCR)**

Integrate diverse data types, including open DOE application codebases, historical compiler and intermediate representations, performance logs, hardware performance counters, solver library internals, and campaign-level data, to train comprehensive foundation models.

G. **Partnerships for HPC AI Advancement (ASCR, AMMTO)**

Partnerships should enhance HPC coding for manufacturing and materials engineering by doing some or all of the following:

1. Automating code generation (from mathematical problem formulation to direct coding), code optimization, software testing, automated test suites, and workflow orchestration.
2. Enhancing both parallel and portable code across heterogenous architectures and generalizable simulations and analysis.

3. Accelerating the development of high-fidelity models for digital twins, discovery, and predictive modeling.
4. Accelerating control system modeling to ensure prescriptive analytics
5. Converting existing well-tested codes to modern CUDA/HIP or other trustworthy AI for verification, validation, and uncertainty quantification
6. Reducing hallucinations in parallel code.
7. Providing an industry use case in manufacturing that shows a measurable boost in productivity, in problem formulation and in coding.
8. Fostering foundation model collaborations with industry partners, manufacturing end-users, and academic institutions.
9. Leveraging expertise in accelerators, compilers and AI research, in Ellora and Durban DOE ASCR projects and in Neuro-Symbolic Agents for Code Development for development of applied mathematics and industry platforms.

Applications are sought that detail how performance improvement and other claims are to be generalized, validated, and scaled.

19 – AI for Scientific Reasoning

Participating Offices: Advanced Scientific Computing Research (SC-ASCR)

Challenge: While large language models (LLMs) have demonstrated remarkable capabilities in processing and generating natural language, their performance on complex, multi-faceted tasks in complex scientific domains remains limited. Core scientific progress requires deep analytical and mathematical reasoning, hypothesis generation from complex datasets, and the design of novel experiments—all areas where current LLMs fall short of envisioned capabilities. They often lack the rigorous, verifiable, and multi-modal reasoning abilities necessary to move beyond summarizing existing knowledge to generating novel, testable scientific insights. Bridging this gap is essential for leveraging AI as a true partner in the scientific discovery process.

AI Solution: The opportunity lies in developing a new class of AI systems specifically architected for scientific reasoning. This involves creating powerful base LLMs that serve as a core component, capable of being integrated with other foundation models, such as those for chemical properties or the energy grid. These systems will innately understand core principles of mathematics and science and will be enhanced with the ability to use external tools, such as data analysis packages, simulation software, and symbolic mathematical frameworks. By building sophisticated AI agents that can autonomously formulate hypotheses, design experiments to test them, analyze the resulting data, and refine their understanding, we can create a powerful "closed loop" discovery engine. This represents a shift from AI as a passive information processor to an active participant in the scientific method.

Justification: The Department of Energy oversees a vast and intricate ecosystem of scientific data, from experimental facilities, large-scale simulations, and extensive research literature. This provides an unparalleled training ground for developing AI models that understand the language and logic of science. DOE's leadership in high-performance computing enables the training of the necessarily large and complex base models required for this task.

Furthermore, the multi-disciplinary expertise within the DOE/NNSA laboratories is critical for guiding the development of AI that can reason across different scientific domains, from physics and chemistry to biology and materials science, ensuring the models are grounded in fundamental principles.

National Impact: Creating AI systems capable of independent scientific reasoning would represent a monumental leap forward, fundamentally accelerating the pace of discovery. Such systems could uncover novel materials, design more efficient energy technologies, propose new avenues for research, and help solve long-standing theoretical problems. This would dramatically enhance U.S. scientific leadership and economic competitiveness. By automating aspects of the research lifecycle, it would empower scientists to focus on higher-level creative and strategic thinking, ushering in a new era of AI-accelerated science that could provide solutions to the nation's most pressing energy, environmental, and security challenges.

Focus Areas for FY 2026:

A. **Trustworthy Mathematical and Symbolic Reasoning (ASCR)**
Develop foundation models with provably enhanced capabilities for performing complex mathematical operations and symbolic manipulations, which are crucial for deriving and verifying scientific theories.

B. **Hypothesis Generation from Multi-Modal Data (ASCR)**
Build AI systems capable of synthesizing information from diverse sources—including scientific literature, experimental datasets, simulation outputs, and visual data—to identify gaps in current knowledge and formulate novel, testable hypotheses.

C. **Composable and Modular Foundation Models (ASCR)**
Focus on developing strong base LLMs designed for flexible integration with other specialized foundation models and/or tools (e.g., for genomics, materials science, or grid modeling) to enable complex, cross-domain reasoning.

20 – Cybersecurity for AI-driven Science Workflows

Participating Offices: Advanced Scientific Computing Research (SC-ASCR)

Challenge: The increasing integration of AI into critical scientific workflows—from experimental design and data acquisition to analysis and simulation—creates a new and complex attack surface. Scientific AI models and the high-performance computing (HPC) environments they run on are targets for adversarial attacks intended to steal intellectual property, disrupt research, or manipulate results to support deliberately false conclusions. Unlike traditional information technology (IT systems, the vulnerabilities in AI-driven science are not just in the code or network but are embedded in the data and the model's logic itself. Adversaries might attempt to inject poisoned data into training sets to silently corrupt a model's behavior, create backdoors, or degrade its accuracy. The “black box” nature of many advanced AI models may make it difficult to detect such manipulations, and the open, collaborative nature of many scientific computing environments might exacerbate these risks.

AI Solution: A new generation of cyber-risk reduction tools is required, which are both AI-aware and science domain-aware. These tools will go beyond conventional cybersecurity to secure the entire AI lifecycle. The opportunity includes developing AI systems that can continuously monitor, evaluate, and defend other AI models and their associated data workflows. This "AI for securing AI" approach will include technologies to certify the integrity of training and inference datasets, detect subtle data poisoning and model manipulation in real-time, and automatically generate defenses to strengthen AI models against known and novel adversarial attacks. By creating a framework for trusted AI, these solutions will ensure that scientific discoveries built on AI are reproducible, reliable, and secure. Applicants are encouraged to include domain science expertise within proposed teams.

Justification: The DOE/NNSA National Laboratories operate at the nexus of leadership-class computing, cutting-edge AI research, and scientific discovery for high-consequence areas. This unique position provides an unparalleled environment to pioneer and validate next-generation cybersecurity solutions. The vast scientific datasets, complex simulation workflows, and expertise in both AI and domain sciences within the DOE complex are essential resources for developing and testing these security tools. By building on established expertise in securing HPC systems and investing in research on AI vulnerabilities, the DOE can lead the development of robust, domain-aware defenses. Advancement in this area will help protect the integrity of DOE-mission science and establish a new standard for trustworthy AI in research nationwide.

National Impact: Securing AI-driven scientific workflows is critical for maintaining the nation's leadership in science and technology and protecting national security. Ensuring the integrity of AI-powered research in fields like materials science, grid modeling, fusion energy, and genomics will prevent costly and dangerous scientific conclusions based on compromised systems. The development of these advanced cybersecurity tools will not only safeguard billions of dollars in federal research investments but also create a foundation of trust that accelerates the adoption of AI across the U.S. research enterprise. This will bolster economic competitiveness, enable breakthroughs in critical challenges, and ensure that the nation's scientific endeavors are resilient against foreign adversaries.

Focus Areas for FY 2026:

A. **AI for Adversarial Robustness and Resilience (ASCR)**

Develop AI-powered tools that autonomously probe science-dedicated AI models for vulnerabilities. These tools should benchmark model resilience against a spectrum of adversarial attacks (e.g., evasion, poisoning, backdoor attacks) and generate methods to "harden" the models, optimizing the trade-off between robustness and scientific accuracy. Benchmarks, either existing or new, must be used to demonstrate effectiveness, as well as trade-offs between, for instance, improved adversarial robustness and AI model accuracy.

B. **Data Provenance and Integrity Verification (ASCR)**

Create and implement scalable frameworks for verifying the provenance of data used in AI workflows. This includes developing automated tools to detect malicious compromise, such as data poisoning or manipulation, in large-scale scientific datasets

used for both model training and inference. These tools must be efficient enough for use in high-throughput HPC environments.

C. **Real-Time Attack Detection and Mitigation for AI Models (ASCR)**

Design and demonstrate AI-based systems that monitor science-dedicated models during training or inference. These systems must be capable of detecting that a model is under attack and deploying real-time mitigation strategies to limit the impact and preserve the integrity of the scientific workflow. The tools or techniques must be capable of, but not limited to, detecting attacks with the adversarial intent to degrade accuracy of model results, insert a backdoor, or cause model results to support incorrect scientific conclusions.

21 - Artificial Intelligence in Fluid Flow for Energy Components and Technologies

Participating Offices: Advanced Scientific Computing Research (SC-ASCR), Critical Minerals and Energy Innovation – Integrated Energy Systems Office (CMEI-IESO), SC-BER, SC-FES

Challenge: The dynamic behavior of fluids (gases, liquids, plasmas, and multiphase mixtures) dictates the performance, safety, and longevity of many energy technologies. Examples are diverse, including extreme weather impacts on energy infrastructure, reacting flows for combustion, magnetically confined fusion plasmas, cooling of advanced reactors and datacenters, resin flows through composites, and fuel storage and transport. Achieving a secure and resilient energy future depends on understanding and optimizing fluid flow, but current modeling and design approaches struggle with the multi-scale, multi-physics nature of these fluid systems, leading to high development costs, suboptimal performance, and slower deployment of critical energy technologies.

AI Solution: Artificial Intelligence in Fluid Flow for Energy Components and Technologies (AFFECT) leverages sophisticated AI and machine learning techniques, including physics-informed neural networks and reinforcement learning, to analyze vast datasets from high-fidelity simulations (e.g., PDE-based computational fluid dynamics), in-situ and remote sensing observations, and flow experiments in the field and laboratory. This will enable the rapid discovery of governing equations and surrogate models for complex fluid phenomena, and optimized control strategies. The topic aims to accelerate the design cycle of energy technologies by 5-10x, reduce operational inefficiencies by 15-25 percent, and significantly enhance safety and reliability.

Justification: The Department of Energy (DOE) possesses unparalleled expertise in fluid dynamics modeling and simulation, the world's most capable supercomputers, and operates world-class experimental facilities. Facilities like the Atmospheric Radiation Measurement User Facility provide relevant long-term datasets, and testbeds like the Advanced Research on Integrated Energy Systems platform at the National Laboratory of the Rockies, and the National Solar Thermal Testing Facility at Sandia National Laboratory, provide at-scale integration and validation capabilities for energy systems. By combining DOE's deep domain expertise,

advanced computational resources, and access to integrated testbeds with industry partnerships, AFFECT can develop, validate, and deploy AI solutions to real-world energy challenges.

National Impact: AFFECT will lead to a more efficient, secure, and cost-effective energy infrastructure for the nation. It will enhance the performance and safety of the integrated energy system and accelerate energy innovation, enabling energy dominance and global competitiveness.

Focus Areas for FY 2026:

Additional Requirements:

Applications submitted to this focus area should:

- Describe the range of applicability of the proposed innovation across the energy system and strive to create models and solutions that have the widest possible applicability, with at least two identified energy use cases.
- Detail the data sources they will use to train and validate their proposed models, confirm that they or their partners have ready access (within 30 days) to the data, and discuss the metrics and procedures they will use to determine success.
- Demonstrate that they advance both CFD methods and applications beyond the current state of the art.

A. **Physics-Informed AI for Complex Flow Modeling (IESO, BER, ASCR, FES)**

Develops AI models that integrate fundamental physical laws and domain knowledge to accurately represent and predict complex fluid phenomena (e.g., wall-bounded turbulence, bluff-body flows, particle-fluid interactions, and atmospheric dynamics). Unlike purely data-driven models, which require vast amounts of data and may lack generalizability, physics-informed AI (e.g., PINNs, Physics-Informed Neural Networks) can learn from sparse or noisy data while adhering to known physical constraints. This improves model robustness, interpretability, and predictive capabilities across diverse operating conditions or spatial scales.

B. **AI-Driven Design and Control for Performance and Durability (IESO, ASCR)**

Develops AI methods, particularly generative AI and reinforcement learning, to remove the bottleneck of fluid flow modeling, rapidly explore vast design spaces, and identify optimal configurations and controls for energy components (e.g. advanced heat exchangers or turbine designs). These AI-driven tools will rapidly characterize fluid flow and component response within a virtual test bed, and in turn optimize the design and operation for key metrics like cost, efficiency, and fatigue, thereby accelerating the design process, enhancing component performance, and extending operational lifespans.

C. **Data-Driven Operational Intelligence and System Resilience (IESO)**

PHASE II APPLICATIONS WILL NOT BE ACCEPTED IN THIS FOCUS AREA.

Integrates AI-enabled fluid flow models with real-time sensor data of energy systems to enable improved state estimation, anomaly detection, predictive maintenance, and adaptive control. Through this integration we aim to enhance the resilience,

reliability, and economic performance of energy infrastructure by enabling faster, more informed decision-making and autonomous adaptation to changing fluid-driven conditions. This approach is central in building toward digital twins, virtual representations of the physical system, allowing for continuous monitoring, simulation, and analysis throughout its lifecycle with much reduced cost, risk, and expedited development timelines.

OTHER PROGRAMMATIC GUIDANCE

Annual Meetings

The selected awardees will be expected to attend up to two annual Genesis Mission meetings and participate in coordination activities with other projects. Applicants should anticipate a need for travel to effectively communicate with other researchers and request appropriate funding in their budgets.

Annual Progress Reports

The prime recipient/lead institution for Phase II projects is responsible for submitting an integrated annual progress report on behalf of the multi-institutional team.

Teaming Arrangements

Phase I: Small teams attack a particular challenge focus area or part of a focus area. All teams in Phase I must include institutions from at least two of the following categories: (1) DOE/NNSA National Laboratory[7], (2) Industry, and (3) IHE/Non-profit/Other.

Phase II: All teams in Phase II must include at least one institution from the following categories: (1) DOE/NNSA National Laboratory[8] and (2) Industry. Inclusion of lead or partner institutions from (3) IHE/Non-profit/Other are strongly encouraged but not required.

- FY26: Teams that believe they have already met the Phase I goals may apply directly for a Phase II award instead of a Phase I award.
- FY27: At the end of six months, Phase I teams will undergo a go/no go review. Phase I teams have the option to request up to a three-months extension to their go/no go review date to complete planned tasks, such as experiments. Only a small fraction of Phase I teams will be selected for Phase II awards. These larger team partnerships (approximately three to five times the level of effort of Phase I awards per year for three years) may include multiple Phase I teams, removal of Phase I team members, or additional external researchers. Phase I teams that are not selected will end after nine months.

[7] Office of Science Scientific User Facilities (https://science.osti.gov/User-Facilities) not located at a DOE/NNSA National Laboratory are included in this category.

[8] Office of Science Scientific User Facilities (https://science.osti.gov/User-Facilities) not located at a DOE/NNSA National Laboratory are included in this category.

All FY26 Phase I applications and FY26 Phase II LOIs and applications: Domain experts can find industrial partners through their networks, through existing relationships, or through the Consortium. Interested universities who are unfamiliar with the DOE lab enterprise can also use the Consortium to find potential partners. Partners, including industry, need not request nor provide funding, but must provide significant intellectual leadership. DOE funding for all industrial partners combined may be up to 20 percent of the total requested budget for specific project-relevant research efforts – specific focus areas might provide more guidance. All partner institutions must provide a Letter of Commitment as specified in Section IV.C.

Prohibition on anti-competitive behaviors: Teaming partnerships are required to foster open competition to enhance capabilities within the United States. It is impermissible for any team member, including DOE/NNSA National Laboratories or industry participants, to make their involvement in a response to this RFA conditional upon any agreement, understanding, or expectation that another team member will restrict its pursuit of or commitment to participating in other separate responses. DOE reserves the right to decline, without review, any applications submitted by parties found to be in violation of this prohibition.

Collaborative ApplicationsWhile the use of collaborative applications is very strongly discouraged, teams of multiple institutions may submit collaborative applications. Each submitted application in such a team must indicate that it is part of a collaborative project/group. Every partner institution must submit an application through its own sponsored research office. Each multi-institutional team can have only one lead institution. Each application within the multi-institutional team, including the narrative, starting with the title page, and all required appendices and attachments, must be identical with the following exceptions:

- Each application must contain a correct Standard Form (SF)-424 Research and Related (R&R) cover page for the submitting institution only.
- Each application must contain a unique budget corresponding to the expenditures for that application's submitting institution only.
- Each application must contain a unique budget justification corresponding to the expenditures for that application's submitting institution only.
- Each application must contain a Project/Performance Site Location(s) form for the submitting institution.
- Each application must include a list for the Identification of Merit Review Conflicts for the submitting institution's senior/key personnel.
- Each application must include a Research and Related Senior/Key Person Profile (Expanded) form with the biographical sketches and current and pending support from that institution's senior/key personnel. The applicant leading the multi-institutional team must include biographical sketches and current and pending support from each institution's senior/key personnel.
- Each application must include a Transparency of Foreign Connections disclosure as an appendix to the Project Narrative for only the submitting institution and any proposed subawards.

DOE's intent is to create from the various applications associated with a multi-institutional team one document for merit review that consists of the common, identical materials combined with a set of detailed budgets from the partner institutions. Each team member's

application must contain the same project title. Team members may use Grants.gov Workspace(s), webforms, and system-to-system services in any combination.

SUBAWARDS[9]

- Multi-institutional teams are very strongly encouraged to submit one application from a designated lead institution (i.e. the prime applicant) with all other team members proposed as subrecipients.

Note that the value of any such proposed subaward to DOE/NNSA National Laboratories[10], other Federal agencies, and another Federal agency's FFRDCs[11] may be removed from any such prime award: DOE may make separate awards to Federally affiliated institutions.

Joint Consideration

Applications submitted to this RFA will be considered for award by the DOE elements listed on the cover page. All elements will coordinate their award selections to avoid overlap and duplication. If an application is recommended for funding by SC, all administrative provisions of this RFA will apply. If an application is recommended for funding by an organization outside SC, applicants are cautioned to strictly follow that organization's instructions regarding the transfer of the application and potential award administration.

Open Science

DOE 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.

All entities submitting applications to this RFA must recognize the moral and legal obligations to comply with export controls and policies that limit the transfer of technologies with potential dual use. Applicants are reminded that international activities

[9] Subawards are made to subrecipients. Both terms are defined in 2 C.F.R. § 200.1 (https://www.ecfr.gov)

[10] The phrase "National Laboratories" is used broadly to encompass DOE/NNSA laboratories and sites capable of performing the work described in this RFA and capable of receiving funds through the DOE Field Work Proposal System.

[11] An authoritative list of all Federally Funded Research and Development Centers (FFRDCs) may be found at https://www.nsf.gov/statistics/ffrdclist/

must comply with nonproliferation, sanction, and other protocols described at https://www.trade.gov/export-solutions.

International activities related to special nuclear materials (SNM) are subject to additional requirements. Please see 10 C.F.R. § 810 (2025) for further information.

All work proposed under this RFA must be for research of which results may be published in scholarly literature. Do not submit applications containing restricted data or unclassified controlled nuclear information as defined in the Atomic Energy Act of 1954, as amended, 42 U.S.C. § 2011, et seq., 10 C.F.R. § 1017 (2024), 10 C.F.R. § 1045 (2024).

B. Program Goals, Objectives, and Priorities

The Office of Science's (SC) mission is to deliver scientific discoveries and major scientific tools to transform our understanding of nature and advance the energy, economic, and national security of the United States. SC is the Nation's largest Federal sponsor of basic research in the physical sciences and the lead Federal agency supporting fundamental scientific research for our Nation's energy future.

SC accomplishes its mission and advances national goals by supporting:

- The frontiers of science—exploring nature's mysteries from the study of fundamental subatomic particles, atoms, and molecules that are the building blocks of the materials of our universe and everything in it to the DNA, proteins, and cells that are the building blocks of life. Each of the programs in SC supports research probing the most fundamental disciplinary questions.
- The 21st Century tools of science—providing the nation's researchers with 28 state-of-the-art national scientific user facilities, the most advanced tools of modern science, propelling the U.S. to the forefront of science, technology development, and deployment through innovation.
- Science for energy and the environment—paving the knowledge foundation to spur discoveries and innovations for advancing the Department's mission in energy and environment. SC supports a wide range of funding modalities from single principal investigators to large team-based activities to engage in fundamental research on energy production, conversion, storage, transmission, and use, and on our understanding of the earth systems.

SC is an established leader of the U.S. scientific discovery and innovation enterprise. Over the decades, SC investments and accomplishments in basic research and enabling research capabilities have provided the foundations for new technologies, businesses, and industries, making significant contributions to our nation's economy, national security, and quality of life

The Office of Electricity (OE) leads the U.S. Department of Energy's R&D to strengthen and modernize our nation's power grid to maintain a reliable, affordable and secure electricity delivery infrastructure. To ensure every American home and business has reliable access to affordable energy, OE works closely with industry and other stakeholders to drive technological and operational advancements to sustain U.S. global leadership in energy. OE drives innovation to strengthen, improve, and transform our electricity delivery system to reliably power homes, businesses, and communities. OE leverages its expertise in cutting-edge research, system-level analyses, and partnerships with stakeholders to develop advanced systems and technologies that meet today's needs and are ready for tomorrow's challenges.

The Office of Environmental Management's (EM) mission is to complete the safe cleanup of the environmental legacy brought about from decades of nuclear weapons development and government-sponsored nuclear energy research. EM's priority is to ensure the safety and health of the public and EM's workforce while continuing to protect the environment. The EM program is responsible for the cleanup of millions of gallons of radioactive waste; the safe management and disposition of thousands of tons of spent nuclear fuel and nuclear material;

disposition of large volumes of transuranic waste and mixed low-level waste; remediation of huge quantities of contaminated soil and groundwater; and deactivation and decommissioning of thousands of excess facilities.

The Hydrocarbons and Geothermal Energy Office (HGEO) is unleashing the full potential of America's hydrocarbon and geothermal resources to provide affordable, reliable, and secure energy. Through applied innovation and U.S. energy leadership, HGEO develops and advances breakthrough technologies that lower costs and power American prosperity, freedom, and human flourishing. By leveraging America's hydrocarbon and geothermal resources, HGEO works to enhance reliable baseload power, strengthen grid reliability, and improve long-term energy security for communities nationwide.

The Office of Nuclear Energy's (NE) mission is to advance nuclear energy science and technology to meet U.S. energy, environmental, and economic needs. NE has identified four goals to address challenges in the nuclear energy sector, help realize the potential of advanced technology, and leverage the unique role of the government in spurring innovation:

1. Enable continued operation of existing U.S. nuclear reactors.
2. Enable deployment of advanced nuclear reactors.
3. Develop advanced nuclear fuel cycles.
4. Maintain U.S. leadership in nuclear energy technology.

The U.S. Department of Energy's Office of Critical Minerals & Energy Innovation (CMEI) is advancing America's critical minerals supply chains and accelerating next-generation energy technologies to strengthen our nation's energy security and power our future. CMEI's mission is to enable a long-overdue return to dominance for America's mineral, mining, and extractive industries, to lead the world in the sciences and industries that underpin our national security and economic prosperity, to drive growth, efficiency, and innovation to new heights, to responsibly steward the resources entrusted to us by the American taxpayer, and to develop the systems and standards that directly support American industry.

C. Award Contribution to Goals and Objectives

Awards resulting from this RFA are intended to speed up science and transform energy through the use of AI.

