Department of Energy (DOE)
Office of Energy Efficiency and Renewable Energy (EERE)

Bipartisan Infrastructure Law Section 41006. Water Power Projects: Innovative Technologies to Enable Low Impact Hydropower and Pumped Storage Hydropower Growth

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Informational Webinar:	November 1, 2022
Submission Deadline for Concept Papers:	December 1, 2022 5:00pm ET
Submission Deadline for Full Applications:	March 6, 2023 5:00pm ET
Expected Submission Deadline for Replies to Reviewer Comments:	May 10, 2023 5:00pm ET
Expected Date for DOE Selection Notifications:	July, 2023
Expected Timeframe for Award Negotiations:	October, 2023

- Applicants must submit a Concept Paper by 5:00pm ET on the due date listed above to be eligible to submit a Full Application.

- To apply to this FOA, applicants must register with and submit application materials through EERE Exchange at https://eere-exchange.energy.gov/, EERE's online application portal.

- Applicants must designate primary and backup points-of-contact in EERE Exchange with whom EERE will communicate to conduct award negotiations. If an application is selected for award negotiations, it is not a commitment to issue an award. It is imperative that the applicant/selectee be responsive during award negotiations and meet negotiation deadlines. Failure to do so may result in cancellation of further award negotiations and rescission of the selection.

NOTE: Due to the high demand of UEI requests and SAM registrations, entity legal business name and address validations are taking longer than expected to process. Entities should start the UEI and SAM registration process as soon as possible. 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. Additional entity validation resources can be found here: GSAFSD Tier 0 Knowledge Base - Validating your Entity .

Modifications

All modifications to the FOA are [HIGHLIGHTED] in the body of the FOA.

Mod. No.	Date	Description of Modification
0001	11/03/2022	To remove the requirement of the Community Benefits Plan section within the Content and Form of the Concept Paper in Section IV.C.
0002	11/08/2022	To update the submission deadline for Full Applications from Sunday, March 5, 2023, to Monday, March 6, 2023.

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I. Funding Opportunity Description

A. Background and Context

The Office of Energy Efficiency and Renewable Energy (EERE) on behalf of the Water Power Technologies Office (WPTO), is issuing this Funding Opportunity Announcement (FOA). Awards made under this FOA will be funded, in whole or in part, with funds appropriated by the Infrastructure Investment and Jobs Act,[1] more commonly known as the Bipartisan Infrastructure Law (BIL).

The BIL is a once-in-a-generation investment in infrastructure, designed to modernize and upgrade American infrastructure to enhance United States competitiveness, drive the creation of good-paying union jobs, tackle the climate crisis, and ensure stronger access to economic, environmental, and other benefits for disadvantaged communities.[2] The BIL appropriates more than $62 billion to the Department of Energy (DOE)[3] to invest in American manufacturing and workers; expand access to energy efficiency and clean energy; deliver reliable, clean and affordable power to more Americans; and demonstrate and deploy the technologies of tomorrow through clean energy demonstrations.

As part of and in addition to upgrading and modernizing infrastructure, DOE's BIL investments will support efforts to build a clean and equitable energy economy that achieves a carbon pollution-free electricity system by 2035, and to put the United States on a path to achieve net-zero emissions economy-wide by no later than 2050[4] to benefit all Americans.

The BIL will invest up to $36 million for the 4-year period encompassing Fiscal Years (FYs) 2022 through 2025 for the support of Hydropower research, development and

[1] Infrastructure Investment and Jobs Act, Public Law 117-58 (November 15, 2021). https://www.congress.gov/bill/117th-congress/house-bill/3684. This FOA uses the more common name "Bipartisan Infrastructure Law".

[2] Pursuant to E.O. 14008 and the Office of Management and Budget's Interim Justice40 Implementation Guidance M-21-28, DOE has developed a definition and tools to locate and identify DACs. These resources can be located at https://energyjustice.egs.anl.gov/. DOE will also recognize DACs as defined and identified by the White House Council of Environmental Quality's Climate and Economic Justice Screening Tool (CEJST), which can be located at https://screeningtool.geoplatform.gov/.

[3] U.S. Department of Energy. November 2021. "DOE Fact Sheet: The Bipartisan Infrastructure Deal Will Deliver For American Workers, Families and Usher in the Clean Energy Future." https://www.energy.gov/articles/doe-fact-sheet-bipartisan-infrastructure-deal-will-deliver-american-workers-families-and-0

[4] Executive Order (EO) 14008, "Tackling the Climate Crisis at Home and Abroad," January 27, 2021.

demonstration activities. WPTO expects the amount of funding available for projects under this FOA will be approximately $14.5 million and cover the following topic areas:

1. Hydropower Retrofits for Non-Powered Dams;
2. Innovative Pumped Storage Hydropower Technologies; and
3. Hydropower R&D by Emerging Organizations

The activities to be funded under this FOA support BIL section 41006(a)(1) and the broader government-wide approach to further the sustainable development of hydropower and pumped storage hydropower (PSH) at a reasonable cost. These activities will support the development of long duration energy storage to maximize the benefits of the clean energy transition as the nation works to curb the climate crisis, empower workers, and advance environmental justice.

i. Program Purpose

The mission of WPTO is to enable research, development, and testing of new technologies to advance marine energy, and next-generation hydropower and pumped storage systems, for a flexible, reliable grid. To reduce marine energy costs and fully leverage hydropower's contribution to the grid, WPTO invests in early-stage research and technology design; validates performance and grid-reliability for new technologies; develops and enables access to necessary testing infrastructure; and disseminates objective information and data for technology developers and decision makers. WPTO works with national laboratories, industry, universities, and other federal agencies to conduct R&D activities through competitively selected, directly funded, and cost-shared projects.

WPTO works to support DOE and EERE objectives of combating the climate crisis, creating millions of new clean energy jobs, and promoting energy and environmental justice. WPTO consists of two R&D programs: the Marine Energy Program and the Hydropower Program.

To achieve the vision of the Hydropower Program, WPTO conducts research, development, demonstration, and commercialization activities to advance transformative, cost-effective, reliable, and environmentally sustainable hydropower and pumped storage technologies; better understand and capitalize on opportunities for these technologies to support the nation's rapidly evolving grid; and improve energy water infrastructure and security.

Hydropower is defined as using structures to create hydraulic head and a turbine to convert the potential energy of falling water into mechanical energy to run a

generator for electricity generation. Hydropower has provided the U.S. with sustainable, reliable, and affordable power for over 100 years, and its capabilities have continued to evolve based on available technologies and societal needs. In addition to the economic benefits of providing cost-competitive and clean electricity, resource assessments have shown up to 12 GW[5] of potential for hydropower development at existing non-powered dams (NPDs) and that there is significant potential for research and development of innovative PSH designs[6].

In addition to the above, WPTO encourages engagement with organizations and institutions that are located in and/or serve disadvantaged communities, or have a history of training and mentoring students from populations that are under-represented in water power technologies, such as those served by Historically Black Colleges and Universities (HBCUs) and minority-serving institutions (MSIs).

This FOA supports the administration goals laid out above by seeking technology advancements that can increase the size of the hydropower and PSH fleet, so that hydropower and PSH can better enable increased deployments of other sources of renewable generation to support the goals of carbon pollution-free electricity by 2035 and net-zero greenhouse gas emissions by 2050.

As part of the whole-of-government approach to advance equity and encourage worker organizing and collective bargaining,[7,8,9] and in alignment with BIL sections 41006(a)(1), this FOA and any related activities will seek to encourage meaningful engagement and participation of workforce organizations, including labor unions, as well as underserved communities and underrepresented groups, including consultation with Tribal Nations[10]. Consistent with Executive Order 14008,[11] this FOA is designed to help meet the goal that 40% of the overall benefits of investments in clean energy and climate solutions flow to disadvantaged communities, as defined by the Department pursuant to the Executive Order. These investments should also drive the creation of good-paying jobs with the free and fair chance for workers to join a union.

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[5] Hadjerioua, B., Wei, Y., and Kao, S. 2012. An Assessment of Energy Potential at Non-Powered Dams in the United States. An Assessment of Energy Potential at Non-Powered Dams in the United States

[6] Koritarov et al. 2022. A Review of Technology Innovations for Pumped Storage Hydropower. https://publications.anl.gov/anlpubs/2022/05/175341.pdf

[7] EO 13985, "Advancing Racial Equity and Support for Underserved Communities Through the Federal Government" (January 20, 2021).

[8] EO 14025, "Worker Organizing and Empowerment," April 26, 2021.

[9] EO 14052, "Implementation of the Infrastructure Investment and Jobs Act," November 18, 2021.

[10] EO 13175, November 6, 2000 "Consultation and Coordination With Indian Tribal Governments", charges all executive departments and agencies with engaging in regular, meaningful, and robust consultation with Tribal officials in the development of federal policies that have Tribal implications.

[11] EO 14008, "Tackling the Climate Crisis at Home and Abroad," January 27, 2021.

ii. Technology Space and Strategic Goals

This FOA seeks applications to address innovative solutions to retrofit NPDs with environmentally sustainable hydropower at a reasonable cost; applications to address development and testing technologies that mitigate challenges to PSH deployment, including market and revenue uncertainty, development costs and financing, long development timelines, permitting challenges, construction risks, and environmental impacts; and applications to address and encourage emerging organizations to support hydropower development. Detailed technical descriptions of the specific Topic Areas are provided in the sections that follow.

Topic Area 1: Hydropower Retrofits for Non-Powered Dams

Non-powered dams (NPDs) are defined as dams that do not have any electricity generation equipment installed.[12] With over 89,000 NPDs[13] across the United States, there is a sizable opportunity for new renewable energy[14] in support of the Biden Administration's clean energy goals. As one of the leading sources of renewable power, hydropower represents 6.3% of the U.S. electricity generation and 31.3% of total renewable generation.[15] Despite its slow growth over the past few decades, there remains undeveloped hydropower potential in the United States, including via NPDs.

Multiple assessments have been conducted to estimate the potential to add hydropower at NPDs. The 2012 Oak Ridge National Laboratory (ORNL)-led NPD resource assessment identified over 12 GW of NPD technical development potential.[16] A subsequent 2016 U.S. Department of Energy (DOE)-funded assessment identified a long-term economic potential to add 4.8 GW at NPDs through 2050.

DOE WPTO's 2022 Multi-Year Program Plan[17] identified a number of NPD-related goals, including:

[12] Water Power Technologies Office. https://www.energy.gov/eere/water/glossary-hydropower-terms. Accessed Aug 29, 2022.
[13] According to the 2021 US Army Corps of Engineers' National Inventory of Dams (Accessed July 21, 2022).
[14] Hadjerioua, B., Wei, Y., and Kao, S. 2012. An Assessment of Energy Potential at Non-Powered Dams in the United States. An Assessment of Energy Potential at Non-Powered Dams in the United States
[15] According to the US Energy Information Administration, values as of 2021
[16] Hadjerioua, B., Wei, Y., and Kao, S. 2012. An Assessment of Energy Potential at Non-Powered Dams in the United States. An Assessment of Energy Potential at Non-Powered Dams in the United States
[17] Water Power Technologies Office. 2022. Hydropower Multi-year Program Plan. https://www.energy.gov/sites/default/files/2022-03/wpto-mypp-hydropower-plan.pdf

- Developing data sets and interactive geospatial tools to identify NPD development potential and site characteristics;
- Developing, testing, and validating new technologies for low-impact hydropower growth at NPDs; and
- Supporting standardized and modular approaches to NPD hydropower project design.

In support of these goals, several key data sets have been developed related to NPDs. These include:

- Oak Ridge National Laboratory (ORNL)'s Existing Hydropower Assets (EHA) data set[18]; and
- U.S. Hydropower Development Pipeline data set.

Additionally, WPTO has funded research at ORNL related to NPD classification, data access, and retrofitting. These research efforts include two web-based applications: the NPD Explorer[19] and NPDamCAT Apps[20,21] that enable characterization and identification of NPDs for potential hydropower retrofits, as well as the Non-Powered Dam Retrofit Exemplary Design for Hydropower Applications report.[22]

To enable deployment of new renewable energy resources, technology innovations of interest in this FOA include:

- Utilization of novel components, approaches, designs, and/or construction techniques for development of hydropower at NPDs; and
- Reduction of time, cost and/or risks associated with development of hydropower at NPDs.

The FOA will solicit technology innovations that can advance towards the prototype or pilot-scale testing stage, preferably including partnership with a hydropower owner or operator. Section I.B.i ("Topic 1: Hydropower Retrofits for Non-Powered Dams") of this document describes the scope of eligible innovations, type of work, the down-select process, and other details that a competitive application should present.

[18] Johnson, M, S-C Kao, and R Uria-Martinez. 2022. Existing Hydropower Assets (EHA), 2022. https://doi.org/10.21951/EHA_FY2021/1782791

[19] NPD Explorer (arcgis.com)

[20] NPDamCAT (ornl.gov)

[21] Carter, F., Deneale, S., Derolph, C., and Hansen, C. 2022. NPD Classification Tools - User Guide NPD Explorer and NPDamCAT Apps. Oak Ridge National Laboratory. https://doi.org/10.2172/1855640.

[22] Deneale, S., Sasthav, C., Musa, M., Hansen, C., Stewart, K., and Matson, P. Non-Powered Dam Retrofit Exemplary Design for Hydropower Applications. United States: N. p., 2022. Web. doi:10.2172/1869108.

Topic Area 2: Innovative Pumped Storage Hydropower Technologies

Energy storage is essential to economic and reliable operation of a grid with high variable renewable energy (VRE) penetration. As such, a power system with increasing VRE penetration will need to add significant new energy storage. Currently, PSH offers about 22 GW of energy storage capacity in the United States, which amounts to about 93% of all utility-scale energy storage capacity. PSH is a flexible resource that can balance energy supply with demand and provide a variety of grid services. In addition, PSH can fill a need for long-duration energy storage (LDES) to provide power system resiliency in case of prolonged extreme weather events and other disturbances. PSH is a commercially available and proven technology that can reliably meet the needs for both short- and long-duration storage.[23]

Despite these favorable technology characteristics, not many new PSH plants have been constructed in the United States in the last few decades, likely due to a combination of environmental, social, economic, and technical factors.[24] The developers of new PSH projects face significant challenges, including high capital investments, long construction periods, revenue uncertainties, long permitting and licensing processes, lack of mechanisms to provide revenues for PSH services and contributions to the system, and others.[25]

DOE WPTO's 2022 Multi-Year Program Plan[26] identified a number of R&D priorities to address these challenges and support the expansion of national PSH capacity. They include:

- supporting PSH technology R&D to reduce costs;
- soliciting ideas from outside the hydropower industry to reduce PSH commissioning timelines; and
- scoping PSH innovation opportunities.

This work is supported by the HydroWIRES (Water Innovation for a Resilient Electricity System) Initiative. The HydroWIRES Initiative, launched in April 2019 by WPTO, seeks to understand, enable, and improve hydropower's contributions

[23] Koritarov et al. 2022. A Review of Technology Innovations for Pumped Storage Hydropower. https://publications.anl.gov/anlpubs/2022/05/175341.pdf
[24] Hadjerioua et al. 2020. Pumped Storage Hydropower FAST Commissioning Technical Analysis. https://www.osti.gov/servlets/purl/1734671/
[25] Koritarov et al. 2022. A Review of Technology Innovations for Pumped Storage Hydropower. https://publications.anl.gov/anlpubs/2022/05/175341.pdf
[26] Water Power Technologies Office. 2022. Hydropower Multi-year Program Plan. https://www.energy.gov/sites/default/files/2022-03/wpto-mypp-hydropower-plan.pdf

to reliability, resilience, and integration in the rapidly evolving U.S. electricity system.[27]

This FOA topic builds on a significant body of HydroWIRES work on PSH valuation, optimization, and technology R&D. The PSH Valuation Guidebook established a comprehensive and broadly applicable methodology for valuing the many services a PSH plant can provide, including energy, capacity, ancillary services, black start, and transmission benefits.[28] To ensure easy use by developers, regulators, and other stakeholders, the PSH Valuation Guidebook was also expanded to an online web tool.[29] Other industry-led work has developed new tools and model enhancements for analyzing the value of PSH operational patterns.[30,31] Given the complexity of compensating storage capabilities, particularly long-duration storage, WPTO has also supported research on the role of PSH and other storage technologies in future market designs.[32] Recently, WPTO released its first PSH resource assessment for the U.S., highlighting high-level technical potential for new PSH deployment.[33] [34] To facilitate apples-to-apples comparison with other storage technologies, several studies have broken down PSH costs into different component categories.[35] Technology R&D efforts have focused on identifying opportunities for new PSH technologies that can overcome barriers to development. [36]

To further program goals and ongoing R&D, this topic area seeks applications to advance development and testing for innovative technologies that could accelerate the deployment of PSH. Broadly, this funding opportunity will support

[27] Water Power Technologies Office. 2022. HydroWIRES Initiative. https://www.energy.gov/eere/water/hydrowires-initiative
[28] Koritarov et al. 2021. Pumped Storage Hydropower Valuation Guidebook. https://publications.anl.gov/anlpubs/2021/03/166807.pdf
[29] Argonne National Laboratory. 2021. PSH Valuation Tool. https://pshvt.egs.anl.gov/
[30] Bo et al. 2021. Modeling and Optimizing Pumped Storage in a Multi-stage Large Scale Electricity Market under Portfolio Evolution. https://www.osti.gov/servlets/purl/1833111/
[31] Shao et al. 2021. Value and Role of Pumped Storage Hydro under High Variable Renewables. https://www.osti.gov/servlets/purl/1824300/
[32] Zhou et al. 2022. Price Formation in Zero-Carbon Electricity Markets: The Role of Hydropower. https://publications.anl.gov/anlpubs/2022/07/176317.pdf
[33] Rosenlieb et al. 2022. Closed-Loop Pumped Storage Hydropower Resource Assessment for the United States. https://www.nrel.gov/docs/fy22osti/81277.pdf
[34] Rosenlieb, E. 2022. Closed Loop Pumped Storage Hydropower Resource Assessment of the United States. https://data.openei.org/submissions/5711
[35] Mongird et al. 2020. 2020 Grid Energy Storage Technology Cost and Performance Assessment. https://www.pnnl.gov/sites/default/files/media/file/Final%20-%20ESGC%20Cost%20Performance%20Report%2012-11-2020.pdf Cite LCA report, or mention that we're doing it
[36] Koritarov et al. 2022. A Review of Technology Innovations for Pumped Storage Hydropower. https://publications.anl.gov/anlpubs/2022/05/175341.pdf

work that de-risks hydropower components, construction processes, and/or alternative PSH configurations that could reduce costs and/or improve value. Ideally, an awardee would have the necessary analysis to finance and permit a demonstration of their technology following the completion of this award. Section I.B.ii ("Topic 2: Innovative Pumped Storage Hydropower Technologies") of this document describes the scope of eligible innovations, type of work, and other details that a competitive application should present.

Topic Area 3: Hydropower R&D by Emerging Organizations

Besides the specific technology innovations of interest in Topic Areas 1 and 2 of this FOA, WPTO is open to innovative ideas in hydropower research and development that are in line with the office's strategic objectives described in the Multi-Year Program Plan.[37] WPTO aims to provide an avenue for ideas that may not align with previous and current funding opportunities through this pathway. WPTO specifically aims to support emerging organizations and institutions that have not extensively engaged with WPTO in the past, which include organizations and institutions located in or serving disadvantaged and/or underserved communities and groups, minority serving institutions (MSIs) and Historically Black Colleges and Universities (HBCUs).

B. Topic Areas

All work for projects selected under this FOA must be performed in the United States. See Section IV.J.iii. and Appendix B.

Topic Areas	
1	Hydropower Retrofits for Non-Powered Dams
2	Innovative Pumped Storage Hydropower Technologies
3	Hydropower R&D by Emerging Organizations

All technical volume submissions for all topic areas will require a Market Transformation Plan. The key goal of the plan is to identify the target market, competitors, and distribution channels for proposed technology along with known or perceived barriers to market penetration, including a mitigation plan. The market transformation plan should include but not be limited to product development and/or service plan, commercialization timeline, financing, product marketing, legal/regulatory considerations including intellectual property, infrastructure requirements, Open Source Software Distribution Plan, etc., and

[37] Water Power Technologies Office. 2022. Hydropower Multi-year Program Plan. https://www.energy.gov/sites/default/files/2022-03/wpto-mypp-hydropower-plan.pdf

product distribution. Additionally, an Industry Adoption Plan should identify the interest and extent of industry adoption of the technology/process.

i. Topic Area 1: Hydropower Retrofits for Non-Powered Dams

This topic area seeks applications to support studies and designs that facilitate the licensing, construction, and commissioning for retrofits to non-powered dams. Proposed retrofits should advance the state of the industry through providing novel and advanced methods of power production, construction, intake design, and interconnections to the larger power grid. The overall goal of this effort will support the broad decarbonization of the larger power system.

Motivation:
Resource assessments have shown a potential opportunity for development of up to 12 GW of clean energy from hydropower at the more than 90,000 non-powered dams (NPDs) in the United States.[38] Because of this, new hydropower development over the past 10 years has strongly concentrated on the addition of hydropower generation to NPDs and conduits. As of December 2019, of the 217 projects in the U.S. hydropower development pipeline, 88 are NPD projects and 109 are conduit projects.[39] However, opportunities for hydropower applications for NPDs and conduits in the United States typically have lower head potential and therefore, smaller power densities and higher normalized costs.