D. Performance Goals

Phase I awards will be expected to show progress towards demonstrating AI advantage in your selected focus area through a go/no go evaluation at six months. Phase II awards will be expected to demonstrate progress towards AI advantage in your selected focus area(s) through periodic progress reports, meetings, and to-be-determined project milestones which may include a midterm review.

E. Program Unallowable Costs

Applications will be informed of cost principles and standards that comply with 2 C.F.R. § 930.210 after selection.

F. Citations to Statute and Regulations

The programmatic authorizing statutes and governing regulations are:
U.S. Department of Energy Organization Act, codified as amended at 42 U.S.C. § 7256 (2020).
Act of Jul. 4, 2025, Pub. L. No. 119-21, § 50404, 139 Stat. 72 (2025).
Energy Independence and Security Act of 2007, Pub. L. No. 110-140, as amended, §§ 618, 1340A, codified at 42 U.S.C. §§ 17197, 17384a (2020).
Energy Policy Act of 2005, Pub. L. No. 109-58, §§ 901, 911, 965, 119 Stat. 594 (2005).
National Quantum Initiative Act, Pub. L. No. 115-368, § 401, 132 Stat. 5100, 5105 (2018).
CHIPS and Science Act of 2022, Pub. L. No. 117-167, § 10731, 136 Stat. 1366 (2022).
U.S. Department of Energy Other Transaction Agreements Rule, codified at 2 C.F.R. § 930 (2025).
The following provisions or the principles reflected in these provisions may apply such as when incorporated into the award instrument or as a starting point for negotiations for an Other Transaction Authority Agreement:
Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards, codified at 2 C.F.R. § 200 (2024).
U.S. Department of Energy Financial Assistance Regulations, codified at 2 C.F.R. § 910 (2022).
U.S. Department of Energy, Office of Science Financial Assistance Program Rule, codified at 10 C.F.R. § 605 (2014).

G. Program History

You can learn about SC's history at https://science.osti.gov/About/History. You can read about our achievements at https://science.osti.gov/Science-Features/Science-Highlights. You can find information about all of our awards at https://pamspublic.science.energy.gov/WebPAMSExternal/interface/awards/AwardSearchExternal.aspx.

You can learn about OE's history at https://www.energy.gov/oe/our-history.

EM's history can be found at https://www.energy.gov/em/about-office-environmental-management.

Please learn more about NE at Office of Nuclear Energy | Department of Energy.

HGEO is a new office, created in the latest DOE reorganization, which brings together the former Fossil Energy Office with the Geothermal Technologies Office. You can learn more about HGEO's history at: https://www.energy.gov/hgeo/our-history

CMEI is a new office, also created in the latest DOE reorganization, please learn more about CMEI at Office of Critical Minerals & Energy Innovation.

H. Other Information

Anticipated Award Size

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

Period of Performance

DOE anticipates making Phase I awards with a project period of approximately nine months and Phase II awards with a project period of three years.

Award Budget Periods

Applicants for Phase I awards should prepare budgets with a single period that starts on July 1, 2026, and ends on March 31, 2027.

Applicants for Phase II awards should use 12-month budget periods. When preparing the budget request, assume a start date of September 1, 2026.

IV. Application Contents and Format

A. Preliminary Submissions

1. Letter of Intent (LOI)

PHASE I AWARDS:

Not applicable for Phase I awards.

PHASE II AWARDS:

A LOI is strongly encouraged and should be submitted by the date indicated on the cover of this RFA for FY26 Phase II awards. If the LOI is not submitted by the deadline, DOE may hold any subsequent Phase II application until FY27. DOE may send a response before the Phase II application deadline.

Program Manager to select when submitting a LOI: Dawn Adin
All questions about this RFA must be submitted to GenesisMissionNOFO@science.doe.gov.

Only the prime applicant / lead applicant should submit an LOI.

The LOI is to help in planning the review and the selection process for FY26 applications.

The LOI must begin with a title page that will not count toward the LOI page limitation. Include, at the top of the first page, the following information:

The project title:
Principal Investigator (PI) Name, Job Title
Lead Institution
PI Phone Number, PI Email Address
RFA Number: Include the RFA number printed on the cover of this RFA
Application Stage: Phase II
Anticipated Total Annual Budget ($Million):
The primary challenge and focus area as identified in Section III of this RFA: [For example, 1-A Reenvisioning Advanced Manufacturing and Industrial Productivity | Agentic AI-Driven Chemical Manufacturing]
[Optional]: One or more secondary challenge and focus areas identified in Section III of this RFA: [For example, 1-D: Reenvisioning Advanced Manufacturing and Industrial Productivity | Digitalization of Industrial Processes]

Include a list of all senior/key personnel at the applicant and team member institutions, whether or not the institution is proposed to receive DOE funds under the award.

Senior/Key Personnel for Prime Applicant/Lead Institution and All Partner Institutions	
Institution Name	**Senior/Key Personnel including the Director**
Institution 1 (Lead)	PI A; PI B; PI C; …
Institution 2	
Institution #	

The senior/key personnel, partner institutions, and focus area(s) will be compiled across all applications. For purposes of uniformity, an Excel template (Genesis Mission Phase II LOI Template) is provided through Grants.gov ("Related Documents" tab on the RFA page) and should be included as an "Additional Attachment" to your letter of intent in PAMS.

The material listed here defines the required content of a title page. Additional material is not allowed.

The title page must be followed by a clear and concise description of the objectives and technical approach of the proposed research. This description must include at least the following elements:

- A statement of the goal of the proposed project;
- A statement addressing how the project aligns with the primary and, if applicable, with the secondary focus areas and leads to an AI advantage;
- A description of the research methods and approaches;
- An explanation of how the proposed project distinguishes itself from other ongoing efforts;
- An assessment of the potential impact of the proposed research and the need for an integrated, multi-disciplinary research team.

The description of the proposed research may not exceed **three pages**, when printed using standard letter-size (8.5-inch x 11-inch) paper with one-inch margins (top, bottom, left, and right). The body text font must not be smaller than 11 point. Figures and references, if included, must fit within the page limit.

In addition, the LOI must include a listing of senior/key personnel and a listing of individuals who should not serve as merit reviewers of a subsequent application due to an actual or perceived conflict of interest. Detailed instructions for how to craft the required listings are provided in Section IX of this RFA. **Note that the listing of individuals who should not serve as merit reviewers is rarely empty because the instructions contain mandatory inclusions requirements.** This listing will not count toward the LOI's page limit. The list of individuals must be included as an "Additional Attachment" to your LOI in PAMS. For your convenience, a Collaborator Template is available at https://science.osti.gov/grants/Policy-and-Guidance/Agreement-Forms.

The LOI may include a list of suggested reviewers (including email address and organizational affiliation) who are well qualified to review the application. DOE is under no obligation to consider any suggested reviewers. If provided, this list should be on a separate

page titled, “List of Suggested Reviewers” and will not count towards the LOI page limit.

The LOI must be machine-readable. Do not submit a scanned image of a printed document.

LOI SUBMISSION

LOIs are created in the software system of your choice and must be submitted electronically through the DOE SC Portfolio Analysis and Management System (PAMS) website https://pamspublic.science.energy.gov/. You cannot draft or edit a LOI in PAMS. Do not submit a LOI through FedConnect or Grants.gov.

LOIs may be submitted by a PI or by other users at the PI’s institution with the “Submit to DOE” privilege in PAMS.

Applicants are strongly encouraged to inform GenesisMissionNOFO@science.doe.gov if teaming arrangements, proposed personnel, topics, or the anticipated title change between submitting the LOI and when an application is submitted, to ensure that the application is properly linked to their LOI and that reviewers are properly assigned to the application.

Detailed instructions about how to submit an LOI are in Section IX of this RFA.

B. Application

The instructions below apply to Phase I and Phase II applications. Applications in response to this RFA must be submitted through Grants.gov. Detailed instructions for registering in and using Grants.gov are in Section IX of this RFA.

C. Component Pieces of the Application

LETTERS OF COMMITMENT

Letters of commitment from each institution participating as a subrecipient/team member **must** be appended to your Project Narrative and are not considered part of the Project Narrative’s page limit. Each institutional letter of commitment is limited to one page and must be current, signed, and dated by a person authorized to commit the participating institution to a legally binding agreement for this project. Please ensure that letters of commitment only describe the nature of the institution’s involvement. Letters of recommendation are not allowed in applications under this RFA. Letters of commitment should be placed in Appendix 7 (Other Attachments).

LETTERS OF COLLABORATION OR ACCESS

Letters from collaborators or from institutions providing access to data, models, software, equipment and/or facilities may be appended to your Project Narrative and are not considered part of the Project Narrative’s page limit. Please ensure that letters from collaborators or from institutions providing access to data, models, software, equipment and/or facilities only describe

the nature of the collaboration or the access to data, models, software, equipment and/or facilities. Letters of recommendation are not allowed in applications under this RFA.

All letters may be addressed "To Whom It May Concern:."

Letters of collaboration or access should be placed in Appendix 7 (Other Attachments). Letters of collaboration or access must not be written as recommendation or endorsement letters, which are not allowed. Each letter of collaboration or access may contain two and only two sentences and must use the following format:

Dear <Principal Investigator Name>:

If your application entitled, "<Application Name>," is selected for funding under the RFA Name, it is my intent to collaborate in this research by <Complete Sentence With a Very Short Description of What the Collaborator Offers to Do or Provide>.

Thank you for the opportunity to participate.

Sincerely,

<Collaborator's Name and Signature Block>

SCIENTIFIC USER FACILITIES

Documentation from any SC scientific user facility (https://science.osti.gov/User-Facilities) may be provided with other letters of collaboration or access in Appendix 7.

If the proposed research includes activities at the DIII-D National Fusion Facility, a U.S. DOE Office of Science user facility, then a Record of Discussion from the facility must be included in the submission. The Record of Discussion documents potential resources required by the facility to support the proposed research scope. Information on the Record of Discussion process at DIII-D is available at https://d3dfusion.org/become-a-user/ under the "Records of Discussion" header. A Record of Discussion form is available for download from that site.

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[12]. Applicants are bound by their representations and certifications in SAM.gov.

TYPE OF SUBMISSION (FIELD 1)

[12] No separate form or submission is required for the Certifications and Assurances.

Select the checkbox for "Application" for an initial submission. Select the checkbox for "Changed/Corrected Application" if submitting an updated version of an application. Do not submit pre-applications via Grants.gov: Do not select the checkbox for "Pre-application."

IDENTIFYING NUMBERS (FIELD 4)

For renewals and supplemental funding, enter the DOE award number in Field 4a. Do not enter any other number in Field 4a. Do not enter anything in Field 4b. If submitting an updated version of an application, you may enter the previous Grants.gov Tracking ID in Field 4c, though this is not required.

UEI AND EIN NUMBERS (FIELDS 5 AND 6)

The Uniform Entity Identifier (UEI) 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 the UEI as a 12-digit alpha-numerical sequence.
- Enter the EIN as a nine-digit number.
- Do not use hyphens or dashes.
- DOE does not use the 12-digit EIN format required by some other agencies.
- Applications will not be rejected if an applicant's system-to-system service uses a 12-digit EIN format or inserts hyphens or dashes in an EIN.

TYPE OF APPLICATION (FIELD 8)

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

DOE does not make use of the Resubmission or Continuation options.

Applications for supplemental support of an existing award should be marked as "Revision."

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.

DOE will accept new, renewal, and supplemental applications under this RFA.

2. Research and Related Other Project Information for Phase I Applications

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, impacts to endangered species or historic properties, etc.).

For actions that could have 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, based on requirements and guidance in 10 C.F.R. § 1021.102 and DOE's NEPA Implementing Procedures, to find that a proposal is covered by a categorical exclusion (CX), DOE will determine: (1) the proposal fits within one or more classes of actions for which CXs are permissible, (2) there are no extraordinary circumstances related to the proposal that may affect the significance of the environmental effects of the proposal (DOE or an applicant may modify the proposal to avoid reasonably foreseeable adverse significant effects such that the CX would apply), and (3) the proposal has not been segmented to meet the definition of a CX.

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. The project summary/abstract must be comprised of:

- The project title, application stage (Phase I), the PI name and the PI's institutional affiliation, and any coinvestigators and their institutional affiliations. This information will not count toward the abstract's one-page limit.

- This information must be followed by a statement of the project's vision for the science and applied energy initiatives that will be pursed and a description of how and why AI will enhance the associated scientific and technical workflows.
- The description of the proposed research may not exceed one page (excluding Project Title and list of investigators) when printed using standard letter-size (8.5-inch x 11-inch) paper with one-inch margins (top, bottom, left, and right). The body text font must not be smaller than 11 point. Figures and references, if included, must fit within the one-page limit.

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.osti.gov/about/.

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

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

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

- The project title:
- Prime/Lead Applicant/Institution:
- Street Address: Include the street, city, state, and ZIP code.
- Postal Address: If different then the street address, provide the postal address.
- Lead PI name, telephone number, email:
- Administrative Point of Contact name, telephone number, email:
- RFA Number: Include the RFA number printed on the cover of this RFA
- Application Stage: Phase I
- The primary challenge and focus area as identified in Section III of this RFA: [For example, 1-A Reenvisioning Advanced Manufacturing and Industrial Productivity | Agentic AI-Driven Chemical Manufacturing]

Senior/Key Personnel for Prime Applicant/Lead Institution and All Partner Institutions	
Institution Name	**Senior/Key Personnel including the Director**
Institution 1 (Lead)	PI A; PI B; PI C; …
Institution 2	
Institution #	

Summary budget information for prime applicant/lead institution and all partner institutions	
Institution	**Year 1 Budget $**
Institution (lead)	
Institution #2	
Institution …	
Total	

* Include all partner institutions, including the prime applicant/lead institution, whether or not the institution is proposed to receive DOE funds under the award. Include in whole dollars ($) the budget request in each year for each institution and totals for all columns.

For the prime applicant/lead institution only: The senior/key personnel, partner institutions, budget, computational resource estimate, and focus area will be compiled across all applications. For purposes of uniformity, an Excel template, Genesis Mission Phase I Application Template, is provided through Grants.gov ("Related Documents" tab on the RFA page) and should be used in preparing this information. Attach this excel file to Field 12 of the Research and Related Other Project Information Form.

The material listed here defines the required content of a title page. Additional material is not allowed.

Important Instructions to the Sponsored Research Office of Submitting Institutions: DOE requires that you create one single machine-readable PDF file that contains the DOE Title Page, Project Narrative, all required appendices, and other attachments. This single PDF file may not be scanned from a printed document and must be attached in Field 8 on the Grants.gov form. This must be a plain PDF file 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. The Project Narrative will be read by DOE staff using the full version of Adobe Acrobat: Please ensure that the narrative is readable in Acrobat. If combining multiple files into one Project Narrative, ensure that a PDF portfolio or binder is not created. If creating PDF files using any software other than Adobe Acrobat, please use a "Print to PDF" or equivalent process to ensure that all content is visible in the Project Narrative. Once a Project Narrative has been assembled, please submit the combined Project Narrative file through a "Print to PDF" or equivalent process to ensure that all content is visible in one PDF file that can be viewed in Adobe Acrobat. Do not attach any of the appendices 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.

* Note that collaborating applications must be submitted separately.

PROJECT NARRATIVE (FIELD 8 ON THE FORM)

The Project Narrative **must not exceed a page limit of five pages** of technical information, including charts, graphs, maps, photographs, and other pictorial presentations, when

printed using standard letter-size (8.5-inch x 11-inch) paper with one-inch margins (top, bottom, left, and right). The body text font of all main text 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 Title Page, Budget Page(s), Budget Justification, biographical material, publications and references, appendices, and an optional table of content, each of which may have its own page limit defined later in this RFA.

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

The Project Narrative must clearly articulate a vision for the science and/or applied energy initiatives that will be pursued and a description of how and why AI will enhance the scientific and technical workflows. It must clearly address the chosen focus area and explain how it advances or solves the corresponding challenge. In Phase I, the focus is demonstrating which elements are needed to achieve an AI advantage.

For all Phase I applications:

- Applications should clearly specify the aspects of realistic scientific or engineering workflows that can be accelerated or improved by the proposed AI capabilities, and moreover, why creating such new AI capabilities is particularly promising compared to other potential solutions.
- Applications should describe the full pipeline of data generation and curation; experiments and observation, AI model training, fine tuning, and inferencing; and integration, using agentic techniques or otherwise, into a capability of use for science or engineering.
- Where some or all of the data to be used is sensitive or proprietary, the application should describe how the data preparation process and/or the AI training process will appropriately protect sensitive aspects of the data while maximizing the value of the resulting AI capability.

Applicants are encouraged to build upon general-purpose capabilities, especially those produced by the Genesis Mission teams, building domain-specific capabilities deployable in a plug-and-play fashion.

The following organization of the Project Narrative is strongly encouraged:

- **Background/Introduction** (approximately one page): Explain the importance and relevance of the proposed work and clearly articulate which aspect of the chosen challenge will be addressed and solved. Set the proposed research in perspective to other efforts in the field. Highlight novel or unique aspects of the proposed work. Cite relevant literature.

- **Project Objectives** (approximately 0.5 page): Provide a clear and concise statement of the specific objectives of the proposed project. Address how the objectives align with the chosen focus topic and lead to an AI advantage.
- **Proposed Research and Methods** (approximately 1.5 pages): Provide a clear research plan for a nine-month project and describe the proposed activities and methods. Include enough technical details to evaluate the impact of the proposed activity. For each activity, indicate the responsibility of the key investigator(s) and the associated budget. If the proposed application is building on an existing, currently funded DOE project, describe how the submitted application leverages that work and is distinct from the existing funding.
- **Milestones in the Nine Months** (approximately one page): Provide a list of clearly defined and measurable milestones of the project.
- **Data Sources and Models** (approximately 0.5 page): Describe which existing or new data sources will be used. Address your team's access to the data. If applicable, indicate which AI models or frameworks will be used in your proposed project. Do not include a description of computing resources and the means by which you will secure an allocation timed to your performance period; this should be done in Appendix 2.
- **Decision Gate Metrics** (approximately 0.5 page): Provide specific metrics that can be used for the evaluation of Phase I go/no go decision. DOE encourages the development of metrics to identify AI advantage. One such metric could include scaling behavior which shows increasing performance as additional data, computing, and/or other resources are applied. Quantitative statements enabling transformative science and engineering through AI are preferred.

Buy America Preference for Infrastructure Projects

Awards funded through this RFA that are for, or contain, construction, alteration, maintenance, or repair of public infrastructure in the United States undertaken by applicable recipient types, require that:

- All iron, steel, and manufactured products used in the infrastructure project are produced in the United States; and
- All construction materials used in the infrastructure project are manufactured in the United States.

Applicants should consult 2 C.F.R. § 184 and Section IX of this RFA to determine whether the Buy America Preference applies and if they should consider the application of the Buy America Preference in the proposed project's budget and/or schedule.

Within the first two (2) pages of the Project Narrative, include a short statement on whether the project will involve the construction, alteration, maintenance and/or repair of public infrastructure in the United States. See Section IX of this RFA for applicable definitions and other information regarding Infrastructure Projects and the Buy America Preference.

The Project Narrative is considered the intellectual work of the proposed researchers. Concurrent submission of the same or substantially similar narratives attributed to different

researchers may constitute academic dishonesty or research misconduct. Submission of a Project Narrative that is not the work of the proposed researchers, including machine-generated Project Narratives, may constitute academic dishonesty or research misconduct.

DOE will apply a "fair use" concept regarding the use of generative artificial intelligence to support investigators' efforts in presenting their intellectual work in an application. Guided by the principles expressed by others (https://www.acm.org/publications/policies/frequently-asked-questions and https://journals.ieeeauthorcenter.ieee.org/become-an-ieee-journal-author/publishing-ethics/guidelines-and-policies/submission-and-peer-review-policies/#ai-generated-text), applicants must disclose the use of any artificial intelligence tools in applications, unless the tools were used solely for editing an original draft.

> **For Collaborative Applications Only**: Note, applicants are very strongly encouraged to submit a single application with subrecipient(s) under a lead institution. However, if a collaborative application is submitted, the following instructions must be followed. Each institution that is part of a multi-institutional team submitting collaborative applications must submit an identical common narrative, including all appendices. The common narrative must identify which tasks and activities will be performed by which of the institutions in the budget period of the proposed project. The budget and the budget justification—which are unique to each institution—may refer to parts of the common narrative to further identify each institution's activities in the joint project. There should be no ambiguity about each institution's role and participation in the team.

DOE will use the multiple applications associated with a multi-institutional team to create one consolidated document for merit review that consists of the common, identical application materials, a set of detailed budgets from the partner institutions, and the senior/key personnel form (with attached biographical sketches and current and pending support statements). It is very important that every Project Narrative in the team be identical (including the title).

Unfunded partner institutions should not submit a collaborative application. However, the prime applicant/lead institution should include the following information in their application on behalf of any unfunded institution(s): biographical sketches and current and pending support for any senior/key personnel and details of any cost share agreements in the lead institution's budget justification.

Do not attach any of the requested appendices described below as files for Fields 9, 10, 11, and 12 on the SF-424 Research and Related Other Project Information form in Grants.gov. Follow the instructions below to include the information as appendices in the single Project Narrative file.

> Biographical sketches and current and pending support may no longer be provided as attachments to a Project Narrative. These documents must be attached to the Research and Related Senior/Key Person Profile (Expanded) form in an application.

APPENDIX 1: 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.

- This appendix will not count in the Project Narrative page limitation.
- Do not attach a bibliography to Field 9 of the Research and Related Other Project Information form.

APPENDIX 2: FACILITIES & OTHER RESOURCES

This information is used to assess the capability of the organizational resources, including subrecipient resources, available to perform the effort proposed. Identify the resources and/or 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 the computing, networking, and data resources required to conduct the proposed work; while DOE does not intend to imply that these computing requirements will be satisfied, DOE foresees that computing resources may be available from the DOE/NNSA National Laboratories and/or private-sector Genesis Mission partners in support of applications under this call. Describe current computing allocations that will be used to support the proposed work, or the intent to apply for computing allocations. Computational resource estimates should also be provided in the Genesis Mission Phase I Application Template excel file attached to Field 12. Describe other necessary 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. Such documents, provided that they do not become letters of support or recommendation, may be printed on any letterhead. Please provide the Facility and Other Resource information as an appendix to your Project Narrative.

- This appendix should be no more than **one page** when printed using standard letter-size (8.5-inch x 11-inch) paper with one-inch margins (top, bottom, left, and right).
- This appendix will not count in the Project Narrative page limitation.
- Do not attach a facilities and other resources statement to Field 10 of the Research and Related Other Project Information form.

APPENDIX 3: EQUIPMENT

List major items of equipment planned for use in this project and, if appropriate, identify location and pertinent capabilities. Provide the Equipment information as an appendix to your Project Narrative.

- This appendix should be no more than **half a page** when printed using standard letter-size (8.5-inch x 11-inch) paper with one-inch margins (top, bottom, left, and right).
- This appendix will not count toward the Project Narrative page limitation.
- Do not attach an equipment statement to Field 11 of the Research and Related Other Project Information form.

APPENDIX 4: DATA MANAGEMENT AND SHARING PLAN

A Data Management and Sharing Plan (DMSP) is NOT required as an appendix to the project narrative but it will be required during award negotiation. Information about DMSPs is below. Subject to the applicable cost principles, applications may request costs necessary for implementing the DMSP.

The standard requirements for a DMSP may be found in Section IX of this RFA. In addition, the DMSP should specifically address:

- How FAIR (Findable, Accessible, Interoperable, and Reusable)[13] principles will apply to the anticipated data sets, software[14], and models[15] to be developed.
- What developed software, data sets, and models will be made available using an "opensource" licensing arrangement, noting the Software Package Data Exchange (SPDX) identifier(s) (https://spdx.org/licenses/) when possible, and where deviation in this arrangement is expected from The Open Source Initiative's "Open Source Definition" (https://opensource.org/osd), a specific justification must be provided.
- How best practices in scientific software development will be applied to any development activities. For more information on best practices, see Better Scientific Software (https://bssw.io/).

APPENDIX 5: SYNERGISTIC ACTIVITIES (OPTIONAL)

In addition to biographical sketches in the Common Format, each senior/key person has the option to provide a one-page list of no more than five distinct examples of synergistic

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[13] Wilkinson, M. D. et al. The FAIR Guiding Principles for Scientific Data Management and Stewardship. Sci. Data 3:160018, 2016. https://doi.org/10.1038/sdata.2016.18

[14] Chue Hong, N. P., Katz, D. S., Barker, M., Lamprecht, A-L, Martinez, C., Psomopoulos, F. E., Harrow, J., Castro, L. J., Gruenpeter, M., Martinez, P. A., Honeyman, T., et al. (2022). FAIR Principles for Research Software version 1.0. (FAIR4RS Principles v1.0). Research Data Alliance. DOI: https://doi.org/10.15497/RDA00068

[15] Ravi, N., Chaturvedi, P., Huerta, E.A. et al. FAIR principles for AI models with a practical application for accelerated high energy diffraction microscopy. Sci Data 9, 657 (2022). https://doi.org/10.1038/s41597-022-01712-9

activities that demonstrate the individual's professional and scholarly activities that focus on the integration, transfer, and creation of knowledge as related to the application.

- Do not attach a separate file to Field 12 of the Research and Related Other Project Information form.
- This appendix may not exceed a limit of the same number of pages as senior/key personnel when printed using standard letter-size (8.5-inch x 11-inch) paper with one-inch margins (top, bottom, left, and right). This appendix will not count in the Project Narrative page limitation.

APPENDIX 6: TRANSPARENCY OF FOREIGN CONNECTIONS

You must provide a Transparency of Foreign Connections disclosure and certification as it relates to the proposed recipient and subrecipients. Include a separate disclosure for the applicant and each proposed subrecipient.

Disclosure Format

For the convenience of the entity providing the disclosure and certification, a template is available at Transparency of Foreign Connections; however, you are not required to use this format. If you use another format, the signatory must include the same substantive information, a signature, the date, and the certification statement provided at Transparency of Foreign Connections.

Disclosure exceptions by entity type

- U.S. national laboratories and domestic government entities are not required to provide the Transparency of Foreign Connections disclosure
- Institutions of higher education are only required to respond to items with an asterisk (*)
- The disclosure requirements are determined by the entity type. Even if the applicant is exempt, the subrecipients must provide these disclosures unless the subrecipient is also exempt

Applicants, regardless of entity type, must provide complete responses for project team members that are not U.S. national laboratories, domestic government entities, or institutions of higher education.

Questions: Contact rtesinfo@hq.doe.gov

DOE reserves the right to request additional or clarifying information based on the information submitted.

APPENDIX 7: OTHER ATTACHMENT

As an appendix to your Project Narrative, include the required letters of commitment and any optional letters of collaboration or access. In this appendix, you may also include any needed elaboration to your responses to questions 1-6 on the "Other Project Information" document or information not easily accessible to a reviewer. However, do not use this appendix to circumvent the page limitations of the application.

- Do not attach a separate file to Field 12 of the Research and Related Other Project Information form.
- This appendix will not count in the Project Narrative page limitation.

REMINDERS REGARDING ALL APPENDICES

- 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 appendices to Fields 9, 10, 11, or 12.

3. Research and Related Other Project Information for Phase II Applications

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, impacts to endangered species or historic properties, etc.).

For actions that could have 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, based on requirements and guidance in 10 C.F.R. § 1021.102 and DOE's NEPA Implementing Procedures, to find that a proposal is covered by a categorical exclusion (CX), DOE will determine: (1) the proposal fits within one or more classes of actions for which CXs are permissible, (2) there are no extraordinary circumstances related to the proposal that may affect the significance of the environmental effects of the proposal (DOE or an applicant may modify the proposal to avoid reasonably foreseeable adverse significant effects such that the CX would apply), and (3) the proposal has not been segmented to meet the definition of a CX.

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. The project summary/abstract must be comprised of:

- The project title, application stage (Phase II), the PI name and the PI's institutional affiliation, and any coinvestigators and their institutional affiliations. This information will not count toward the abstract's one-page limit.
- This information must be followed by a statement of the project's vision for the science and applied energy initiatives that will be pursed and a description of how and why AI will enhance the associated scientific and technical workflows.
- The description of the proposed research may not exceed one page (excluding Project Title and list of investigators) when printed using standard letter-size (8.5-inch x 11-inch) paper with one-inch margins (top, bottom, left, and right). The body text font must not be smaller than 11 point. Figures and references, if included, must fit within the one-page limit.

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.osti.gov/about/.

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

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

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

- The project title:
- Lead Applicant/Institution:
- Street Address: Include the street, city, state, and ZIP code.
- Postal Address: If different then the street address, provide the postal address.
- Lead PI name, telephone number, email:
- Administrative Point of Contact name, telephone number, email:
- RFA Number: Include the RFA number printed on the cover of this RFA
- Application Stage: Phase II
- The primary challenge and focus area as identified in Section III of this RFA: [For example, 1-A Reenvisioning Advanced Manufacturing and Industrial Productivity | Agentic AI-Driven Chemical Manufacturing]

Senior/Key Personnel for Prime Applicant/Lead Institution and All Partner Institutions	
Institution Name	**Senior/Key Personnel including the Director**
Institution 1 (Lead)	PI A; PI B; PI C; …
Institution 2	
Institution #	

Summary budget information for prime applicant/lead institution and all partner institutions				
Institution	**Year 1 ($)**	**Year 2 ($)**	**Year 3 ($)**	**Total ($)**
Institution 1 (Lead)				$ -
Institution 2				$ -
Institution #				$ -
Total	**$ -**	**$ -**	**$ -**	**$ -**

* Include all partner institutions, including the prime applicant/lead institution, whether or not the institution is proposed to receive DOE funds under the award. Include in whole dollars ($) the budget request in each year for each institution and totals for all columns.

For the prime applicant/lead institution only: The senior/key personnel, partner institutions, budget, computational resource estimate, and focus area will be compiled across all applications. For purposes of uniformity, an Excel template, Genesis Mission Phase II Application Template, is provided through Grants.gov ("Related Documents" tab on the RFA page) and should be used in preparing this information. Attach this excel file to Field 12 of the Research and Related Other Project Information Form.

The material listed here defines the required content of a title page. Additional material is not allowed.

Important Instructions to the Sponsored Research Office of Submitting Institutions: DOE requires that you create one single machine-readable PDF file that contains the DOE Title Page, Project Narrative, all required appendices, and other attachments. This single PDF file may not be scanned from a printed document and must be attached in Field 8 on the Grants.gov form. This must be a plain PDF file 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. The Project Narrative will be read by DOE staff using the full version of Adobe Acrobat: Please ensure that the narrative is readable in Acrobat. If combining multiple files into one Project Narrative, ensure that a PDF portfolio or binder is not created. If creating PDF files using any software other than Adobe Acrobat, please use a "Print to PDF" or equivalent process to ensure that all content is visible in the Project Narrative. Once a Project Narrative has been assembled, please submit the combined Project Narrative file through a "Print to PDF" or equivalent process to ensure that all content is visible in one PDF file that can be viewed in Adobe Acrobat. Do not attach any of the

appendices 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.

* Note that collaborating applications must be submitted separately.

PROJECT NARRATIVE (FIELD 8 ON THE FORM)

The Project Narrative must clearly articulate a vision for the science and/or applied energy initiatives that will be pursued and a description of how and why AI will enhance the scientific and technical workflows. It must clearly address the chosen primary and secondary focus areas and explain how it advances or solves the corresponding challenge. While the goal in Phase I is the demonstration of elements (e.g., models, data, experiments, simulations, …) needed to achieve an AI advantage, Phase II applications must describe the elements and present preliminary results indicating AI advantage.

For all Phase II applications:

- Applications should clearly specify the aspects of realistic scientific or engineering workflows and provide preliminary results to demonstrate acceleration or improvement by the proposed AI capabilities, and moreover, why creating such new AI capabilities is particularly promising compared to other potential solutions.
- Applications should describe the full pipeline of data generation and curation; experiments and observation, AI model training, fine tuning, and inferencing; and integration, using agentic techniques or otherwise, into a capability of use for science or engineering.
- Where some or all of the data to be used is sensitive or proprietary, the application should describe how the data preparation process and/or the AI training process will appropriately protect sensitive aspects of the data while maximizing the value of the resulting AI capability.
- FOR APPLIED TECHNOLOGY APPLICATIONS: Applicants should describe the transition from proof-of-concept demonstrations to applied energy-relevant deployment environments, including validation under operational constraints, performance benchmarking, cost characterization, and readiness for sustained programmatic adoption.

Applicants are encouraged to build upon general-purpose capabilities, especially those produced by the Genesis Mission teams, building domain-specific capabilities deployable in a plug-and-play fashion.

In addition, the narrative must describe what will be delivered in each year in Phase II. It must include a budget breakdown and resources for the core set of activities for each year. Metrics with measurable milestones must be included for each year of the project to assess the progress of the project. The metrics should focus on the acceleration of science and engineering through the use of AI.

The following organization of the Project Narrative is strongly encouraged. If not specified, the instructions apply to both fundamental research and applied technology applications.

- **Background/Introduction:** (2 pages) Explain the importance and relevance of the proposed work and clearly articulate which aspect of the chosen challenge will be addressed and solved. Set the proposed research in perspective to other efforts in the field. Highlight novel or unique aspects of the proposed work. Cite relevant literature.
- **Project Objectives:** (2 pages) Provide a clear and concise statement of the specific objectives of the proposed project. Address how the objectives align with the chosen primary and, if applicable, secondary focus areas and lead to an AI advantage.
- **Proposed Research and Methods**: (5 pages) Provide a clear research plan for a 36-month project and describe the proposed activities and methods. Include enough technical details to evaluate the impact of the proposed activity. Address how your team will adapt quickly to changing technical challenges, scientific advances, and changes in enabling technologies. For each activity, indicate the responsibility of the key investigator(s) and the associated budget. If the proposed application is building on an existing, currently funded project, describe how the submitted application leverages that work and is distinct from the existing funding.
- **Preliminary Results:** (4 pages) Provide preliminary results focusing on demonstrating the AI advantage for proposed elements of the project, to include quantitative measures to the extent possible. Clearly indicate the provenance of the preliminary results and how these results will help to achieve the project objectives.
- **Timeline and Milestones**: (1 page) Include a timeline for all major activities including yearly milestones and deliverables. Provide a list of clearly defined and measurable yearly milestones of the project.
- **Data Sources, Models, Scaling, and Generalization**: (2 pages) Describe which existing or new data sources will be used. Address your team's access to the data. If applicable, indicate which AI models or frameworks will be used in your proposed project. Do not include a description of computing resources and the means by which you will secure an allocation timed to your performance period; this should be done in Appendix 2. Plans for managing and sharing data should be addressed in Appendix 4. Describe the plan to extend AI-enabled methods to multiple data, operational environments, or use cases.
  FOR APPLIED TECHNOLOGY APPLICATIONS: Quantify improvements relative to baseline engineering or operational workflows, as well as describe how the demonstration will be generalized beyond initial project conditions.
- **Performance Metrics**: (4 page) Provide specific metrics to assess the progress of the project or how the project establishes standardized benchmarks and evaluation criteria. DOE encourages the development of metrics to identify AI advantage--One such metric could include scaling behavior which shows increasing performance as additional data, computing, and/or other resources are applied. Provide statistically defensible performance comparisons to non-AI baselines while also describing how to characterize uncertainty, robustness of the workflow, and reproducibility. Quantitative statements, including AI model explainability and traceability are preferred.
  FOR APPLIED TECHNOLOGY APPLICATIONS: Describe formal benchmarking and evaluation protocols pertaining to data, model validation, or specific to an application Identify and document failure modes and degraded performance states and demonstrate mitigation strategies for sensor noise or system disruptions (which could include adversarial inputs). Quantify computational efficiency improvements such as runtime,

throughput, hardware utilization, etc.) and identify scalability limits and cost inflection points.

- **Management Plan:** (2 pages) Provide a clear, substantive overview of the management and organization of the proposed project. Describe a strategy and plan for establishing and maintaining an integrated team and for ensuring that the stated milestones are met. Define an organizational structure that clearly delineates the roles and responsibilities of senior/key personnel and describes the means of providing oversight and guidance for the research project. Include an organizational diagram. Define mechanisms by which the project leadership will periodically evaluate the success/failure of the various components of the project, and by which project components will be reconfigured and resources redistributed, including the possibility of ending activities and starting new ones, in response to key scientific or technological challenges, promising developments, or lack of progress. Describe mechanisms for information and data sharing and for workforce development across different team partners.
  FOR APPLIED TECHNOLOGY APPLICATIONS: When applicable, plans should describe how data can be reused across multiple DOE Applied Energy Offices.

Buy America Preference for Infrastructure Projects

Awards funded through this RFA that are for, or contain, construction, alteration, maintenance, or repair of public infrastructure in the United States undertaken by applicable recipient types, require that:

- All iron, steel, and manufactured products used in the infrastructure project are produced in the United States; and
- All construction materials used in the infrastructure project are manufactured in the United States.

Applicants should consult 2 C.F.R. § 184 and Section IX of this RFA to determine whether the Buy America Preference applies and if they should consider the application of the Buy America Preference in the proposed project's budget and/or schedule.

Within the first two (2) pages of the Project Narrative, include a short statement on whether the project will involve the construction, alteration, maintenance and/or repair of public infrastructure in the United States. See Section IX of this RFA for applicable definitions and other information regarding Infrastructure Projects and the Buy America Preference.

The Project Narrative is considered the intellectual work of the proposed researchers. Concurrent submission of the same or substantially similar narratives attributed to different researchers may constitute academic dishonesty or research misconduct. Submission of a Project Narrative that is not the work of the proposed researchers, including machine-generated Project Narratives, may constitute academic dishonesty or research misconduct.

DOE will apply a "fair use" concept regarding the use of generative artificial intelligence to support investigators' efforts in presenting their intellectual work in an application. Guided by

the principles expressed by others (https://www.acm.org/publications/policies/frequently-asked-questions and https://journals.ieeeauthorcenter.ieee.org/become-an-ieee-journal-author/publishing-ethics/guidelines-and-policies/submission-and-peer-review-policies/#ai-generated-text), applicants must disclose the use of any artificial intelligence tools in applications, unless the tools were used solely for editing an original draft.

Merit review consists of the common, identical application materials, a set of detailed budgets from the partner institutions, and the senior/key personnel form (with attached biographical sketches and current and pending support statements). It is very important that every Project Narrative in the team be identical (including the title).

The prime applicant should include the following information in their application on behalf of any unfunded institution(s): biographical sketches and current and pending support for any senior/key personnel and details of any cost share agreements in the lead institution's budget justification.

Do not attach any of the requested appendices described below as files for Fields 9, 10, 11, and 12 on the SF-424 Research and Related Other Project Information form in Grants.gov. Follow the instructions below to include the information as appendices in the single Project Narrative file.

Biographical sketches and current and pending support may no longer be provided as attachments to a Project Narrative. These documents must be attached to the Research and Related Senior/Key Person Profile (Expanded) form in an application.

APPENDIX 1: 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.

- This appendix will not count in the Project Narrative page limitation.
- Do not attach a bibliography to Field 9 of the Research and Related Other Project Information form.

APPENDIX 2: FACILITIES & OTHER RESOURCES

This information is used to assess the capability of the organizational resources, including subrecipient resources, available to perform the effort proposed. Identify the resources and/or

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 the computing, networking, and data resources required to conduct the proposed work; while DOE does not intend to imply that these computing requirements will be satisfied, DOE foresees that computing resources may be available from the DOE/NNSA National Laboratories and/or private-sector Genesis Mission partners in support of applications under this call. Describe current computing allocations that will be used to support the proposed work, or the intent to apply for computing allocations. Computational resource estimates should also be provided in the Genesis Mission Phase II Application Template excel file attached to Field 12. Describe other necessary 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. Such documents, provided that they do not become letters of support or recommendation, may be printed on any letterhead. Please provide the Facility and Other Resource information as an appendix to your Project Narrative.

- This appendix should be no more than **one page per institution** when printed using standard letter-size (8.5-inch x 11-inch) paper with one-inch margins (top, bottom, left, and right). If an institution has six or more senior/key personnel, responses should be no more than two pages for that institution. In many cases, responses will be much shorter.
- This appendix will not count in the Project Narrative page limitation.
- Do not attach a "Facilities & Other Resources" statement to Field 10 of the Research and Related Other Project Information form.

APPENDIX 3: EQUIPMENT

List major items of equipment planned for use in this project and, if appropriate, identify location and pertinent capabilities. Provide the Equipment information as an appendix to your Project Narrative.

- This appendix should be no more than **one page per institution** when printed using standard letter-size (8.5-inch x 11-inch) paper with one-inch margins (top, bottom, left, and right). In many cases, responses will be much shorter.
- This appendix will not count toward the Project Narrative page limitation.
- Do not attach an equipment statement to Field 11 of the Research and Related Other Project Information form.

APPENDIX 4: DATA MANAGEMENT AND SHARING PLAN

Provide a Data Management and Sharing Plan (DMSP) as an appendix to the project narrative. Subject to the applicable cost principles, applications may request costs necessary for implementing the DMSP.

- This appendix should not exceed a page limit of **four** pages including charts, graphs, maps, photographs, and other pictorial presentations, when printed using standard letter-size (8.5-inch x 11-inch) paper with one-inch margins (top, bottom, left, and right)
- Do not attach a separate file to Field 12 of the Research and Related Other Project

Information form.
- This appendix will not count in the Project Narrative page limitation.

The standard requirements for a DMSP may be found in Section IX of this RFA. In addition, the DMSP should specifically address:

- How FAIR (Findable, Accessible, Interoperable, and Reusable)[16] principles will apply to the anticipated data sets, software[17], and models[18] to be developed.
- What developed software, data sets, and models will be made available using an "opensource" licensing arrangement, noting the Software Package Data Exchange (SPDX) identifier(s) (https://spdx.org/licenses/) when possible, and where deviation in this arrangement is expected from The Open Source Initiative's "Open Source Definition" (https://opensource.org/osd), a specific justification must be provided.
- How best practices in scientific software development will be applied to any development activities. For more information on best practices, see Better Scientific Software (https://bssw.io/).

APPENDIX 5: SYNERGISTIC ACTIVITIES (OPTIONAL)

In addition to biographical sketches in the Common Format, each senior/key person has the option to provide a one-page list of no more than five distinct examples of synergistic activities that demonstrate the individual's professional and scholarly activities that focus on the integration, transfer, and creation of knowledge as related to the application.

- Do not attach a separate file to Field 12 of the Research and Related Other Project Information form.
- This appendix may not exceed a limit of the same number of pages as senior/key personnel when printed using standard letter-size (8.5-inch x 11-inch) paper with one-inch margins (top, bottom, left, and right). This appendix will not count in the Project Narrative page limitation.

APPENDIX 6: TRANSPARENCY OF FOREIGN CONNECTIONS

You must provide a Transparency of Foreign Connections disclosure and certification as it relates to the proposed recipient and subrecipients. Include a separate disclosure for the applicant and each proposed subrecipient.

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[16] Wilkinson, M. D. et al. The FAIR Guiding Principles for Scientific Data Management and Stewardship. Sci. Data 3:160018, 2016. https://doi.org/10.1038/sdata.2016.18

[17] Chue Hong, N. P., Katz, D. S., Barker, M., Lamprecht, A-L, Martinez, C., Psomopoulos, F. E., Harrow, J., Castro, L. J., Gruenpeter, M., Martinez, P. A., Honeyman, T., et al. (2022). FAIR Principles for Research Software version 1.0. (FAIR4RS Principles v1.0). Research Data Alliance. DOI: https://doi.org/10.15497/RDA00068

[18] Ravi, N., Chaturvedi, P., Huerta, E.A. et al. FAIR principles for AI models with a practical application for accelerated high energy diffraction microscopy. Sci Data 9, 657 (2022). https://doi.org/10.1038/s41597-022-01712-9

Disclosure Format

For the convenience of the entity providing the disclosure and certification, a template is available at Transparency of Foreign Connections; however, you are not required to use this format. If you use another format, the signatory must include the same substantive information, a signature, the date, and the certification statement provided at Transparency of Foreign Connections.

Disclosure exceptions by entity type

- U.S. national laboratories and domestic government entities are not required to provide the Transparency of Foreign Connections disclosure
- Institutions of higher education are only required to respond to items with an asterisk (*)
- The disclosure requirements are determined by the entity type. Even if the applicant is exempt, the subrecipients must provide these disclosures unless the subrecipient is also exempt

Applicants, regardless of entity type, must provide complete responses for project team members that are not U.S. national laboratories, domestic government entities, or institutions of higher education.

Questions: Contact rtesinfo@hq.doe.gov

DOE reserves the right to request additional or clarifying information based on the information submitted.

APPENDIX 7: OTHER ATTACHMENT

As an appendix to your Project Narrative, include the required letters of commitment. and any optional letters of collaboration or access. In this appendix, you may also include any needed elaboration to your responses to questions 1-6 on the "Other Project Information" document or information not easily accessible to a reviewer. However, do not use this appendix to circumvent the page limitations of the application.

- Do not attach a separate file to Field 12 of the Research and Related Other Project Information form.
- This appendix will not count in the Project Narrative page limitation.

REMINDERS REGARDING ALL APPENDICES

- 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 appendices to Fields 9, 10, 11, or 12.

4. Research and Related Senior/Key Person Profile (Expanded)

Complete the Research and Related Senior/Key Person Profile (Expanded) form in accordance with the instructions on the form and the following instructions. Complete this form before the Budget form to populate data on the Budget form.

You must submit this information for the PI and all senior/key personnel who will be identified by name in Section A of the application's budget. List all other personnel who contribute in a substantive, meaningful way to the scientific development or execution of the project, whether or not salaries are requested. Consultants should be included in this "Senior/Key Person Profile (Expanded)" Form if they meet this definition. List individuals that meet the definition of senior/key regardless of what organization they work for. Senior/key personnel must be aware that they are included in the application and must agree to perform the work if awarded. The form will pre-populate with the PI identified on the SF-424(R&R) form. For each senior/key person:

- Complete the required sections in their profile.
- In the "credential" field, enter the person's PAMS username, if known.
- Attach the person's biographical sketch, following the instructions in Section IX of this RFA for crafting a biographical sketch.
- Attach the person's current and pending support, following the instructions in Section IX of this RFA for crafting current and pending support.

The Senior/Key Person Profile (Expanded) form will support the PI and up to 99 additional senior/key personnel. On the addition of the 99th senior/key person, you will be presented with an option to upload an additional file with the required information for all other senior/key personnel.

5. 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. All fields with a red border are required, but you may enter a zero "0" in any field in which funds are not being requested. 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 RFA.

Additional information is found in Section IX of this RFA.

BUDGET JUSTIFICATION (FIELD L ON THE FORM)

Provide a justification that explains all costs proposed in the budget. The following items of advice are offered to assist you in developing a justification.