[38] Hadjerioua, B., et al., 2012, An Assessment of Energy Potential at Non-Powered Dams in the United States, US DOE, Office of EERE (February 2, 2022)
[39] Published by Oak Ridge National Laboratory (ORNL) and supported by DOE, "2021 U.S. Hydropower Market Report," 2021. Page 32. https://www.energy.gov/sites/prod/files/2021/01/f82/us-hydropower-market-report-full2021.pdf

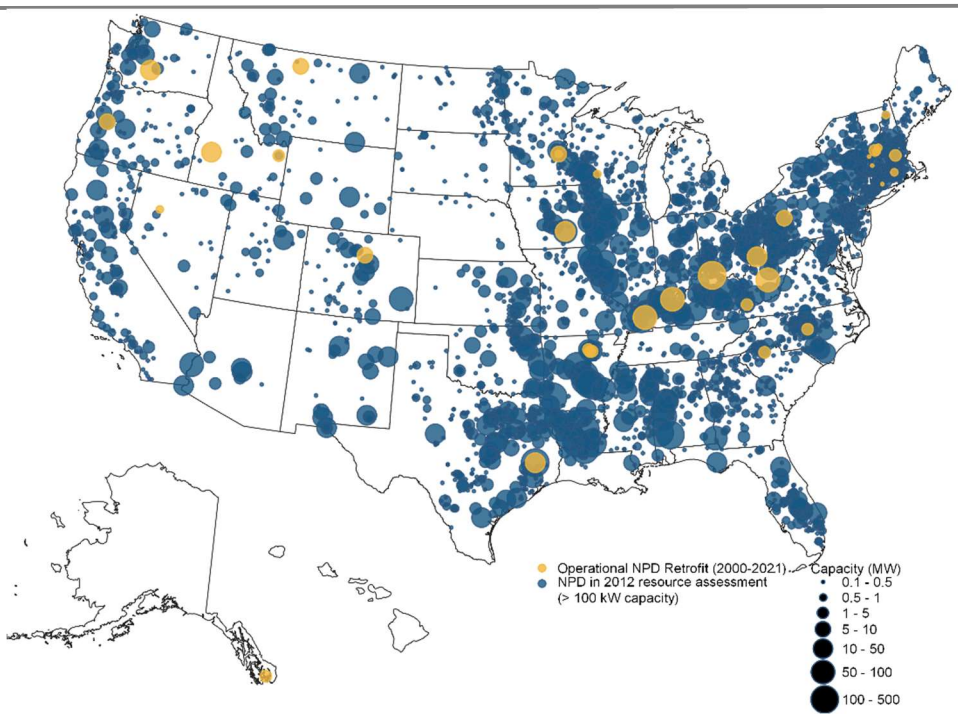

Figure 1. U.S. NPDs and operational NPD retrofits.
Blue dots represent NPDs estimated as having at least 100 kW of power potential in the 2012 NPD Resource Assessment and are scaled by capacity. Gold dots represent NPDs that were retrofitted from 2000 to 2021, totaling 588 MW in installed capacity. (Hansen et al. under review).

Based on a review of environmental assessments for Federal Energy Regulatory Commission applications, coupled with data from the U.S. Army Corps of Engineers (USACE) National Inventory of Dams (NID),[40] the National Hydropower Asset Assessment Program (NHAAP) and a U.S. resource assessment of NPDs,[41] descriptions of NPD retrofit configurations[42] can be classified into three approaches: over, around, and through a dam or diversion. "Over" refers to adding a siphon or penstock over a weir, spillway, embankment, or abutment that passes water to a powerhouse downstream; "around" refers to adding a new intake and bypass infrastructure that passes water to a powerhouse downstream; and "through" refers to adding electro-mechanical generation equipment to a new or existing outlet structure. Of the projects from

[40] US Army Corps of Engineers. 2013. National Inventory of Dams. National Inventory of Dams (army.mil)
[41] A. Witt, R. Uria-Martinez, M. Johnson, J. Werble, M. Mobley, P.W. O'Connor, United States trends in non-powered dam electrification, Int J Hydropower Dams (2018), pp. 33-38
[42] T.K. Yuguda, Y. Li, W. Xiong, W. Zhang, **Life cycle assessment of options for retrofitting an existing dam to generate hydro-electricity**, Int J Life Cycle Assess, 25 (2020), pp. 57-72, 10.1007/s11367-019-01671-1

the dataset for 2000-2020, 81% fall into the "through" category, exploiting an existing intake structure. This approach allows for the use of existing features and avoids major civil works such as the construction of new intake or penstock. The remainder used a bypass approach, and no projects used any technologies or configurations that were designed to generate power by going over the dam.[43]

Additionally, while NPDs come in a variety of shapes and sizes, serve numerous purposes, and exhibit a wide range of characteristics that make each dam unique[44]; similarities do exist. Ongoing work at ORNL, to be published, is using a data-driven approach to assess NPD hydropower development opportunities in the United States. The goal is to describe project feasibility drivers for NPDs by examining recent NPD retrofits with respect to a variety of characteristics. Based on the assessment, several attributes were selected to characterize the remaining NPD population: (1) owner type, (2) 30% exceedance flow, a common design flow that describes the flow that is exceeded by 30% of the flow in the record, (3) hydraulic head, and (4) maximum reservoir storage. These four characteristics were used as inputs to a statistical clustering analysis of a set of 2,709 NPDs with at least 100 kW potential capacity and recently retrofit dams with available data.

This assessment can help identify the commonalities that exist between the recent successful projects for adding hydropower generation at an NPD. Those characteristics can help to understand the importance of considering future innovation needs and design constraints. Additionally, the assessment characterizes the remaining population of NPDs. This can help guide innovators and developers to better understand the remaining opportunity space and how technologies should be tailored to be most adaptable to the resource potential. Innovations should consider the broad applicability of the approach to the existing NPD population based on common characteristics (i.e., head, flow, purpose and ownership). Applicants are encouraged to validate the need and value of the innovation by considering the likelihood of success based on past projects as well as the remaining resource potential.

[43] Carly Hansen, Mirko Musa, Colin Sasthav, Scott DeNeale, Hydropower development potential at non-powered dams: Data needs and research gaps, Renewable and Sustainable Energy Reviews, Volume 145, 2021, 111058, ISSN 1364-0321, https://doi.org/10.1016/j.rser.2021.111058.

[44] Hansen, C, C Sasthav, M Musa, and S Deneale. 2022. "Non-Powered Dam Custom Analysis and Taxonomy Framework." https://www.osti.gov/biblio/1855679-non-powered-dam-custom-analysis-taxonomy-npdamcat-framework

	Description	% retrofits	% NPDs
1	High flow, head, and storage federal dams, most often flood control	51.2	13.9
5	Low flow, head, and storage, privately owned, used for water supply/recreation	29.3	28.9
2	Low flow, medium head and storage, local gov, mixed purposes	14.6	36.4
3	Low flow, high head, low storage, public utility, mixed purposes	4.9	5.9
4	Low flow, medium head, large storage, largely unknown/recreation	0	14.8

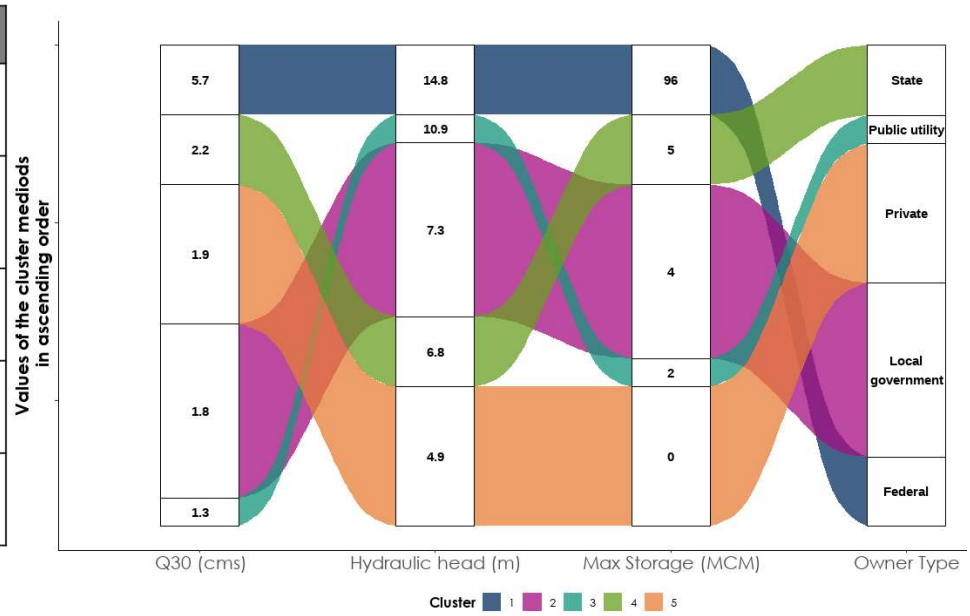

Figure 2 Alluvial diagram of clusters with the median value of the cluster for each variable. Numerical categories are shown in ascending order (increasing from bottom to top). For this study, low and high are used to describe characteristics relative to the NPD population. Note that the median of the maximum storage for cluster 5 is 0, which is commonly reported for dams with no practical storage. The table lists clusters in order of the percentage of retrofits included in each cluster to highlight which clusters have had the greatest number of successful retrofit projects. Note the differences in the relative share of retrofits and NPDs > 100 kW potential capacity in each cluster. (Hansen et al. under review)

ORNL concludes that:

- NPD retrofits have been dominated by larger, federally-owned dams. Dams with locks also are a disproportionately high share of the retrofits, relative to their share of the total NPD population.
- The dams with highest potential capacity and lowest development costs are also overwhelmingly from this category of larger federal dams.
- However, some of the highest capacity or lowest development costs come from the group of smaller state-owned dams and that cluster does not have any NPD retrofits. This highlights an area for potential needed research – to identify and remove barriers that have prevented recent development at those kinds of dams.

To enable further development of NPDs to produce clean energy, cost saving opportunities should be explored. Key findings of a recent cost analysis identify that near-term innovations could reduce the baseline costs of hydropower

development at U.S. NPD sites.[45] Thus, if remaining R&D issues with these near-term innovations can be resolved within the next 5 to 10 years, industry-wide adoption of these technologies and improved competitiveness of NPD hydropower development can be expected.[46]

Scope and Technical Requirements

This topic area is focused on innovative solutions to facilitate the retrofit of non-powered dams for hydropower generation. DOE is requesting applications that propose technologies and/or methodologies to advance the state of the industry for development of hydropower at NPDs. This FOA therefore supports a broad range of innovations that can utilize novel components, approaches, designs, and/or construction techniques to retrofit an NPD for hydropower generation. These should lead to a reduction of time, cost and/or risks. Work should improve feasibility assessments, project design, interconnection, power market assessment, or combination of other necessary topics for the technology to advance towards the prototype or pilot-scale testing stage. Partnership with a hydropower owner or operator is preferred.

While a broad set of innovations are of interest, the application should include a novel technology, method, and/or approach that has not been applied for powering NPDs in the US. This can include but is not limited to novel components, approaches, designs, and/or construction techniques fit for research and development thru testing and validation. Technologies applied in other countries may be considered. Proposed technologies should present a significant opportunity to help improve the potential for site development. The application should clearly explain the current state of the industry and how the innovation will provide an improvement.

<u>Technological Maturity</u>

The application should clearly define and justify the required R&D to de-risk the unique technology and enable advancement towards full- scale and/or pilot testing.

The application should:

- Describe the technology's current state of technological maturity

[45] Oladosu, G, et al, 2021, Pub145012.pdf (ornl.gov) , ORNL (February 11, 2022)
[46] Oladosu, G, et al, 2021, Pub145012.pdf (ornl.gov) , ORNL (February 11, 2022)

- Describe a target level of maturity, which the technology would reach if the proposed work were successful
- Describe what risks associated with the technology would be mitigated as a result of the proposed work
- Justify that the target level of maturity is a critical step towards proving the technology's value proposition, as defined in the previous section
- Justify that results from the proposed work can provide foundation for making additional steps towards full-scale deployment outside the scope of this award

Use of established scales or frameworks, such as Technology Readiness Levels (TRL), to describe technological maturity is encouraged. However, this may not be useful for all technologies. Even if such a scale or framework is used, a qualitative description of the current and target state is still required.

Additionally, the technology's current state must meet the following criteria, which represent both a maximum and minimum level of maturity allowed for this award:

- *Maximum:* This award will not consider technologies that can be described as a "Commercial Technology" under DOE LPO's Title 17 Innovation criterion.[47] According to this standard, "Commercial Technology is defined as technology that has been installed in and is being used in three or more commercial projects in the United States in the same general application as in the proposed project." Notably, this means that more mature technologies developed internationally and not yet installed in the U.S. could be eligible for this award. However, such applications should focus exclusively on barriers and opportunities unique to deployment in the U.S.
- *Minimum:* Technologies must also have progressed past basic research and development in order for this award to be useful. Basic physical principles, innovative components, and unconventional configurations must have shown some level technical or techno-economic feasibility in an existing analysis from the academic or business community. Reference(s) to academic publications, technical documents, presentations, news reports, or press releases that support any such claims are highly desirable.

<u>Siting</u>

[47] Loan Programs Office, 2022. Technical Eligibility Guide – Title 17 Innovative Clean Energy. https://www.energy.gov/lpo/articles/technical-eligibility-guide-title-17-innovative-clean-energy

Successful applications under this topic should identify a specific subset of non-powered dams for which the innovation is applicable. The innovation should be transferable and applicable to a number of sites, and the applicant should provide evidence for this. The targeted subset of dams for the innovation should be described providing a basis for its selection. This description should include elements such as the purpose of the dam, head and flow considerations, methods of water passage and control, dam type and construction, environmental impacts, including potential cumulative environmental impacts, and specific owner types. Identification of a specific site for future testing is encouraged, but not required. Evidence of engagement with the current operators of potential sites is also encouraged.

Full hydropower system development technologies should consider a water to wire approach and provide power output greater than 500kW. This means items such as water flow control and isolation, turbine types, water conveyances, generator operation and controls, methods of interconnection, and necessary balance of plant components should be described.

Applications are encouraged to include progress that has occurred to date with respect to their proposed technology(s). This may include a design basis for the technology being proposed with calculations, drawings, and technical discussions.

Value Proposition

Applicants should describe the value and utility of the innovation both quantitatively and qualitatively including, but is not limited to, elements of time, cost and/or risk. For full facility designs, applicants should describe how the project supports variable renewable energy integration, including identifying relevant electricity markets and explaining how integration of the powering the NPD will complement existing and future market and VRE needs. Plans for provision of capacity, energy, and/or other grid services (both compensated and non-compensated) should be explained, including market participation and/or offtake agreements. Plans to utilize advanced technologies that can switch rapidly between modes and provide increased flexibility to the power system are encouraged but not required. Similarly, innovation in civil works or other aspects of the plant (e.g., repurposing existing infrastructure) is also of interest.

Proposed work should also include mechanisms to engage the broader hydropower industry throughout the effort, as appropriate, to create awareness of the technology and methods being developed and solicit feedback on design and performance metrics. Such engagement efforts are important to support the

project itself, as well as to cultivate industry buy-in and markets for the technology.

The applicant is encouraged to describe, both quantitatively and qualitatively, how their selection will support future powering of non-powered dams.

Market Transformation

Every application will include a market transformation plan within its Technical Volume. Generally, this should describe how the team would leverage the work supported by this award to advance the viability of powering NPDs. Detailed requirements for the market transformation plan (and the rest of the Technical Volume) can be found in the table in Section IV.D.ii of this document. These requirements are application review criteria, as described in Section V.A.ii.

Except where infeasible due to intellectual property, deliverables should be appropriate for public dissemination. Output should include some kind of generalized resource that supports deploying a similar technology(ies) past the instance analyzed in this award.

Team and Partnerships

The team should indicate expertise and/or attention dedicated to both technical and commercialization aspects.

For WPTO, partnerships with potential stakeholders in a full-scale deployment of the technology are strong indicators of success. Letters of support are valuable illustrations of a partner's involvement. Letters of support are strongest when they indicate time commitments from specific personnel or specific challenges on which the partner will advise the applicant.

Consider indicating partnerships with the following types of organizations:

- Federally funded research and development centers
- Universities and other non-profit research institutions
- OEMs
- Engineering, procurement, and construction (EPC) firms
- Potential investors or other financial backers
- Trade associations, labor representatives, and general workforce development
- Utilities, including municipalities and co-ops, or other relevant off-takers
- Community leaders near a future demonstration site, including local non-profits

- Local or state governments responsible for a future demonstration site

Many of these are mostly relevant towards large-scale demonstrations or pilot projects, which are potentially outside the financial scope of this award. However, this award is intended to prepare applicants for future demonstrations and pilots, so advice from such groups could inform award outcomes that are more directly transferrable to the next stage of technology commercialization.

Anticipated Work to be Performed

Budget Period (BP) 1: Conceptual Verification
It is anticipated that applicants will test innovations through desktop analysis and modeling, computer-based simulations, laboratory scale tests, or a combination of both. This phase will also serve to further develop the business case for further testing and industry adoption. The deliverables noted below are provided as an example to illustrate the type of work to be performed in BP1.

Applicants must define deliverables and commensurate level of detail necessary in the application to meet the criteria discussed in the down-selection discussion below. This should occur through a detailed scope, timeline, and sequence of proposed work studies and tests, identifying the critical path and dependencies.

Anticipated deliverables: Detailed[48] technical report(s) to include the following:

- Preliminary design
- Discussion of specific innovations and options considered
- Preliminary power and efficiency analysis
- Calculations and simulations to determine performance and loads
- Necessary actions, such as permitting, necessary to progress to component validation
- Scale test plan, including ranges of operation
- Results of lab scale testing
- Financial and economic analyses like cost modeling
- Risk management and mitigation strategies
- Updated workplan for component validation
- Component validation test plan

Down-Selection from BP1 to BP2
For Topic Area 1 only, WPTO intends to conduct a down-selection upon completion of the verification/proof of concept phase (BP1). Subject matter

[48] *The level of detail should be defined by the applicant and commensurate with the technology readiness level.*

experts from academia, national laboratories, and industry may be used as reviewers, subject to conflict of interest and non-disclosure considerations. WPTO will down select up to three projects to proceed into BP2 to complete the design, build and testing plan prepared in BP1. Before the completion of BP1, all BP1 awardees will submit BP1 required deliverables to the WPTO Project Officer. These reports will be used by the WPTO team to conduct a project review against the criteria listed below. Additionally, before the completion of BP1, BP1 awardees will be required to give a presentation to WPTO team.

Down-Select Review Criteria

Projects will be evaluated based on the following criteria:

1. Technical performance and progress towards stated project objectives including technical completeness.
2. Level of innovation and potential impact of the project to reduce time, cost and/or risks associated with development of hydropower at NPDs.
3. Likelihood of project success; as indicated by the technical risk analysis, test plans, feasibility of permitting plan, progress made on permitting activities, market and financial viability, and stakeholder engagement, etc.

Upon completion of the competitive project review (down-selection process), WPTO will select which Topic Area 1 project(s) will receive federal funding beyond BP1. Due to the availability of funding and program considerations, only up to three (3) recipients will be selected to receive funding for project continuation into BP2. As a result of this down-select process, certain projects will not receive federal funding beyond BP1 even if the project is meeting the pre-defined metrics.

BP2: **Final Design, Fabrication, and Testing**

The applicant will propose the necessary items to validate the viability of the innovation and project. Based on the proposed site(s), technology(s), and progress that has occurred to date, applicants will propose the necessary steps to fully validate the long-term viability. This should occur through a detailed scope, timeline, and sequence of proposed work products, identifying the critical path and dependencies. Work in BP2 should aim for prototype or pilot-scaling testing of the innovation to improve feasibility assessments, project design, interconnection, power market assessment, or combination of other necessary topics for the technology. This should lead to a reduction of time, cost and/or risks. The following items are examples of the type of work products to be completed during BP2.

- **Detailed[49] technical report(s) to include the following:**
  - Discussion of primary features
  - Calculations supporting sizing primary features
  - Define operations criteria
  - Hydraulic design, including calculations for gross flow, elevations, slopes, hydraulic and energy grade lines
  - Updated power analysis
  - Updated DEIA plan
  - Financial analysis
  - Prototype or pilot-scale test results

- **Detailed technical drawings to convey the conceptual design, including items such as:**
  - Hydraulic Design, including elevations, shapes, slopes, and hydraulic and energy grade lines
  - Structural design elements such as foundations and water conveyance supports
  - Mechanical elements such as water conveyances, turbines, flow control, and isolation features
  - Electrical elements such as generator selection, basic control schemes, and one line system diagrams

- **Detailed workplan to convey the steps and budget needed to bring the project to full completion, including items such as:**
  - Workplan
  - Risks and risk management plan
  - Schedule, dependencies, and critical path
  - Necessary budget breakdown to finalize the project design, DOE NEPA and licensing process
  - Changes to the original budget complete with justifications

WPTO intends to manage any award under this FOA as an integrated part of the Hydropower Program, both in the selection process and during the period of performance. This may include coordination with efforts by the DOE National Laboratories and other external partners.

All work for projects selected under this FOA must be performed in the United States. See Section IV.J.iii. and Appendix B.

[49] *The level of detail should be defined by the applicant and commensurate with the conceptual design.*

ii. Topic Area 2: Innovative Pumped Storage Hydropower Technologies

Motivation

Energy storage is essential to economic and reliable operation of a grid with high variable renewable energy (VRE) penetration. As such, a decarbonizing power system with increasing VRE penetration will need to add much new energy storage.[50] Modeling from the Storage Futures Study estimates that, even in a conservative case, decarbonization could require a fivefold increase in storage capacity.[51]

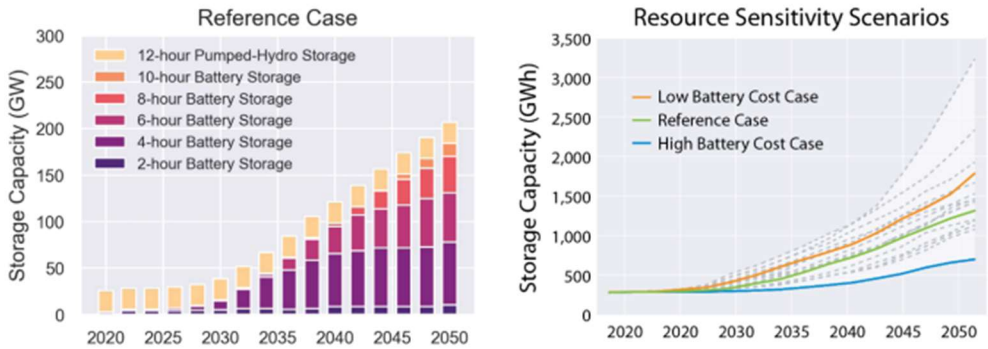

Figure 3. National storage capacity in the reference case grows to about 200 GW by 2050, deploying a range of durations (left). This translates to about 1,200 gigawatt-hours (GWh) of stored energy (right), with a wide range of deployments.[52]

Pumped storage hydropower (PSH) could fill some of this imminent energy storage need. PSH's promise is largely suggested by proven track records. Currently, PSH offers about 22 GW of energy storage capacity in the United States, which amounts to about 93% of all utility-scale energy storage capacity.[53] PSH facilities are fairly large, with the average facility offering about 280 MW of capacity.[54] Recent supply chain complications and concerns of mineral availability also suggest that diversifying energy storage plans beyond lithium-ion

[50] Koritarov et al. 2022. A Review of Technology Innovations for Pumped Storage Hydropower. https://publications.anl.gov/anlpubs/2022/05/175341.pdf
[51] Blair et al. 2022. Storage Futures Study: Key Learnings for the Coming Decades. https://www.nrel.gov/docs/fy22osti/81779.pdf
[52] Blair et al. 2022. Storage Futures Study: Key Learnings for the Coming Decades. https://www.nrel.gov/docs/fy22osti/81779.pdf
[53] Koritarov et al. 2022. A Review of Technology Innovations for Pumped Storage Hydropower. https://publications.anl.gov/anlpubs/2022/05/175341.pdf
[54] National Hydropower Association. 2018. 2018 Pumped Storage Report. https://www.hydro.org/wp-content/uploads/2018/04/2018-NHA-Pumped-Storage-Report.pdf

batteries may be prudent.[55] With such a massive energy storage quota to fill, PSH could be a critical ingredient for filling the U.S.'s energy storage needs.