- Organize the justification by listing items in the same order as presented on the budget.
- Ensure that the narrative matches the budget in dollar amounts and language.
- Explain the line items. If costs are estimated, provide a basis for the estimate. Explain if costs are based on prior experience of similar activities. If a cost is based on the product of two numbers (such as a number of items at a per-item price), ensure that your math is correct.

- If including an inflationary factor for future budget periods, explain the basis for the inflationary factor.

Provide any other information you wish to submit to justify your budget request. Including items in the budget justification is not considered a form of cost-sharing: Provide the details of all personnel (key or other) who will be working on the award, regardless of their source(s) of compensation. Explain their source(s) of compensation if it is not from this award. Include the indirect cost rate agreement as a part of the budget justification.

For milestone-based OT agreements as discussed in Section VII(A), the budget justification should clearly propose milestones with specific costs, and, in such cases, the budget provided does not need to comply with the cost principles in 2 C.F.R. § 200.

Attach a single budget justification file for the entire project period in Field L. The file automatically carries over to each budget year.

Additional information is found in Section IX of this RFA.

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

Budgets for Subawards: You must provide a separate R&R budget and budget justification for each subrecipient. Download the R&R Budget Attachment from the R&R SUBAWARD BUDGET ATTACHMENT(S) FORM and either email it to each subrecipient that is required to submit a separate budget or use the collaborative features of Workspace. After the subrecipient has either emailed its completed budget back to you or completed it within Workspace, attach it to one of the blocks provided on the form. All fields with a red border are required, but you may enter a zero "0" in any field in which funds are not being requested. Use up to ten letters of the subrecipient'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 subrecipients 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 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) that any files received from subrecipients are the PDF files extracted from the SUBAWARD BUDGET ATTACHMENT(S) FORM. Errors will be created if a subrecipient sends a prime applicant a budget form that was not extracted from the application package.

Note: The prime award budget request should include any subawards to a DOE/NNSA National Laboratory, a Federal agency, another Federal agency's FFRDC, or Genesis Mission Consortium members, and subaward budgets and budget justifications should be included in the application; the details of such proposed budgets are essential for understanding and analyzing the proposed research. If recommended for an award, a revised budget will be requested where the value of such proposed subawards is deducted from any resulting award: Those classes of organizations may be paid directly by DOE.

7. 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.

8. Disclosure of Lobbying Activities (SF-LLL)

If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the OT agreement, you must complete and submit Standard Form - LLL, "Disclosure Form to Report Lobbying." Applicants that have never paid any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress do not need to submit this form.

9. Identification of Merit Reviewer Conflicts

Provide a list of individuals who should not serve as merit reviewers of this application, following the instructions in Section IX of this RFA. Attach this information to Field 12 of the Research and Related Other Project Information Form.

10. Summary of Required Forms/Files

Your application must include the following items:

Name of Document	Format	Attach to
SF 424 (R&R)	Form	N/A
RESEARCH AND RELATED Other Project Information	Form	N/A
Project Summary/Abstract	PDF	Field 7
Project Narrative, including required appendices	PDF	Field 8
Identification of Merit Review Conflicts	File	Field 12
Genesis Mission Phase I or II Application Template, as appropriate.	File	Field 12
RESEARCH & RELATED Senior/Key Person Profile (Expanded)	Form	N/A

Name of Document	Format	Attach to
RESEARCH & RELATED BUDGET	Form	N/A
Budget Justification	PDF	Field L
R&R SUBAWARD BUDGET ATTACHMENT(S) FORM (if applicable)	Form	N/A
Subaward Budget Justification (if applicable)	PDF	Field L of the subaward budget
PROJECT/PERFORMANCE SITE LOCATION(S)	Form	N/A
SF-LLL Disclosure of Lobbying Activities, if applicable	Form	N/A

D. Information that Must be Submitted After Application but Before Award

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 C.F.R. § 1040.5 (2025))
- Representation of Limited Rights Data and Restricted Software, if applicable
- Commitment Letter from Third Parties Contributing to Cost Sharing, if applicable
- Environmental Information
- Information required to resolve concerns about conflicts of interest, conflicts of commitment, potential duplication of support
- PHASE I APPLICATIONS ONLY: Data management and sharing plans

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.

V. Submission Requirements and Deadlines

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 "Search Grants," and then enter the Assistance Listings[19] number (81.049) and/or the RFA number shown on the cover of this RFA. Select the "Apply" button to access the application package.

Applications submitted through www.FedConnect.net will not be accepted. Applications may not be submitted through PAMS at https://pamspublic.science.energy.gov.

Detailed instructions for registering in and using Grants.gov are in Section IX of this RFA.

B. Unique Entity Identifier (UEI) and System for Award Management (SAM.gov)

Applicants must complete a series of registrations and enrollments to submit applications in response to this RFA. Applicants not currently registered with SAM and Grants.gov should allow **at least four weeks** to complete these requirements. Applicants refers to the legal entity submitting an application: This is usually a corporate entity, not an individual investigator.

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 register with SAM at https://www.sam.gov/ and obtain a UEI. Assistance is available at https://sam.gov/content/help.

Applicants must provide a Taxpayer Identification Number (TIN) to complete their registration in www.SAM.gov. An applicant's TIN is an EIN assigned by the Internal Revenue Service (IRS). 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.

If entities have technical difficulties with the UEI validation or SAM registration process, they should utilize the HELP feature on SAM.gov. SAM.gov will work entity service tickets in the order in which they are received and asks that entities not create multiple service tickets for the same request or technical issue.

Do not use a SSN as a TIN.
Obtain a TIN from the IRS using the website listed above.

[19] The Assistance Listings were formerly known as the Catalog of Federal Domestic Assistance (CFDA).

1. Requirement for System for Award Management

The recipient must maintain a current and active registration in SAM.gov. The recipient's registration must always be current and active until the recipient submits all final reports required under this Federal award or receives the final payment, whichever is later. The recipient must review and update its information in SAM.gov at least annually from the date of its initial registration or any subsequent updates to ensure it is current, accurate, and complete. If applicable, this includes identifying the recipient's immediate and highest-level owner and subsidiaries and providing information about the recipient's predecessors that have received a Federal award or contract within the last three years.

2. Requirement for Unique Entity Identifier

If the recipient is authorized to make subawards under this Federal award, the recipient:

- Must notify potential subrecipients that no entity may receive a subaward until the entity has provided its UEI to the recipient.
- Must not make a subaward to an entity unless the entity has provided its UEI to the recipient. Subrecipients are not required to complete full registration in SAM.gov to obtain a UEI.

C. Submission Instructions

Applications must be submitted in Grants.gov at https://www.grants.gov. Detailed instructions are in Section IX of this RFA.

D. Submission Dates and Times

1. Letter of Intent Due Date

Not required for Phase I. The LOI due date for Phase II is printed on the cover of this RFA.

2. Pre-application Due Date

Not required.

3. Application Due Date

The application due date is printed on the cover of this RFA.

You are encouraged to submit your application well before the deadline. Applications may be submitted at any time between the publication of this RFA and the stated deadline.

4. Late Submissions

Delays in submitting 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.

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

Applicants must contact GenesisMissionNOFO@science.doe.gov to discuss the option of a late submission. Contacting GenesisMissionNOFO@science.doe.gov 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.

If a clerical error by administrative staff results in an incomplete submission of an application, an authorized institutional official may appeal to correct its error by emailing GenesisMissionNOFO@science.doe.gov within 48 business hours of the deadline. This grant of leniency is at DOE's sole discretion.

VI. Application Review Information

A. Responsiveness Review

Prior to a comprehensive merit evaluation, DOE will perform an initial compliance review in accordance with 10 C.F.R. § 605.10(b) to determine that (1) the applicant is eligible for the award; (2) the information required by the RFA has been submitted; (3) all mandatory requirements are satisfied; (4) the proposed project is responsive to the objectives of the RFA; 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.

B. Review Criteria

Applications will be subjected to merit review and will be evaluated against the following criteria, listed in descending order of importance:

1. **Scientific and/or Technical Merit and Impact**
2. **Technical Approach, Methods, and Feasibility**
3. **Team, Resources, and Management**
4. **Commercialization Potential for Energy Applications** (Criteria 4 will only be considered by applied technology development applications.)
5. **Budget and Cost-Effectiveness**

Note that reviewers are selected regarding both their 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. For applications that span from fundamental research to applied technology development both review criteria apply. Unless marked as "FOR PHASE II APPLICATIONS ONLY", all review criteria apply to both Phase I and Phase II applications.

Criterion 1: Scientific and/or Technical Merit and Impact

For Fundamental Research Applications:

- What is the scientific innovation of the proposed research?
- How well does the proposed research achieve AI advantage?
- 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 original and innovative is the proposed scientific approach, or concept?
- How well does the proposed work articulate its contribution to the related scientific community or mission application?

For Applied Technology Development Applications:

- What is the technical readiness level (TRL) of the proposed materials/technology, and how will the project advance it? (e.g., from TRL 3 to TRL 5)
- Does the application demonstrate a clear path toward improving key performance indicators (KPIs) for mission applications (e.g., cost reduction, improved safety, enhanced efficiency) compared to current state-of-the-art technologies?
- How well does the proposed technology align with the focus area specific objectives cited in the RFA?
- Are the proposed technical goals measurable, achievable, and impactful for real-world or commercial deployment?

Criterion 2: Technical Approach, Methods, and Feasibility

For All Applications:

- How logically sound, well justified, and appropriate is the proposed methodology for achieving the stated objectives?
- Does the proposed research employ innovative concepts or methods?
- Are the experimental design, theoretical models, and/or computational simulations robust and adequately detailed?
- Have potential challenges and risks been identified, and are the proposed mitigation strategies reasonable and comprehensive?
- Does the application provide a clear and realistic timeline for key project activities and milestones?

For Applied Technology Development Applications:

- How well does the application address potential scalability issues?
- Are the proposed testing and validation protocols rigorous and representative of realistic operating conditions?
- How well does the project incorporate considerations for environmental impact and safety relevant to mission application lifecycle?
- FOR PHASE II APPLICATIONS ONLY:
    - Are failure modes, degraded performance states, and demonstrated mitigation strategies for sensor noise or system disruptions (which could include adversarial inputs) identified and what are the extent of mitigation strategies?
    - Are computational efficiency improvements such as runtime, throughput, hardware utilization, etc.) identified and to what extent are they quantified?

Criterion 3: Team, Resources, and Management

For All Applications:

- How well-qualified is the research team to carry out the proposed work?

- Does the project team possess the necessary expertise across all relevant disciplines to be successful?
- To what extent does the application demonstrate a clear, well-coordinated collaboration among partnering institutions, with appropriately balanced responsibilities, synergistic contributions, and clearly defined roles for each team member?
- Are the proposed facilities, equipment, and other resources, including access to data and AI models, adequate and appropriate for conducting the research/development?

Criterion 4: Commercialization Potential for Energy Applications

For Applied Technology Development Applications:

- Does the application articulate a credible strategy for technology transfer and/or commercialization beyond the project's duration?
- Are there identified market opportunities, and does the application present a preliminary techno-economic analysis or market assessment supporting the potential impact?
- What is the potential for the materials/technology to be adopted by industry, and what barriers to adoption are addressed?

Criterion 5: Budget and Cost-Effectiveness

For All Applications:

- Is the proposed budget reasonable, well-justified, and appropriate for the scope and scale of the proposed work?
- Does the cost share meet the RFA requirements and reflect a strong commitment from the applicant or team?
- Does the application demonstrate efficient use of resources and provide good value for the federal investment or foster collaboration with DOE/NNSA National Laboratories, academia, and relevant industries to leverage collective expertise for mission applications?

C. 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 C.F.R. § 605.10(d).

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
- Availability of computational resources
- Relevance of the proposed activity to DOE priorities
- Ensuring an appropriate balance of activities within DOE programs
- Performance under current awards
- Strengthening partnerships between DOE/NNSA Laboratories, universities, non-profits, and industry.
- Commitment to sharing the results of research

3. Selection

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

4. 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 C.F.R. § 200 as modified by 2 C.F.R. § 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.

5. Risk Review

Pursuant to 2 C.F.R. § 200.206, DOE will conduct a review of any potential risks posed by the applicant. Such review of risk will include:

- Quality of the application,
- Reports and findings from audits performed under 2 C.F.R. § 200 and/or 2 C.F.R. § 910, and
- Systems maintained under 2 C.F.R. § 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/or their ability to comply with the management standards of 2 C.F.R. § 200.

6. Due Diligence for Research, Technology, and Economic Security (RTES)

All applications submitted to DOE are subject to a due diligence review.

As DOE invests in critical infrastructure and funds critical and emerging technology areas,[20] DOE considers possible threats to United States research, technology, and economic security from undue foreign government influence when evaluating risk. If high risks are identified and cannot be sufficiently mitigated, DOE may elect to not fund the applicant. As part of the research, technology, and economic security risk review, DOE may contact the applicant and/or proposed project team members for additional information to inform the review. This risk review is conducted separately from the technical merit review.

The due diligence review of covered individuals includes but is not limited to the review of resumes and disclosures, as required in the RFA. DOE reserves the right to ask for disclosures on project participants not defined as covered individuals. The Applicant need not submit any additional information on non-covered individuals, unless requested by DOE. The volume and type of information collected may depend on various factors associated with the award. Users requiring access to DOE computing facilities, information, and systems may require individual vetting before being granted access.

Note this review is separate and distinct from DOE Order 142.3B "Unclassified Foreign National Access Program."

In the event an RTES risk is identified, DOE may require risk mitigation measures, including but not limited to, requiring that an individual or entity not participate in the award. If significant risks are identified and cannot be sufficiently mitigated, DOE may elect to not fund the applicant.

Consistent with section 4(e) of the Presidential Memorandum on United States Government-Supported Research and Development National Security Policy-33 (NSPM-33), DOE may share information regarding the risks identified as part of the RTES due diligence review process or monitoring with other Federal agencies.

DOE's decision regarding a due diligence review is not appealable.

[20] See Critical and Emerging Technologies List Update (whitehouse.gov).

VII. Award Notices

A. Type of Award Instrument

DOE anticipates awarding interagency agreements, and/or other transaction agreements under this RFA. DOE intends to issue a single OT agreement to a prime applicant or lead institution of a collaborative application. If the project team is led by a DOE/NNSA national laboratory and if intellectual property provisions and data sharing cannot be adequately ensured by the standard provisions of management and operating subcontracts, DOE may issue a single OT agreement to another entity on the project team. Although, the DOE/NNSA laboratory would remain the lead organization for the project. DOE intends to release at least the following fast-track OT agreements for rapid award and early start date leveraging a non-negotiable agreement designed for the Genesis Mission.

1. A milestone based OT agreement whereby DOE will issue payments only upon the successful completion of a negotiated milestone.
2. A cost reimbursement OT agreement with terms similar to a grant.

B. Anticipated Timeline for Notice of Selection for Award Negotiation

DOE is interested in seeing projects supported under this RFA begin work by July 1, 2026.

1. Notice of Selection for Award Negotiation

Applicants Selected for Award Negotiation Notification: DOE will notify applicants selected for award negotiation. This notice of selection for award negotiation is not an authorization for the applicant/recipient to begin performance.

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

Fast-track OT agreements have been provided.

VIII. Post-Award Requirements and Administration

A. Administrative and National Policy Requirements

Additional policy provisions applicable to this RFA are included in the list below. Awards made under this RFA are subject to the respective Administrative and National Policy Requirements. The full text of each provision is in Section IX of this RFA and may be accessed by navigating to the hyperlinks below:

1. Administrative Requirements
2. Availability of Funds
3. Buy America Preference for Infrastructure Projects
4. Conference Spending (February 2015)
5. Commitment of Public Funds
6. Corporate Felony Conviction and Federal Tax Liability Representations (March 2014)
7. Covered Individual Definition, Designation, and Responsibility
8. Digital Persistent Identifier (PID)
9. Environmental, Safety and Health (ES&H) Performance of Work at DOE Facilities
10. Evaluation and Administration by Non-Federal Personnel
11. Federal, State, and Local Requirements
12 Foreign Travel
13. Framework for Nucleic Acid Synthesis Screening Requirement
14. Funding Restrictions
15. Government Right to Reject or Negotiate
16. Implementation of Presidential Memorandum Simplifying the Funding of Energy Infrastructure and Critical Mineral and Material Projects
17. Intergovernmental Review
18. Logos and Wordmarks
19. Modifications
20. National Environmental Policy Act (NEPA) Compliance
21. Nondisclosure and Confidentiality Agreements Representations (June 2015)
22. Notice Regarding Eligible/Ineligible Activities
23. Portable Document Format (PDF) Generation
24. Prohibition on the Use of Funds for Activities Related to FASC-Prohibited Unmanned Aircraft Systems
25. Prohibition on Certain Telecommunications and Video Surveillance Services or Equipment
26. Prohibition on Discrimination and Harassment
27. Prohibition on Entities of Concern
28. Prohibition on Lobbying Activity
29. Prohibition Related to Malign Foreign Talent Recruitment Programs
30. Proprietary Application Information
31. Publications
32. Registration Requirements
33. Research Misconduct
34. Research Security Training Requirement
35. Rights in Technical Data
36. Statement of Federal Stewardship

B. Reporting

Reporting requirements are identified on the Federal Assistance Reporting Checklist attached to the award agreement. The standard checklist is available at http://energy.gov/management/office-management/operational-management/financial-assistance/financial-assistance-forms under Award Forms: Individual awards may impose additional requirements.

C. 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 (see 41 U.S.C.§ 2313).

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

DOE will consider any written comments by the applicant, in addition to the other information in the designated integrity and performance system, in making a judgment about the applicant's integrity, business ethics, and record of performance under Federal awards when completing the review of risk posed by applicants as described in 2 C.F.R. § 200.206 Federal awarding agency review of risk posed by applicants.

D. Interim Conflict of Interest Policy for Financial Assistance

1. Policy

The DOE interim Conflict of Interest Policy for Financial Assistance (COI Policy) can be found at https://www.energy.gov/management/department-energy-interim-conflict-interest-policy-requirements-financial-assistance. This policy is applicable to OT agreements and, through the implementation of this policy by the entity, to each Investigator who is planning to participate in, or is participating in, the project funded wholly or in part under the DOE financial assistance award. DOE's interim COI Policy establishes standards that provide a reasonable expectation that the design, conduct, and reporting of projects funded wholly or in part under DOE financial assistance awards will be free from bias resulting from financial conflicts of interest or organizational conflicts of interest. The applicant is subject to the requirements of the interim COI Policy and within each application for financial assistance, the applicant must

certify that it is, or will be by the time of receiving any financial assistance award, compliant with all requirements in the interim COI Policy. The applicant must flow down the requirements of the interim COI Policy to any subrecipient non-Federal entities.

2. Implementation

SC only requires that unmanaged or unmanageable financial conflicts of interest be included in the financial conflict of interest (FCOI) report. Awards that will be administered by non-SC DOE elements will be subject to those elements' requirements.

IX. Other Information

A. Checklist for Avoiding Common Errors

Note that not all items in this checklist will apply to every submission under every RFA.

Item	Issue
Applications	Submitted in Grants.gov. Do not submit applications in PAMS or FedConnect.
Grants.gov Submission	Ensure that applications are submitted under the correct Opportunity Number. Standard Form (SF)-424 Research and Related (R&R): - Attach nothing to Field 20 - Attach nothing to Field 21 SF-424 Research and Related Other Project Information form: - Attach the abstract to Field 7 - Attach the Project Narrative, with all appendices, to Field 8 - Attach nothing to Field 9 - Attach nothing to Field 10 - Attach nothing to Field 11 - Attach the list of individuals who should not serve as merit reviewers (Collaborator Template) and Genesis Mission Phase I/II Application Template to Field 12 - Do not attach other files to Field 12 - NOTE: Files attached to Field 12 will not be shared with merit reviewers.
Letters of Intent (LOIs)	Phase II Applications Only: **- Submit your LOI in PAMS.** - Do not submit your LOI in Grants.gov. - Do not attach your LOI to the SF-424 Research and Related (R&R) form. - Follow the instructions in Section IV for the preparation of an LOI.
Pre-Applications	Not applicable
Page Limits	Strictly followed throughout application, including particular attention to: - Project Narrative and appendices - Biographical sketches

Item	Issue
	- Data Management and Sharing Plans (DMSPs) - Letter(s) of Collaboration or Access, if any
Personally Identifiable Information	None present in the application
Project Narrative	Composed of one PDF file including all appendices (bibliography, facilities, equipment, DMSP for Phase II applications only)
Project Summary / Abstract	Name of PI, PI's institutional affiliation(s), Co-Investigator(s), Co-Investigator's institutional affiliation(s)
DOE Title Page	Follow instructions closely
Budget	Use current negotiated indirect cost and fringe benefit rates
Budget Justification (attached to budget)	Justify all requested costs
Biographical Sketches	Follow page limits strictly and do not include list of collaborators. Attach the biographical sketch to the Senior/Key Person Profile (Expanded) Form.
Current and Pending Support	Ensure complete listing of all activities, regardless of source of funding. Attach the current and pending support to the Senior/Key Person Profile (Expanded) Form.
List of Individuals who Should not Serve as Merit Reviews	Attach to Field 12 of the SF-424 Research and Related Other Project Information form.
Data Management and Sharing Plans (DMSP)	Phase I applications: Not required. It will be required at the time of award. Phase II applications: - If referring to an experiment's DMSP, describe the relationship to the proposed research. - Include a DMSP even if no experimental data is expected.
Institutions capable of being funded through the DOE Field Work System	If DOE/NNSA National Laboratories and/or DOE sites are permitted to submit under this RFA: - Do not create new institutions in the PAMS website. - Submit applications in Grants.gov using the name of the laboratory or site in Field 5 of the SF-424(R&R) application form, not the contractor operating the laboratory or site.

Item	Issue
	Submissions under this RFA will be evaluated for technical merit, but any resulting funding, work, or awards will be made under the laboratory or site's contract with DOE. No separate financial assistance awards will be made. No administrative provisions of this RFA will apply to the laboratory or any laboratory subcontractor.

B. How-To Guides

The how-to guides provided in this section are intended as general guidance about SC. Not all parts will be applicable to every RFA, every application, or every institution.

1. How to Distinguish Between a New and Renewal Application

New Application: An application must be submitted as "new" in the following circumstances:

- When applying for funding to create a new research award that has not previously received DOE funding, including any funding for the current year,
- When applying for funding to support continued research from the same applicant institution as the current OT Agreement but with a significant change in fundamental nature of the research, or
- When applying for funding to support continued research supported by an existing DOE award but at a new applicant institution.

Renewal Application: A renewal application is appropriate when funds are requested for an award from the same recipient/applicant institution that has no significant changes in the following items:

- The award's senior leadership, and
- The fundamental nature of the award.

A change in an award's PI does not necessarily require submission as a new application: The change in personnel must be considered in light of other changes.

Renewal applications compete for funds with all other peer-reviewed applications and must be developed as fully as though the applicant were applying for the first time. Renewal applications must be submitted by the same sponsoring institution as that holding the current award for which renewal funding is requested, and the proposed research topic must be logical scientific extensions of the research that has been performed in the current award.

2. How Federally Affiliated Organizations May Participate and Be Funded

VALUE/FUNDING FOR DOE/NNSA NATIONAL LABORATORIES AND NON-DOE/NNSA FFRDCS

For OT awards, the value of, and funding for, a DOE/NNSA National Laboratory contractor, a non-DOE/NNSA Federally Funded Research and Development Center (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 may 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.

RESPONSIBILITY

The successful prime applicant/recipient (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 subrecipient.

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 recipient.

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 recipient.

3. How Federally Affiliated Organizations May Apply

DOE SC NATIONAL LABORATORIES

DOE Office of Science (SC) National Laboratories (Ames National Laboratory, Argonne National Laboratory, Brookhaven National Laboratory, Fermi National Accelerator Laboratory, Lawrence Berkeley National Laboratory, Oak Ridge National Laboratory, Pacific Northwest National Laboratory, Princeton Plasma Physics Laboratory, SLAC National Accelerator Laboratory, Thomas Jefferson National Accelerator Facility)

DOE SC National Laboratories, if eligible either as a prime applicant or a proposed team member on another entity's application, should ensure that their cognizant DOE Agreements Officer provides written authorization. This authorization does not need to be submitted with the application as part of the Budget Justification for DOE SC National Laboratory Contractor File. However, this authorization must be provided prior to any award being made. [This is not required for the National Energy Technology Laboratory because it is a Government Owned/Government Operated (GOGO) Laboratory.] If a DOE SC 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 authorization may be addressed "To Whom It May Concern:." 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."

(End of acceptable authorization)

If a DOE/NNSA FFRDC is selected for award negotiation, the proposed work will be authorized under the DOE work authorization process and performed under the laboratory's Management and Operating (M&O) contract.

DOE NON-SC/NNSA NATIONAL LABORATORIES

DOE Non-SC/NNSA National Laboratories (Idaho National Laboratory, Lawrence Livermore National Laboratory, Los Alamos National Laboratory, National Laboratory of the Rockies, Sandia National Laboratories, and Savannah River National Laboratory)

DOE Non-SC/NNSA National Laboratories, if eligible either as a prime applicant or a proposed team member on another entity's application, should consult with their relevant site office and their cognizant DOE/NNSA Agreements Officer about the time at which written authorization should be provided. This authorization may 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) Laboratory.] **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 authorization may be addressed "To Whom It May Concern:". 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."

(End of acceptable authorization)

If a DOE/NNSA FFRDC is selected for award negotiation, the proposed work will be authorized under the DOE work authorization process and performed under the laboratory's Management and Operating (M&O) contract.

NON-DOE/NNSA FFRDCS

Non-DOE/NNSA FFRDCs, if eligible either as a prime applicant or a proposed team member on another entity's application, should follow the following guidelines:

The prime applicant must obtain written authorization for non-DOE/NNSA FFRDC participation. The cognizant Agreements 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 authorization may be addressed "To Whom It May Concern:". 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 <<Include the RFA number on the cover page>> by the following statutory authority (insert statute name, citation, and section)."

(End of acceptable authorization)

OTHER FEDERAL AGENCIES

Other Federal Agencies, if eligible either as a prime applicant or a proposed team member on another entity's application, must include in their budget justifications any specific statutory authorization (other than the Economy Act) that permits their receipt of an interagency agreement or that authorizes the payment of certain costs.

4. How Consortia May be Used

INCORPORATED CONSORTIA

Incorporated consortia are eligible to apply for funding as a prime recipient (lead organization) or subrecipient (team member).

Each incorporated consortium must have an internal governance structure and a written set of internal rules. Upon request, the consortium must provide a written description of its internal governance structure and its internal rules to the DOE Contracting Officer. There is no requirement that subawards be formalized into incorporated consortia.

UNINCORPORATED CONSORTIA

Unincorporated consortia (team arrangements) must designate one member of the consortium to serve as the prime recipient/consortium representative (lead organization).

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

- Management structure;
- Method of making payments to consortium members;
- Means of ensuring and overseeing members' efforts on the project;
- Provisions for members' cost sharing contributions (though neither required nor considered); and
- Provisions for ownership and rights in intellectual property developed previously or under the agreement.

Note that a consortium is applied for in one application and results in one award with subawards to consortia members.

5. How to Submit Letters of Intent

This RFA does not require a Letter of Intent for Phase I. Letters of Intent are strongly encouraged for Phase II.

It is important that the LOI be a single file with extension .pdf, .docx, or .doc. The filename must not exceed 50 characters. 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 LOI. **All PIs and those submitting LOIs on behalf of PIs are encouraged to establish PAMS accounts as soon as possible to avoid submission delays.**

Submit Your Letter of Intent:

- Create your LOI 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 Letter of Intent" from the dropdown.
- On the Submit Letter of Intent page, select the institution from which you are submitting this LOI 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 LOI; 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 LOI. Save the LOI for later work by clicking the "Save" button at the bottom of the screen. It will be stored in "My Letters of Intent" for later editing.

- Enter a title for your LOI.
- Select the appropriate technical contact from the Program Manager dropdown.
- To upload the LOI 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 LOI to DOE.
- Upon submission, the PI will receive an email from the PAMS system <PAMS.Autoreply@science.doe.gov> acknowledging receipt of the LOI.
- If this RFA requires that LOIs be submitted only by an authorized institutional official, the PI (or the PI's delegate) will only be able to send the LOI to a user at the PI's institution with the institutional "submit to DOE" privilege. That user will then apply an institutional countersignature to the LOI when it is sent to DOE.

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

> **WARNING**: The PAMS website at https://pamspublic.science.energy.gov/ will permit you to revise a previously submitted LOI in the time between your submission and the deadline. Doing so will remove your previously submitted version from consideration. If you have not submitted the revision at the time of the deadline, you will not have a valid submission. Please pay attention to the deadline.

Do not attach pre-applications to Field 20 of the SF-424(R&R) form or letters of intent to Field 21 of the SF-424(R&R) form. Doing so will render your application unreadable.

6. How to Submit a Pre-Application

This RFA does not require a pre-application.

7. How to Register and Submit an Application in Grants.gov

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

ELECTRONIC DELIVERY

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

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 an active System for Award Management (SAM) registration which provides a Unique Entity Identifier (UEI), and Grants.gov account to apply for grants. If individual applicants (those submitting on their own behalf) are eligible to apply for this funding opportunity, they need only refer to steps 2 and 3 below.

Creating a Grants.gov account can be completed online in minutes, but SAM registration 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.

1) *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/applicants/applicant-registration/

2) *Create a Grants.gov Account*: The next step is to register an account with Grants.gov. Follow the on-screen instructions provided on the registration page.

3) *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 UEI for the organization in the UEI field. If you are an individual applicant submitting on your own behalf, you do not need a UEI to add the profile. For more detailed instructions about creating a profile on Grants.gov, refer to: https://www.grants.gov/applicants/applicant-registration/add-profile

4) *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 Electronic Business Point of Contact (EBiz POC)[21]. The EBiz

[21] Individuals with the EBiz POC role are commonly found in an Office of Sponsored Research or similar institutional business office. Other than small businesses, a PI would usually not have the EBiz POC role.

POC will then log in to Grants.gov and authorize the appropriate roles, which may include the Authorized Organization Representative (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/applicants/applicant-registration/ebiz-poc-authorizes-profile-roles

5) *Track Role Status*: To track your role request, refer to: https://www.grants.gov/applicants/applicant-registration/track-profile-role-status

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.**

HOW TO APPLY 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 RFA, you can create individual instances of a workspace.

For an overview of applying on Grants.gov using Workspaces, refer to: https://www.grants.gov/applicants/workspace-overview/

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 to work on the application together, complete all the required forms online or by downloading PDF versions, and check for errors before submission. The Workspace progress bar will display the state of your application process as you apply. As you apply using Workspace, you may click the blue question mark icon near the upper-right corner of each page to access context-sensitive help.

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/applicants/adobe-software-compatibility

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: These forms are designed to fill in common required fields across other forms, such as the applicant's name, address, and SAM UEI. 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/applicants/applicant-training

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 opportunity, contact the number listed in the application package of the application you are applying for funding.

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.

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 may not be considered for funding by SC.

Applicants using unreliable internet connections should be aware that the process of completing the Workspace can take some time. Therefore, applicants should allow enough time to prepare and submit the application before the package closing date.

Grants.gov will provide either an error or a successfully received submission message in the form of an email sent to the applicant with the AOR role attempting to submit the application.

If you do not promptly receive an email from Grants.gov with an agency tracking number, indicating receipt of the application by SC, please contact the Grants.gov Helpdesk at 1-800-518-4726 (toll-free) or support@Grants.gov immediately. SC will have no records of your attempted submission without the second email from Grants.gov.

8. How to Prepare an Application

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 above.)

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 RFA. 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.

RENEWAL APPLICATIONS

For renewal applications only, the PI is required to submit a Renewal Proposal Products section through the PAMS website at https://pamspublic.science.energy.gov. The PI must enter into PAMS each product created during the course of the previous project period. Types of products include publications, intellectual property, technologies or techniques, and other products such as databases or software. As soon as the renewal application is assigned to a DOE Program Manager, the PI will receive an automated email from PAMS (<PAMS.Autoreply@science.doe.gov>) instructing him or her to navigate to the PAMS Task tab to complete and submit the Renewal Proposal Products. The submitted product list will be sent for merit review as part of the application. The application will not be considered complete and cannot be sent for review until the product list has been submitted.

RESUBMISSION OF APPLICATIONS

Applications submitted under this RFA 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 the application is made available to merit reviewers, the applicant may contact the DOE program office identified in this RFA to request that it be withdrawn.

After an application is withdrawn, it may be resubmitted, if this RFA is still open for the submission of applications. Such resubmissions will only count as one submission if this RFA 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 RFA 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 that a non-Federal entity may not openly distribute, whether classified, export control, or unclassified controlled nuclear information. Non-Federal entities are not subject to any restrictions on distributing controlled unclassified information (CUI).
- 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 RECIPIENT INSTITUTION

If a recipient chooses to relinquish an award made under this RFA to permit the transfer of the award to a new institution, the new institution must apply under the then-available SC "annual" or "open" RFA.

9. How to Prepare a Biographical Sketch

As part of the application, each covered individual at the applicant and subrecipient level must submit a biographical sketch ("*Biosketch*"). Use SciENcv (Science Experts Network Curriculum Vitae) to produce a DOE/NNSA compliant PDF version of the *Biosketch*. Note that there is no page limitation for the *Biosketch*, though some fields in SciENcv have character limitations for consistency.

Consistent with the instructions in NSPM-33 Implementation Guidance Pre- and Post-award Disclosures Relating to the Biographical Sketch and Current and Pending (Other) Support[22] and the DOE/NNSA RFA-Specific Biosketch Instructions below, the *Biosketch* and *CPS Common Form* must together include a list of all sponsored activities, awards, and appointments, whether paid or unpaid; provided as a gift with terms or conditions or provided as a gift without terms or conditions; full-time, part-time, or voluntary; faculty, visiting, adjunct, or honorary; cash or in-kind; foreign or domestic; governmental or private-sector; directly supporting the individual's research or indirectly supporting the individual by supporting students, research staff, space, equipment, or other research expenses. All connections with malign foreign talent recruitment programs must be identified.

Please note the following:

- With the exception of "covered individual", which is defined in Section IX, all other definitions of terms used in the *Biosketch* are available at: NSPM-33 Definitions.
- If there is any conflict between NSPM-33 Implementation Guidance Pre- and Post-award Disclosures Relating to the Biographical Sketch and Current and Pending (Other) Support and the DOE/NNSA RFA-Specific Biosketch Instructions below, **follow the DOE/NNSA RFA-Specific Biosketch Instructions**.

DOE/NNSA RFA-Specific Biosketch Instructions	
Persistent Identifier (PID) of the Covered Individual	The PID field is required for all applications sent to SC.

[22] This table supersedes in its entirety, Table 2a and Paragraph 7 of the Disclosure Requirements and Standardization Section of the NSPM-33 Implementation Guidance.

Appointments and Positions Reporting Timeframe	Identify all domestic and foreign professional appointments and positions outside of the primary organization for a period up to three years from the date the applicant submits the application.
Products: Limitation on number provided	List up to ten products 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 ten authors.

Biographical sketches must be attached to the Research and Related Senior/Key Person Profile (Expanded) form in an application.

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.

10. How to Prepare a List of Individuals Who Should Not Serve as Reviewers

To assist in identifying individuals who should not serve as merit reviews, provide the following information for each senior/key person who is planned to be or is identified in Section A of the R&R Budget for the applicant and any proposed subrecipients:

- Advisees (graduate students or postdocs) of the senior/key person
- Advisors of the senior/key person while a graduate student or a postdoc
- Close associates of the senior/key person over the past 48 months
- Co-authors of the senior/key person over the past 48 months
- Co-editors of the senior/key person over the past 48 months
- Co-investigators of the senior/key person over the past 48 months
- Collaborators of the senior/key person over the past 48 months

Do not identify any personnel at the applicant institution or any proposed subrecipient or team institutions: Those personnel are prohibited from serving as merit reviewers.

Large collaborations of ten or more researchers do not require that all collaborators be identified: rather, only list the researchers with whom the senior/key person collaborated.

For all identified individuals, provide the following information:

- The senior/key person to whom the individual was an advisee, advisor, close associate, co-author, co-editor, co-investigator, or collaborator, identified by first name and last name
- The individual's first (given) name

- The individual's last (family) name
- The individual's Open Researcher and Contributor ID (ORCiD), if known
- The individual's institutional affiliation spelling out acronyms (For joint appointments, separate each institution with a slash ("/"). Do not list departmental affiliations.)
- The reason for listing the individual (advisee, advisor, close associate, co-author, co-editor, co-investigator, collaborator)
- The year when the individual last was a close associate, co-author, co-editor, co-investigator, or collaborator

You may also provide a list of all senior/key personnel who are planned to be or are identified in Section A of the R&R Budget for the applicant and any proposed subrecipients.

The lists do not need to be sorted in any method.

The lists must be submitted in tabular format, preferably as Microsoft Excel (.xls or .xlsx) files.

For your convenience, a Collaborator Template is available at https://science.osti.gov/grants/Policy-and-Guidance/Agreement-Forms. The template may also be posted with this RFA in Grants.gov. If using the template:

- Do not add tabs to the spreadsheet
- Do not merge the existing tabs
- Do not remove headers
- Fill out the requested headers on both tabs with the same information
- Ensure that given and family names are presented in the correct columns

11. How to Prepare Current and Pending Support

Current and pending (other) support ("*CPS Common Form*") is used to identify potential duplication, overcommitment, potential conflicts of interest or commitment, and all other sources of support.

As part of the application, each covered individual at the prime applicant and subrecipient level must submit a *CPS Common Form*. Use SciENcv (Science Experts Network Curriculum Vitae) to produce a DOE/NNSA compliant PDF version of the *CPS Comon Form*. Note that there is no page limitation for the *CPS Common Form*, though some fields in SciENcv have character limitations for consistency.

Consistent with the instructions in NSPM-33 Implementation Guidance Pre- and Post-award Disclosures Relating to the Biographical Sketch and Current and Pending (Other) Support[23] and the DOE/NNSA RFA-Specific CPS Instructions below, the *CPS Common Form* and *Biosketch Common Form* must together include a list of all sponsored activities, awards, and appointments, whether paid or unpaid; provided as a gift with terms or conditions or provided as

[23] This table supersedes in its entirety, Table 2a and Paragraph 7 of the Disclosure Requirements and Standardization Section of the NSPM-33 Implementation Guidance.

a gift without terms or conditions; full-time, part-time, or voluntary; faculty, visiting, adjunct, or honorary; cash or in-kind; foreign or domestic; governmental or private-sector; directly supporting the individual's research or indirectly supporting the individual by supporting students, research staff, space, equipment, or other research expenses. All connections with malign foreign talent recruitment programs must be identified in current and pending support.

Please note the following:

- With the exception of "covered individual," which is defined in Section IX, all other definitions of terms used in the *CPS Common Form* are available at: NSPM-33 Definitions.
- If there is any conflict between NSPM-33 Implementation Guidance Pre- and Post-award Disclosures Relating to the Biographical Sketch and Current and Pending (Other) Support and the DOE/NNSA RFA-Specific CPS Instructions below, **follow the DOE/NNSA RFA-Specific CPS Instructions**.

DOE/NNSA RFA-Specific CPS Instructions	
Persistent Identifier (PID) of the Covered Individual	The PID field is required.
Reporting Timeframe for Proposals, Projects, and In-Kind Contributions	Disclose only **current** and **pending** support, as defined in the "Status of Support" field of the SciENcv Common Form.
Types of Proposals and Active Projects to Disclose	In addition to the guidance listed above, consulting activities must be disclosed under the proposals and active projects section of the form when any of the following scenarios apply: • The consulting activity will require the covered individual to perform research as part of the consulting activity; • The consulting activity does not involve performing research, but is related to the covered individual's research portfolio and may have the ability to impact funding, alter time or effort commitments, or otherwise impact scientific integrity; or • The consulting entity has provided a contract that requires the covered individual to conceal or withhold confidential financial or other ties between the covered individual and the entity, irrespective of the duration of the engagement.

Disclosure Instructions for In-Kind Travel	Follow the disclosure instructions for travel in NSPM-33 Implementation Guidance Pre- and Post-award Disclosures Relating to the Biographical Sketch and Current and Pending (Other) Support.
Current and Pending (Other) Support Addendum	The Current and Pending (Other) Support Addendum is **not** required for this RFA.

Throughout the life of the award, the recipient has an ongoing responsibility to submit: 1) current and pending support disclosure statements and resumes/biosketches for any new covered individuals, and 2) updated disclosures if there are changes to the current and pending support or resume/bisoketch previously submitted to DOE.

Submission of current and pending support constitutes the individual's certification that they have complied with the Research Security Training requirement.

12. How to Prepare a Data Management and Sharing Plan

Data Management and Sharing Plans (DMSPs) must be provided for the proposed research following DOE and DOE sponsoring office guidelines. If needed, updates to the DMSP, through the course of the R&D, must be provided to DOE for review and approval. In general, a DMSP should address the following requirements:

1. Validation and replication of results
The DMSP should describe how scientific data generated in the course of the research project will be publicly shared and preserved in a timely and fair manner that enables validation and replication of results. If data will not be publicly shared and preserved (see "Data sharing limitations"), the DMSP should describe how results could be validated and replicated.

2. Timely and fair access
The DMSP should provide a plan for making all scientific data displayed in peer-reviewed scholarly 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 scientific data used to generate peer-reviewed scholarly publications should be made freely available and publicly accessible at the time of publication, in accordance with the principles stated above. The published article should indicate how this data can be accessed. The DMSP should also provide a timeline for sharing digital scientific data produced under the DOE funded R&D effort not associated with peer-reviewed scholarly publications.

3. Data repository selection

The DMSP should specify the use of digital repositories that align, to the extent practicable, with the National Science and Technology Council document entitled "Desirable Characteristics of Data Repositories for Federally Funded Research," by the Subcommittee on Open Science of the National Science and Technology Council, May 2022.[24] In general, DOE does not endorse or require sharing in any specific repository and encourages researchers to select the repository that is most appropriate for their data type and discipline, though individual sponsoring research offices may provide specific guidance or designate a specific repository.

4. Data management and sharing resources
The DMSP should describe the data management and sharing resources that may be available and used in the course of the proposed research. In particular, a DMSP that explicitly or implicitly commit data management and sharing 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 and sharing at DOE scientific user facilities, researchers should consult the published description of data management resources and practices at that facility and reference it in the DMSP.

5. Data sharing limitations
The DMSP must address any limitations of scientific data sharing to facilitate the protection of confidentiality, privacy, business confidential information, and/or security; avoid negative impact on intellectual property rights, innovation, program and operational improvements, and U.S. competitiveness; consider maximizing appropriate sharing through risk-mitigated limited access; preserve the balance between the relative value of long-term preservation and access and the associated cost and administrative burden; and otherwise be consistent with all applicable laws, regulations, and DOE orders and policies. Depending on the DOE funding agreement, a contractor or financial award recipient may have the right to assert copyright to or protect from public release for certain scientific data products. When contractors or award recipients assert copyright of scientific data, the DMSP should address licensing requirements and any limitations for sharing the copyrighted data. When contractors or award recipients assert data protection, the scientific data will not be shared with the public during the data protection period.

To improve the discoverability of and attribution for datasets created and used in the course of research, DOE encourages the citation of publicly available datasets within the reference section of publications, including using the persistent identifiers associated with the dataset, such as a Digital Object Identifier (DOI).

In addition, scientific data made publicly available through the implementation of a DMSP are required to be reported under any applicable reporting requirements to DOE's Office of Scientific and Technical Information (OSTI). A DOI is a type of persistent identifier that may

[24] NSTC Subcommittee on Open Science. Desirable Characteristics of Data Repositories for Federally Funded Research. (2022) DOI: https://doi.org/10.5479/10088/113528

be assigned to a dataset prior to reporting to OSTI, e.g., by the repository hosting the data or by a publisher. When there is a DOI assigned to a dataset, it must be provided within the metadata record submitted to OSTI. In cases where a data record does not already have an associated DOI, OSTI will assign a DOI for the data record.

DMSPs will be reviewed as part of the overall SC research application merit review process. Applicants are encouraged to consult the SC website for further information and suggestions for how to structure a DMSP: https://science.osti.gov/funding-opportunities/digital-data-management.

13. How to Prepare a Research and Related Budget and Justification

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.
- If a field is required (indicated with either an asterisk or a differently colored background) and no funds are being requested, enter a zero "0."
- You are encouraged to include the rate agreement used in preparing a budget as a part of the budget justification.
- Do not prepare a budget justification using the expired DOE form F4260.1.

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.osti.gov/sbir/applicant-resources/grant-application/.

Institutions of higher education must either include their negotiated Indirect Cost Rate Agreement or a Uniform Resource Locator (URL, commonly referred to as a web link) where their agreement can be found in their budget justifications.

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. Within the justification, explain the fringe benefit rate used if it is not the standard faculty rate.
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. Within the justification, provide the number of positions being filled in each category of other personnel.
Section C Equipment	For the purpose of this budget, equipment is designated as an item of property that has an acquisition cost of $10,000 or more and an expected service life of more than one year, unless a different threshold is specified in a negotiated Facilities and Administrative Cost Rate. (Note that this designation applies for proposal budgeting only and differs from the DOE definition of capital equipment.) List **each** item of equipment separately and justify each in the budget justification section. Do not aggregate items of equipment. Allowable items ordinarily will be limited to research equipment and apparatus not already available for the conduct of the work. General-purpose office equipment is not eligible for support unless primarily or exclusively used in the actual conduct of scientific research.
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. Within the budget justification, detail the number of personnel planning to travel and the estimated per-traveler cost for each trip.
Section E Participant/Trainee Support Costs	If applicable, submit training support costs. Educational projects that intend to support trainees (precollege, college, graduate and postgraduate) must list each trainee cost that includes stipend levels and amounts, cost of tuition for each trainee, cost of any travel (provide the same information as needed under the regular travel category), and costs for any related training expenses. Participant costs are those

	costs associated with conferences, workshops, symposia or institutes and breakout items should indicate the number of participants, cost for each participant, purpose of the conference, dates and places of meetings and any related administrative expenses. Indicate the basis for the cost estimate (quotes from vendors or suppliers, past experience of similar items, or some other basis).
Section F Other Direct Costs	• **Materials and Supplies:** 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). • **Publication Costs:** 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). • **Consultant Services:** Enter total funds requested for all consultant services. In the budget justification, identify each consultant, the services he/she will perform, total number of days, 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). • **Automatic Data Processing (ADP)/Computer Services:** Enter total funds requested for ADP/Computer Services. Cloud computing costs must be included under this item. The cost of computer services, including computer-based retrieval of scientific, technical and education information may be requested. In the budget justification, include the established computer service rates at the proposing organization if applicable. Indicate the basis for the cost estimate (quotes from vendors or suppliers, past experience of similar items, or some other basis). • **Subawards/Consortium/Contractual Costs:** Enter total costs for all subawards/consortium organizations and other contractual costs proposed for the project. In the budget justification, justify the details. • **Equipment or Facility Rental/User Fees:** Enter total funds requested for Equipment or Facility Rental/User Fees. In the budget 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).