Recently, however, PSH plant development in the United States has slowed considerably. In the past 20 years, only one new facility has come online. There are several contributing factors, such as market uncertainty, development costs and financing, long payback times, permitting challenges, construction risks, competition from other storage technologies, and technical challenges related to energy storage valuation.[56] One recent review of literature about PSH development identified 45 types of barriers, including both techno-environmental and socio-economic factors.[57]

However, advancements in PSH technology could overcome some of these challenges. Although PSH is an established technology, many new PSH technologies are in development and deployment. These include both improvements to existing PSH technologies and configurations, like those perused as part of XFLEX, and completely new technologies.[58] A recent study from Argonne National Laboratory discusses 12 such opportunities for PSH innovation, and illustrates potential improvement in value relative to existing PSH and battery technologies.[59] A report from the International Forum on Pumped Storage Hydropower discusses the challenges, feasibility, and use cases of a similar sample of PSH innovations.[60] Many of these innovations have potential to mitigate or eliminate barriers to PSH deployment, and thus the associated costs. In addition, some innovations could improve the range or magnitude of values that PSH can provide to grids and communities. PSH facilities with improved values or reduced costs would offer more attractive options for energy storage.

While many promising technologies exist, most have not yet been deployed at scale. Some, such as pressurized vessel PSH, have machinery proven in a lab setting but no experience servicing a grid. Others, such as wind-hydro hybrids,

[55] Mann et al. 2022. Grid Energy Storage: Supply Chain Deep Dive Assessment. https://www.energy.gov/sites/default/files/2022-02/Energy%20Storage%20Supply%20Chain%20Report%20-%20final.pdf
[56] Hadjerioua et al. 2020. Pumped Storage Hydropower FAST Commissioning Technical Analysis. https://www.osti.gov/servlets/purl/1734671/
[57] Ali et al. 2021. Drivers and barriers to the deployment of pumped hydro energy storage applications: Systematic literature review. https://www.sciencedirect.com/science/article/pii/S266679082100241X
[58] XFLEX Hydro. https://xflexhydro.net/
[59] Koritarov et al. 2022. A Review of Technology Innovations for Pumped Storage Hydropower. https://publications.anl.gov/anlpubs/2022/05/175341.pdf
[60] IFPSH. 2021. Innovative Pumped Storage Hydropower Configurations and Uses. https://www.hydropower.org/publications/innovative-pumped-storage-hydropower-configurations-and-uses

have been shown effective at a small-scale demonstration, but not yet been proven in additional locations or a full set of representative scenarios. Still others, such as open-pit mines converted to reservoirs, are relatively simple technological jumps from conventional PSH and are on the cusp of full-size deployment abroad, but have struggled to begin construction in the United States.[61] Even with capable technologies, the strategy for bringing these technologies to market is critical if any of these technologies are to make an impact.

To build off R&D supported by DOE, other agencies, and industry, this topic area seeks applications to advance development and testing for innovative technologies that could accelerate the deployment of PSH. Innovations developed under this FOA topic will be supported by WPTO's HydroWIRES Initiative, which seeks to understand, enable, and improve hydropower and PSH's contributions to reliability, resilience, and integration in the rapidly evolving U.S. electricity system. Broadly, this funding opportunity will support work that de-risks PSH components, construction processes, and/or alternative PSH configurations that could reduce costs and/or improve value. Ideally, an awardee would have the necessary analysis to finance and permit a demonstration of their technology following the completion of this award.

Scope and Technical Requirements

The objective of Topic Area 2 is to prepare innovative PSH technologies for full-scale or pilot testing. The path to commercialization and thus the exact scope of work will depend on maturity and nature of technology, but some general principles and suggested courses of action will be described in the next section.

<u>Eligible Technologies</u>

This award can support a broad range of PSH innovations. Innovations can include both (a) significant improvements on one or more subsystems of existing conventional PSH technology, or (2) unconventional PSH technologies/configurations.

[61] Koritarov et al. 2022. A Review of Technology Innovations for Pumped Storage Hydropower. https://publications.anl.gov/anlpubs/2022/05/175341.pdf

Conventional PSH refers to a configuration of two water reservoirs at different elevations where gravity drives water from the upper reservoir to the lower. As the water moves to the lower-elevation reservoir, it passes through a turbine-generator (discharge). The same system uses power as a pump-motor to move the water back into the upper reservoir (recharge).[62] Thus, the system stores energy by pumping water to the upper reservoir at times of low demand and uses the stored water flowing from the upper to lower reservoir to generate during high demand.

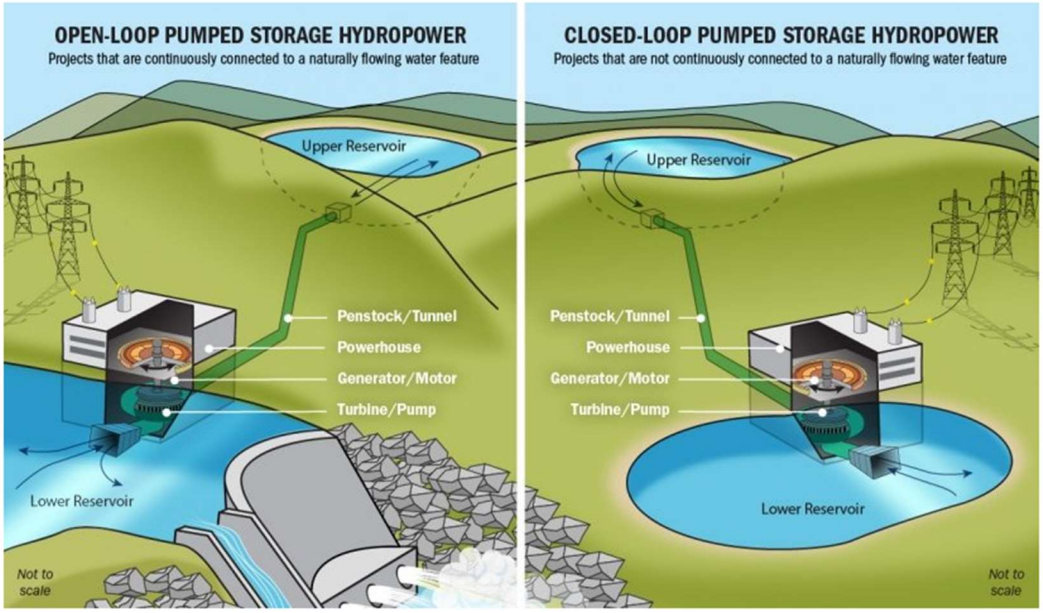

Figure 4. Illustration of conventional PSH. [63]

Unconventional PSH includes any configuration which stores energy by imparting mechanical potential energy into a water or water-based fluid, then extracts that energy from this fluid moving down that potential energy gradient using a turbine-generator. Some configurations may store water at varying elevations like with conventional PSH, but use something other than a purpose-built reservoir to contain the water. Some configurations may impart potential energy into water by pressurizing one or more bodies of water relative to another.

<u>Value Proposition</u>

[62] Water Power Technologies Office. 2022. Pumped Storage Hydropower. https://www.energy.gov/eere/water/pumped-storage-hydropower
[63] Water Power Technologies Office. 2022. Pumped Storage Hydropower. https://www.energy.gov/eere/water/pumped-storage-hydropower

The technology must offer a significant advantage relative to an existing energy storage technology. For the purposes of this FOA, this relative advantage is the technology's value proposition. The strongest comparisons will likely be with conventional PSH and/or lithium-ion batteries, based on the anticipated storage duration, as these are most widespread technologies currently used in the market. The value proposition can include both increased benefits and reduced risks, and can include several such benefits and risks. Ali et al[64] illustrates the breadth of potential benefits and risks by categorizing drivers (i.e., benefits) and barriers (i.e., risks) to PSH deployment identified in a detailed survey of literature on PSH deployment.

In most cases, energy storage costs that are competitive in modern or anticipated energy markets will be central to a PSH technology's value proposition. All technologies meant to buy and sell energy into a grid at wholesale prices should aim for competitive prices. The application should quantify such a cost parity or advantage by comparing the levelized cost of storage (LCOS) over project lifetime, as used in Koritarov et al[65] and as defined in Pawel[66]:

$$LCOS = \frac{CAPEX + \sum_1^N \frac{Replacement\ Cost}{(1+r)^t} + \sum_1^N \frac{O\&M\ Cost}{(1+r)^t} + \sum_1^N \frac{Charging\ Cost}{(1+r)^t} + \frac{End\text{-}of\text{-}lif\ \ Cost}{(1+r)^{N+1}}}{\sum_1^N \frac{E_{discharge}}{(1+r)^t}}$$

Where:

LCOS	= Levelized cost of storage ($/MWh)
CAPEX	= Project capital investment costs ($)
Replacement Cost	= Additional capital investment costs over the project lifetime ($)
O&M Cost	= Annual O&M costs ($)
Charging Cost	= Annual cost of electricity used for charging ($)
End-of-life Cost	= Decommissioning cost minus recovery value at the end of project lifetime ($)
$E_{discharged}$	= Annual discharged electricity (MWh)
N	= Project lifetime (years)

Showing the calculation of LCOS in the application is not necessary, and a rough estimate is acceptable. However, references to previous technoeconomic studies

[64] Ali et al. 2021. Drivers and barriers to the deployment of pumped hydro energy storage applications: Systematic literature review. https://www.sciencedirect.com/science/article/pii/S266679082100241X

[65] Koritarov et al. 2022. A Review of Technology Innovations for Pumped Storage Hydropower. https://publications.anl.gov/anlpubs/2022/05/175341.pdf

[66] Pawel, I. The Cost of Storage – How to Calculate the Levelized Cost of Stored Energy (LCOE) and Applications to Renewable Energy Generation. https://www.sciencedirect.com/science/article/pii/S1876610214001751

of the technology are encouraged to justify a high degree of confidence in the estimate.

When demonstrating cost competitiveness, the applicant should consider the conditions in which the technology would be competing. For example, if the technology is meant to serve all >6-hour energy storage needs at a competitive price, then the LCOS should be competitive with the anticipated LCOS of conventional PSH. A technology meant to cycle across 2 or 4 hours should have a LCOS competitive with lithium-ion batteries. A technology meant to operate in an area of the country where conventional PSH is not feasible does not need to be competitive with conventional PSH, but costs should be competitive relative to anticipated price trends in that area of the country.

The value propositions of some technologies may not involve transactions for energy services, in which cases financial metrics are not necessary. Such cases may include technologies with value propositions specifically geared towards serving critical, isolated, or novel loads. A Review of Technology Innovations for Pumped Storage Hydropower[67] offers some other useful metrics for describing a technology's value proposition (Table 1). Both qualitative and quantitative measures of value are important for consideration.

[67] Koritarov et al. 2022. A Review of Technology Innovations for Pumped Storage Hydropower. https://publications.anl.gov/anlpubs/2022/05/175341.pdf

Table 1. A recent study from Argonne National Lab compares PSH technologies on these 9 criteria, illustrating some potential metrics for describing some value propositions. [68]

Criteria	Evaluation Parameters and Considerations	Metrics
Estimated Project Cost	Estimated investment cost or total CAPEX to develop PSH project	$/kW
Estimated Levelized Cost of Storage (LCOS)	Estimated LCOS over the lifetime of the project	$/MWh
Construction Time	Potential to reduce project construction time compared to current PSH technologies	Years
Project Development Risk	Potential to either increase or reduce project development risks (e.g., by applying either new innovative technologies or proven construction methods and technologies used in other industries)	Qualitative
Scalability and Applicability	Whether the PSH design is scalable to allow for a range of capacities (e.g., modular design) and a variety of use cases	Estimated minimum and maximum capacity range (MW)
Operational Flexibility	PSH technology potential to provide flexible operation (i.e., wide operating range, fast ramp rates, quick mode change times)	Estimated operating range
Potential Market Size	Estimated market potential for PSH technology	MW of capacity or number of installations
Environmental Impacts	Discussion of potential impacts of PSH technology on the environment, including potential public acceptance issues	Qualitative
Physical Siting Limitations	Geographical or topological limitations that may limit the siting opportunities	Qualitative

The value proposition should be described in the Market Transformation plan as part of the Technical Volume. This should also describe plans for outreach to investors, what metrics are needed, and how the team will demonstrate them (even if after this award).

[68] Koritarov et al. 2022. A Review of Technology Innovations for Pumped Storage Hydropower. https://publications.anl.gov/anlpubs/2022/05/175341.pdf

Technological Maturity

The application should clearly define and justify the required R&D to de-risk the unique technology and enable advancement towards full- scale and/or pilot testing.

The application should:

- Describe the technology's current state of technological maturity
- Describe a target level of maturity, which the technology would reach if the proposed work were successful
- Describe what risks associated with the technology would be mitigated as a result of the proposed work
- Justify that the target level of maturity is a critical step towards proving the technology's value proposition, as defined in the previous section
- Justify that results from the proposed work can provide foundation for making additional steps towards full-scale deployment outside the scope of this award

Use of established scales or frameworks, such as Technology Readiness Levels (TRL), to describe technological maturity is encouraged. However, this may not be useful for all technologies. Even if such a scale or framework is used, a qualitative description of the current and target state is still required.

Additionally, the technology's current state must meet the following criteria, which represent both a maximum and minimum level of maturity allowed for this award:

- *Maximum:* This award will not consider technologies that can be described as a "Commercial Technology" under DOE LPO's Title 17 Innovation criterion.[69] According to this standard, "Commercial Technology is defined as technology that has been installed in and is being used in three or more commercial projects in the United States in the same general application as in the proposed project." Notably, this means that more mature technologies developed internationally and not yet installed in the US could be eligible for this award. However, such applications should focus exclusively on barriers and opportunities unique to deployment in the U.S.
- *Minimum:* Technologies must also have progressed past basic research and development in order for this award to be useful. Basic physical principles, innovative components, and unconventional configurations must have shown some level technical or techno-economic feasibility in

[69] Loan Programs Office, 2022. Technical Eligibility Guide – Title 17 Innovative Clean Energy. https://www.energy.gov/lpo/articles/technical-eligibility-guide-title-17-innovative-clean-energy

an existing analysis from the academic or business community. Reference(s) to academic publications, technical documents, presentations, news reports, or press releases that support any such claims are highly desirable.

Siting

Conventional PSH is constrained to specific geographies where there are significant elevation differences. Many unconventional PSH configurations may also require specific geographic or geological features. If the innovation requires any specific geophysical features to deliver its value proposition, please comment on the extent of available sites. Broad applicability should be considered and described. If the innovation requires any specific features besides conventional reservoirs, then evidence of adequate formations should be referenced.

Beyond feasibility, location may be central to a technology's value proposition. Prominent examples include systems designed to provide resilience in electrically remote areas or to co-locate with a significant generation or demand for optimal coordination. For such designs, discussion of a sample site is encouraged to illustrate the value proposition, and any preparation for a demonstration or pilot would likely require some focus on a specific site. However, the application must also argue how the proposed work would benefit the broader industry beyond any sample or target site.

Support from relevant state and local governments is likely a strength. Teams leveraging or aiming to leverage state programs for R&D or business development appear proactive, and success in such programs can help illustrate long-term viability. In addition, support from local governments and compliance with regulations is a valuable indicator of eventual success with full-scale or pilot testing siting.

Market Transformation

Every application will include a market transformation plan within its Technical Volume. Generally, this should describe how the team would leverage the work supported by this award to advance the viability of pumped storage hydropower. Detailed requirements for the market transformation plan (and the rest of the Technical Volume) can be found in the table in Section IV.D.ii of this document. These requirements are application review criteria, as described in Section V.A.ii.

Except where infeasible due to intellectual property, deliverables should be appropriate for public dissemination. Output should include some kind of generalized resource that supports deploying a similar technologies past the instance analyzed in this award.

Team and Partnerships

The team should indicate expertise and/or attention dedicated to both technical and commercialization aspects.

For WPTO, partnerships with potential stakeholders in a full-scale deployment of the technology are strong indicators of success. Letters of support are valuable illustrations of a partner's involvement. Letters of support are strongest when they indicate time commitments from specific personnel or specific challenges on which the partner will advise the applicant.

Consider indicating partnerships with the following types of organizations:

- Federally funded research and development centers
- Universities and other non-profit research institutions
- OEMs
- Engineering, procurement, and construction (EPC) firms
- Potential investors or other financial backers
- Trade associations, labor representatives, and general workforce development
- Utilities, including municipal and co-ops, or other relevant off-takers
- Community leaders near a future demonstration site, including local non-profits
- Local or state governments responsible for a future demonstration site

Many of these are mostly relevant towards large-scale demonstrations or pilot projects, which are likely outside the financial scope of this award. However, this award is intended to prepare applicants for future demonstrations and pilots, so advice from such groups could inform award outcomes that are more directly transferrable to the next stage of technology commercialization.

Anticipated Work to be Performed

Projects awarded as part of the FOA may span technologies with prototype testing experience through technologies that have been demonstrated in some but not all intended operating conditions. Work under the awards will significantly advance the technology solution from its initial state to a final state closer to deployment in the U.S. hydropower fleet.

In general, the technology should be developed to the point at which critical data regarding the performance, reliability, and cost of the system can be collected. Advancement of solutions to the field testing stage or first-in-kind deployment readiness is preferred. Partnership with hydropower owner/operators as well as any additional engineering expertise required should be included in the proposed work. In addition to technology development, work under the project may also include data-driven analytics; cost and economic modeling; component reliability and integration assessments; financial risk analysis; or any activities relevant to establishing bankability.

Projects should include two budget periods separated by a Go/No-Go decision point. The division between the budget periods should be chosen at an appropriate review point. Typically, high quality review points are immediately after the team expects to complete a task whose results will have a significant impact on the best approach for achieving the intended final result, such as when lab testing is completed, but prior to field testing. This could result in reevaluation of tasks in the 2nd budget period if results from the 1st budget period suggests a different course of action. Final results and results at the Go/No-Go decision point should be documented in detailed written reports.

Proposed work should also include mechanisms to engage the broader hydropower industry throughout the effort, as appropriate, to create awareness of the technology being developed and solicit feedback on their design and performance metrics. Such engagement efforts are important to support the project itself, as well as to cultivate industry buy-in and markets for the technology.

WPTO intends to manage any award under this FOA as an integrated part of the HydroWIRES Initiative, both in the selection process and during the period of performance. This may include coordination with efforts by the DOE National Laboratories and other external partners.

iii. Topic Area 3: Hydropower R&D by Emerging Organizations

This topic seeks to support hydropower related research and development (R&D) that is not covered in other topic areas in this FOA and helps to meet one or more of the outcomes described in WPTO's Multi-Year Program Plan (MYPP)[70] related to the Hydropower Program. The Hydropower Program comprises five

[70] Water Power Technologies Office. 2022. Hydropower Multi-year Program Plan. https://www.energy.gov/sites/default/files/2022-03/wpto-mypp-hydropower-plan.pdf

R&D activity areas, which represent the program's strategic approach to addressing the challenges faced by U.S. hydropower stakeholders:

1. Innovations for Low-Impact Hydropower Growth
2. Grid Reliability, Resilience, and Integration (HydroWIRES)
3. Fleet Modernization, Maintenance, and Cybersecurity
4. Environmental and Hydrologic Systems Science
5. Data Access, Analytics, and Workforce Development

This topic only seeks applications in areas NOT covered in Topics 1 and 2 of this FOA, and that address one or more activity and sub-activity area priorities. Applicants are strongly encouraged to read these priorities in the MYPP to prepare a competitive project proposal and identify the relevant activity area(s) and sub-activity area(s) that the proposed work would address.

This topic seeks R&D projects from institutions that have not engaged with WPTO through significant research projects and have limited familiarity with WPTO programs and research support mechanisms. WPTO recognizes that this lack of familiarity can be a barrier to participation in WPTO research activities and application to WPTO funding opportunities. WPTO encourages applications from organizations and institutions that are located in and/or serve disadvantaged communities, or have a history of training and mentoring students from populations that are under-represented in water power technologies, such as those served by Historically Black Colleges and Universities (HBCUs) and minority-serving institutions (MSIs). Primarily undergraduate-serving institutions, as well as institutions that are less research-intensive, are encouraged to apply.

WPTO intends to manage any award under this FOA as an integrated part of the Hydropower Program, both in the selection process and during the period of performance. This may include coordination with efforts by the DOE National Laboratories and other external partners.

iv. Teaming Partner List

DOE is compiling a "Teaming Partner List" to facilitate the formation of new project teams for this FOA. The Teaming Partner List allows organizations who may wish to participate on an application to express their interest to other applicants and to explore potential partnerships.

Updates to the Teaming Partner List will be available in the EERE Exchange website. The Teaming Partner List will be regularly updated to reflect new teaming partners who provide their organization's information.

SUBMISSION INSTRUCTIONS: Any organization that would like to be included on this list should submit the following information: Organization Name, Contact Name, Contact Address, Contact Email, Contact Phone, Organization Type, Area of Technical Expertise, Brief Description of Capabilities, and Area of Interest. Interested parties should email the information to HydropowerFOA@ee.doe.gov with the subject line "Teaming Partner Information."

DISCLAIMER: By submitting a request to be included on the Teaming Partner List, the requesting organization consents to the publication of the above-referenced information. By facilitating the Teaming Partner List, DOE is not endorsing, sponsoring, or otherwise evaluating the qualifications of the individuals and organizations that are self-identifying themselves for placement on this Teaming Partner List. DOE will not pay for the provision of any information, nor will it compensate any applicants or requesting organizations for the development of such information.

C. Applications Specifically Not of Interest

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

- Applications that fall outside the technical parameters specified in Sections I.A. and I.B. of the FOA.
- Applications for proposed technologies that are not based on sound scientific principles (e.g., violates the laws of thermodynamics).
- Applications for proposed technologies that do not have applicability beyond a single use case.
- Topic Area 2: Applications for proposed technologies that do not use water or water-based fluids to drive a turbine-generator for producing electricity.
- Topic Area 3:
    - Applications from entities that received financial assistance through a WPTO funding opportunity announcement in the last five years.
    - Applications led by Principal Investigators on WPTO financial assistance awards in the last five years.
- Applications with marine energy applications that harness energy from:
    - waves, tides, and currents in oceans, estuaries, and tidal areas
    - free flowing hydrokinetic water in rivers, lakes, and streams
    - free flowing hydrokinetic water in man-made channels
    - differentials in ocean temperature (ocean thermal energy conversion)
- Applications proposing purely analytical or software modeling studies that do not include physical technology development.