	• **Alterations and Renovations:** Enter total funds requested for Alterations and Renovations. In the budget justification, itemize by category and justify the costs of alterations and renovations, including repairs, painting, removal or installation of partitions, shielding, or air conditioning. Where applicable, provide the square footage and costs. • **Other:** Add text to describe any other Direct Costs not requested above. Enter costs associated with "Other" item(s). Use the budget justification to further itemize and justify.
Section G Direct Costs	This represents Total Direct Costs (Sections A through F).
Section H Other Indirect Costs	Enter the Indirect Cost information, including the rates and bases being used, 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. Within the budget justification, explain the use of multiple rates, if multiple rates are used.
Section I Total Direct and Indirect Costs	This is the total of Sections G and H.

GUIDANCE FOR APPLICATION BUDGETS AND COSTS

Allowable costs may include, but are not limited to, the following:

- "Buying out" faculty time dedicated to teaching or administrative responsibilities,
- Support for administrative personnel dedicated to the proposed activity,
- Support for professional development, training, mentoring of students and junior researchers,
- Travel to meet with collaborators at other institutions and relevant DOE/NNSA National Laboratories, including costs for internships at the national laboratories; or to attend one or more science team, user facility, scientific conference, workshop, or professional society meetings relevant to the proposed research; or for the conduct of off-site research,
- Fringe benefits, which must be paid in accordance with an institution's negotiated rates agreement, institutional policies, and the individual's appointment,
- Temporary dependent-care costs incurred during travel,
- Membership costs in relevant professional societies, including both scientific societies and those dedicated to research administration,
- Instrumentation required to conduct proposed research,
- Equipment (items with a useful life of more than 12 months and a per-item acquisition cost of more than $10,000) required to conduct proposed research,
- Purchase of equipment, modification of equipment, or provision of services necessary to enable work to be carried out by project personnel with a disability,
- Stipends and benefits for students and post-doctoral researchers, recognizing their dual nature as both trainees and employees,

- Participation in standards development relevant to the proposed research, including travel and membership costs,
- Salary support to cover time to participate in outreach for recruitment, internships, training events, science team meetings, partnership development, or information gathering, and
- Other direct costs, e.g., materials and supplies such as office supplies, desktop or laptop computer, and/or software licenses that are directly necessary to enable the proposed activities.

14. How to Register in 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 award 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 LOI.

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

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

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.)

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 "PAMS Help" link on the PAMS website, https://pamspublic.science.energy.gov/. You may also contact the PAMS Help Desk, which can be reached Monday through Friday, 9AM – 5:30 PM Eastern Time. Telephone: (855) 818-1846 (toll free) or (301) 903-9610, email: sc.pams-helpdesk@science.doe.gov. All submission and inquiries about this RFA should reference the RFA number printed on the cover page.

15. How to View Applications in PAMS

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.

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.

16. How to Register in Other Systems Before Submitting an Application

SYSTEMS TO REGISTER IN

Applicants must register with FedConnect at www.FedConnect.net. The full, binding version of assistance agreements will be posted to FedConnect. To create an organization account, your organization's SAM MPIN is required. For more information about the SAM MPIN or other registration requirements, review the FedConnect Ready, Set, Go! Guide at https://www.fedconnect.net/FedConnect/Marketing/Documents/FedConnect_Ready_Set_Go.pdf

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

REGISTERING IN GRANTS.GOV

Applicants must register with Grants.gov, following the instructions at https://www.grants.gov/applicants/applicant-registration and described above.

WHERE TO SUBMIT AN APPLICATION

You must submit the application through Grants.gov at www.Grants.gov, using either the online webforms or downloaded forms, or a system-to-system service

Submit electronic applications through the "Apply for Grants" function at 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.

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

DOE SC PORTFOLIO ANALYSIS AND MANAGEMENT SYSTEM (PAMS)

Applicants must register in the Portfolio Analysis and Management System (PAMS) to submit letters of intent and pre-applications, to view merit reviewer comments, or to take a number of post-award actions.

C. Administrative and National Policy Requirements

1. Availability of Funds

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 DOE Agreements Officer for this award and until the recipient receives notice of such availability, to be confirmed in writing by the DOE Agreements Officer.

2. Buy America Preference for Infrastructure Projects

1. OVERVIEW

Made law via the passage of the Infrastructure Investment and Jobs Act (Pub. L. No. 117-58, 135 Stat. 429 (2021)), the Build America, Buy America Act ("BABA") mandates that all iron, steel, manufactured products, and construction materials used in Federally funded projects meets certain domestic assembly and domestic content requirements. **Applicants are strongly encouraged to read this section carefully, as this requirement may impact project budget and/or timeline; it is crucial that applicants properly understand the requirements of BABA as they scope out their projects.**

As is detailed more thoroughly below, BABA applies to any project that is receiving Federal financial assistance where the prime recipient is a State, local, or tribal government,

nonprofit organization, or institution of higher education. It does not apply to projects that have a for-profit organization serving as the prime recipient.

2. DEFINITIONS

There are several terms of art that are given specific definitions with respect to the application and execution of BABA. **Full definitions of these terms can be found by following this hyperlink to the relevant section (2 C.F.R. § 184.3) of the Code of Federal Regulations**. Any additional context not present in the Code of Federal Regulations definition for a given term is provided below.

a. *Buy America Preference* (Sometimes also referred to as the **Buy America Requirement** or **Domestic Content Procurement Preference**). Note that, despite the use of the word "Preference," this is very much a mandatory compliance requirement. The statute, implementing regulations, and Office of Management and Budget (OMB) guidance characterize this requirement as the "Buy America Preference," and so that terminology is reflected here to ensure consistency with the statute and existing guidance.
b. *Component*
c. *Construction Materials*
d. *Infrastructure Project*
e. *Iron or steel products*
f. *Manufactured Products*
g. *Manufacturer*
h. *Predominantly of iron or steel or a combination of both*
i. *Produced in the United States* (Sometimes also referred to as the "Domestic Production requirement")
j. Section 70917(c) *Materials* (i.e., certain materials used in construction that are specifically excluded from being categorized as "construction materials;" as such, the Buy America Preference is not applied to these materials.

Additionally, the following terms are not defined in 2 C.F.R. § 184.3 (2023), but are important for a proper understanding of BABA and its application:

k. *Project* – means the construction, alteration, maintenance, or repair of public infrastructure in the United States.
l. *Infrastructure* – Infrastructure includes, at a minimum: the structures, facilities, and equipment for roads, highways, and bridges; public transportation; dams, ports, harbors, and other maritime facilities; intercity passenger and freight railroads; freight and intermodal facilities; airports; water systems, including drinking water and wastewater systems; electrical transmission facilities and systems; utilities; broadband infrastructure; buildings and real property; and structures, facilities, and equipment that generate, transport, and distribute energy, including electric vehicle (EV) charging.
m. *Public infrastructure* – The Buy America Preference does not apply to non-public (private) infrastructure. For purposes of compliance with BABA, infrastructure should be considered "public" if it is:

(1) publicly owned (owned, operated, funded and managed, in whole or in part, by any unit or authority of a Federal, State, or Local government-including U.S. Territories and Indian Tribes); or
(2) privately owned but utilized primarily for a public purpose. Infrastructure should be considered to be "utilized primarily for a public purpose," and therefore "public," if it is privately owned but operated on behalf of the public or is a place of public accommodation.

3. BUY AMERICA PREFERENCE

A. The Buy America Preference

Absent an approved waiver, none of the funds provided under a federal award (i.e., whether paid for with federal share or recipient cost-share) may be used for a project for infrastructure unless all iron, steel, manufactured products, and/or construction materials are "produced in the United States."

In general, applicants should ask the following questions to determine BABA applicability to their award:

1. Is the recipient a State, local, or tribal government; nonprofit organization, or institution of higher education? (If the prime is a for-profit organization, BABA does not apply. Otherwise, move on to question 2);
2. Does the project include the construction, alteration, maintenance, and/or repair of infrastructure in the United States? ("Infrastructure" is defined in the BABA statute and regulations and is quite broad; although the definition provides several specific items that are considered infrastructure, it also includes broad categories such as "buildings and real property," which casts a wide net. If the project does not include work on infrastructure, then BABA does not apply. Otherwise, move to question 3);
3. Is the infrastructure in question publicly owned or privately-owned but utilized primarily for a public purpose? (Anything owned by a public entity is publicly owned, by definition. "Privately owned but utilized primarily for a public purpose" generally means privately-owned infrastructure that is operated on behalf of the public, or that serves as a place of public accommodation. DOE has the final say on this determination, so applicants who do not think their infrastructure is "privately-owned but utilized primarily for a public purpose" should have justifications prepared supporting their determination).

If the answer to the above questions is "yes," then BABA applies to your project.

If a determination is made that BABA will apply to a project, recipients must then ensure that all iron, steel, manufactured products, and construction materials used in the project are "produced in the United States." Standards to satisfy this requirement differ based on the category a given material falls under**:**

a. All iron and steel used in the project is produced in the United States—this means all manufacturing processes, from the initial melting stage through the application of coatings, occurred in the United States;

b. All manufactured products used in the project are produced in the United States—this means the manufactured product was manufactured in the United States; and the cost of the components of the manufactured product that are mined, produced, or manufactured in the United States is greater than 55 percent of the total cost of all components of the manufactured product, unless another standard for determining the minimum amount of domestic content of the manufactured product has been established under applicable law or regulation. (**Note:** 2 C.F.R. § 184.5 provides specific guidance for determining the cost of components for manufactured products); and
c. All construction materials are manufactured in the United States—this means that all manufacturing processes for the construction material occurred in the United States. (**Note:** 2 C.F.R. § 184.6 provides additional standards that must be satisfied for some specified construction materials in order for those materials to be considered "produced in the United States").

Recipients are responsible for administering their award in accordance with the terms and conditions, including the Buy America Preference. The recipient must ensure that the Buy America Preference flows down to all subawards and that the subawardees and subrecipients comply with the Buy America Preference. The Buy America Preference term and condition must be included all sub-awards, contracts, subcontracts, and purchase orders for work performed under the infrastructure project.

B. Specific Application of the Preference

The Domestic Production requirement only applies to the iron or steel products, manufactured products, and construction materials used for the construction, alteration, maintenance, or repair of public infrastructure in the United States. Only items that are consumed in, incorporated into, or permanently affixed to the infrastructure in the project are required to meet the "produced in the United States" requirements. As such, this requirement does not apply to tools, equipment, and supplies - such as temporary scaffolding - brought into the construction site and removed at or before the completion of the infrastructure project. This is likewise applicable to equipment and furnishings, such as movable chairs, desks, and portable computer equipment, that are used at or within the finished infrastructure project but are not an integral part of the structure or permanently affixed to the infrastructure project.

C. Section 70917(c) Materials

The BABA Statute at Section 70917(c) provides a list of materials which are specifically excluded from categorization as "construction materials," and therefore may be used without meeting the relevant "produced in the United States" standard.

Generally referred to as "Section 70917(c) Materials," these are:
• cement and cementitious materials;
• aggregates such as stone, sand, or gravel; or
• aggregate binding agents or additives as provided in Section 70917(c) of BABA.

Asphalt concrete pavement mixes are typically composed of asphalt cement (a binding agent) and aggregates such as stone, sand, and gravel. Accordingly, asphalt is also excluded from the definition of Construction materials.

Section 70917(c) materials, on their own, are not manufactured products. Further, Section 70917(c) materials should not be considered manufactured products when they are used at or combined proximate to the work site—such as is the case with wet concrete or hot mix asphalt brought to the work site for incorporation. However, certain Section 70917(c) materials (such as stone, sand, and gravel) may be used to produce a manufactured product, such as is precast concrete. Precast concrete is made of components, is processed into a specific shape or form, and is in such state when brought to the work site. Furthermore, wet concrete should not be considered a manufactured product if not dried or set prior to reaching the work site.

Further clarification is provided in 2 C.F.R. § 184 on the circumstances under which a determination is made that Section 70917(c) materials should be treated as components of a manufactured product. That determination is based on consideration of: (i) the revised definition of the "manufactured products" at 2 C.F.R. § 184.3; (ii) a new definition of "Section 70917(c) materials" at 2 C.F.R. § 184.3; (iii) new instructions at 2 C.F.R. § 184.4(e) on how and when to categorize articles, materials, and supplies; and (iv) new instructions at 2 C.F.R. § 184.4(f) on how to apply the Buy America preference by category.

4. Certification of Compliance

Recipients must request a certification from a product manufacturer that the iron, steel, manufactured product or construction material they are acquiring from the manufacturer were "produced in the United States" (i.e., that they meet the requisite standards outlined at the beginning of Section 3, above). DOE will not provide any sort of "certification template" for this purpose; recipients are responsible for ensuring that a certification contains enough information that it properly validates the BABA compliance of the item(s) listed within the certification.

Although DOE does not require a specific format for the certification, the following elements must be present:

- A listing of all products covered by the certification, including their category (e.g., iron, steel, manufactured product, or construction material);
- A recitation of the relevant "produced in the United States" standard for any categories (iron, steel, manufactured product, or construction material) provided in the above list, to ensure the manufacturer properly understands the standards to be met;
- A clear statement that the products listed meet the relevant "produced in the United States" standard(s);
- A signature from an authorized representative of the manufacturer certifying the contents of the compliance statement; and
- Any other information the recipient deems necessary for the certification to demonstrate compliance with the BABA requirements.

Recipients must also maintain certifications or equivalent documentation for proof of compliance that those articles, materials, and supplies that are consumed in, incorporated into, affixed to, or otherwise used in the infrastructure project, not covered by a waiver or exemption, are produced in the United States. The certification or proof of compliance must be provided by the suppliers or manufacturers of the iron, steel, manufactured products and construction materials and flow up from all subawardees, contractors and vendors to the recipient. Recipients must keep these certifications with the award/project files and be able to produce them upon request from DOE, auditors or Office of Inspector General.

5. WAIVERS

When necessary, recipients may apply for, and DOE may grant, a waiver from the Buy America Preference. In general, DOE will not review or consider waiver requests from applicants. Waiver requests are subject to review by DOE and the Office of Management and Budget, as well as a public comment period of no less than 15 calendar days.

Waivers must be based on one of the following justifications:

a. Public Interest - Applying the Buy America Preference would be inconsistent with the public interest;
b. Non-Availability - The types of iron, steel, manufactured products, or construction materials are not produced in the United States in sufficient and reasonably available quantities or of a satisfactory quality; or
c. Unreasonable Cost - The inclusion of iron, steel, manufactured products, or construction materials produced in the United States will increase the cost of the overall project by more than 25 percent.

Additional information on the submission and processing of a waiver request will be provided to applicants whose applications are selected for award negotiations. Alternatively, applicants can find more information about the process on DOE's Build America, Buy America home page.

3. 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 OT 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.

4. 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.

5. Corporate Felony Conviction and Federal Tax Liability Representations (March 2014)

In submitting an application in response to this RFA 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.

6. Covered Individual Definition, Designation, and Responsibility

For the purposes of this RFA, a Covered Individual means an individual who (a) contributes in a substantive, meaningful way to the development or execution of the scope of work of a project proposed for funding by DOE, and (b) is designated as a covered individual by DOE.

DOE designates as covered individuals any principal investigator (PI); project director (PD); co-principal investigator (Co-PI); co-project director (Co-PD); project manager; and any individual regardless of title that is functionally performing as a PI, PD, Co-PI, Co-PD, or project manager. Status as a consultant, graduate (master's or PhD) student, or postdoctoral associate

does not automatically disqualify a person from being designated as a "covered individual" if they meet the definition in (a) above.

The prime applicant is responsible for assessing the applicability of (a) against each person listed on the application. Further, the prime applicant is responsible for identifying any such individual to DOE for designation as a covered individual, if not already designated by DOE as described above.

Individuals committing no measurable effort or "as-needed" effort are not automatically exempt from being designated as a covered individual. The prime applicant's listing of an individual in the "Senior/Key Person" section of an SF-424(R&R) budget serves as an acknowledgement that DOE designates that person as a covered individual.

DOE may further designate covered individuals during award negotiations or the award period of performance.

If selected, throughout the life of the award, the recipient has an ongoing responsibility to submit: 1) current and pending support disclosure statements and resumes/biosketches for any new covered individuals, and 2) updated disclosures if there are changes to the current and pending support or resume/biosketch previously submitted to DOE.

7. Digital Persistent Identifier (PID)

Individuals that are required to submit Biographical Sketch and/or Current and Pending (Other) Support disclosures must provide a digital persistent identifier (PID) in such disclosures as part of the application. Included PIDs must meet the common/core standards specified in an ORCID iD).

Include this information for each covered individual with the Current and Pending (Other) Support submission as described above and in Section IX.

8. 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 subrecipients at any tier.

9. 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 a conflict-of-interest agreement and a certificate of confidentiality prior to reviewing an application. Non-Federal personnel conducting administrative activities must sign a non-disclosure agreement.

10. 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 subrecipients at any tier.

11. Foreign Travel

If international travel is proposed for your project, please note that your organization must comply with the International Air Transportation Fair Competitive Practices Act of 1974, 49 U.S.C. § 40118 (2018), commonly referred to as the "Fly America Act," and implementing regulations at 41 C.F.R. §§ 301-10.131 through 301-10.143. (2025) The law and regulations require air transport of people or property to, from, between, or within a country other than the United States, the cost of which is supported under this award, to be performed by or under a cost-sharing arrangement with a United States flag carrier, if service is available.

12. Framework for Nucleic Acid Synthesis Screening Requirement

Entities conducting life sciences R&D activities, or technical assistance to support life sciences R&D activities awards issued after October 2024 with synthetic nucleic acids – including but not limited to Deoxyribonucleic acid (DNA) and ribonucleic acid (RNA), whether single- or double- stranded, as well as whole organism genomes (e.g., viruses, bacteria), or the use of any benchtop equipment capable of synthesizing nucleic acids are required to obtain synthetic nucleic acids or devices capable of synthesizing them – from Providers or Manufacturers that attest to implementing 2024 OSTP Framework for Nucleic Acid Synthesis Screening.

The attestation may be provided through: (1) a publicly posted statement (e.g., public website) or (2) directly to the Grants Officer and the prime recipient/subrecipient for subawards by the Provider or Manufacturer. The Provider or Manufacturer must ensure that the attestation is signed by an individual with authority to respond on behalf of the organization.

Flowdown of requirements to subrecipients. The prime recipient shall incorporate the substance of this term in its terms and conditions, including this paragraph, in all subawards in support of the award that may involve the procurement of synthetic nucleic acids and benchtop nucleic acid synthesis equipment.

13. 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 C.F.R. § 200 as modified by 2 C.F.R. § 910 (DOE Financial Assistance Regulation).

Pre-award Costs: Recipients may charge to an award resulting from this RFA pre-award costs that were incurred within the 90-day calendar 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 C.F.R. § 200 as modified by 2 C.F.R. § 910 (DOE Financial Assistance Regulation). Recipients must obtain the prior approval of the DOE Agreements 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.

14. Government Right to Reject or Negotiate

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

15. Implementation of Presidential Memorandum Simplifying the Funding of Energy Infrastructure and Critical Mineral and Material Projects

Pursuant to this Presidential Memorandum, DOE may share and use within the Government any application information provided by or on behalf of the applicant. Accordingly, in accordance with applicable law and notwithstanding any other provisions herein, by submitting an application or agreeing to a financial assistance arrangement with DOE under this RFA, the applicant is providing consent for any properly marked trade secret, confidential, proprietary, privileged or otherwise sensitive application information provided by or on behalf of the applicant to be disclosed to the Executive Office of the President and relevant Agencies offering loans, grants, equity, guarantees or other federal funding, for the purposes of the Presidential Memorandum on Simplifying the Funding of Energy Infrastructure and Critical Mineral and Material Project.

16. Intergovernmental Review

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

17. Logos and Wordmarks

DOE created a logo that recipients may use. The logos and best practices may be found at https://www.energy.gov/management/pf-2023-19-department-energy-awardee-usage-branding-and-logo-guide. Information about the DOE logo, seal, and wordmark may be found at https://www.energy.gov/management/doe-logo-seal-and-word-mark.

18. Modifications

Notices of any modifications to this RFA will be posted on Grants.gov and the FedConnect portal. You can receive an email when a modification or a RFA message is posted by registering with FedConnect as an interested party for this RFA. It is recommended that you register as soon as possible after release of the RFA to ensure you receive timely notice of any amendments or other Notices of Funding Opportunity (NOFOs). More information is available at www.FedConnect.net.

19. National Environmental Policy Act (NEPA) Compliance

DOE would determine if NEPA applies to the proposal in accordance with Section 2.1 of the DOE NEPA Implementing Procedures [DOE NEPA Implementing Procedures (June 2025) | Department of Energy], by evaluating the information provided in question 4.a. on the "Research and Related Other Project Information" form. If NEPA applies, DOE would then determine the required level of NEPA review following the procedures described in Section 2.2 of the DOE NEPA Implementing Procedures. If DOE could not apply a categorical exclusion (CX) to the proposed action, DOE would evaluate the significance of the proposed action's reasonably foreseeable effects consistent with Section 3.2 of the DOE NEPA Implementing Procedures:

1. If the proposed action is evaluated in a prior NEPA document by DOE or any other agency, DOE will consider relying on the existing document, or any pertinent part thereof, and supplementing that document as needed;
2. If the proposed action is not likely to have a reasonably foreseeable significant effect on the quality of the human environment, or if the significance of the effects of the proposed action is unknown, DOE will prepare an environmental assessment (EA), as described in chapter six of the DOE NEPA Implementing Procedures; or
3. If the proposed action is likely to have a reasonably foreseeable significant effect on the quality of the human environment, DOE will prepare an environmental impact statement (EIS), as described in Chapter 7 of the DOE NEPA Implementing Procedures.

This NEPA process would need to be completed prior to the applicant taking any action on the proposed project that could have adverse environmental effects or that could limit the choice of reasonable alternatives. The process would begin with a request from DOE for an environmental disclosure. If DOE is able to make a CX determination based on that disclosure, that would end the NEPA process. If DOE determines that an EA or EIS is necessary, it would need to be funded by the applicant. DOE has the expectation that the recipient will disclose the potential environmental effects, which would serve to initiate dialogue with DOE as necessary.

The inability to satisfy the NEPA requirements after an award would result in cancellation of the award.

20. Nondisclosure and Confidentiality Agreements Representations (June 2015)

By submitting an application in response to this RFA, the Applicant represents that:

(1) It **does not and will not** require its employees or contractors to sign internal nondisclosure or confidentiality agreements or statements prohibiting or otherwise restricting its employees or contactors from lawfully reporting waste, fraud, or abuse to a designated investigative or law enforcement representative of a Federal department or agency authorized to receive such information.

(2) It **does not and will not** use any Federal funds to implement or enforce any nondisclosure 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.

21. 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.

22. Portable Document Format (PDF) Generation

The Project Narrative in an application must be one single PDF file that contains the DOE Title Page, Project Narrative, all required appendices, and other attachments. This single PDF file may not be scanned from a printed document and must be attached in Field 8 on the Grants.gov form. This must be a plain PDF file consisting of text, numbers, and images. The Project Narrative will be read by SC staff using the full version of Adobe Acrobat: Please ensure that the narrative is readable in Acrobat.