- Applications that do not propose substantive advancements to technologies previously or currently funded by DOE.
- Applications whose technology would require modifications to the dam or hydropower unit that are unsafe for staff, structures, or the environment.

D. Community Benefits Plan: Job Quality and Equity

To support the goal of building a clean and equitable energy economy, the BIL-funded projects are expected to (1) support meaningful community and labor engagement; (2) invest in America's workforce; (3) advance diversity, equity, inclusion, and accessibility; and (4) contribute to the President's goal that 40% of the overall benefits from certain federal investments flow to disadvantaged communities (the Justice40 Initiative).To ensure these goals are met, applications must include a Community Benefits Plan that describes how the proposed project would incorporate the four objectives stated above.

Applicants are encouraged to submit letters of support from established labor and community-based organizations that demonstrate the applicant's ability to achieve the above goals as outlined in the Community Benefits Plan. Within the Community Benefits Plan, the applicant is encouraged to provide specific detail on how to ensure the delivery of measurable community and jobs benefits, e.g., through the use of tools such as good neighbor agreements, community workforce agreements, project labor agreements, other collective bargaining agreements, or similar agreements (collectively referred to throughout this FOA as "Workforce and Community Agreements"). See Section IV.D.xiv. for the Community Benefits Plan content requirements

E. Authorizing Statutes

The programmatic authorizing statute is the Energy Independence and Security Act of 2007 (EISA), Public Law 110-140, Section 634. Hydropower Research, Development and Demonstration; 42 U.S.C. § 17213 (as amended by Sec. 3001 of the Energy Act of 2020, Public Law 116-260, Division Z, Dec. 27, 2020).

Section 41006(a)(1) of the BIL authorizes appropriations in the amount of $36 million to carry out activities under section 634 of EISA 2007.

Awards made under this announcement will fall under the purview of 2 CFR Part 200 as amended by 2 CFR Part 910.

F. Notice of Bipartisan Infrastructure Law-Specific Requirements

Be advised that special terms and conditions apply to projects funded by the BIL relating to:

- Reporting, tracking and segregation of incurred costs;
- Reporting on job creation and preservation;
- Publication of information on the Internet;
- Access to records by Inspectors General and the Government Accountability Office;
- Requiring all of the iron, steel, manufactured goods, and construction materials used in the infrastructure activities of applicable projects are produced in the United States;
- Ensuring laborers and mechanics employed by contractors or subcontractors on BIL-funded projects are paid wages equivalent to prevailing wages on similar projects in the area;
- Protecting whistleblowers and requiring prompt referral of evidence of a false claim to an appropriate inspector general; and
- Certification and Registration.

Recipients of funding appropriated by the BIL must comply with requirements of all applicable federal, state, and local laws, regulations, DOE policy and guidance, and instructions in this FOA. Recipients must flow down the requirements to subrecipients to ensure the recipient's compliance with the requirements.

II. Award Information

A. Award Overview

i. Estimated Funding

DOE expects to make a total of approximately $14,500,000 of federal funding available for new awards under this FOA, subject to the availability of appropriated funds. DOE anticipates making approximately up to 13 awards under this FOA. DOE may issue one, multiple, or no awards. Individual awards may vary from up to $200,000 to $4,000,000.

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

Topic Area Number	Topic Area Title	Anticipated Number of Awards	Anticipated Minimum Award Size for Any One Individual Award (Fed Share)	Anticipated Maximum Award Size for Any One Individual Award (Fed Share)	Approximate Total Federal Funding Available for All Awards	Anticipated Number of Budget Periods	Anticipated Period of Performance (months)
1	Topic Area 1: Hydropower Retrofits for Non-Powered Dams	BP1: Up to 6 awards; BP2: Up to 3 awards	BP1: $300k; BP2: $1.3M	BP1: Up to $350K; BP2: Up to $2M	$8M	2	BP1: 12 months; BP2: 24 months
2	Topic Area 2: Innovative Pumped Storage Hydropower Technologies	2-3	$2M	Up to $4M	$6M	2	24-36 months
3	Topic Area 3: Hydropower R&D by Emerging Organizations	3-4	$125k	Up to $200k	$500k	1	12-24 months

DOE may establish more than one budget period for each award and fund only the initial budget period(s). Funding for all budget periods, including the initial budget period, is not guaranteed. Before the expiration of the initial budget period(s), DOE may perform a down-select among different recipients and provide additional funding only to a subset of recipients.

ii. Period of Performance

DOE anticipates making awards that will run from 12 months up to 36 months in length, comprised of one or more budget periods. Project continuation will be contingent upon several elements, including satisfactory performance and DOE's Go/No-Go decision. For a complete list and more information on the Go/No-Go review, see Section VI.B.xv.

iii. New Applications Only

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

B. DOE Funding Agreements

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

i. Cooperative Agreements

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

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

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

ii. Funding Agreements with Federally Funded Research and Development Center (FFRDCs)[71]

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

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

III. Eligibility Information

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

A. Eligible Applicants

i. Domestic Entities

For-profit entities, educational institutions, and nonprofit entities that are organized, chartered or incorporated (or otherwise formed) under the laws of a particular state or territory of the United States and have a physical location for business operations in the United States are eligible to apply for funding as a prime recipient or subrecipient.

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

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

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

Notwithstanding the above definition of "domestic entity," federal agencies, instrumentalities, and corporations (other than DOE) are eligible to participate as a subrecipient but are not eligible to apply as a prime recipient.

Entities banned from doing business with the United States government such as entities debarred, suspended, or otherwise excluded from or ineligible for participating in Federal programs are not eligible.

Nonprofit organizations described in Section 501(c)(4) of the Internal Revenue Code of 1986 that engaged in lobbying activities after December 31, 1995 are not eligible to apply for funding.

ii. Foreign Entities

If a foreign entity applies for funding as a prime recipient, it must designate in the Full Application a subsidiary or affiliate incorporated (or otherwise formed) under the laws of a state or territory of the United States to be the prime

recipient. The Full Application must state the nature of the corporate relationship between the foreign entity and domestic subsidiary or affiliate.

Foreign entities may request a waiver of the requirement to designate a subsidiary in the United States as the prime recipient in the Full Application (i.e., a foreign entity may request that it be the prime recipient). To do so, the applicant must submit an explicit written waiver request in the Full Application.

Appendix B lists the information that must be included in a request to waive this requirement. The applicant does not have the right to appeal DOE's decision concerning a waiver request.

iii. Incorporated Consortia

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

Each 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.

iv. Unincorporated Consortia

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

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

- Management structure;
- Method of making payments to consortium members;
- Means of ensuring and overseeing members' efforts on the project;
- Provisions for members' cost sharing contributions; and

- Provisions for ownership and rights in intellectual property developed previously or under the agreement.

If the consortium includes foreign members, the applicant must submit a separate explicit written waiver request in the Full Application for each foreign member. See Appendix B.

B. Cost Sharing

Applicants are bound by the cost share proposed in their Full Applications if selected for award negotiations.

1. For institutions of higher education and non-profit organizations:

Cost sharing is not required under this FOA, 0%.

Section 10725 of the Research and Development, Competition, and Innovation Act, P.L. 117-167 (Aug. 9, 2022) extends the cost share waiver pilot program enacted by Section 108 of the Department of Energy Research and Innovation Act, Public Law 115–246 (Innovation Act) and provides an exemption for institutions of higher education and non-profit organizations from the 20% cost share requirement for Research and Development activities. The exemption is available for the two-year period beginning on August 9, 2022. Codified at 42 U.S.C 16352

2. For all other entities:

The cost share must be at least 20% of the total project costs[72] for research and development projects.[73] The cost share must come from non-federal sources unless otherwise allowed by law.

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

i. Legal Responsibility

Although the cost share requirement applies to the project as a whole, including work performed by members of the project team other than the prime recipient, the prime recipient is legally responsible for paying the entire cost share. If the

[72] Total project costs is the sum of the government share, including FFRDC costs if applicable, and the recipient share of project costs.

[73] Energy Policy Act of 2005, Pub.L. 109-58, sec. 988. Also see 2 CFR 200.306 and 2 CFR 910.130 for additional cost sharing requirements.

funding agreement is terminated prior to the end of the project period, the prime recipient is required to contribute at least the cost share percentage of total expenditures incurred through the date of termination.

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

ii. Cost Share Allocation

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

iii. Cost Share Types and Allowability

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

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

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

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

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

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

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

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

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

Applicants are encouraged to refer to 2 CFR 200.306 and 2 CFR 910.130 for additional cost sharing requirements.

iv. Cost Share Contributions by FFRDCs

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

v. Cost Share Verification

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

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

vi. Cost Share Payment

DOE requires prime recipients to contribute the cost share amount incrementally over the life of the award. Specifically, the prime recipient's cost share for each billing period must always reflect the overall cost share ratio negotiated by the parties (i.e., the total amount of cost sharing on each invoice when considered

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

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

C. Compliance Criteria

All applicant submissions must:

- comply with the applicable content and form requirements listed in Section IV. of the FOA;
- include all required documents;
- be successfully uploaded in EERE Exchange https://eere-Exchange.energy.gov, including clicking the "Submit" button; and
- be submitted by the deadline stated in the FOA.

DOE will not review or consider submissions submitted through means other than EERE Exchange, submissions submitted after the applicable deadline, or incomplete submissions.

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

DOE will not extend the submission deadline for applicants that fail to submit required information by the applicable deadline due to server/connection congestion.

D. Responsiveness Criteria

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

E. Other Eligibility Requirements

i. Requirements for DOE/NNSA and non-DOE/NNSA FFRDCs Included as a Subrecipient

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

a. Authorization for non-DOE/NNSA FFRDCs
The federal agency sponsoring the FFRDC must authorize in writing the use of the FFRDC on the proposed project and this authorization must be submitted with the application. The use of a FFRDC must be consistent with its authority under its award.

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

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

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

d. Cost Share

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

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

f. Limit on FFRDC effort.

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

ii. Agreement Requirements for DOE/NNSA FFRDCs Participating as a Subrecipient

DOE/NNSA FFRDCs participating as a subrecipient on a project and funded directly through the DOE WP System are strongly encouraged to establish a Cooperative Research and Development Agreement[74] (CRADA) or, if the role of the DOE/NNSA FFRDC is limited to technical assistance and intellectual property is not anticipated to be generated from the DOE/NNSA FFRDC's work, a Technical Assistance Agreement (TAA), with at least the prime recipient before any project work begins. Any questions regarding the use of a CRADA or TAA should be directed to the cognizant DOE field intellectual property (IP) counsel.

The CRADA or TAA is used to ensure accountability for project work and provide the appropriate management of intellectual property (IP), e.g., data protection and background IP. The DOE/NNSA FFRDC (or lead DOE/NNSA FFRDC, if more than one FFRDC is involved) must provide a Joint Work Statement to the DOE COs with cognizance over the DOE funding program and DOE/NNSA FFRDC during negotiations or prior commencing work on the project. The CRADA or TAA must be executed by all parties without substantive changes within 30 days of the start of the award period of performance.

[74] A cooperative research and development agreement is a contractual agreement between a national laboratory contractor and a private company or university to work together on research and development. For more information, see https://www.energy.gov/gc/downloads/doe-cooperative-research-and-development-agreements

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

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

G. Questions Regarding Eligibility

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

IV. Application and Submission Information

A. Application Process

The application process includes multiple phases: a Concept Paper phase, and a Full Application phase. **Only applicants who have submitted an eligible Concept Paper will be eligible to submit a Full Application**.

All submissions must conform to the form and content requirements described below, including maximum page lengths.

- Each must be submitted in Adobe PDF format unless stated otherwise;
- Each must be written in English;
- All pages must be formatted to fit on 8.5 x 11 inch paper with margins not less than one inch on every side. Use Calibri typeface, a black font color, and a font size of 12 point or larger (except in figures or tables, which may be 10 point font). A symbol font may be used to insert Greek letters or special characters, but the font size requirement still applies. References must be included as footnotes or endnotes in a font size of 10 or larger. Footnotes and endnotes are counted toward the maximum page requirement;
- A **control number** will be issued when an applicant begins the EERE Exchange application process. The control number must be included with all application documents. Specifically, the control number must be prominently displayed on the upper right corner of the header of every page and included in the file name (i.e., *Control Number_Applicant Name_Full Application*);
- Page numbers must be included in the footer of every page; and
- Each submission must not exceed the specified maximum page limit, including cover page, charts, graphs, maps, and photographs when printed

using the formatting requirements set forth above and single spaced. If applicants exceed the maximum page lengths indicated below, DOE will review only the authorized number of pages and disregard any additional pages.

i. Additional Information on EERE Exchange

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

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

B. Application Forms

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

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

TechnicalVolume_Part_1
TechnicalVolume_Part_2

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

C. Content and Form of the Concept Paper

Each Concept Paper must be limited to a single concept or technology. The Concept Paper must conform to the requirements listed below, including the stated page limits.

Section	Page Limit	Description
Cover Page	1 page maximum	The cover page should include the project title, the specific announcement Topic Area being addressed (if applicable), both the technical and business points of contact, names of

		all team member organizations, the project location(s), and any statements regarding confidentiality.
Technology Description	3 pages maximum plus 2 pages maximum for figures	Applicants are required to describe succinctly: • The proposed technology, including its basic operating principles and how it is unique and innovative; • The proposed technology's target level of performance (applicants should provide technical data or other support to show how the proposed target could be met); • The current state-of-the-art in the relevant field and application, including key shortcomings, limitations, and challenges; • How the proposed technology will overcome the shortcomings, limitations, and challenges in the relevant field and application; • The potential impact that the proposed project would have on the relevant field and application; • How the proposed location of the proposed project will support technology development and long-term success; • The key technical risks/issues associated with the proposed technology development plan; and • The impact that DOE funding would have on the proposed project. • Applicants may provide graphs, charts, or other data to supplement their Technology Description.
Addendum	3 pages maximum	Applicants are required to describe succinctly the qualifications, experience, and capabilities of the proposed Project Team, including: • Whether the Principal Investigator (PI) and Project Team have the skill and expertise needed to successfully execute the project plan; • Whether the applicant has prior experience which demonstrates an ability to perform tasks of similar risk and complexity; • Whether the applicant has worked together with its teaming partners on prior projects or programs; • Whether the applicant has adequate access to equipment and facilities necessary to accomplish the effort and/or clearly explain how it intends to obtain access to the necessary equipment and facilities; and • Applicants may provide graphs, charts, or other data to supplement their Technology Description.

DOE makes an independent assessment of each Concept Paper based on the criteria in Section V. of the FOA. DOE will encourage a subset of applicants to

submit Full Applications. Other applicants will be discouraged from submitting a Full Application. See Section VI.A.

D. Content and Form of the Full Application

Applicants must complete the following application forms found on the EERE Exchange website at https://eere-Exchange.energy.gov/.

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

All Full Application documents must be marked with the control number issued to the applicant.

i. Full Application Content Requirements

Each Full Application must be limited to a single concept or technology. Full Applications must conform to the following requirements, and must not exceed the stated page limits.

Component	File Format	Page Limit	File Name
Technical Volume	PDF	20	ControlNumber_LeadOrganization_TechnicalVolume
Resumes	PDF	3 pages each	ControlNumber_LeadOrganization_Resumes
Letters of Commitment	PDF	1 page each	ControlNumber_LeadOrganization_LOCs
Community Partnership Documentation	PDF	10	ControlNumber_LeadOrganization_PartnerDoc
Statement of Project Objectives	MS Word	10	ControlNumber_LeadOrganization_SOPO
SF-424	PDF	n/a	ControlNumber_LeadOrganization_App424
Budget Justification Workbook	MS Excel	n/a	ControlNumber_LeadOrganization_Budget_Justification
Summary/Abstract for Public Release	PDF	1	ControlNumber_LeadOrganization_Summary
Summary Slide	MS PowerPoint	1	ControlNumber_LeadOrganization_Slide
Subrecipient Budget Justification	MS Excel	n/a	ControlNumber_LeadOrganization_Subrecipient_Budget_Justification
DOE Work Proposal for FFRDC, if applicable (see DOE O 412.1A, Attachment 3)	PDF	n/a	ControlNumber_LeadOrganization_WP

Authorization from cognizant Contracting Officer for FFRDC	PDF	n/a	ControlNumber_LeadOrganization_FFRDCAuth
SF-LLL Disclosure of Lobbying Activities	PDF	n/a	ControlNumber_LeadOrganization_SF-LLL
Foreign Entity Waiver Requests and Foreign Work Waiver Requests	PDF	n/a	ControlNumber_LeadOrganization_Waiver
Buy America Requirements for Infrastructure Projects Waiver Requests	PDF	n/a	ControlNumber_LeadOrganization_BAWaiver
Community Benefits Plan: Job Quality and Equity	PDF	3	ControlNumber_LeadOrganization_CBenefits
Current and Pending Support	PDF	n/a	ControlNumber_LeadOrganization_CPS
Locations of Work	Excel	n/a	

Note: The maximum file size that can be uploaded to the EERE Exchange website is 10MB. See Section IV.B.

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

ii. Technical Volume

The Technical Volume must conform to the following content and form requirements. This volume must address the technical review criteria as discussed in Section V. of the FOA. Save the Technical Volume in a single PDF file using the following convention for the title "ControlNumber_LeadOrganization_TechnicalVolume".

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

The Technical Volume to the Full Application may not be more than 20 pages, including the cover page, table of contents, and all citations, charts, graphs, maps, photos, or other graphics, and must include all of the information in the table below. The applicant should consider the weighting of each of the technical review criterion (see Section V. of the FOA) when preparing the Technical Volume.

The Technical Volume should clearly describe and expand upon information provided in the Concept Paper.

Technical Volume Content Requirements	
SECTION/PAGE LIMIT	**DESCRIPTION**
Cover Page	The cover page should include the project title, the specific FOA Topic Area being addressed (if applicable), both the technical and business points of contact, names of all team member organizations, names of project managers, senior/key personnel and their organizations, the project location(s), and any statements regarding confidentiality.
Project Overview (Approximately 10% of the Technical Volume)	The Project Overview should contain the following information: • Background: The applicant should discuss the background of their organization, including the history, successes, and current research and development status (i.e., the technical baseline) relevant to the technical topic being addressed in the Full Application. • Project Goal: The applicant should explicitly identify the targeted improvements to the baseline technology and the critical success factors in achieving that goal, including the ways in which the proposed project location and related infrastructure, skilled workforce, community benefits, etc. will contribute to the success of the overall project. • DOE Impact: The applicant should discuss the impact that DOE funding would have on the proposed project. Applicants should specifically explain how DOE funding, relative to prior, current, or anticipated funding from other public and private sources, is necessary to achieve the project objectives. • Identify any potential long-term constraints project will have on community's access to natural resources (e.g., water) and tribal cultural resources. If applicable, describe a long-term cleanup strategy that ensures communities and neighborhoods remain healthy and safe and not burdened with cleanup costs and waste. • The applicant should outline a climate resilience strategy that accounts for climate impacts and extreme weather patterns such as high winds (tornadoes and hurricanes), heat and freezing temperatures, drought, wildfire, and floods.
Technical Description, Innovation, and Impact (Approximately 30% of the Technical Volume)	The Technical Description should contain the following information: • Relevance and Outcomes: The applicant should provide a detailed description of the technology or focus area, including the scientific and other principles and objectives that will be pursued during the project. This section should describe the relevance of the proposed project to the goals and objectives of the FOA, including the potential to meet specific DOE technical targets or other relevant performance targets. The applicant should clearly specify the expected outcomes of the project.

	• Feasibility: The applicant should demonstrate the technical feasibility of the proposed technology and capability of achieving the anticipated performance targets, including a description of previous work done and prior results. This section should also address the project's access to necessary infrastructure (e.g., transportation, water, electricity transmission), including any use of existing infrastructure, as well as to a skilled workforce. • Innovation and Impacts: The applicant should describe the current state-of-the-art in the applicable field, the specific innovation of the proposed technology or focus area, the advantages of proposed technology over current and emerging technologies, and the overall impact on advancing the state-of-the-art/technical baseline if the project is successful.
Workplan (Approximately 40% of the Technical Volume)	The Workplan should include a summary of the Project Objectives, Technical Scope, Work Breakdown Structure (WBS), Milestones, Go/No-Go decision points, and Project Schedule. A detailed SOPO is separately requested. The Workplan should contain the following information: • Project Objectives: The applicant should provide a clear and concise (high-level) statement of the goals and objectives of the project as well as the expected outcomes. • Technical Scope Summary: The applicant should provide a summary description of the overall work scope and approach to achieve the objective(s). The overall work scope is to be divided by performance periods that are separated by discrete, approximately annual decision points (see below for more information on Go/No-Go decision points). The applicant should describe the specific expected end result of each performance period, including milestones in the Community Benefits Plan. • WBS and Task Description Summary: The Workplan should describe the work to be accomplished and how the applicant will achieve the milestones, will accomplish the final project goal(s), and will produce all deliverables. The Workplan is to be structured with a hierarchy of performance period (approximately annual), task and subtasks, which is typical of a standard WBS for any project. The Workplan shall contain a concise description of the specific activities to be conducted over the life of the project. The description shall be a full explanation and disclosure of the project being proposed (i.e., a statement such as "we will then complete a proprietary process" is unacceptable). It is the applicant's responsibility to prepare an adequately detailed task plan to describe the proposed project and the plan for addressing the objectives of this FOA. The summary provided should be consistent with the SOPO. The SOPO will contain a more detailed description of the WBS and tasks. • Milestone Summary: The applicant should provide a summary of appropriate milestones throughout the project to demonstrate success.

	A milestone may be either a progress measure (which can be activity based) or a SMART technical milestone. SMART milestones should be Specific, Measurable, Achievable, Relevant, and Timely, and must demonstrate a technical achievement rather than simply completing a task. Unless otherwise specified in the FOA, the minimum requirement is that each project must have at least one milestone per quarter for the duration of the project with at least one SMART technical milestone per year (depending on the project, more milestones may be necessary to comprehensively demonstrate progress). The applicant should also provide the means by which the milestone will be verified. The summary provided should be consistent with the Milestone Summary Table in the SOPO.
	• Go/No-Go Decision Points (See Section VI.B.xv. for more information on the Go/No-Go Review): Provide a summary of project-wide Go/No-Go decision points at appropriate points in the Workplan. At a minimum, each project must have at least one project-wide Go/No-Go decision point for each budget period (12 to 18-month period) of the project. See Section VI.B.xv. The applicant should also provide the specific technical and community benefits plan criteria to be used to evaluate the project at the Go/No-Go or down-select decision point. The summary provided should be consistent with the SOPO. Go/No-Go decision points are considered "SMART" and can fulfill the requirement for an annual SMART milestone.
	• End of Project Goal: The applicant should provide a summary of the end of project goal(s). At a minimum, each project must have one SMART end of project goal. The summary provided should be consistent with the SOPO.
	• Project Schedule (Gantt Chart or similar): The applicant should provide a schedule for the entire project, including task and subtask durations, milestones, and Go/No-Go decision points.
	• Buy America Requirements for Infrastructure Projects: Within the first 2 pages of the Workplan, include a short statement on whether the project will involve the construction, alteration, and/or repair of infrastructure in the United States. See Appendix D for applicable definitions and other information to inform this statement.
	• Project Management: The applicant should discuss the team's proposed management plan, including the following:
	  ○ The overall approach to and organization for managing the work.
	  ○ The roles of each project team member.
	  ○ Any critical handoffs/interdependencies among project team members.

	○ The technical and management aspects of the management plan, including systems and practices, such as financial and project management practices. ○ The approach to project risk management, including a plan for securing a qualified workforce and mitigating risks to project performance including but not limited to community or labor disputes. ○ A description of how project changes will be handled. ○ If applicable, the approach to Quality Assurance/Control. ○ How communications will be maintained among project team members. • Market Transformation Plan: The applicant should provide a market transformation plan, including the following: ○ Identification of target market, competitors, and distribution channels for proposed technology along with known or perceived barriers to market penetration, including a mitigation plan. ○ Identification of a product development and/or service plan, commercialization timeline, financing, product marketing, legal/regulatory considerations including intellectual property, infrastructure requirements, data dissemination, and product distribution.
Technical Qualifications and Resources (Approximately 20% of the Technical Volume)	The Technical Qualifications and Resources should contain the following information: • Describe the project team's unique qualifications and expertise, including those of key subrecipients. • Describe the project team's existing equipment and facilities, or equipment or facilities already in place on the proposed project site, that will facilitate the successful completion of the proposed project; include a justification of any new equipment or facilities requested as part of the project. • This section should also include relevant, previous work efforts, demonstrated innovations, and how these enable the applicant to achieve the project objectives. • Describe the time commitment of the key team members to support the project. • Describe the technical services to be provided by DOE/NNSA FFRDCs, if applicable. • Describe the skills, certifications, or other credentials of the construction and ongoing operations workforce.

	• For multi-organizational projects, describe succinctly: ○ The roles and the work to be performed by the Project Manager and senior/key personnel at the prime and sub levels; ○ Business agreements between the applicant and sub; ○ How the various efforts will be integrated and managed; ○ Process for making decisions on technical direction; ○ Publication arrangements; ○ Intellectual Property issues; and ○ Communication plans.

iii. Resumes

A resume provides information that can be used by reviewers to evaluate the individual's skills, experience, and potential for leadership within the scientific community. Applicants must submit three-page resume for each Principal Investigator and Senior/Key Personnel that include the following:

1. Contact Information;
2. Education and training: Provide institution, major/area, degree, and year for undergraduate, graduate, and postdoctoral training;
3. Research and Professional Experience: Beginning with the current position, list professional/academic positions in chronological order with a brief description. List all current academic, professional, or institutional appointments, foreign or domestic, at the applicant institution or elsewhere, whether or not remuneration is received, and, whether full-time, part-time, or voluntary;
4. Awards and honors;
5. A list of up to 10 publications most closely related to the proposed project. For each publication, identify the names of all authors (in the same sequence in which they appear in the publication), the article title, book or journal title, volume number, page numbers, year of publication, and website address if available electronically. Patents, copyrights, and software systems developed may be provided in addition to or substituted for publications. An abbreviated style such as the Physical Review Letters (PRL) convention for citations (list only the first author) may be used for publications with more than 10 authors;
6. Synergistic Activities: List up to five professional and scholarly activities related to the proposed effort; and
7. There should be no lapses in time over the past ten years or since age 18, which ever time period is shorter.

As an alternative to a resume, it is acceptable to use the biographical sketch format approved by the National Science Foundation (NSF). The biographical sketch format may be generated by the Science Experts Network Curriculum Vita (SciENcv), a cooperative venture maintained at https://www.ncbi.nlm.nih.gov/sciencv/, and is also available at https://nsf.gov/bfa/dias/policy/nsfapprovedformats/biosketch.pdf. The use of a format required by another agency is intended to reduce the administrative burden to researchers by promoting the use of common formats.

Save the resumes in a single PDF file using the following convention for the title "ControlNumber_LeadOrganization_Resumes".

iv. Letters of Commitment

Submit letters of commitment from all subrecipient and third party cost share providers. If applicable, the letter must state that the third party is committed to providing a specific minimum dollar amount or value of in-kind contributions allocated to cost sharing. The following information for each third party contributing to cost sharing should be identified: (1) the name of the organization; (2) the proposed dollar amount to be provided; and (3) the proposed cost sharing type – (cash-or in-kind contributions). Each letter must not exceed 1 page. Save the letters of commitment in a single PDF file using the following convention for the title "ControlNumber_LeadOrganization_LOCs".

Letters of support or endorsement for the project from entities that do not have a substantive role in the project are not accepted.

v. Community Partnership Documentation

In support of the Community Benefits Plan, applicants may submit documentation to demonstrate existing or planned partnerships with community entities, such as, organizations that work with local stakeholders such residents and businesses, organizations that carry out workforce development programs, trade associations, worker organizations including labor unions, and community-based organizations that work with disadvantaged communities. The Partnership Documentation could be in the form of letter on the partner's letterhead outlining the planned partnership signed by an officer of the entity, a Memorandum of Understanding, or other similar agreement. Such letters must state the specific nature of the partnership and must not be general letters of support. If the applicant intends to enter into a Workforce and Community Agreement as part of the Community Benefits Plan, please include letters from proposed partners as appropriate. Each letter must not exceed 1 page. In total, the partnership documentation must not exceed 10 pages. Save

the partnership documentation in a single PDF file using the following convention for the title "ControlNumber_LeadOrganization_PartnerDoc".

vi. Statement of Project Objectives (SOPO)

Applicants are required to complete a SOPO. A SOPO template is available on EERE Exchange at https://eere-Exchange.energy.gov/. The SOPO, including the Milestone Table, must not exceed 10 pages when printed using standard 8.5 x 11 paper with 1" margins (top, bottom, left, and right) with font not smaller than 12 point (except in figures or tables, which may be 10 point font). Save the SOPO in a single Microsoft Word file using the following convention for the title "ControlNumber_LeadOrganization_SOPO".

vii. SF-424: Application for Federal Assistance

Complete all required fields in accordance with the instructions on the form. The list of certifications and assurances in Field 21 can be found at http://energy.gov/management/office-management/operational-management/financial-assistance/financial-assistance-forms, under Certifications and Assurances. Note: The dates and dollar amounts on the SF-424 are for the complete project period and not just the first project year, first phase or other subset of the project period. Save the SF-424 in a single PDF file using the following convention for the title "ControlNumber_LeadOrganization_424".

viii. Budget Justification Workbook

Applicants must complete the Budget Justification Workbook, which is available on EERE Exchange at https://eere-Exchange.energy.gov/. Applicants must complete each tab of the Budget Justification Workbook for the project as a whole, including all work to be performed by the prime recipient and its subrecipients and contractors. Applicants should include costs associated with implementing the Community Benefits Plan and with required annual audits and incurred cost proposals in their proposed budget documents. The "Instructions and Summary" included with the Budget Justification Workbook will auto-populate as the applicant enters information into the Workbook. Applicants must carefully read the "Instructions and Summary" tab provided within the Budget Justification Workbook. Save the Budget Justification Workbook in a single Microsoft Excel file using the following convention for the title "ControlNumber_LeadOrganization_Budget_Justification".

ix. Summary for Public Release

Applicants must submit a one-page summary of their project that is suitable for dissemination to the public. It should be a self-contained document that

identifies the name of the applicant, the project director/principal investigator(s), the project title, the objectives of the project, a description of the project, including methods to be employed, the potential impact of the project (e.g., benefits, outcomes), and major participants (for collaborative projects) and the project's commitments and goals described in the Community Benefits Plan. This document must not include any proprietary or sensitive business information as DOE may make it available to the public after selections are made. The summary must not exceed 1 page when printed using standard 8.5 x 11 paper with 1" margins (top, bottom, left, and right) with font not smaller than 12 point. Save the Summary for Public Release in a single PDF file using the following naming convention "ControlNumber_LeadOrganization_Summary".

x. Summary Slide

Applicants must provide a single slide summarizing the proposed project. The Summary Slide template must include the following information:

- A technology summary;
- A description of the technology's impact;
- Proposed project goals;
- Any key graphics (illustrations, charts and/or tables);
- The project's key idea/takeaway;
- Topline community benefits;
- Project title, prime recipient, Principal Investigator, and senior/key personnel information; and
- Requested DOE funds and proposed applicant cost share.

Save the Summary Slide in a single Microsoft PowerPoint file using the following convention for the title "ControlNumber_LeadOrganization_Slide".

xi. Subrecipient Budget Justification (if applicable)

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

xii. Budget for DOE/NNSA FFRDC (if applicable)

If a DOE/NNSA FFRDC is to perform a portion of the work, the applicant must provide a DOE WP in accordance with the requirements in DOE Order 412.1A,

Work Authorization System, Attachment 3, available at: https://www.directives.doe.gov/directives-documents/400-series/0412.1-BOrder-a-chg1-AdmChg Save the WP in a single PDF file using the following convention for the title "ControlNumber_LeadOrganization_WP".

xiii. Authorization for non-DOE/NNSA or DOE/NNSA FFRDCs (if applicable)

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

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

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

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

- An officer or employee of any federal agency;
- A member of Congress;
- An officer or employee of Congress; or
- An employee of a member of Congress.

Save the SF-LLL in a single PDF file using the following convention for the title "ControlNumber_LeadOrganization_SF-LLL".

xv. Waiver Requests (if applicable)

Foreign Entity Participation

As set forth in Section III., all recipients must qualify as domestic entities. See Section III. To request a waiver of this requirement, the applicant must submit an explicit waiver request in the Full Application. Appendix B lists the information that must be included in a waiver request.

Performance of Work in the United States (Foreign Work Waiver)
As set forth in Section IV.J.iii., all work for the projects selected under this FOA must be performed in the United States. To request a waiver of this requirement, the applicant must submit an explicit waiver request in the Full Application. Appendix B lists the information that must be included in a foreign work waiver request.

Save the Waivers in a single PDF file using the following convention for the title "ControlNumber_LeadOrganization_Waiver".

xvi. Community Benefits Plan: Job Quality and Equity

The Community Benefits Plan: Job Quality and Equity (Community Benefits Plan or Plan) must set forth the applicant's approach to ensuring that Federal investments advance the following four goals: 1) community and labor engagement; 2) investing in the American workforce 3) advancing diversity, equity, inclusion, and accessibility (DEIA); and 4) contributing to the Justice40 Initiative. The below sections set forth the Plan requirements for each of the foregoing goals. At this stage of the application process, the Community Benefits Plan should indicate the applicant's intention to engage meaningfully with community stakeholders on these goals, including the potential of entering into a formal Workforce and Community Agreement.

The applicant's Community Benefits Plan must include at least one Specific, Measurable, Achievable, Relevant and Timely (SMART) milestone per budget period in order to measure progress on the proposed actions. The Community Benefits Plan will be evaluated as part of the technical review process. If the project is selected, DOE will incorporate the Community Benefits Plan into the award and the recipient will be required to meet the Community Benefits Plan it proposed. During the life of the DOE award, DOE will evaluate the recipient's progress, including as part of the Go/No-Go review process.

The Community Benefits Plan must be submitted in PDF format and must not exceed three pages. This Plan must address the technical review criterion titled, "Community Benefits Plan: Job Quality & Equity." See Section V. of the FOA.

Applicants must submit the Community Benefits Plan electronically in a single PDF file saved using the following convention name for the title: "Control Number_LeadOrganization_CBenefits."

1. Community and Labor Engagement: The Community Benefits Plan must describe the applicant's actions to date and future plans to engage with

community stakeholders – such as labor unions, local governments, Tribal governments, and community-based organizations that support or work with underserved communities, including Disadvantaged Communities as defined for purposes of the Justice40 Initiative. By facilitating community input, social buy-in, and accountability, such engagement can substantially reduce or eliminate stalls or slowdowns, litigation, and other risks associated with project implementation. Community and labor engagement should lay the groundwork for the eventual negotiation of a Workforce and Community Agreement, which could take the form of one or more kinds of negotiated agreements with affected communities, such as Community Benefits Agreements, Project Labor Agreements, or others. More information is detailed in the https://www.energy.gov/bil/community-benefits-plan-frequently-asked-questions-faqs.

Applicants may also provide letters of support from representative organizations reflecting substantive engagement and feedback on applicant's approach to community benefits including the American workforce; diversity, equity, inclusion, and accessibility; and the Justice40 Initiative detailed below.

2. Investing in the American Workforce: A well-qualified workforce is necessary to ensure project stability, continuity, and success, and to meet program goals. Job quality is critical to attracting and retaining the qualified workforce required.

The Plan must describe the applicant's approach to investing in workforce education and training of both new and incumbent workers and ensuring jobs are of sufficient quality to attract and retain skilled workers in the industry.

Specific components of the Plan must include:

A) A summary of the applicant's plan to attract, train, and retain a skilled and well-qualified workforce for both construction and ongoing operations/production activities. A collective bargaining agreement, project labor agreement, labor-management partnership, or other similar agreement would provide evidence of such a plan. Alternatively, applicants may describe:
    i. wages, benefits, and other worker supports to be provided;
    ii. commitments to support workforce education and training, including measures to reduce employee turnover costs for employers, increase productivity from a committed and engaged workforce, and promote a nimble, resilient, and stable workforce for the project; and

iii. efforts to engage employees in the design and execution of workplace safety and health plans.

For more guidance, see BIL FOA FAQ found at https://www.energy.gov/bil/community-benefits-plan-frequently-asked-questions-faqs.

B) Describe whether workers can form and join unions of their choosing, exercising collective voice. Employees' ability to organize, bargain collectively, and participate, through labor organizations of their choosing, in decisions that affect them contributes to the effective conduct of business and facilitates amicable settlements of any potential disputes between employees and employers, providing assurances of project efficiency, continuity, and multiple public benefits.
C) [Placeholder for any other specific statutory requirement or preference pertaining to jobs or workforce]

3. DEIA: The Community Benefits Plan must include a section describing how diversity, equity, inclusion, and accessibility (DEIA) objectives will be incorporated into the project. The section should detail how the applicant will partner with underrepresented businesses, educational institutions, and training organizations that serve workers who face barriers to accessing quality jobs, and/or other project partners to help address DEIA.

The following is a non-exhaustive list of potential DEIA actions that could be included in a Plan. This list is offered to provide guidance to applicants and is not intended to be comprehensive or mandatory.

A) Commitment to partner with Minority Business Enterprises, Minority Owned Businesses, Woman Owned Businesses, and Veteran Owned Businesses for contractor support needs;
B) To fill open positions for the DOE-funded project, partner with workforce training organizations serving under-represented communities and those facing systemic barriers to quality employment such as those with disabilities, returning citizens, opportunity youth, and veterans;

4. Justice40 Initiative: Applicants must provide an overview of benefits to disadvantaged communities that the project can deliver, supported by measurable milestones.

Specifically, the Justice40 Initiative section must include:

1. *Identification of applicable disadvantaged communities to which the anticipated project benefits will flow*.

2. *Identification of applicable benefits that are quantifiable, measurable, and trackable, including, at a minimum, a discussion of the relevance of each of the eight DOE Justice40 Initiative benefits outlined below.*

   Benefits include (but are not limited to) measurable direct or indirect investments or positive project outcomes that achieve or contribute to the following in disadvantaged communities: (1) a decrease in energy burden; (2) a decrease in environmental exposure and burdens; (3) an increase in access to low-cost capital; (4) an increase in job creation, the clean energy job pipeline, and job training for individuals; (5) increases in clean energy enterprise creation and contracting (e.g., minority-owned or disadvantaged business enterprises); (6) increases in energy democracy, including community ownership; (7) increased parity in clean energy technology access and adoption; and (8) an increase in energy resilience. In addition, applicants should also discuss how the project will maximize all of the benefits listed in #4.

3. *A description of how and when anticipated benefits are expected to flow to disadvantaged communities.* For example, will the benefits be provided directly within the disadvantaged communities identified in the Justice40 Initiative section, or are the benefits expected to flow in another way? Further, will the benefits flow during project development or after project completion, and how will applicant track benefits delivered?

4. *A discussion of anticipated negative and cumulative environmental impacts on disadvantaged communities*. Are there anticipated negative or positive environmental impacts associated with the project, and how will the applicant mitigate any negative impacts? Within the context of cumulative impacts created by the project, applicants should use Environmental Protection Agency EJSCREEN tool to quantitatively discuss existing environmental impacts in the project area.

For projects funded under this FOA, DOE will provide specific reporting guidance for the benefits described above.

xvii. Current and Pending Support

Current and pending support is intended to allow the identification of potential duplication, overcommitment, potential conflicts of interest or commitment, and

all other sources of support. As part of the application, the principal investigator and all senior/key personnel at the applicant and subrecipient level must provide 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 foreign government-sponsored talent recruitment programs must be identified in current and pending support.

For every activity, list the following items:

- The sponsor of the activity or the source of funding;
- The award or other identifying number;
- The title of the award or activity. If the title of the award or activity is not descriptive, add a brief description of the research being performed that would identify any overlaps or synergies with the proposed research;
- The total cost or value of the award or activity, including direct and indirect costs and cost share. For pending proposals, provide the total amount of requested funding;
- The award period (start date – end date); and
- The person-months of effort per year being dedicated to the award or activity.

To identify overlap, duplication of effort, or synergistic efforts, append a description of the other award or activity to the current and pending support.

Details of any obligations, contractual or otherwise, to any program, entity, or organization sponsored by a foreign government must be provided on request to either the applicant institution or DOE. Supporting documents of any identified source of support must be provided to DOE on request, including certified translations of any document.

PIs and senior/key personnel must provide a separate disclosure statement listing the required information above regarding current and pending support. Each individual must sign and date their respective disclosure statement and include the following certification statement:

> I, [Full Name and Title], certify to the best of my knowledge and belief that the information contained in this Current and Pending Support Disclosure Statement is true, complete, and

accurate. I understand that any false, fictitious, or fraudulent information, misrepresentations, half-truths, or omissions of any material fact, may subject me to criminal, civil or administrative penalties for fraud, false statements, false claims or otherwise. (18 U.S.C. §§ 1001 and 287, and 31 U.S.C. §§ 3729-3733 and 3801-3812). I further understand and agree that (1) the statements and representations made herein are material to DOE's funding decision, and (2) I have a responsibility to update the disclosures during the period of performance of the award should circumstances change which impact the responses provided above.

The information may be provided in the format approved by the National Science Foundation (NSF), which may be generated by the Science Experts Network Curriculum Vita (SciENcv), a cooperative venture maintained at https://www.ncbi.nlm.nih.gov/sciencv/, and is also available at https://www.nsf.gov/bfa/dias/policy/nsfapprovedformats/cps.pdf. The use of a format required by another agency is intended to reduce the administrative burden to researchers by promoting the use of common formats. If the NSF format is used, the individual must still include a signature, date, and a certification statement using the language included in the paragraph above.

Save the Current and Pending Support in a single PDF file using the following convention for the title "ControlNumber_LeadOrganization_CPS".

Definitions:

Current and pending support – (a) All resources made available, or expected to be made available, to an individual in support of the individual's RD&D efforts, regardless of (i) whether the source is foreign or domestic; (ii) whether the resource is made available through the entity applying for an award or directly to the individual; or (iii) whether the resource has monetary value; and (b) includes in-kind contributions requiring a commitment of time and directly supporting the individual's RD&D efforts, such as the provision of office or laboratory space, equipment, supplies, employees, or students. This term has the same meaning as the term Other Support as applied to researchers in NSPM-33: For researchers, Other Support includes all resources made available to a researcher in support of and/or related to all of their professional RD&D efforts, including resources provided directly to the individual or through the organization, and regardless of whether or not they have monetary value (e.g., even if the support received is only in-kind, such as office/laboratory space, equipment, supplies, or employees). This includes resource and/or financial support from all foreign and

domestic entities, including but not limited to, gifts provided with terms or conditions, financial support for laboratory personnel, and participation of student and visiting researchers supported by other sources of funding.

Foreign Government-Sponsored Talent Recruitment Program – An effort directly or indirectly organized, managed, or funded by a foreign government, or a foreign government instrumentality or entity, to recruit science and technology professionals or students (regardless of citizenship or national origin, or whether having a full-time or part-time position). Some foreign government-sponsored talent recruitment programs operate with the intent to import or otherwise acquire from abroad, sometimes through illicit means, proprietary technology or software, unpublished data and methods, and intellectual property to further the military modernization goals and/or economic goals of a foreign government. Many, but not all, programs aim to incentivize the targeted individual to relocate physically to the foreign state for the above purpose. Some programs allow for or encourage continued employment at United States research facilities or receipt of federal research funds while concurrently working at and/or receiving compensation from a foreign institution, and some direct participants not to disclose their participation to United States entities. Compensation could take many forms including cash, research funding, complimentary foreign travel, honorific titles, career advancement opportunities, promised future compensation, or other types of remuneration or consideration, including in-kind compensation.

Senior/key personnel – an individual who contributes in a substantive, meaningful way to the scientific development or execution of a research, development and demonstration (RD&D) project proposed to be carried out with DOE award.[75]

xviii. Locations of Work

The applicant must complete the supplied template by listing the city, state, and zip code + 4 and State for each location where project work will be performed by the prime recipient or subrecipient(s). Save the completed template as a MS Excel file using the following convention for the title "Control Number_LeadOrganization_LOW."

[75] 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, graduate students, and those with a postdoctoral role also may be considered senior/key personnel if they meet this definition.

E. Content and Form of Replies to Reviewers Comments

DOE will provide applicants with reviewer comments following the evaluation of all eligible Full Applications. Applicants have a brief opportunity to prepare a short Reply to Reviewer Comments (Reply). The Reply must not exceed three (3) pages. If a Reply is more than three (3) pages in length, DOE will review only the first three (3) pages and disregard any additional pages. Applicants may use the Reply to respond to one or more comments or to supplement their Full Application. The Reply may include text, graphs, charts, or data.