Do not submit files with editable fields, password-protection, encryption, redactions, comments, or any other advanced features in some PDF-compatible software. If a file cannot be opened and searched, an application may be declined.

If combining multiple files into one Project Narrative, ensure that a PDF portfolio or binder is not created.

If creating PDF files using any software other than Adobe Acrobat, please use a "Print to PDF" or equivalent process to ensure that all content is visible in the Project Narrative.

Once a Project Narrative has been assembled, please submit the combined Project Narrative file through a "Print to PDF" or equivalent process to ensure that all content is visible in one PDF file that can be viewed in Adobe Acrobat.

Review your submission to ensure that blank pages are not present.

23. Prohibition on the Use of Funds for Activities Related to FASC-Prohibited Unmanned Aircraft Systems

Pursuant to the prohibition in section 1825 of the American Security Drone Act of 2023 (Public Law 118-31), on or after December 22, 2025, the following prohibition applies to the use of funds provided through this award:

1) **Definition** – The terms "FASC-prohibited unmanned aircraft system" and "unmanned aircraft system" have the definitions provided in 48 C.F.R. § 40.201, or successor regulation.
2) **Prohibition** – No Federal funds awarded through this award may be used by a recipient or subrecipient:
   a) To procure a FASC-prohibited unmanned aircraft system; or
   b) In connection with the operation of a FASC-prohibited unmanned aircraft system.

24. Prohibition on Certain Telecommunications and Video Surveillance Services or Equipment

As set forth in 2 C.F.R. § 200.216, recipients and subrecipients are prohibited from obligating or expending project funds (federal funds and recipient cost share) to procure or obtain; extend or renew a contract to procure or obtain; or enter into a contract (or extend or renew a contract) to procure or obtain equipment, services, or systems that use covered telecommunications equipment or services as a substantial or essential component of any system,

or as critical technology as part of any system. As described in John S. McCain National Defense Authorization Act for Fiscal Year 2019, Pub. L. No. 115-232, § 889, 132 Stat. 1636, 1917 (2018), covered telecommunications equipment is telecommunications equipment produced by Huawei Technologies Company or ZTE Corporation (or any subsidiary or affiliate of such entities).

See section 889 of Pub. L. No. 115-232, 2 C.F.R. § 200.216, and 2 C.F.R. § 200.471 for additional information.

25. Prohibition on Discrimination and Harassment

All people conducting, supporting, or participating in scientific research under this award must be able to do so on the basis of their abilities and without any unnecessary barriers. Recipients of awards resulting from this RFA are prohibited from engaging in discrimination on any basis prohibited by law, including harassment (sexual or non-sexual) as contained in 10 C.F.R. §§ 1040, 1041, and 1042.

Recipients may contact the DOE's Office of Civil Rights for technical assistance in meeting their institutional requirements under these regulations, including assistance in addressing complaints of discrimination or harassment. DOE is committed to meeting its obligations under Title IV of the Civil Rights Act. The United States Equal Employment Opportunity Commission also makes a number of resources available at https://www.eeoc.gov/eeoc/publications/index.cfm to ensure that employees may perform their work without hindrance. Graduate students and post-doctoral researchers are understood to have a dual role as both trainees and employees, in accordance with 2 C.F.R. § 200.400 (f).

26. Prohibition on Entities of Concern

PROHIBITION

No Entity of Concern as defined in section 10114 of Public Law 117-167 (42 U.S.C. § 18912), may receive any OT award, or loan of $10 million or more in Department of Energy funds, including funds made available by the Consolidated Appropriations Act, 2024 (Public Law 118-42).

In addition, for all awards involving Departmental activities authorized under Public Law 117-167, no Entity of Concern (including an individual that owns or controls, is owned or controlled by, or is under common ownership or control with an Entity of Concern) may receive DOE funds or perform work under any award, subject to certain penalties. See section 10114 of Public Law 117-167 (42 U.S.C. § 18912) and Division D, Title III, Section 310 of Division D of the Consolidated Appropriations Act of 2024 (Pub. L. No. 118-42) for additional information.

By submitting an application to this RFA, the applicant is certifying that neither the applicant nor any of the project participants qualify as Entities of Concern.

DEFINITIONS

Entity of Concern is defined in section 10114 of Public Law 117-167 (42 U.S.C. § 18912), also known as the CHIPS and Science Act, as any entity, including a national, that is—

(A) identified under section 1237(b) of the Strom Thurmond National Defense Authorization Act for Fiscal Year 1999 (50 U.S.C. § 1701 note; Public Law 105–261);

(B) identified under section 1260H of the William M. (Mac) Thornberry National Defense Authorization Act for Fiscal Year 2021 (10 U.S.C. § 113 note; Public Law 116–283);

(C) on the Entity List maintained by the Bureau of Industry and Security of the Department of Commerce and set forth in Supplement No. 4 to part 744 of title 15, Code of Federal Regulations;

(D) included in the list required by section 9(b)(3) of the Uyghur Human Rights Policy Act of 2020 (Public Law 116–145; 134 Stat. 656); or

(E) identified by the Secretary, in coordination with the Director of the Office of Intelligence and Counterintelligence and the applicable office that would provide, or is providing, covered support, as posing an unmanageable threat—

(i) to the national security of the United States; or

(ii) of theft or loss of United States intellectual property.

27. 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 U.S.C. § 1913. This restriction is in addition to those prescribed elsewhere in statute and regulation.

28. Prohibition Related to Malign Foreign Talent Recruitment Programs

PROHIBITION

Individuals participating in a Malign Foreign Talent Recruitment Program are prohibited from participating in this award.

Should an award result from this RFA, the recipient must exercise ongoing due diligence to reasonably ensure that no such individuals participating on the DOE-funded project are participating in a *Malign Foreign Talent Recruitment Program*. Consequences

for violations of this prohibition will be determined according to applicable law, regulations, and policy.

Further, the recipient must notify DOE within five (5) business days upon learning that an individual on the project team is or is believed to be participating in a malign foreign talent recruitment program. DOE may modify and add requirements related to this prohibition to the extent required by law.

REQUIRED CERTIFICATIONS

a. Each covered individual must certify that they are not party to a Malign Foreign Talent Recruitment Program.
b. The applicant and the subrecipients must certify that the covered individuals in their respective employment have been made aware of the Malign Foreign Talent Recruitment Program prohibition and have complied with their certification responsibilities identified in a.

NON-DISCRIMINATION

DOE will ensure that the Malign Foreign Talent Recruitment Program Prohibition is carried out in a manner that does not target, stigmatize, or discriminate against individuals on the basis of race, ethnicity, or national origin, consistent with title VI of the Civil Rights Act of 1964 (42 U.S.C. § 2000(d) et seq.).

DEFINITIONS

Malign Foreign Talent Recruitment Program. as defined in Pub. L. No. 117-167, Section 10638(4):

A. any program, position, or activity that includes compensation in the form of cash, in-kind compensation, including research funding, promised future compensation, complimentary foreign travel, things of non de minimis value, honorific titles, career advancement opportunities, or other types of remuneration or consideration directly provided by a foreign country at any level (national, provincial, or local) or their designee, or an entity based in, funded by, or affiliated with a foreign country, whether or not directly sponsored by the foreign country, to the targeted individual, whether directly or indirectly stated in the arrangement, contract, or other documentation at issue, in exchange for the individual—

i. engaging in the unauthorized transfer of intellectual property, materials, data products, or other nonpublic information owned by a United States entity or developed with a federal research and development award to the government of a foreign country or an entity based in, funded by, or affiliated with a foreign country regardless of whether that government or entity provided support for the development of the intellectual property, materials, or data products;

ii. being required to recruit trainees or researchers to enroll in such program, position, or activity;

iii. establishing a laboratory or company, accepting a faculty position, or undertaking any other employment or appointment in a foreign country or with an entity based in, funded by, or affiliated with a foreign country if such activities are in violation of the standard terms and conditions of a federal research and development award;
iv. being unable to terminate the foreign talent recruitment program contract or agreement except in extraordinary circumstances;
v. through funding or effort related to the foreign talent recruitment program, being limited in the capacity to carry out a research and development award or required to engage in work that would result in substantial overlap or duplication with a federal research and development award;
vi. being required to apply for and successfully receive funding from the sponsoring foreign government's funding agencies with the sponsoring foreign organization as the recipient;
vii. being required to omit acknowledgment of the recipient institution with which the individual is affiliated, or the federal research agency sponsoring the research and development award, contrary to the institutional policies or standard terms and conditions of the federal research and development award;
viii. being required to not disclose to the federal research agency or employing institution the participation of such individual in such program, position, or activity; or
ix. having a conflict of interest or conflict of commitment contrary to the standard terms and conditions of the federal research and development award; and

B. a program that is sponsored by—
i. a foreign country of concern or an entity based in a foreign country of concern, whether or not directly sponsored by the foreign country of concern;
ii. an academic institution on the list developed under section 1286(c)(8) of the John S. McCain National Defense Authorization Act for Fiscal Year 2019 (10 U.S.C. § 2358 note; [1] Public Law 115–232); or
iii. a foreign talent recruitment program on the list developed under section 1286(c)(9) of the John S. McCain National Defense Authorization Act for Fiscal Year 2019 (10 U.S.C. § 2358 note; [1] Public Law 115–232).

Consistent with applicable law (42 U.S.C. § 19232), this provision does not prohibit, unless such activities are funded, organized, or managed by an academic institution or a foreign talent recruitment program on the lists developed under paragraphs (8) and (9) of section 1286(c) of the John S. McCain National Defense Authorization Act for Fiscal Year 2019 (10 U.S.C. § 4001 note; Public Law 115–232):

A. making scholarly presentations and publishing written materials regarding scientific information not otherwise controlled under current law;

B. participation in international conferences or other international exchanges, research projects or programs that involve open and reciprocal exchange of scientific information, and which are aimed at advancing international scientific understanding and not otherwise controlled under current law;

C. advising a foreign student enrolled at an institution of higher education or writing a recommendation for such a student, at such student's request; and

D. other international activities determined appropriate by the federal research agency head or designee.

29. Use and Disclosure of Application Information

Department of Energy (DOE) takes very seriously the confidentiality of all applicants and will treat properly marked sensitive information submitted in applications, as well as the identity of applicants, as confidential to the fullest extent permissible under Federal law. In order for DOE to protect confidential information, the applicant must also treat the information as confidential and properly mark it as described below. DOE will not be able to protect information that the applicant has released publicly or is in the public domain. For additional information on DOE's Freedom of Information Act (FOIA) regulations, see 10 C.F.R. § 1004.

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

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

Applications and other submissions containing confidential, proprietary, or privileged information must be marked as described below. Failure to comply with these marking requirements may result in the disclosure of the unmarked information under the FOIA or otherwise. The U.S. Government is not liable for the disclosure or use of unmarked information and may use or disclose such information for any purpose.

The cover sheet of the Application and other submission must be marked as follows and identify the specific pages containing trade secrets, confidential, proprietary, or privileged information:

Notice of Restriction on Use and Disclosure of Information:
Pages [list applicable pages] of this document may contain trade secrets or business-sensitive, proprietary, or otherwise confidential information that is exempt from public disclosure. Such information shall be used or disclosed only for evaluation purposes with the restriction that the information be retained in confidence and not be further disclosed,

or in accordance with an agreement between the submitter and the government. The government may use or disclose any information that is not appropriately marked or otherwise restricted, regardless of source. [End of Notice]

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

Notwithstanding the above, for compliance with the PRESIDENTIAL MEMORANDUM on SIMPLIFYING THE FUNDING OF ENERGY INFRASTRUCTURE AND CRITICAL MINERAL AND MATERIAL PROJECTS, the Department of Energy may share and use within the Government any application information provided by or on behalf of the applicant. Accordingly, in accordance with applicable law and notwithstanding any other provisions herein, by submitting an application or agreeing to an arrangement with the Department of Energy under this RFA, the applicant is providing consent for any properly marked trade secret or confidential, proprietary, privileged, or otherwise sensitive application information provided by or on behalf of the applicant to be disclosed to the Executive Office of the President and relevant agencies offering loans, grants, equity, guarantees, or other federal funding for the purposes of the Presidential Memorandum on Simplifying the Funding of Energy Infrastructure and Critical Mineral and Material Projects.

IMPORTANT GUIDANCE FOR COMPANY SUBMITTERS:

As per DOE's FOIA regulations and Department of Justice FOIA guidance, if DOE receives a FOIA request the following general steps will be taken:

1. DOE will review the request to determine whether your company's information is subject to the request. Only federal records are subject to FOIA requests. Depending on the circumstances, information submitted by an outside entity may be considered "federal records" for purposes of FOIA.
2. If your company information is determined to be a federal record and responsive to a FOIA request, DOE will review what was submitted in order to determine if DOE can make a determination whether the information is legally exempt.
    a. If DOE determines your information is fully exempt under an exemption and that it will not be released, DOE may not contact you.
    b. If DOE is unable to determine whether the information is exempt under an exemption or is planning on releasing some or all of your information, DOE will first contact you in order for you to have an opportunity to respond and provide additional justification as to why it may be exempt. DOE will do all that it can to work with company submitters to be in compliance with the law and maintain positive relations with company submitters.
    c. It is critical if DOE or DOE's contractors who are processing your FOIA contact you that you respond in a timely manner. DOE is under strict deadlines when processing a FOIA request.

30. Publications

The recipient is expected to publish scientific results in peer-reviewed journals or otherwise make publicly available the results of the work conducted under any award resulting from this RFA. Publications and other methods of public communication describing any work based on or developed under an award resulting from this RFA must contain an acknowledgment of SC support. The format for such acknowledgments is provided at https://science.osti.gov/funding-opportunities/acknowledgements/. The author's copy of any peer-reviewed manuscript accepted for publication 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. Awards made under this RFA are subject to DOE's Public Access Plan. Full-text versions of scientific publications must be made publicly accessible at no charge to readers.

31. Registration Requirements

Prime recipients must keep their data in SAM current at www.SAM.gov. Subrecipients at all tiers must obtain UEI numbers and provide the UEI to the prime recipient before the subaward can be issued.

32. Research Misconduct

Scientific discoveries can only take place when scientific research is conducted in a fair, transparent, and honestly reported manner. Any form of dishonesty—whether plagiarism, falsifying results, or misrepresenting conditions—makes it impossible to advance our understanding of the physical universe.

Recipients are "responsible for maintaining the integrity of research of any kind under an award from DOE including the prevention, detection, and remediation of research misconduct, and the conduct of inquiries, investigations, and adjudication of allegations of research misconduct," and conducting appropriate administrative processes in response to allegations of research misconduct in accordance with 2 C.F.R. § 910.132. Allegations of any misconduct under an award resulting from this RFA must be reported to the appropriate institutional officials in accordance with institutional policies against misconduct. Additional information on DOE research misconduct policies can be found at: https://science.osti.gov/grants/Policy-and-Guidance/Research-Misconduct.

33. Research Security Training Requirement

Covered individuals listed on applications are required to certify that they have taken research security training consistent with section 10634 of the CHIPS and Science Act of 2022. In addition, an applicant who receives an award must maintain sufficient records (records must be retained for the time period noted in 2 C.F.R. § 200.334 and made available to DOE upon request) of its compliance with this requirement for covered individuals at the applicant/recipient organization and it must extend this requirement to any and all subrecipients.

Include this information for each covered individual with the Current and Pending Support submission as described above.

34. Rights in Data

For U.S. government rights in application information, please refer to the Use and Disclosure of Application Information section. The U.S. government rights to data produced under the award or used in the performance of the award varies according to following classifications.

Limited Rights Data: Limited Rights Data is data (other than computer software) developed at private expense that embody trade secrets or are commercial or financial and confidential or privileged. For limited rights data used in the performance of the award, the U.S. government may inspect such data for the purposes of verifying the limited rights data rights assertion or for evaluating work performance, but will not normally require delivery of such data. For awards requiring delivery of Limited Rights Data and to ensure the protection of such data, the Limited Rights Data must be properly marked as set forth in the award's intellectual property terms and conditions.

Unlimited Rights: Unlimited Rights Data is data first produced under the award or unmarked data delivered to the U.S. government as part of the award. Unlimited rights mean the right of the U.S. government to use, disclose, reproduce, prepare derivative works, distribute copies to the public, and perform publicly and display publicly, in any manner and for any purpose whatsoever, and to have or permit others to do so.

Patentable Information: In addition to any other protection allowed under the award, invention disclosures and other patentable information may be protectable from public disclosure for a reasonable time to allow for filing a patent application.

Protected Data: Notwithstanding the unlimited rights that the U.S. government normally obtains in data first produced under the award, DOE may in certain circumstances pursuant to special statutory authority provide that certain categories of data first produced under awards resulting from this RFA may be marked as Protected Data. Protected Data is technical data or commercial or financial data first produced under the award which, if it had been obtained from and first produced by a non-federal party, would be privileged or confidential. Such data is protected from public disclosure for up to five years after the data was first produced. Should DOE grant the ability to mark data as Protected Data, DOE may in certain circumstances authorize protection of data for more than five years. To qualify as Protected Data, DOE must concur with the classification, and the data must be properly marked as set forth in the award's intellectual property terms and conditions. The applicant may request Protected Data in their award terms, and DOE may, at its discretion and subject to applicable authorities, include applicable terms in the resulting award.

The recipient, subrecipient(s), and contractor(s) may assert copyright in copyrightable works, such as software, first produced under the award without DOE approval. When copyright is asserted, the government retains a paid-up nonexclusive, irrevocable worldwide license to

reproduce, prepare derivative works, distribute copies to the public, and to perform publicly and display publicly the copyrighted work. This license extends to contractors and others doing work on behalf of the government.

35. Statement of Federal Stewardship

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

36. Subaward and Executive Reporting

Additional administrative requirements necessary for DOE agreements to comply with the Federal Funding and Transparency Act of 2006 are contained in 2 C.F.R. § 170. (See: www.eCFR.gov). Prime recipients must register with the new Federal Funding and Transparency Act Subaward Reporting System (FSRS) at https://www.fsrs.gov and report the required data on their first tier subrecipients. Prime recipients may be required to report the total compensation for their five most highly compensated executives as part of their registration profile in SAM.gov and for first-tier subrecipients' five most highly compensated executives as in FSRS.gov.

37. Title to Subject Inventions

DOE intends to release fast-track OT agreements using provisions similar to 37 C.F.R. § 401.14 and 35 U.S.C. § 200 et seq. allowing recipients to elect to retain title to their subject inventions. This RFA uses DOE's OTA to negotiate intellectual property rights.

38. Trafficking in Persons

Awards resulting from this RFA are subject to the requirements of 2 C.F.R. § 175 (https://www.ecfr.gov) which prohibit recipients, their employees, subrecipients, and their employees from severe forms of trafficking in persons; the procurement of a commercial sex act during the period of time that this award or any subaward is in effect; the use of forced labor in the performance of this award or any subaward; or acts that directly support or advance trafficking in persons.

39. U.S. Competitiveness

The following U.S. Competitiveness is required under all award types, including OTAs.

A primary objective of DOE's multi-billion-dollar research, development and demonstration investments is to cultivate new research and development ecosystems, manufacturing capabilities, and supply chains for and by U.S. industry and labor. Therefore, in

exchange for receiving taxpayer dollars to support an applicant's project, the applicant must agree to a U.S. Competitiveness provision requiring any products embodying any subject invention or produced using any subject invention will be manufactured substantially in the United States unless the Recipient can show to the satisfaction of DOE that it is not commercially feasible.

Please note that a subject invention is any invention conceived or first actually reduced in performance of work under an award. An invention is any invention or discovery which is or may be patentable. The recipient includes any awardee, recipient, sub-awardee, or sub-recipient.

As noted in the U.S. Competitiveness Provision, if an entity cannot meet the requirements of the U.S. Competitiveness Provision, the entity may request a modification or waiver of the U.S. Competitiveness Provision. If granted, DOE will modify the award terms and conditions for the requesting entity accordingly. More information and guidance on the waiver and modification request process can be found in the DOE Financial Assistance Letter on this topic, available here at https://www.energy.gov/management/pf-2022-09-fal-2022-01-implementation-doe-determination-exceptional-circumstances-under. Additional information on DOE's Commitment to Domestic Manufacturing for DOE-funded R&D is available at https://www.energy.gov/gc/us-manufacturing.

40. Updating Your Portfolio Analysis and Management System (PAMS) Profile

All applicants are encouraged to update their profiles in the PAMS website at https://pamspublic.science.energy.gov regularly to ensure SC has your most up to date information. The PAMS profile allows individuals to provide responses to various fields, including selecting a "Do not wish to provide" option. Your individual information will not be shared with peer reviewers and the information in your PAMS profile is protected by the requirements established in the Federal Privacy Act of 1974.

D. Reference Material

Glossary of Terms

Acquisition cost	*Acquisition cost* means the cost of the asset including the cost to ready the asset for its intended use. Acquisition cost for equipment, for example, means the net invoice price of the equipment, including the cost of any modifications, attachments, accessories, or auxiliary apparatus necessary to make it usable for the purpose for which it is acquired. Acquisition costs for software includes those development costs capitalized in accordance with generally accepted accounting principles (GAAP). Ancillary charges, such as taxes, duty, protective in transit insurance, freight, and installation may be included in or excluded from the acquisition cost in accordance with the non-Federal entity's regular accounting practices.
Administrative requirements	*Administrative requirement*s mean the general business management practices that are common to the administration of all grants, such as financial accountability, reporting, equipment management, and retention of records.