DOE will post the reviewer comments in EERE Exchange. The expected submission deadline is on the cover page of the FOA; however, it is the applicant's responsibility to monitor EERE Exchange in the event that the expected date changes. The deadline will not be extended for applicants who are unable to timely submit their Reply due to failure to check EERE Exchange or relying on the expected date alone. Applicants should anticipate having approximately three (3) business days to submit a Reply.

Applicants are not required to submit a Reply to Reviewer Comments. DOE will review and consider each eligible Full Application, even if no Reply is submitted or if the Reply is found to be ineligible.

F. Post Selection Information Requests

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

- Personnel proposed to work on the project and collaborating organizations (See Section VI.B.xix. Participants and Collaborating Organizations);
- Current and Pending Support (See Sections IV.D.xvi. and VI.B.xxiii. Current and Pending Support);
- An Intellectual Property Management Plan (if applicable) describing how the project team/consortia members will handle intellectual property rights and issues between themselves while ensuring compliance with federal intellectual property laws, regulations, and policies in accordance with Section VI.B.xi. Intellectual Property Management Plan;
- A Data Management Plan (if applicable) describing how all research data displayed in publications resulting from the proposed work will be digitally accessible at the time of publications, in accordance with Section VI.B.xxiii;
- Cybersecurity Plan (See Section VI.B.xxvi)
- Indirect cost information;
- Other budget information;

- Letters of Commitment from third parties contributing to cost share, if applicable;
- Name and phone number of the Designated Responsible Employee for complying with national policies prohibiting discrimination (See 10 CFR 1040.5);
- Representation of Limited Rights Data and Restricted Software, if applicable;
- Information related to Davis-Bacon Act Requirements;
- Information related to any proposed Workforce and Community Agreement, as defined above in "Community Benefits Plan: Job Quality and Equity," that applicants may have made with the relevant community; and
- Environmental Questionnaire.

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

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

NOTE: Due to the high demand of UEI requests and SAM registrations, entity legal business name and address validations are taking longer than expected to process. Entities should start the UEI and SAM registration process as soon as possible. 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. Additional entity validation resources can be found here: GSAFSD Tier 0 Knowledge Base - Validating your Entity.

H. Submission Dates and Times

All required submissions must be submitted in EERE Exchange no later than 5 p.m. ET on the dates provided on the cover page of this FOA.

I. Intergovernmental Review

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

J. Funding Restrictions

i. Allowable Costs

All expenditures must be allowable, allocable, and reasonable in accordance with the applicable federal cost principles. Pursuant to 2 CFR 910.352, the cost principles in the Federal Acquisition Regulations (48 CFR 31.2) apply to for-profit entities. The cost principles contained in 2 CFR Part 200, Subpart E apply to all entities other than for-profits.

ii. Pre-Award Costs

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

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

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

1. **National Environmental Policy Act (NEPA) Requirements Related to Pre-Award Costs**
   DOE's decision whether and how to distribute federal funds under this FOA is subject to NEPA. Applicants should carefully consider and should seek legal counsel or other expert advice before taking any action related to the proposed project that would have an adverse effect on the environment or limit the choice of reasonable alternatives prior to DOE completing the NEPA review process.

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

iii. Performance of Work in the United States (Foreign Work Waiver)

1. **Requirement**
   All work performed under awards issued under this FOA must be performed in the United States. The prime recipient must flow down this requirement to its subrecipients.

2. **Failure to Comply**
   If the prime recipient fails to comply with the Performance of Work in the United States requirement, DOE may deny reimbursement for the work conducted outside the United States and such costs may not be recognized as allowable recipient cost share. The prime recipient is responsible should any work under this award be performed outside the United States, absent a

waiver, regardless of whether the work is performed by the prime recipient, subrecipients, contractors or other project partners.

3. **Waiver**
   To seek a foreign work waiver, the applicant must submit a written waiver request to DOE. Appendix B lists the information that must be included in a request for a foreign work waiver.

   Save the waiver request(s) in a single PDF file. The applicant does not have the right to appeal DOE's decision concerning a waiver request.

iv. Construction

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

v. 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), commonly referred to as the "Fly America Act," and implementing regulations at 41 CFR 301-10.131 through 301-10.143. The law and regulations require air transport of people or property to, from, between, or within a country other than the United States, the cost of which is supported under this award, to be performed by or under a cost-sharing arrangement with a United States flag carrier, if service is available. Foreign travel costs are allowable only with the written prior approval of the Contracting Officer assigned to the award.

vi. Equipment and Supplies

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

vii. Buy America Requirements for Infrastructure Projects

Pursuant to the Build America Buy America Act, subtitle IX of BIL (Buy America, or "BABA"), federally assisted projects that involve infrastructure work, undertaken by applicable recipient types, require that:

- All iron, steel, and manufactured products used in the infrastructure work are produced in the United States; and

- All construction materials used in the infrastructure work are manufactured in the United States.

Whether a given project must apply this requirement is project-specific and dependent on several factors, such as the recipient's entity type, whether the work involves "infrastructure," as that term is defined in Section 70914 of the Bipartisan Infrastructure Law, and whether the infrastructure in question is publicly owned or serves a public function.

Applicants are strongly encouraged to consult Appendix C of this FOA to determine whether their project may have to apply this requirement, both to make an early determination as to the need of a waiver, as well as to determine what impact, if any, this requirement may have on the proposed project's budget.

Please note that, based on implementation guidance from the Office of Management and Budget (OMB) issued on April 18, 2022, the Buy America requirements of the BIL do not apply to DOE projects in which the prime recipient is a for-profit entity; the requirements only apply to projects whose prime recipient is a "non-Federal entity," e.g., a State, local government, Indian tribe, Institution of Higher Education, or nonprofit organization. Subawards should conform to the terms of the prime award from which they flow; in other words, for-profit prime recipients are not required to flow down these Buy America requirements to subrecipients, even if those subrecipients are non-Federal entities as defined above. Conversely, prime recipients which are non-Federal entities must flow the Buy America requirements down to all subrecipients, even if those subrecipients are for-profit entities. Finally, for all applicants—both non-Federal entities and for-profit entities—DOE is including a Program Policy Factor that the Selection Official may consider in determining which Full Applications to select for award negotiations that considers whether the applicant has made a commitment to procure U.S. iron, steel, manufactured products, and construction materials in its project.

The Grant or Cooperative Agreement between DOE and the awardee will require each recipient: (1) to fulfill the commitments made in its application regarding the procurement of U.S.-produced products and (2) to fulfill the commitments made in its application regarding the procurement of other key component metals and manufactured products domestically that are deemed available in sufficient and reasonably available quantities or of a satisfactory quality at the time of award negotiation. Applicants may seek waivers of these requirements in very limited circumstances and for good cause shown. Further details on requesting a waiver can be found in Appendix C and the terms and conditions of the applicant's award.

Applicants are strongly encouraged to consult Appendix C for more information.

viii. Davis-Bacon Act Requirements

Projects awarded under this FOA will be funded under Division D of the Bipartisan Infrastructure Law. Accordingly, per Section 41101 of that law, all laborers and mechanics employed by the recipient, subrecipients, contractors or subcontractors in the performance of construction, alteration, or repair work funded in whole or in part under this FOA shall be paid wages at rates not less than those prevailing on similar projects in the locality, as determined by the Secretary of Labor in accordance with subchapter IV of chapter 31 of title 40, United States Code commonly referred to as the "Davis-Bacon Act" (DBA).

Applicants shall provide written assurance acknowledging the DBA requirements above, and confirming that the laborers and mechanics performing construction, alteration, or repair work on projects funded in whole or in part by awards made as a result of this FOA are paid or will be paid wages at rates not less than those prevailing on projects of a character similar in the locality as determined by subchapter IV of Chapter 31 of Title 40, United States Code (Davis-Bacon Act).

Applicants acknowledge that they will comply with all of the Davis-Bacon Act requirements, including but not limited to:

(1) ensuring that the wage determination(s) and appropriate Davis-Bacon clauses and requirements are flowed down to and incorporated into any applicable subcontracts or subrecipient awards.

(2) ensuring that if wage determination(s) and appropriate Davis-Bacon clauses and requirements are improperly omitted from contracts and subrecipient awards, the applicable wage determination(s) and clauses are retroactively incorporated to the start of performance.

(3) being responsible for compliance by any subcontractor or subrecipient with the Davis-Bacon labor standards.

(4) receiving and reviewing certified weekly payrolls submitted by all subcontractors and subrecipients for accuracy and to identify potential compliance issues.

(5) maintaining original certified weekly payrolls for 3 years after the completion of the project and must make those payrolls available to the DOE or the United States Department of Labor ("DOL") upon request, as required by 29 CFR 5.6(a)(2).

(6) conducting payroll and job-site reviews for construction work, including interviews with employees, with such frequency as may be necessary to assure compliance by its subcontractors and subrecipients and as requested or directed by the DOE.

(7) cooperating with any authorized representative of the DOL in their inspection of records, interviews with employees, and other actions undertaken as part of a DOL investigation.

(8) posting in a prominent and accessible place the wage determination(s) and DOL Publication: WH-1321, Notice to Employees Working on Federal or Federally Assisted Construction Projects.

(9) notifying the Contracting Officer of all labor standards issues, including all complaints regarding incorrect payment of prevailing wages and/or fringe benefits, received from the recipient, subrecipient, contractor, or subcontractor employees; significant labor standards violations, as defined in 29 CFR 5.7; disputes concerning labor standards pursuant to 29 CFR Parts 4, 6, and 8 and as defined in FAR 52.222-14; disputed labor standards determinations; DOL investigations; or legal or judicial proceedings related to the labor standards under this Contract, a subcontract, or subrecipient award.

(10) preparing and submitting to the Contracting Officer, the Office of Management and Budget Control Number 1910-5165, Davis Bacon Semi-Annual Labor Compliance Report, by April 21 and October 21 of each year. Form submittal will be administered through the iBenefits system (https://doeibenefits2.energy.gov), its successor system, or other manner of compliance as directed by the Contracting Officer.

Recipients of funding under this FOA will also be required to undergo Davis-Bacon Act compliance training and to maintain competency in Davis-Bacon Act compliance. The Contracting Officer will notify the recipient of any DOE sponsored Davis-Bacon Act compliance trainings. The DOL offers free Prevailing Wage Seminars several times a year that meet this requirement, at https://www.dol.gov/agencies/whd/government-contracts/construction/seminars/events.

For additional guidance on how to comply with the Davis-Bacon provisions and clauses, see https://www.dol.gov/agencies/whd/government-contracts/construction and https://www.dol.gov/agencies/whd/government-contracts/protections-for-workers-in-construction.

DOE anticipates contracting with a third party for a Davis-Bacon Act electronic payroll compliance software application. Recipients of funding under this FOA must ensure the timely electronic submission of weekly certified payrolls through this software as part of its compliance with the Davis-Bacon Act unless a waiver is granted to a particular contractor or subcontractor because they are unable or limited in their ability to use or access. Applicants should indicate if a waiver will be sought.

ix. Lobbying

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

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

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

x. Risk Assessment

Pursuant to 2 CFR 200.206, DOE will conduct an additional review of the risk posed by applications submitted under this FOA. Such risk assessment will consider:

1. **Financial stability;**
2. **Quality of management systems and ability to meet the management standards prescribed in 2 CFR 200 as amended and adopted by 2 CFR 910;**
3. **History of performance;**
4. **Audit reports and findings; and**
5. **The applicant's ability to effectively implement statutory, regulatory, or other requirements imposed on non-federal entities.**

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

Depending on the severity of the findings and whether the findings were resolved, DOE may elect not to fund the applicant.

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

Further, as DOE funds critical and emerging technology areas, DOE also considers possible vectors of undue foreign influence in evaluating risk. If high risks are identified and cannot be sufficiently mitigated, DOE may elect to not fund the applicant.

xi. Invoice Review and Approval

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

- Summary of costs by cost categories;
- Timesheets or personnel hours report;
- Proof of compliance with Davis-Bacon and electronic submittals of certified payroll reports;
- Invoices/receipts for all travel, equipment, supplies, contractual, and other costs;
- UCC filing proof for equipment acquired with project funds by for-profit recipients and subrecipients;
- Explanation of cost share for invoicing period;

- Analogous information for some subrecipients; and
- Other items as required by DOE.

xii. Prohibition related to Foreign Government-Sponsored Talent Recruitment Programs

a. Prohibition

Persons participating in a *Foreign Government-Sponsored Talent Recruitment Program of a Foreign Country of Risk* are prohibited from participating in projects selected for federal funding under this FOA. Should an award result from this FOA, the recipient must exercise ongoing due diligence to reasonably ensure that no individuals participating on the DOE-funded project are participating in a *Foreign Government-Sponsored Talent Recruitment Program of a Foreign Country of Risk*. 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 foreign government talent recruitment program of a foreign country of risk. DOE may modify and add requirements related to this prohibition to the extent required by law.

b. Definitions

1. **Foreign Government-Sponsored Talent Recruitment Program.** An effort directly or indirectly organized, managed, or funded by a foreign government, or a foreign government instrumentality or entity, to recruit science and technology professionals or students (regardless of citizenship or national origin, or whether having a full-time or part-time position). Some foreign government-sponsored talent recruitment programs operate with the intent to import or otherwise acquire from abroad, sometimes through illicit means, proprietary technology or software, unpublished data and methods, and intellectual property to further the military modernization goals and/or economic goals of a foreign government. Many, but not all, programs aim to incentivize the targeted individual to relocate physically to the foreign state for the above purpose. Some programs allow for or encourage continued employment at United States research facilities or receipt of federal research funds while concurrently working at and/or receiving compensation from a foreign institution, and some direct participants not to disclose their participation to U.S. entities. Compensation could take many forms including cash, research funding, complimentary foreign

travel, honorific titles, career advancement opportunities, promised future compensation, or other types of remuneration or consideration, including in-kind compensation.

2. **Foreign Country of Risk.** DOE has designated the following countries as foreign countries of risk: Iran, North Korea, Russia, and China. This list is subject to change.

xiii. Affirmative Action and Pay Transparency Requirements

All federally assisted construction contracts exceeding $10,000 annually will be subject to the requirements of Executive Order 11246:

(1) Recipients, subrecipients, and contractors are prohibited from discriminating in employment decisions on the basis of race, color, religion, sex, sexual orientation, gender identity or national origin.

(2) Recipients and Contractors are required to take affirmative action to ensure that equal opportunity is provided in all aspects of their employment. This includes flowing down the appropriate language to all subrecipients, contractors and subcontractors.

(3) Recipients, subrecipients, contractors and subcontractors are prohibited from taking adverse employment actions against applicants and employees for asking about, discussing, or sharing information about their pay or, under certain circumstances, the pay of their co-workers.

The Department of Labor's (DOL) Office of Federal Contractor Compliance Programs (OFCCP) uses a neutral process to schedule contractors for compliance evaluations. OFCCP's Technical Assistance Guide[76] should be consulted to gain an understanding of the requirements and possible actions the recipients, subrecipients, contractors and subcontractors must take.

V. Application Review Information

A. Technical Review Criteria

[76] See OFCCP's Technical Assistance Guide at: https://www.dol.gov/sites/dolgov/files/ofccp/Construction/files/ConstructionTAG.pdf?msclkid=9e397d68c4b111ec9d8e6fecb6c710ec Also see the National Policy Assurances http://www.nsf.gov/awards/managing/rtc.jsp

i. Concept Papers

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

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

This criterion involves consideration of the following factors:

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

ii. Full Applications

Applications will be evaluated against the technical review criteria shown below. All sub-criteria are of equal weight.

Criterion 1: Technical Merit, Innovation, and Impact (50%)

This criterion involves consideration of the following factors:

<u>Technical Merit and Innovation</u>

- Extent to which the proposed technology, process, or project is innovative or replicable;
- Degree to which the current state of the technology and the proposed advancement to demonstration and commercialization are clearly described;
- Extent to which the application specifically and convincingly demonstrates how the applicant will move the state-of-the-art to the proposed advancement to demonstration and commercialization;
- Sufficiency of technical detail in the application to assess whether the proposed work is scientifically meritorious and revolutionary, including relevant data, calculations and discussion of prior work with analyses that support the viability of the proposed work;
- Extent to which project has buy-in from needed stakeholders to ensure success of the demonstration;

- Degree to which key manufacturing and supply chain challenges are considered, as applicable, for viable scale-up in this and future demonstrations;
- Degree to which siting and environmental constraints are considered for deployment;
- Extent to which project has the potential to reduce emissions and provide clean energy acceleration benefits for a community or region; and
- Sufficiency of existing infrastructure to support addition of proposed demonstration.

Impact of Technology Advancement

- The ability of the project to advance industry adoption;
- The extent the project supports the topic area objectives and target specifications and metrics;
- The potential impact of the project on advancing the state-of-the-art;
- Extent to which demonstration/ deployment is replicable and may lead to future demonstrations; and
- Extent to which the project facilitates stakeholder relationships across new or existing stakeholders to gain technical buy-in and increase potential for future deployments.

Project Management

- Adequacy of proposed project management systems including the ability to track scope, cost, and schedule progress and changes;
- Adequacy, reasonableness, and soundness of the project schedule, as well as periodic Go/No-Go decisions prior to further funds disbursement, interim milestones, and metrics to track process;
- Adequacy, reasonableness, and soundness of the project schedule, as well as annual Go/No-Go decisions prior to a budget period continuation application, interim milestones, and metrics to track process;
- Adequacy of the identification of risks, including labor and community opposition or disputes, and "timely" and appropriate strategies for mitigation and resolution; and
- Soundness of a plan to expeditiously address environmental, siting, and other regulatory requirements for the project, including evaluation of resilience to climate change.

Criterion 2: Project R&D and Market Transformation Plan (20%)
This criterion involves consideration of the following factors:

R&D Approach, Workplan and SOPO

- Degree to which the approach and critical path have been clearly described and thoughtfully considered; and
- Degree to which the task descriptions are clear, detailed, timely, and reasonable, resulting in a high likelihood that the proposed Workplan and SOPO will succeed in meeting the project goals.

Identification of Technical Risks

- Discussion and demonstrated understanding of the key technical risk areas involved in the proposed work and the quality of the mitigation strategies to address them.

Baseline, Metrics, and Deliverables

- The level of clarity in the definition of the baseline, metrics, and milestones; and
- Relative to a clearly defined project baseline, the strength of the quantifiable metrics, milestones, and a mid-point deliverables defined in the application, such that meaningful interim progress will be made.

Market Transformation Plan

- Identification of target market, competitors, and distribution channels for proposed technology along with known or perceived barriers to market penetration, including mitigation plan; and
- Comprehensiveness of market transformation plan including but not limited to product development and/or service plan, commercialization timeline, financing, product marketing, legal/regulatory considerations including intellectual property, infrastructure requirements, etc., and product distribution.

Industry Adoption Plan

- Identification of the interest and extent of industry adoption of the technology/process.

Criterion 3: Team and Resources (20%)

This criterion involves consideration of the following factors:

- The capability of the Project Manager(s) and the proposed team to address all aspects of the proposed work with a high probability of success. The qualifications, relevant expertise, and time commitment of the individuals on the team;
- The sufficiency of the facilities to support the work;
- The degree to which the proposed consortia/team demonstrates the ability to facilitate and expedite further demonstration, development and commercial deployment of the proposed technologies;

- The level of participation by project participants as evidenced by letter(s) of commitment and how well they are integrated into the Workplan, Workplan; and
- The reasonableness of the budget and spend plan for the proposed project and objectives.

Criterion 4: Community Benefits Plan: Job Quality and Equity (Community Benefits Plan) (10%)
This criterion involves consideration of the following factors:

Overall Approach
- The extent to which applicant's Community Benefits Plan illustrates project viability and social risk mitigation through community and labor engagement; investment in the American workforce; diversity, equity, inclusion and accessibility, and "Justice40 Initiative" benefits to disadvantaged communities.
- The extent the actions outlined in the Community Benefits Plan are supported by existing Workforce and Community Agreements (e.g., good neighbor agreements, workforce agreements, project labor agreements, collective bargaining agreements, and similar agreements).

Community and Labor Engagement
- Extent to which the applicant demonstrates community and labor engagement to date and/or a clear and appropriately robust plan to engage local stakeholders, including labor unions and community-based organizations that support or work with disadvantaged communities.

Job Quality
- Extent to which Community Benefits Plan demonstrates that the jobs supported by the proposed project will be quality jobs and provides robust and credible plan to attract, train, and retain skilled workers. The bullets include examples of how this could be demonstrated—
    - Collective bargaining agreement, project labor agreement, labor management partnership, labor peace or labor neutrality agreement, or similar agreement or commitment to workers' free and fair choice to join a union or labor organization of their choosing; and
    - Commitments to fair wages, benefits, or other worker support, including education and training and worker engagement in workplace safety and health plans.

Diversity, Equity, Inclusion, and Accessibility

- Extent to which the Community Benefits Plan includes specific and high-quality actions to meet DEIA goals, which may include DEIA recruitment procedures; partnerships with workforce training or support organizations serving workers facing systematic barriers to employment; and other DEIA commitments.

Justice40 Initiative

- Extent to which the Community Benefits Plan identifies: specific, measurable benefits for disadvantaged communities, how the benefits will flow to disadvantaged communities, and how negative environmental impacts affecting disadvantaged communities would be mitigated; and

Extent to which the project would contribute to meeting the objective that 40% of the overall benefits of climate and clean energy investments flow to disadvantaged communities.

iii. Criteria for Replies to Reviewer Comments

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

B. Standards for Application Evaluation

Applications that are determined to be eligible will be evaluated in accordance with this FOA, by the standards set forth in EERE's Notice of Objective Merit Review Procedure (76 Fed. Reg. 17846, March 31, 2011) and the guidance provided in the "DOE Merit Review Guide for Financial Assistance," effective September 2020, which is available at: https://energy.gov/management/downloads/merit-review-guide-financial-assistance-and-unsolicited-proposals-current.