Advance payment	*Advance payment* means a payment that a Federal awarding agency or pass-through entity makes by any appropriate payment mechanism, including a predetermined payment schedule, before the non-Federal entity disburses the funds for program purposes.
Allocation	*Allocation* means the process of assigning a cost, or a group of costs, to one or more cost objective(s), in reasonable proportion to the benefit provided or other equitable relationship. The process may entail assigning a cost(s) directly to a final cost objective or through one or more intermediate cost objectives.
Allocability	*Allocability* means the principle which requires that an expense or service charged must directly benefit and be necessary for the performance of the project; when multiple projects are benefited reasonable proportions must be able to be assigned. See 2 C.F.R. § 200.405.
Allowable cost	*Allowable cost* means a cost incurred by a recipient that is: (1) reasonable for the performance of the award; (2) allocable; (3) in conformance with any limitations or exclusions set forth in the Federal cost principles applicable to the organization incurring the cost or in the award documents as to the type or amount of cost; (4) consistent with regulations, policies, and procedures of the recipient that are applied uniformly to both federally supported and other activities of the organization; (5) accorded consistent treatment as a direct or indirect cost; (6) determined in accordance with generally accepted accounting principles; and (7) not included as a cost in any other federally supported award (unless specifically authorized by statute). See 2 C.F.R. § 200.403.
Application	*Application* means a request for financial support of a project or activity submitted to DOE on specified forms and in accordance with DOE instructions. Also known as a proposal.
Appropriation Act	*Appropriation act* means the statute that provides the authority for Federal agencies to incur obligations to and make payments out of the U.S. treasury for specified purposes.
Approved budget	The *approved budget* for the Federal award summarizes the financial aspects of the project or program as approved during the Federal award process. It may include either the Federal and non-Federal share or only the Federal share, depending upon Federal awarding agency requirements. It must be related to performance for program evaluation purposes whenever appropriate. See 2 C.F.R. § 200.308(a).
Assurance	*Assurance* means a certification by an applicant, normally included with the application or State plan, indicating that the entity complies with, or that it will comply with, a particular requirement if awarded.
Authorized organizational representative	*Authorized organizational representative* means the individual, named by the applicant organization, who is authorized to act for the applicant and to assume the obligations imposed by the Federal laws, regulations, requirements, and conditions that apply to applications or grant awards.
Award	*Award* means the provision of funds by DOE, based on an approved application and budget or progress report, to an organizational entity or an individual to carry out a project or activity.
Award documents	*Award documents* means the entirety of the documents describing the legal relationship between DOE and an awardee or recipient. The award documents include an Assistance Agreement and other documents which may be incorporated by reference or as attachments to the Assistance Agreement. The award documents are the official, legally binding document, signed (or the electronic equivalent of signature) by a Agreements Officer that: notifies the recipient of the award of an award; contains or references all the terms and conditions of the grant and Federal funding limits and obligations; and,

	provides the documentary basis for recording the obligation of Federal funds in the DOE accounting system.
Bayh-Dole Act	*Bayh-Dole Act* means a law which encourages universities and researchers to develop their inventions into marketable products; formal citation is section 6 of the Patent and Trademark Amendment of 1980, Pub. L 96-517 as amended.
Budget	*Budget* means the financial plan for the project or program that the Federal awarding agency or pass-through entity approves during the Federal award process or in subsequent amendments to the Federal award. It may include the Federal and non-Federal share or only the Federal share, as determined by the Federal awarding agency or pass-through entity.
Budget period	*Budget period* means the intervals of time (usually 12 months each) into which a project period is divided for budgetary and funding purposes.
Business officer	*Business officer* means the financial official of the recipient who has primary fiscal responsibility for the award. Also known as authorized organizational representative.
Capital assets	*Capital assets* means tangible or intangible assets used in operations having a useful life of more than one year which are capitalized in accordance with GAAP. Capital assets include: (a) Land, buildings (facilities), equipment, and intellectual property (including software) whether acquired by purchase, construction, manufacture, lease-purchase, exchange, or through capital leases; and (b) Additions, improvements, modifications, replacements, rearrangements, reinstallations, renovations or alterations to capital assets that materially increase their value or useful life (not ordinary repairs and maintenance).
Carryover	*Carryover* means unobligated Federal funds remaining at the end of any budget period that may be carried forward to another budget period to cover allowable costs of that budget period (whether as an offset or additional authorization). Obligated, but unliquidated, funds are not considered carryover.
Change in scope	*Change in scope* means an activity whereby the objectives or specific aims identified in the approved application are significantly changed by the recipient after award. Agreements Officer prior approval is required for a change in scope to be allowable under an award.
Closeout	*Closeout* means the process by which a Federal awarding agency determines that all applicable administrative actions and all required work under an award have been completed by the recipient and the Federal awarding agency.
Competitive segment	*Competitive segment* means the initial project period recommended for support or each extension of a project period resulting from a renewal award.
Conference (domestic or international)	*Conference (domestic or international)* means a symposium, seminar, workshop, or any other organized and formal meeting, whether conducted face-to-face or via the Internet, where individuals assemble (or meet virtually) to exchange information and views or explore or clarify a defined subject, problem, or area of knowledge, a published report results from such meeting.
Consortium or sub-award agreement	*Consortium or sub-award agreement* means a formalized agreement whereby a research project is carried out by the recipient and one or more other organizations that are separate legal entities. Under the agreement, the recipient must perform a substantive role in the conduct of the planned research and not merely serve as a conduit of funds to another party or parties. These agreements typically involve a specific level of effort from the consortium organization's PD/PI and a categorical breakdown of costs, such as personnel, supplies, and other allowable expenses, including F&A costs. The relationship between the recipient and the collaborating organizations is considered a subrecipientrelationship.
Consultant	*Consultant* means an individual who provides professional advice or services for a fee, but not as an employee of the engaging party. To prevent apparent or

	actual conflicts of interest, recipients and consultants must establish written guidelines indicating the conditions of payment of consulting fees. Consultants also include firms that provide professional advice or services. See 2 C.F.R. § 200.459.
Continuation application/award	*Continuation application/award* means a financial assistance request (in the form of an application or progress report) or resulting award for a subsequent budget period within a previously approved project period for which a recipient does not have to compete with other applicants.
Contract	*Contract* means a legal instrument by which a non-Federal entity purchases property or services needed to carry out the project or program under a Federal award. The term as used in this part does not include a legal instrument, even if the non-Federal entity considers it a contract, when the substance of the transaction meets the definition of a Federal award or sub-award (see 2 C.F.R. § 200.1 Subaward).
Contractor	*Contractor* means an entity that receives a contract as defined in 2 C.F.R. § 200.1 Contract.
Contracting (or Grants) Officer	*Contracting (or Grants) Officer* means a DOE official responsible for the business management aspects of grants and cooperative agreements, including review, negotiation, award, and administration, and for the interpretation of grants administration policies and provisions. COs and GOs are delegated the authority to obligate DOE to the expenditure of funds and permit changes to approved projects on behalf of DOE.
Contracting (or Grants Management) specialist	*Contracting (or Grants Management) specialist* means a DOE staff member who works with a Contracting or Grants Officer and is assigned the day-to-day management of a portfolio of grants and/or cooperative agreements. These activities include, but are not limited to, evaluating applications for administrative content and compliance with statutes, regulations, and guidelines; negotiating grants; providing consultation and technical assistance to recipients; and administering grants after award.
Cooperative agreement	*Cooperative agreement* means a type of financial assistance used when there will be substantial Federal scientific or programmatic involvement. Substantial involvement means that, after award, scientific or program staff will assist, guide, coordinate, or participate in project activities.
Cost principles	*Cost principles* means the government-wide principles, 2 C.F.R. § 200 Subpart E (or, in the case of commercial organizations, the Federal Acquisition Regulation [48 C.F.R. § 31], or, in the case of hospitals, see Appendix IX to Part 200—Hospital Cost Principles, Appendix E, "Principles for Determining Costs Applicable to Research and Development Under Grants and Contracts with Hospitals"), on allowability and unallowability of costs under federally sponsored agreements.
Cost sharing or matching	*Cost sharing or matching* means the portion of project costs not paid by Federal funds (unless otherwise authorized by Federal statute). See also 2 C.F.R. § 200.306 Cost sharing or matching.
Deadline	*Deadline* means the published date and/or time that a application is to be submitted to the funding agency.
Debarment and suspension	*Debarment and suspension* mean the actions taken by a debarring official in accordance with OMB guidance at 2 C.F.R. § 180, "Non-procurement Debarment and Suspension," to exclude a person or organization from participating in grants and other non-procurement awards government-wide. If debarred or suspended, the person or organization may not receive financial assistance (under a grant, cooperative agreement, or sub-award, or contract under a grant) for a specified period of time. Debarments and suspensions carried out pursuant to 2 C.F.R. § 376 are distinct from post-award suspension action by an awarding agency. See 2 C.F.R. § 901 for DOE implementation.

Direct costs	*Direct costs* mean costs that can be identified specifically with a particular sponsored project, an instructional activity, or any other institutional activity, or that can be directly assigned to such activities relatively easily with a high degree of accuracy. See 2 C.F.R. § 200.413.
Disallowed costs	*Disallowed costs* mean those charges to a Federal award that the Federal awarding agency or pass-through entity determines to be unallowable, in accordance with the applicable Federal statutes, regulations, or the terms and conditions of the Federal award.
Domestic organization	*Domestic organization* means a public (including a State or other governmental agency) or private non-profit or for-profit organization that is located in the United States or its territories, is subject to U.S. laws, and assumes legal and financial accountability for awarded funds and for the performance of the grant-supported activities.
Effort	*Effort* means the amount of time, usually expressed as a percentage of the total, which a faculty member or other employee spends on a sponsored project. No one is allowed to spend more than 100 percent total commitment on all academic activities, including grant-sponsored research, university-sponsored research, teaching, administration, advising and other contracted duties. Effort is indicated on the budget in units of person-months.
Equipment	*Equipment* means tangible personal property (including information technology systems) having a useful life of more than one year and a per-unit acquisition cost which equals or exceeds the lesser of the capitalization level established by the non-Federal entity for financial statement purposes, or $10,000. See also 2 C.F.R. § 200.1 Capital assets, Computing devices, General purpose equipment, Information technology systems, Special purpose equipment, and Supplies.
Expanded authorities	*Expanded authorities* means authorization to recipients under certain research grant mechanisms which waives the requirement for prior agency approval for specified actions related to awards. Example: 90-day pre-award spending authority, no cost extensions for up to one additional year, and automatic carryover of unobligated funds from one budget period to the next. The expanded authorities are now contained in Uniform Guidance of 2 C.F.R. § 200 as being applicable to all research awards.
Expiration date	*Expiration date* means generally, the date signifying the end of the current project period, after which the recipient is not authorized to obligate award funds.
Facilities and administrative costs	*Facilities and administrative costs* mean costs that are incurred by a recipient for common or joint objectives and that, therefore, cannot be identified specifically with a particular project or program. These costs also are known as indirect costs.
Federal financial report	*Federal financial report* means submitted on Standard Form (SF) 425, to indicate the status of awarded funds for the period covered. Frequency of reporting is specified in the Reporting Checklist provided as part of the award documents.
Financial assistance	*Financial assistance* means transfer by DOE of money or property to an eligible entity to support or stimulate a public purpose authorized by statute.
Financial status report	*Financial status report* means see Federal Financial Report.
Foreign travel	*Foreign travel* is meant to include travel outside of North America (Canada, Mexico, and the United States) and U.S. territories and possessions (Guam, American Samoa, Puerto Rico, the U.S. Virgin Islands. A trip is considered foreign travel for all legs of the itinerary if the traveler does not return to his or her post prior to departure for a foreign destination. Costs for foreign travel may be restricted by the language of a Funding Opportunity Announcement.

Grant agreement	*Grant agreement* means a legal instrument of financial assistance between a Federal awarding agency or pass-through entity and a non-Federal entity that, consistent with 31 U.S.C. §§ 6302, 6304: (a) Is used to enter into a relationship the principal purpose of which is to transfer anything of value from the Federal awarding agency or pass-through entity to the non-Federal entity to carry out a public purpose authorized by a law of the United States (see 31 U.S.C. § 6101(3)); and not to acquire property or services for the Federal awarding agency or pass-through entity's direct benefit or use; (b) Is distinguished from a cooperative agreement in that it does not provide for substantial involvement between the Federal awarding agency or pass-through entity and the non-Federal entity in carrying out the activity contemplated by the Federal award. (c) Does not include an agreement that provides only: (1) Direct United States Government cash assistance to an individual; (2) A subsidy; (3) A loan; (4) A loan guarantee; or (5) Insurance.
Grant-supported project or activity	*Grant-supported project or activity* means those activities specified or described in an application or in a subsequent submission that are approved by DOE for funding, regardless of whether Federal funding constitutes all or only a portion of the financial support necessary to carry them out.
Grants.gov	*Grants.gov* (https://www.Grants.gov/) has been designated by the Office of Management and Budget as the single access point for all programs offered by 26 Federal grant-making agencies. It provides a single interface for agencies to announce their grant opportunities and for all applicants to find and apply for those opportunities.
Indirect costs (facilities & administrative)	*Indirect (F&A) costs* mean those costs incurred for a common or joint purpose benefitting more than one cost objective, and not readily assignable to the cost objectives specifically benefitted, without effort disproportionate to the results achieved. To facilitate equitable distribution of indirect expenses to the cost objectives served, it may be necessary to establish several pools of indirect (F&A) costs. Indirect (F&A) cost pools must be distributed to benefitted cost objectives on bases that will produce an equitable result in consideration of relative benefits derived.
Institutional base salary	*Institutional base salary* means the annual compensation paid by an organization for an employee's appointment, whether that individual's time is spent on research, teaching, patient care, or other activities. Base salary excludes any income that an individual may be permitted to earn outside of duties for the applicant/recipient organization. Base salary may not be increased as a result of replacing organizational salary funds with grant funds.
Matching or cost sharing	*Matching or cost sharing* means the value of third-party in-kind contributions and the portion of the costs of a federally assisted project or program not borne by the Federal government. Matching or cost sharing may be required by statute or program regulation. Costs used to satisfy matching or cost-sharing requirements are subject to the same policies governing allowability as other costs under the approved budget.
Merit (or peer) review	*Merit (or peer) review* means the process that involves the consistent application of standards and procedures that produce fair, impartial, and objective examinations of applications based on an evaluation of scientific or technical merit or other relevant aspects of the application. The review is performed by experts (reviewers) in the field of endeavor for which support is requested. Merit review is intended to provide guidance to the DOE individuals responsible for making award decisions.

Monitoring	*Monitoring* means a process whereby the programmatic and business management performance aspects of an award are assessed by reviewing information gathered from various required reports, audits, site visits, and other sources.
NEPA	*NEPA* means the National Environmental Policy Act (NEPA), 42 U.S.C. § 4331, et seq. , as amended. NEPA requires Federal agencies to assess the environmental effects of proposed major Federal actions prior to making decisions.
No-cost extension	*No-cost extension* means an extension of time to a project period and/or budget period to complete the work of the award under that period, without additional Federal funds or competition.
Non-Federal share	*Non-Federal share* means when cost sharing or matching is required as a condition of an award, the portion of allowable project/program costs not borne by the Federal government.
Request for Application (RFA)	*Request for Application (RFA)* means a publicly available document by which a Federal Agency makes known its intentions to award discretionary grants or cooperative agreements, usually as a result of competition for funds. RFAs may be known as program announcements, requests for applications, notices of funding availability, solicitations, or other names depending on the Agency and type of program. RFAs can be found at www.Grants.gov.
Obligations	*Obligations,* when used in connection with a non-Federal entity's utilization of funds under a Federal award, mean orders placed for property and services, contracts and sub-awards made, and similar transactions during a given period that require payment by the non-Federal entity during the same or a future period.
OMB circulars	*OMB circulars* are government-wide guidance issued to Heads of Federal agencies by the Director of the Office of Management and Budget.
Other significant contributors	*Other significant contributors* mean individuals who have committed to contribute to the scientific development or execution of the project, but are not committing any specified measurable effort (i.e., person months) to the project. These individuals are typically presented at "effort of zero person months" or "as needed." Individuals with measurable effort may not be listed as Other Significant Contributors (OSCs). Consultants should be included if they meet this definition.
Other Transactions	*Other Transactions refer to DOE's other transactions authorities, including 42 U.S.C. § 7256(a), (g) (1993)*
Program participant	*Program participants* are the recipients of service or training provided at a workshop, conference, seminar, symposium or other short-term instructional or information-sharing activity funded by an external award, or the training beneficiaries of the project or program funded by an external award. A participant is not involved in providing any deliverable to the recipient or a third party or would not be terminated or replaced for failure to perform.
Participant support costs	*Participant support costs* mean direct costs for items such as stipends or subsistence allowances, travel allowances, and registration fees paid to or on behalf of participants or trainees (but not employees) in connection with conferences, or training projects.
Person months	*Person months* is the metric for expressing the effort (amount of time) PD/PI(s), faculty and other senior/key personnel devote to a specific project. The effort is based on the type of appointment of the individual with the organization, e.g., calendar year, academic year, and/or summer term; and the organization's definition of such. For instance, some institutions define the academic year as a nine (9)-month appointment while others define it as a ten-month appointment.
Pre-application or pre-proposal	*Pre-application or pre-proposal* means a brief outline or narrative of proposed work and sometimes budget, for informal review by a sponsor to determine

	whether an application should be submitted. Three predominant reasons for requiring submission of a preliminary pre-application are: Reduce the applicant's unnecessary effort in proposal preparation when the chance of success is very small. This is particularly true of exploratory initiatives where the community senses that a major new direction is being identified, or competitions that will result in a small number of actual awards. Increase the overall quality of the submission. Distill the number of applications that will be submitted to the agency and the number of anticipated reviewers needed to review.
Pre-award costs	*Pre-award costs* mean any cost incurred prior to the beginning date of the project period or the initial budget period of a competitive segment (under a multi-year award), in anticipation of the award and at the applicant's own risk, for otherwise allowable costs.
Prior approval	*Prior approval* means written approval from the designated Contracting Officer.
Program Director/ Principal Investigator	*Program Director/ Principal Investigator* means the individual(s) designated by the applicant organization to have the appropriate level of authority and responsibility to direct the project or program to be supported by the award. The applicant organization may designate multiple individuals as program directors/principal investigators (PD/PIs) who share the authority and responsibility for leading and directing the project, intellectually and logistically. When multiple PD/PIs are named, each is responsible and accountable to the applicant organization, or as appropriate, to a collaborating organization for the proper conduct of the project or program including the submission of all required reports. The presence of more than one PD/PI on an application or award diminishes neither the responsibility nor the accountability of any individual PD/PI.
Program income	*Program income* means gross income earned by the non-Federal entity that is directly generated by a supported activity or earned as a result of the Federal award during the period of performance except as provided in 2 C.F.R. § 200.307 paragraph (f). (See 2 C.F.R. § 200.1 Period of performance.) Program income includes but is not limited to income from fees for services performed, the use or rental or real or personal property acquired under Federal awards, the sale of commodities or items fabricated under a Federal award, license fees and royalties on patents and copyrights, and principal and interest on loans made with Federal award funds. Interest earned on advances of Federal funds is not program income. Except as otherwise provided in Federal statutes, regulations, or the terms and conditions of the Federal award, program income does not include rebates, credits, discounts, and interest earned on any of them. See also 2 C.F.R. § 200.407 Prior written approval (prior approval). See also 35 U.S.C. § 200-212 "Disposition of Rights in Educational Awards" for inventions made under Federal awards.
Program Manager	*Program Manager* means the DOE official responsible for the programmatic, scientific, and/or technical aspects of a award. The same role is filled by Program Directors, Program Officers, or Project Directors at other Federal agencies.
Progress report	*Progress report* means periodic, frequently annual, report submitted by the recipient and used by DOE to assess progress and to determine whether to provide funding for the budget period that covered by the report.
Project/performance site	*Project/ performance site* means location(s) of where the work described in the research plan will be conducted.
Project period	*Project period* means the total time for which Federal support of a project has been programmatically approved as shown in the award documents; however, it does not constitute a commitment by the Federal government to fund the entire period. The total award period comprises the initial competitive

	segment, any subsequent competitive segments resulting from a renewal award(s), and extensions.
Proposal	See application.
Re-budgeting	*Re-budgeting* means reallocation of funds available for spending between approved budget categories to allow best use of funds to accomplish the project goals.
Real Property	*Real property* means land, including land improvements, structures and appurtenances thereto, but excludes moveable machinery and equipment.
Recipient	*Recipient* means the organization or individual awarded a OT agreement by DOE that is responsible and accountable for the use of the funds provided and for the performance of the award-supported project or activity. The recipient is the entire legal entity even if a particular component is designated in award documents. The recipient is legally responsible and accountable to DOE for the performance and financial aspects of the award-supported project or activity. Also known as awardee or grantee.
Renewal application	*Renewal application* means an application requesting additional funding for a period subsequent to that provided by a current award. Renewal applications compete for funds with all other peer reviewed applications and must be developed as fully as though the applicant is applying for the first time.
Research	*Research* is defined as a systematic study directed toward fuller scientific knowledge or understanding of the subject studied. See 2 C.F.R. § 200.1 Research and Development (R&D).
Research misconduct	*Research misconduct* means fabrication, falsification, or plagiarism in proposing, performing, or reviewing research, or in reporting research results, but does not include honest error or differences of opinion. See 10 C.F.R. § 733.
SAM.gov	*SAM.gov* is the System for Award Management (SAM) a consolidated service that includes Entity Registration, Assistance Listings, and other services for making, managing, and receiving Federal awards.
Scope of work	*Scope of work* means the aims, objectives, and purposes of an award; as well as the methodology, approach, analyses or other activities; and the tools, technologies, and timeframes needed to meet the award's objectives. This includes the research or training plan included with the original award application, along with any approved modifications.
Senior/Key Personnel	*Senior/Key personnel* means the PD/PI and other individuals who contribute to the scientific development or execution of a project in a substantive, measurable way, whether or not they receive salaries or compensation under the award. Typically, these individuals have doctoral or other professional degrees, although individuals at the masters or baccalaureate level may be considered senior/key personnel if their involvement meets this definition. Consultants and those with a postdoctoral role also may be considered senior/key personnel if they meet this definition. "Zero percent" effort or "as needed" is not an acceptable level of involvement for Senior/Key Personnel.
Significant re-budgeting	*Significant re-budgeting* means a threshold that is reached when expenditures in a single direct cost budget category deviate (increase or decrease) from the categorical commitment level established for the budget period by more than 25 percent of the total costs awarded. Significant re-budgeting is one indicator of change in scope.
Small business concern	*Small business concern* means a business that meets the regulatory and size requirements established by the SBA at 13 C.F.R. § 121.
Solicitation	See Request for Application.
Subaward	*Subaward* means a legal instrument by which a recipient provides funds (or property in lieu of funds) to an eligible subrecipient (or a lower-tier transaction) to perform a substantive portion of the award-supported program

	or project. The term includes such financial assistance when provided by any legal agreement (even if the agreement is called a contract) but does not include any form of assistance which is excluded from the definition of a award, including the recipient's procurement of property or services needed to carry out the project or program. The term includes consortium agreements.
Subrecipient	*Subrecipient* means a non-Federal entity that receives a subaward from a pass-through entity to carry out part of a Federal program; but does not include an individual that is a beneficiary of such program. A sub-recipient may also be a recipient of other Federal awards directly from a Federal awarding agency.
Supplement	*Supplement* means a request for an increase in support during a current budget period for expansion of the project's scope or to meet increased costs unforeseen at the time of the new or renewal application. A supplement may increase support for future years in addition to the current year. Supplements require applications and are subject to administrative and merit review.
Terms and conditions of award	*Terms and conditions of award* means all legal requirements imposed on a award by DOE, whether based on statute, regulation, policy, or other document referenced in the award, or specified by the award document itself. The award documents may include both standard and special conditions that are considered necessary to attain the award's objectives, facilitate post-award administration of the award, or otherwise protect the Federal government's interests.
UEI	*UEI* is the Unique Entity Identifier, a twelve-digit alphanumerical sequence established and assigned by the System for Award Management at https://www.SAM.gov to uniquely identify an entity.
Unallowable costs	*Unallowable costs* mean costs that cannot be charged, directly or indirectly, to Federal awards because the costs are prohibited by law, regulation (including applicable cost principles), or the terms and conditions of award. Costs that are not allowable, allocable, or reasonable are unallowable.
Unliquidated obligation	*Unliquidated obligations* mean, for financial reports prepared on a cash basis, obligations incurred by the non-Federal entity that have not been paid (liquidated). For reports prepared on an accrual expenditure basis, these are obligations incurred by the non-Federal entity for which an expenditure has not been recorded.
Unobligated balance	*Unobligated balance* means the amount of funds under a Federal award that the non-Federal entity has not obligated. The amount is computed by subtracting the cumulative amount of the non-Federal entity's unliquidated obligations and expenditures of funds under the Federal award from the cumulative amount of the funds that the Federal awarding agency or pass-through entity authorized the non-Federal entity to obligate.
Validate	In the context of the data management plan requirements, *validate* means to support, corroborate, verify, or otherwise determine the legitimacy of the research findings. Validation of research findings could be accomplished by reproducing the original experiment or analyses, comparing and contrasting the results against those of a new experiment or analyses, or by some other means.