C. Other Selection Factors

i. Program Policy Factors

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

- The degree to which the proposed project exhibits technological diversity when compared to the existing DOE project portfolio and other projects selected from the subject FOA;

- The degree to which the proposed project, including proposed cost share, optimizes the use of available DOE funding to achieve programmatic objectives;
- The level of industry involvement and demonstrated ability to accelerate demonstration and commercialization and overcome key market barriers;
- The degree to which the proposed project is likely to lead to increased high-quality employment and manufacturing in the United States;
- The degree to which the proposed project will accelerate transformational technological advances in areas that industry by itself is not likely to undertake because of technical and financial uncertainty;
- The degree to which the proposed project, or group of projects, represent a desired geographic distribution (considering past awards and current applications);
- The degree to which the proposed project incorporates applicant or team members from Minority Serving Institutions (e.g., Historically Black Colleges and Universities (HBCUs)/Other Minority Serving Institutions); and partnerships with Minority Business Enterprises, Minority Owned Businesses, Woman Owned Businesses, Veteran Owned Businesses, or Tribal Nations; and
- The degree to which the proposed project, when compared to the existing DOE project portfolio and other projects to be selected from the subject FOA, contributes to the total portfolio meeting the goals reflected in the Community Benefits Plan criteria.
- The degree to which the proposed project collectively represents diverse types and sizes of applicant organizations.
- The degree to which the project's solution or strategy will maximize deployment or replication.
- The degree to which the proposed project will employ procurement of U.S. iron, steel, manufactured products, and construction materials.

D. Evaluation and Selection Process

i. Overview

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

ii. Pre-Selection Interviews

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

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

DOE will not reimburse applicants for travel and other expenses relating to the pre-selection interviews, nor will these costs be eligible for reimbursement as pre-award costs.

Participation in pre-selection interviews with DOE does not signify that applicants have been selected for award negotiations.

iii. Pre-Selection Clarification

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

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

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

iv. Recipient Integrity and Performance Matters

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

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

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

v. Selection

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

E. Anticipated Notice of Selection and Award Negotiation Dates

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

VI. Award Administration Information

A. Award Notices

i. Ineligible Submissions

Ineligible Concept Papers and Full Applications will not be further reviewed or considered for award. The Contracting Officer will send a notification letter by

email to the technical and administrative points of contact designated by the applicant in EERE Exchange. The notification letter will state the basis upon which the Concept Paper or the Full Application is ineligible and not considered for further review.

ii. Concept Paper Notifications

DOE will notify applicants of its determination to encourage or discourage the submission of a Full Application. DOE will post these notifications to EERE Exchange. DOE may include general comments provided from reviewers on an applicant's Concept Paper in the encourage/discourage notifications.

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

iii. Full Application Notifications

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

iv. Successful Applicants

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

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

and rescind the Selection. DOE reserves the right to terminate award negotiations at any time for any reason.

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

v. Alternate Selection Determinations

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

vi. Unsuccessful Applicants

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

B. Administrative and National Policy Requirements

i. Registration Requirements

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

1. EERE Exchange

Register and create an account on EERE Exchange at https://eere-Exchange.energy.gov. This account will then allow the user to register for any open EERE FOAs that are currently in EERE Exchange. It is recommended that each organization or business unit, whether acting as a team or a single entity, use only one account as the contact point for each submission. Applicants should also designate backup points of contact so they may be easily contacted if deemed necessary. **This step is required to apply to this FOA.** The EERE Exchange registration does not have a delay; however, **the remaining registration requirements below could take several weeks to process and are necessary for a potential applicant to receive an award under this FOA.**

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

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

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

5. **Electronic Authorization of Applications and Award Documents**
   Submission of an application and supplemental information under this FOA through electronic systems used by the DOE, including EERE Exchange and FedConnect.net, constitutes the authorized representative's approval and electronic signature.

ii. Award Administrative Requirements

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

iii. Foreign National Participation

All applicants selected for an award under this FOA and project participants (including subrecipients and contractors) who anticipate involving foreign nationals in the performance of an award, may be required to provide DOE with specific information about each foreign national to satisfy requirements for foreign national participation. A "foreign national" is defined as any person who is not a United States citizen by birth or naturalization. The volume and type of information collected may depend on various factors associated with the

award. DOE concurrence may be required before a foreign national can participate in the performance of any work under an award.

DOE may elect to deny foreign national's participation in the award. Likewise, DOE may elect to deny a foreign national's access to a DOE sites, information, technologies, equipment, programs or personnel.

iv. Subaward and Executive Reporting

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

v. National Policy Requirements

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

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

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

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

vii. Flood Resilience

Applications should indicate whether the proposed project location(s) is within a floodplain, how the floodplain was defined, and how future flooding will factor

into the project's design. The base floodplain long used for planning has been the 100-year floodplain, that is, a floodplain with a 1.0 percent chance of flooding in any given year. As directed by Executive Order 13690, Establishing a Federal Flood Risk Management Standard and a Process for Further Soliciting and Considering Stakeholder Input (2015), Federal agencies, including DOE, continue to avoid development in a floodplain to the extent possible. When doing so is not possible, Federal agencies are directed to "expand management from the current base flood level to a higher vertical elevation and corresponding horizontal floodplain to address current and future flood risk and ensure that projects funded with taxpayer dollars last as long as intended." The higher flood elevation is based on one of three approaches: climate-informed science (preferred), freeboard value, or 0.2 percent annual flood change (500-year floodplain). EO 13690 and related information is available at https://www.energy.gov/nepa/articles/eo-13690-establishing-federal-flood-risk-management-standard-and-process-further.

viii. Applicant Representations and Certifications

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

2. **Corporate Felony Conviction and Federal Tax Liability Representations**
   In submitting an application in response to this FOA, the applicant represents that:

   a. It is **not** a corporation that has been convicted of a felony criminal violation under any federal law within the preceding 24 months; and

   b. 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.

3. **Nondisclosure and Confidentiality Agreements Representations**
In submitting an application in response to this FOA the applicant represents that:

   a. 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.

   b. 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:

      (1) *''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.''*

      (2) The limitation above shall not contravene requirements applicable to Standard Form 312 Classified Information Nondisclosure Agreement (https://fas.org/sgp/othergov/sf312.pdf), Form 4414 Sensitive Compartmented Information Disclosure Agreement (https://fas.org/sgp/othergov/intel/sf4414.pdf), or any other form issued by a federal department or agency governing the nondisclosure of classified information.

      (3) Notwithstanding the provision listed in paragraph (a), a nondisclosure or confidentiality policy form or agreement that is to be executed by

a person connected with the conduct of an intelligence or intelligence-related activity, other than an employee or officer of the United States government, may contain provisions appropriate to the particular activity for which such document is to be used. Such form or agreement shall, at a minimum, require that the person will not disclose any classified information received in the course of such activity unless specifically authorized to do so by the United States government. Such nondisclosure or confidentiality forms shall also make it clear that they do not bar disclosures to Congress, or to an authorized official of an executive agency or the Department of Justice, that are essential to reporting a substantial violation of law.

ix. 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.

x. Statement of Substantial Involvement

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

1. DOE shares responsibility with the recipient for the management, control, direction, and performance of the project.

2. DOE may intervene in the conduct or performance of work under this award for programmatic reasons. Intervention includes the interruption or modification of the conduct or performance of project activities.

3. DOE may redirect or discontinue funding the project based on the outcome of DOE's evaluation of the project at the Go/No-Go decision point(s).

4. DOE participates in major project decision-making processes.

xi. Intellectual Property Management Plan (IPMP)

IP Management Plan may be required during negotiation or after award at the discretion of the Contracting Officer. Applicants must submit an executed IPMP between the members of the consortia or team upon request.

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

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

- The treatment of confidential information between members (e.g., the use of NDAs);
- The treatment of background intellectual property (e.g., any requirements for identifying it or making it available);
- The treatment of inventions made under the award (e.g., any requirements for disclosing to the other members on an application, filing patent

applications, paying for patent prosecution, and cross-licensing or other licensing arrangements between the members);

- The treatment of data produced, including software, under the award (e.g., any publication process or other dissemination strategies, copyrighting strategy or arrangement between members);
- Any technology transfer and commercialization requirements or arrangements between the members;
- The treatment of any intellectual property issues that may arise due to a change in membership of the consortia or team; and
- The handling of disputes related to intellectual property between the members.

xii. Subject Invention Utilization Reporting

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

xiii. Intellectual Property Provisions

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

xiv. Reporting

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

Additional reporting requirements apply to projects funded by BIL. As part of tracking progress toward key departmental goals – ensuring justice and equity, investing in the American workforce, boosting domestic manufacturing, reducing greenhouse gas emissions, and advancing a pathway to private sector deployment – DOE may require specific data collection. Examples of data that may be collected include:

- New manufacturing production, or recycling capacity
- Number of trainings completed, trainees placed in full-time employment, workforce partnerships involving employers, community-based organizations, or labor unions
- Justice and Equity data, including:
    - Minority Business Enterprises, Minority Owned Businesses, Woman Owned Businesses and Veteran Owned Businesses acting as vendors and sub-contractors for bids on supplies, services and equipment.
    - Value, number, and type of partnerships with MSIs
    - Stakeholder engagement events, consent-based siting activities
    - Other relevant indicators from the Community Benefits Plan
- Number and type of energy efficient and clean energy equipment installed
- Funding leveraged, follow-on-funding, Intellectual Property (IP) Generation and IP Utilization.

xv. Go/No-Go Review

Each project selected under this FOA under Topic 2 will be subject to a periodic project evaluation referred to as a Go/No-Go Review. A Go/No-Go Review is a risk management tool and a project management best practice to ensure that, for the current phase or period of performance, technical success is definitively achieved and potential for success in future phases or periods of performance is evaluated, prior to actually beginning the execution of future phases. At the Go/No-Go decision points, DOE will evaluate project performance, project schedule adherence, the extent milestone objectives are met, compliance with reporting requirements, and overall contribution to the program goals and objectives. Federal funding beyond the Go/No-Go decision point (continuation funding) is contingent upon (1) availability of federal funds appropriated by

Congress for the purpose of this program; (2) the availability of future-year budget authority; (3) recipient's technical progress compared to the Milestone Summary Table stated in Attachment 1 of the award; (4) recipient's submittal of required reports; (5) recipient's compliance with the terms and conditions of the award; (6) DOE's Go/No-Go decision; (7) the recipient's submission of a continuation application[77]; and (8) written approval of the continuation application by the Contracting Officer.

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

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

xvi. Conference Spending

The recipient shall not expend any funds on a conference not directly and programmatically related to the purpose for which the grant or cooperative agreement was awarded that would defray the cost to the United States government of a conference held by any Executive branch department, agency, board, commission, or office for which the cost to the United States government would otherwise exceed $20,000, thereby circumventing the required notification by the head of any such Executive Branch department, agency,

[77] A continuation application is a non-competitive application for an additional budget period within a previously approved project period. At least ninety (90) days before the end of each budget period, the recipient must submit its continuation application, which includes the following information:

i. A progress report on the project objectives, including significant findings, conclusions, or developments, and an estimate of any unobligated balances remaining at the end of the budget period. If the remaining unobligated balance is estimated to exceed 20 percent of the funds available for the budget period, explain why the excess funds have not been obligated and how they will be used in the next budget period.

ii. A detailed budget and supporting justification if there are changes to the negotiated budget, or a budget for the upcoming budget period was not approved at the time of award.

iii. A description of any planned changes from the SOPO and/or Milestone Summary Table.

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.

xvii. Uniform Commercial Code (UCC) Financing Statements

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

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

xviii. Implementation of Executive Order 13798, Promoting Free Speech and Religious Liberty

States, local governments, or other public entities may not condition sub-awards in a manner that would discriminate, or disadvantage sub-recipients based on their religious character.

xix. Participants and Collaborating Organizations

If selected for award negotiations, the selected applicant must submit a list of personnel who are proposed to work on the project, both at the recipient and subrecipient level and a list of proposed collaborating organizations prior to award. Recipients will have an ongoing responsibility to notify DOE of changes to the personnel and collaborating organizations, and submit updated information during the life of the award.

xx. Current and Pending Support

If selected for award negotiations, within 30 days of the selection notice, the selectee must submit 1) current and pending support disclosures and resumes for any new PIs or senior/key personnel, and 2) updated disclosures if there have been any changes to the current and pending support submitted with the application. Throughout the life of the award, the recipient has an ongoing responsibility to submit 1) current and pending support disclosure statements and resumes for any new PI and senior/key personnel, and 2) updated disclosures if there are changes to the current and pending support previously submitted to DOE. Also See Section IV.D.xvi.

xxi. U.S. Manufacturing Commitments

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 United States 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 that any products embodying any subject invention or produced through the use of any subject invention will be manufactured substantially in the United States unless the Recipient can show to the satisfaction of DOE that it is not commercially feasible. Award terms, including the specific U.S. Competitiveness Provision applicable to the various types of Recipients and projects, are available at https://www.energy.gov/gc/standard-intellectual-property-ip-provisions-financial-assistance-awards.

Please note that a subject invention is any invention conceived or first actually reduced to practice 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. For example, the entity may propose modifying the language of the U.S. Competitiveness Provision in order to change the scope of the requirements or to provide more specifics on the application of the requirements for a particular technology. As another example, the entity may request that the U.S. Competitiveness Provision be waived in lieu of a net benefits statement or United States manufacturing plan. The statement or plan would contain specific and enforceable commitments that would be beneficial to the United States economy and competitiveness. Examples of such commitments could include manufacturing

specific products in the United States, making a specific investment in a new or existing United States manufacturing facility, keeping certain activities based in the United States or supporting a certain number of jobs in the United States related to the technology. DOE may, in its sole discretion, determine that the proposed modification or waiver promotes commercialization and provides substantial United States economic benefits, and grant the request. 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 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.

The U.S. Competitiveness Provision is implemented by DOE pursuant to a Determination of Exceptional Circumstances (DEC) under the Bayh-Dole Act and DOE Patent Waivers. See Section VIII.J. Title to Subject Inventions of this FOA for more information on the DEC and DOE Patent Waivers.

xxii. Interim Conflict of Interest Policy for Financial Assistance

The DOE interim Conflict of Interest Policy for Financial Assistance (COI Policy)[78] is applicable to all non-Federal entities applying for, or that receive, DOE funding by means of a financial assistance award (e.g., a grant, cooperative agreement, or technology investment agreement) 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. The term "Investigator" means the PI and any other person, regardless of title or position, who is responsible for the purpose, design, conduct, or reporting of a project funded by DOE or proposed for funding by DOE. Recipients must flow down the requirements of the interim COI Policy to any subrecipient non-federal entities. Further, for DOE funded projects, the recipient must include all financial conflicts of interest (FCOI) (i.e., managed and unmanaged/ unmanageable) in their initial and ongoing FCOI reports.

It is understood that non-federal entities and individuals receiving DOE financial assistance awards will need sufficient time to come into full compliance with DOE's interim COI Policy. To provide some flexibility, DOE allows for a staggered implementation. Specifically, prior to award, applicants selected for award

[78] DOE's interim COI Policy can be found at PF 2022-17 FAL 2022-02 Department of Energy Interim Conflict of Interest Policy Requirements for Financial Assistance.

negotiations must: ensure all Investigators complete their significant financial disclosures; review the disclosures; determine whether a FCOI exists; develop and implement a management plan for FCOIs; and provide DOE with an initial FCOI report that includes all FCOIs (i.e., managed and unmanaged/ unmanageable). Recipients will have 180 days from the date of the award to come into full compliance with the other requirements set forth in DOE's interim COI Policy. Prior to award, the applicant must certify that it is, or will be within 180 days of the award, compliant with all requirements in the COI Policy.

xxiii. Data Management Plan (DMP)

Each applicant whose Full Application is selected for award negotiations will be required to submit a DMP during the award negotiations phase. A DMP explains how, when appropriate, data generated in the course of the work performed under an DOE award will be shared and preserved in order to validate the results of the proposed work or how the results could be validated if the data is not shared or preserved. The DMP must provide a plan for making all research data displayed in publications resulting from the proposed work digitally accessible at the time of publications.

xxiv. Fraud, Waste and Abuse

The mission of the DOE Office of Inspector General (OIG) is to strengthen the integrity, economy and efficiency of the Department's programs and operations including deterring and detecting fraud, waste, abuse and mismanagement. The OIG accomplishes this mission primarily through investigations, audits, and inspections of DOE activities to include grants, cooperative agreements, loans, and contracts.

The OIG maintains a Hotline for reporting allegations of fraud, waste, abuse, or mismanagement. To report such allegations, please visit https://www.energy.gov/ig/ig-hotline.

Additionally, recipients of DOE awards must be cognizant of the requirements of 2 CFR 200.113 Mandatory disclosures, which states:

> The non-Federal entity or applicant for a Federal award must disclose, in a timely manner, in writing to the Federal awarding agency or pass-through entity all violations of Federal criminal law involving fraud, bribery, or gratuity violations potentially affecting the Federal award. Non-Federal entities that have received a Federal award including the term and condition outlined in appendix XII of 2 CFR Part 200 are required to report certain civil, criminal, or administrative proceedings to SAM (currently FAPIIS).

Failure to make required disclosures can result in any of the remedies described in 2 CFR 200.339. (See also 2 CFR part 180, 31 U.S.C. § 3321, and 41 U.S.C. § 2313.) [85 FR 49539, Aug. 13, 2020]

Applicants and subrecipients (if applicable) are encouraged to allocate sufficient costs in the project budget to cover the costs associated for personnel and data infrastructure needs to support performance management and program evaluation needs including but not limited to independent program and project audits to mitigate risks for fraud, waste, and abuse.

xxv. Human Subjects Research

Research involving human subjects, biospecimens, or identifiable private information conducted with DOE funding is subject to the requirements of DOE Order 443.1C, Protection of Human Research Subjects, 45 CFR Part 46, Protection of Human Subjects (subpart A which is referred to as the "Common Rule"), and 10 CFR Part 745, Protection of Human Subjects.

Federal regulation and the DOE Order require review by an Institutional Review Board (IRB) of all proposed human subjects research projects. The IRB is an interdisciplinary ethics board responsible for ensuring that the proposed research is sound and justifies the use of human subjects or their data; the potential risks to human subjects have been minimized; participation is voluntary; and clear and accurate information about the study, the benefits and risks of participating, and how individuals' data/specimens will be protected/used, is provided to potential participants for their use in determining whether or not to participate.

The recipient shall provide the federal Wide Assurance number identified in item 1) below and the certification identified in item 2) below to DOE prior to initiation of any project that will involve interactions with humans in some way (e.g., through surveys); analysis of their identifiable data (e.g., demographic data and energy use over time); asking individuals to test devices, products, or materials developed through research; and/or testing of commercially available devices in buildings/homes in which humans will be present. Note: This list of examples is illustrative and not all inclusive.

No DOE funded research activity involving human subjects, biospecimens, or identifiable private information shall be conducted without:

1) A registration and a federal Wide Assurance of compliance accepted by the Office of Human Research Protection (OHRP) in the Department of Health and Human Services; and

2) Certification that the research has been reviewed and approved by an Institutional Review Board (IRB) provided for in the assurance. IRB review may be accomplished by the awardee's institutional IRB; by the Central DOE IRB; or if collaborating with one of the DOE national laboratories, by the DOE national laboratory IRB.

The recipient is responsible for ensuring all subrecipients comply and for reporting information on the project annually to the DOE Human Subjects Research Database (HSRD) at https://science.osti.gov/HumanSubjects/Human-Subjects-Database/home. Note: If a DOE IRB is used, no end of year reporting will be needed.

Additional information on the DOE Human Subjects Research Program can be found at: HUMAN SUBJECTS Human Subjects Pr... | U.S. DOE Office of Science (SC) (osti.gov).

xxvi. Cybersecurity Plan

Be advised that under Section 40126 of the BIL, the Secretary of Energy has determined that this FOA requires an applicant to submit a Cybersecurity Plan to the DOE prior to the issuance of an award.

Each applicant whose Full Application is selected for award negotiations must submit a Cybersecurity Plan during the award negotiations phase. A Cybersecurity Plan explains how basic cybersecurity practices throughout the life of the proposed the project will be maintained.

C. Program Down-Select

In addition to the Go/No-Go Reviews required for each project, EERE intends to conduct a competitive project review (down-selection process) upon the completion of BP1 for Topic Area 1, only. Recipients will present their projects to DOE individually (not to other recipients). Subject matter experts from academia, national laboratories, and industry may be used as reviewers, subject to conflict of interest and non-disclosure considerations. Projects will be evaluated based on the following criteria:

Down-Select Criteria
Projects will be evaluated based on the following criteria:

1. Technical performance and progress towards stated project objectives including technical completeness.
2. Level of innovation and potential impact of the project to reduce time, cost and/or risks associated with development of hydropower at NPDs.
3. Likelihood of project success; as indicated by the technical risk analysis, test plans, feasibility of permitting plan, progress made on permitting activities, market and financial viability, and stakeholder engagement, etc.

Upon completion of the competitive project review (down-selection process), DOE will select which projects will receive federal funding beyond BP1. Due to the availability of funding and program considerations, only a portion of the recipients will be selected to receive funding for project continuation. As a result of this down-select process, certain projects will not receive federal funding beyond BP1 even if the project is meeting the pre-defined metrics.

VII. Questions/Agency Contacts

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

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

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

VIII. Other Information

A. FOA Modifications

Amendments to this FOA will be posted on the EERE Exchange website and the Grants.gov system. However, you will only receive an email when an amendment or a FOA is posted on these sites if you register for email notifications for this FOA in Grants.gov. EERE recommends that you register as

soon after the release of the FOA as possible to ensure you receive timely notice of any amendments or other FOAs.

B. Government Right to Reject or Negotiate

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

C. Commitment of Public Funds

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

D. Treatment of Application Information

Applicants should not include business sensitive (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 FOA. Applicants are advised to not include any critically sensitive proprietary detail.

If an application includes business sensitive, trade secrets, proprietary, or otherwise confidential information, it is furnished to the federal government (government) in confidence with the understanding that the information shall be used or disclosed only for evaluation of the application. Such information will be withheld from public disclosure to the extent permitted by law, including the Freedom of Information Act. Without assuming any liability for inadvertent disclosure, 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.

If an applicant chooses to submit business sensitive, trade secrets, proprietary, or otherwise confidential information, the applicant must provide **two copies** of the submission (e.g., Concept Paper, Full Application). The first copy should be marked, "non-confidential" with the information believed to be confidential deleted. The second copy should be marked "confidential" and must clearly and conspicuously identify the business sensitive, trade secrets, proprietary, or otherwise confidential information and must be marked as described below. Failure to comply with these marking requirements may result in the disclosure of the unmarked information under the Freedom of Information Act or otherwise. The government is not liable for the disclosure or use of unmarked

information and may use or disclose such information for any purpose as authorized by law.

The cover sheet of the Full Application, and other applicant submission must be marked as follows and identify the specific pages business sensitive, trade secrets, proprietary, or otherwise confidential information:

> **Notice of Restriction on Disclosure and Use of Data:**
> Pages [list applicable pages] of this document may contain business sensitive, trade secrets, proprietary, or otherwise confidential information that is exempt from public disclosure. Such information shall be used or disclosed only for evaluation purposes or in accordance with a financial assistance 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]

In addition, (1) the header and footer of every page that contains business sensitive, trade secrets, proprietary, or otherwise confidential information must be marked as follows: "Contains Business Sensitive, Trade Secrets, Proprietary, or Otherwise Confidential Information Exempt from Public Disclosure," and (2) every line or paragraph containing such information must be clearly marked with double brackets or highlighting. DOE will make its own determination about the confidential status of the information and treat it according to its determination.

E. Evaluation and Administration by Non-Federal Personnel

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

F. Notice Regarding Eligible/Ineligible Activities

Eligible activities under this FOA include those which describe and promote the understanding of scientific and technical aspects of specific energy technologies, but not those which encourage or support political activities such as the

collection and dissemination of information related to potential, planned or pending legislation.

G. Notice of Right to Conduct a Review of Financial Capability

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

H. Requirement for Full and Complete Disclosure

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

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

I. Retention of Submissions

DOE expects to retain copies of all Full Applications and other submissions. No submissions will be returned. By applying to DOE for funding, applicants consent to DOE's retention of their submissions.

J. Title to Subject Inventions

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

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

DOE has issued a class waiver that applies to this FOA. Under this class waiver, domestic large businesses may elect title to their subject inventions similar to the right provided to the domestic small businesses, educational institutions, and

nonprofits by law. In order to avail itself of the class waiver, a domestic large business must agree that any products embodying or produced through the use of a subject invention first created or reduced to practice under this program will be substantially manufactured in the United States.

- Advance and Identified Waivers: For an applicant not covered by a Class Patent Waiver or the Bayh-Dole Act, the applicant may request a patent waiver that will cover subject inventions that may be invented under the award, in advance of or within 30 days after the effective date of the award. Even if an advance waiver is not requested or the request is denied, the recipient will have a continuing right under the award to request a waiver for identified inventions, i.e., individual subject inventions that are disclosed to DOE within the timeframes set forth in the award's intellectual property data terms and conditions. Any patent waiver that may be granted is subject to certain terms and conditions in 10 CFR 784.

- DEC: On June 07, 2021, DOE approved a DETERMINATION OF EXCEPTIONAL CIRCUMSTANCES (DEC) UNDER THE BAYH-DOLE ACT TO FURTHER PROMOTE DOMESTIC MANUFACTURE OF DOE SCIENCE AND ENERGY TECHNOLOGIES. In accordance with this DEC, all awards, including sub-awards, under this FOA shall include the U.S. Competitiveness Provision in accordance with Section VI.B.xxi. U.S. Manufacturing Commitments of this FOA. A copy of the DEC can be found at https://www.energy.gov/gc/determination-exceptional-circumstances-decs. Pursuant to 37 CFR 401.4, any nonprofit organization or small business firm as defined by 35 U.S.C. § 201 affected by any DEC has the right to appeal it by providing written notice to DOE within 30 working days from the time it receives a copy of the determination.

- DOE may issue and publish on the website above further DECs prior to the issuance of awards under this FOA. DOE may require additional submissions or requirements as authorized by any applicable DEC.

K. Government Rights in Subject Inventions

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

Government Use License

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

March-In Rights

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

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

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

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

L. Rights in Technical Data

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

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

Government Rights in Technical Data Produced Under Awards: The United States government normally retains unlimited rights in technical data produced under government financial assistance awards, including the right to distribute to the public. However, pursuant to special statutory authority, certain categories of data generated under DOE awards may be protected from public disclosure for up to five years after the data is generated ("Protected Data"). For awards

permitting Protected Data, the protected data must be marked as set forth in the awards intellectual property terms and conditions and a listing of unlimited rights data (i.e., non-protected data) must be inserted into the data clause in the award. In addition, invention disclosures may be protected from public disclosure for a reasonable time in order to allow for filing a patent application.

M. Copyright

The prime recipient and subrecipients 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.

N. Export Control

The United States government regulates the transfer of information, commodities, technology, and software considered to be strategically important to the United States to protect national security, foreign policy, and economic interests without imposing undue regulatory burdens on legitimate international trade. There is a network of federal agencies and regulations that govern exports that are collectively referred to as "Export Controls". All recipients and subrecipients are responsible for ensuring compliance with all applicable United States Export Control laws and regulations relating to any work performed under a resulting award.

The recipient must immediately report to DOE any export control violations related to the project funded under the DOE award, at the recipient or subrecipient level, and provide the corrective action(s) to prevent future violations.

O. Prohibition on Certain Telecommunications and Video Surveillance Services or Equipment

As set forth in 2 CFR 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 uses *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 Section 889 of Public Law 115-232,

covered telecommunications equipment is telecommunications equipment produced by Huawei Technologies Company or ZTE Corporation (or any subsidiary or affiliate of such entities).

See Public Law 115-232, Section 889, 2 CFR 200.216, and 2 CFR 200.471 for additional information.

P. Personally Identifiable Information (PII)

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

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

Q. Annual Independent Audits

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

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

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

R. Informational Webinar

DOE will conduct one informational webinar during the FOA process. It will be held after the initial FOA release but before the due date for Concept Papers.

Attendance is not mandatory and will not positively or negatively impact the overall review of any applicant submissions. As the webinar will be open to all applicants who wish to participate, applicants should refrain from asking questions or communicating information that would reveal confidential and/or proprietary information specific to their project. Specific dates for the webinar can be found on the cover page of the FOA.

APPENDIX A – COST SHARE INFORMATION

Cost Sharing or Cost Matching

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

How Cost Sharing Is Calculated

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

- Formula: Federal share ($) divided by federal share (%) = Total Project Cost
  Example: $1,000,000 divided by 80% = $1,250,000

- Formula: Total Project Cost ($) minus federal share ($) = Non-federal share ($)
  Example: $1,250,000 minus $1,000,000 = $250,000

- Formula: Non-federal share ($) divided by Total Project Cost ($) = Non-federal share (%)
  Example: $250,000 divided by $1,250,000 = 20%

What Qualifies For Cost Sharing

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

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

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

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

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

General Cost Sharing Rules on a DOE Award

1. Cash Cost Share – encompasses all contributions to the project made by the recipient or subrecipient(s), for costs incurred and paid for during the project. This includes when an organization pays for personnel, supplies, equipment for their own company with organizational resources. If the item or service is reimbursed for, it is cash cost share. All cost share items must be necessary to the performance of the project.

2. In-Kind Cost Share – encompasses all contributions to the project made by the recipient or subrecipient(s) that do not involve a payment or reimbursement and represent donated items or services. In-Kind cost share items include volunteer personnel hours, donated existing equipment, donated existing supplies. The cash value and calculations thereof for all In-Kind cost share items must be justified and explained in the Cost Share section of the project Budget Justification. All cost share items must be necessary to the performance of the project. If questions exist, consult your DOE contact before filling out the In-Kind cost share section of the Budget Justification.

3. Funds from other federal sources MAY NOT be counted as cost share. This prohibition includes FFRDC subrecipients. Non-federal sources include any source not originally derived from federal funds. Cost sharing commitment letters from subrecipients must be provided with the original application.

4. Fee or profit, including foregone fee or profit, are not allowable as project costs (including cost share) under any resulting award. The project may only incur those costs that are

allowable and allocable to the project (including cost share) as determined in accordance with the applicable cost principles prescribed in FAR Part 31 for For-Profit entities and 2 CFR Part 200 Subpart E - Cost Principles for all other non-federal entities.

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

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

(A) Acceptable contributions. All contributions, including cash contributions and third party in-kind contributions, must be accepted as part of the prime recipient's cost sharing if such contributions meet all of the following criteria:

(1) They are verifiable from the recipient's records.

(2) They are not included as contributions for any other federally-assisted project or program.

(3) They are necessary and reasonable for the proper and efficient accomplishment of project or program objectives.

(4) They are allowable under the cost principles applicable to the type of entity incurring the cost as follows:

a. For-profit organizations. Allowability of costs incurred by for-profit organizations and those nonprofit organizations listed in Attachment C to OMB Circular A–122 is determined in accordance with the for-profit cost principles in 48 CFR Part 31 in the FAR, except that patent prosecution costs are not allowable unless specifically authorized in the award document. (v) Commercial Organizations. FAR Subpart 31.2—Contracts with Commercial Organizations; and

b. Other types of organizations. For all other non-federal entities, allowability of costs is determined in accordance with 2 CFR Part 200 Subpart E.

(5) They are not paid by the federal government under another award unless authorized by federal statute to be used for cost sharing or matching.

(6) They are provided for in the approved budget.

(B) Valuing and documenting contributions

(1) Valuing recipient's property or services of recipient's employees. Values are established in accordance with the applicable cost principles, which mean that amounts chargeable to the project are determined on the basis of costs incurred. For real property or equipment used on the project, the cost principles authorize depreciation or use charges. The full value of the item may be applied when the item will be consumed in the performance of the award or fully depreciated by the end of the award. In cases where the full value of a donated capital asset is to be applied as cost sharing or matching, that full value must be the lesser or the following:

a. The certified value of the remaining life of the property recorded in the recipient's accounting records at the time of donation; or

b. The current fair market value. If there is sufficient justification, the Contracting Officer may approve the use of the current fair market value of the donated property, even if it exceeds the certified value at the time of donation to the project. The Contracting Officer may accept the use of any reasonable basis for determining the fair market value of the property.

(2) Valuing services of others' employees. If an employer other than the recipient furnishes the services of an employee, those services are valued at the employee's regular rate of pay, provided these services are for the same skill level for which the employee is normally paid.

(3) Valuing volunteer services. Volunteer services furnished by professional and technical personnel, consultants, and other skilled and unskilled labor may be counted as cost sharing or matching if the service is an integral and necessary part of an approved project or program. Rates for volunteer services must be consistent with those paid for similar work in the recipient's organization. In those markets in which the required skills are not found in the recipient organization, rates must be consistent with those paid for similar work in the labor market in which the recipient competes for the kind of services involved. In either case, paid fringe benefits that are reasonable, allowable, and allocable may be included in the valuation.

(4) Valuing property donated by third parties.

a. Donated supplies may include such items as office supplies or laboratory supplies. Value assessed to donated supplies included in the cost sharing or matching share must be reasonable and must not exceed the fair market value of the property at the time of the donation.

b. Normally only depreciation or use charges for equipment and buildings may be applied. However, the fair rental charges for land and the full value of equipment or other capital assets may be allowed, when they will be consumed in the

performance of the award or fully depreciated by the end of the award, provided that the Contracting Officer has approved the charges. When use charges are applied, values must be determined in accordance with the usual accounting policies of the recipient, with the following qualifications:

i. The value of donated space must not exceed the fair rental value of comparable space as established by an independent appraisal of comparable space and facilities in a privately-owned building in the same locality.

ii. The value of loaned equipment must not exceed its fair rental value.

(5) Documentation. The following requirements pertain to the recipient's supporting records for in-kind contributions from third parties:

a. Volunteer services must be documented and, to the extent feasible, supported by the same methods used by the recipient for its own employees.

b. The basis for determining the valuation for personal services and property must be documented.

APPENDIX B – WAIVER REQUESTS FOR: 1. FOREIGN ENTITY PARTICIPATION; AND 2. FOREIGN WORK

1. Waiver for Foreign Entity Participation as the Prime Recipient

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

Waiver Criteria

Foreign entities seeking to participate in a project funded under this FOA must demonstrate to the satisfaction of DOE that:

a. Its participation is in the best interest of the United States industry and United States economic development;
b. The project team has appropriate measures in place to control sensitive information and protect against unauthorized transfer of scientific and technical information;
c. Adequate protocols exist between the United States subsidiary and its foreign parent organization to comply with export control laws and any obligations to protect proprietary information from the foreign parent organization;
d. The work is conducted within the United States and the entity acknowledges and demonstrates that it has the intent and ability to comply with the U.S. Competitiveness Provision (see Section VI.B.xxi.); and
e. The foreign entity will satisfy other conditions that may be deemed necessary by DOE to protect United States government interests.

Content for Waiver Request

A Foreign Entity waiver request must include the following:

a. Information about the entity: name, point of contact, and proposed type of involvement in the project;
b. Country of incorporation, the extent of the ownership/level control by foreign entities, whether the entity is state owned or controlled, a summary of the ownership breakdown of the foreign entity and the percentage of ownership/control by foreign entities, foreign shareholders, foreign state or foreign individuals;
c. The rationale for proposing a foreign entity participate (must address criteria above);

d. A description of the project's anticipated contributions to the United States economy;
   - How the project will benefit United States research, development and manufacturing, including contributions to employment in the United States and growth in new markets and jobs in the United States;
   - How the project will promote domestic American manufacturing of products and/or services;

e. A description of how the foreign entity's participation is essential to the project;

f. A description of the likelihood of Intellectual Property (IP) being created from the work and the treatment of any such IP; and

g. Countries where the work will be performed (Note: if any work is proposed to be conducted outside the United States, the applicant must also complete a separate request foreign work waiver).

DOE may also require:

- A risk assessment with respect to IP and data protection protocols that includes the export control risk based on the data protection protocols, the technology being developed and the foreign entity and country. These submissions could be prepared by the project lead (if not the prime recipient), but the prime recipient must make a representation to DOE as to whether it believes the data protection protocols are adequate and make a representation of the risk assessment – high, medium or low risk of data leakage to a foreign entity.
- Additional language be added to any agreement or sub-agreement to protect IP, mitigate risk or other related purposes.

DOE may require additional information before considering the waiver request.

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

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

As set forth in Section IV.J.iii., all work under funding under this FOA must be performed in the United States. To seek a waiver of the Performance of Work in the United States requirement, the applicant must submit an explicit waiver request in the Full Application. A separate waiver request must be submitted for each entity proposing performance of work outside of the United States.

Overall, a waiver request must demonstrate to the satisfaction of DOE that it would further the purposes of this FOA and is otherwise in the economic interests of the

United States to perform work outside of the United States. A request for a foreign work waiver must include the following:

1. The rationale for performing the work outside the United States ("foreign work");
2. A description of the work proposed to be performed outside the United States;
3. An explanation as to how the foreign work is essential to the project;
4. A description of the anticipated benefits to be realized by the proposed foreign work and the anticipated contributions to the United States economy;
5. The associated benefits to be realized and the contribution to the project from the foreign work;
6. How the foreign work will benefit the United States, including manufacturing, contributions to employment in the United States and growth in new markets and jobs in the United States;
7. How the foreign work will promote domestic American manufacturing of products and/or services;
8. A description of the likelihood of Intellectual Property (IP) being created from the foreign work and the treatment of any such IP;
9. The total estimated cost (DOE and recipient cost share) of the proposed foreign work;
10. The countries in which the foreign work is proposed to be performed; and
11. The name of the entity that would perform the foreign work.

DOE may require additional information before considering the waiver request.

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

APPENDIX C – REQUIRED USE OF AMERICAN IRON, STEEL, MANUFACTURED PRODUCTS, AND CONSTRUCTION MATERIALS BUY AMERICA REQUIREMENTS FOR INFRASTRUCTURE PROJECTS

A. Definitions

For purposes of the Buy America requirements, based both on the statute and OMB Guidance Document dated April 18, 2022, the following definitions apply:

Construction materials includes an article, material, or supply—other than an item of primarily iron or steel; a manufactured product; cement and cementitious materials; aggregates such as stone, sand, or gravel; or aggregate binding agents or additives[79] —that is or consists primarily of:

- non-ferrous metals;
- plastic and polymer-based products (including polyvinylchloride, composite building materials, and polymers used in fiber optic cables);
- glass (including optic glass);
- lumber; or
- drywall.

Infrastructure includes, at a minimum, the structures, facilities, and equipment for, in the United States, 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; and buildings and real property. Infrastructure includes facilities that generate, transport, and distribute energy.

Moreover, according to the OMB guidance document:

> When determining if a program has infrastructure expenditures, Federal agencies should interpret the term "infrastructure" broadly and consider the definition provided above as illustrative and not exhaustive. When determining if a particular construction project of a type not listed in the definition above constitutes "infrastructure," agencies should consider whether the project will serve a public function, including whether the project is publicly owned and operated, privately operated on behalf of the public, or is a place of public accommodation, as opposed to a project that is privately owned and not open to the public. Projects with the former qualities have greater indicia of infrastructure, while projects with the latter quality have fewer. Projects consisting

[79] BIL, § 70917(c)(1).

solely of the purchase, construction, or improvement of a private home for personal use, for example, would not constitute an infrastructure project.

The Agency, not the applicant, will have the final say as to whether a given project includes infrastructure, as defined herein. Accordingly, in cases where the "public" nature of the infrastructure is unclear, but the other relevant criteria are met DOE strongly recommends that applicants complete their full application with the assumption that Buy America requirements will apply to the proposed project.

Project means the construction, alteration, maintenance, or repair of infrastructure in the United States.

B. Buy America Requirements for Infrastructure Projects ("Buy America" requirements)
In accordance with Section 70914 of the BIL, none of the project funds (includes federal share and recipient cost share) may be used for a project for infrastructure unless:

(1) all iron and steel used in the project are 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;

(2) 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; and

(3) all construction materials are manufactured in the United States—this means that all manufacturing processes for the construction material occurred in the United States.

The Buy America requirements only apply to articles, materials, and supplies that are consumed in, incorporated into, or affixed to an infrastructure project. As such, it does not apply to tools, equipment, and supplies, such as temporary scaffolding, brought to the construction site and removed at or before the completion of the infrastructure project. Nor does the Buy America requirements apply 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.

These requirements must flow down to all sub-awards, all contracts, subcontracts, and purchase orders for work performed under the proposed project, except where the prime

recipient is a for-profit entity. Based on guidance from the Office of Management and Budget (OMB), the Buy America requirements of the BIL do not apply to DOE projects in which the prime recipient is a for-profit entity; the requirements only apply to projects whose prime recipient is a State, local government, Indian tribe, Institution of Higher Education, or nonprofit organization.

For additional information related to the application and implementation of these Buy America requirements, please see OMB Memorandum M-22-11, issued April 18, 2022: https://www.whitehouse.gov/wp-content/uploads/2022/04/M-22-11.pdf

Note that for all applicants—both non-Federal entities and for-profit entities—DOE is including a Program Policy Factor that the Selection Official may consider in determining which Full Applications to select for award negotiations that considers whether the applicant has made a commitment to procure U.S. iron, steel, manufactured products, and construction materials in its project.

C. Waivers

The Grant or Cooperative Agreement between DOE and the awardee will require each recipient: (1) to fulfill the commitments made in its application regarding the procurement of U.S.-produced products and (2) to fulfill the commitments made in its application regarding the procurement of other key component metals and manufactured products domestically that are deemed available in sufficient and reasonably available quantities or of a satisfactory quality at the time of award negotiation.

The Grant or Cooperative Agreement between DOE and the awardee will require each recipient: (1) to fulfill the commitments made in its application regarding the procurement of U.S.-produced products, subject to a waiver process by DOE assessing the availability and cost (increasing the cost of the overall project by >25%) and (2) to fulfill the commitments made in its application regarding the procurement of other key component metals and manufactured products domestically that are deemed available in sufficient and reasonably available quantities or of a satisfactory quality at the time of award negotiation, again subject to a DOE waiver process. Applicants may also seek a DOE waiver of domestic procurement requirements based on applicable public interest factors, such as relating to minor components, international trade obligations, or other considerations.

In limited circumstances, DOE may waive the application of the Buy America requirements where DOE determines that:

> (1) applying the Buy America requirements would be inconsistent with the public interest;

(2) 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

(3) 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.

If an applicant is seeking a waiver of the Buy America requirements, it must include a written waiver request with the Full Application. A waiver request must include:

- A detailed justification for the use of "non-domestic" iron, steel, manufactured products, or construction materials to include an explanation as to how the non-domestic item(s) is essential to the project
- A certification that the applicant or recipient made a good faith effort to solicit bids for domestic products supported by terms included in requests for proposals, contracts, and nonproprietary communications with potential suppliers;
- Applicant /Recipient name and Unique Entity Identifier (UEI)
- Total estimated project cost, DOE and cost-share amounts
- Project description and location (to the extent known)
- List and description of iron or steel item(s), manufactured goods, and construction material(s) the applicant or recipient seeks to waive from Domestic Content Procurement Preference requirement, including name, cost, country(ies) of origin (if known), and relevant PSC and NAICS code for each.
- Waiver justification including due diligence performed (e.g., market research, industry outreach) by the applicant or recipient
- Anticipated impact if no waiver is issued

DOE may require additional information before considering the waiver request.

Waiver requests are subject to public comment periods of no less than 15 days and must be reviewed by the Made in America Office. There may be instances where an award qualifies, in whole or in part, for an existing waiver.

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

APPENDIX D – DEFINITION OF TECHNOLOGY READINESS LEVELS

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

APPENDIX E – LIST OF ACRONYMS

Insert other acronyms applicable to this FOA (e.g., office name, technical terms or metrics)

BIL	Bipartisan Infrastructure Law
BP	Budget Period
COI	Conflict of Interest
DEC	Determination of Exceptional Circumstances
DEIA	Diversity, Equity, Inclusion and Accessibility
DMP	Data Management Plan
DOE	Department of Energy
DOI	Digital Object Identifier
EERE	Energy Efficiency and Renewable Energy
FAR	Federal Acquisition Regulation
FFATA	Federal Funding and Transparency Act of 2006
FOA	Funding Opportunity Announcement
FOIA	Freedom of Information Act
FFRDC	Federally Funded Research and Development Center
GAAP	Generally Accepted Accounting Principles
HBCU	Historically Black Colleges and Universities
IPMP	Intellectual Property Management Plan
LOW	Locations of Work
LPO	Loan Program Office
M&O	Management and Operating
MPIN	Marketing Partner ID Number
MSI	Minority-Serving Institution
MYPP	Multi-Year Program Plan
NDA	Non-Disclosure Acknowledgement
NEPA	National Environmental Policy Act
NHAAP	National Hydropower Asset Assessment Program
NNSA	National Nuclear Security Administration
NPD	Non-Powered Dam
OMB	Office of Management and Budget
ORNL	Oak Ridge National Laboratory
OSTI	Office of Scientific and Technical Information
OTA	Other Transactions Authority
PII	Personal Identifiable Information
PSH	Pumped Storage Hydropower
R&D	Research and Development
RFI	Request for Information
RFP	Request for Proposal
SAM	System for Award Management
SOPO	Statement of Project Objectives
SPOC	Single Point of Contact

STEM	Science, Technology, Engineering, and Mathematics
TIA	Technology Investment Agreement
TRL	Technology Readiness Level
UCC	Uniform Commercial Code
UEI	Unique Entity Identifier
US	United States
USACE	United States Army Corps of Engineers
WBS	Work Breakdown Structure
WP	Work Proposal
WPTO	Water Power Technologies Office