

FINANCIAL ASSISTANCE FUNDING OPPORTUNITY ANNOUNCEMENT



Department of Energy (DOE) Office of Clean Energy Demonstrations (OCED)

BIL: CARBON CAPTURE DEMONSTRATION PROJECTS PROGRAM *FRONT-END ENGINEERING DESIGN STUDIES FOR INTEGRATED CARBON CAPTURE, TRANSPORT, AND STORAGE SYSTEMS*

Funding Opportunity Announcement (FOA) Number: DE-FOA-0002738

FOA Type: **Modification 000003**

Assistance Listing Number: 81.255, Clean Energy Demonstrations

FOA Issue Date:	09/22/2022
Submission Deadline for Mandatory Letters of Intent	10/21/2022 – 5:00 PM ET
Submission Deadline for Full Applications:	12/05/2022 – 5:00 PM ET
Expected Date for DOE Selection Notifications:	~03/31/2023
Expected Timeframe for Award Negotiations:	~08/31/2023

- **Applicants must submit a Letter of Intent 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 OCED Exchange at <https://oced-exchange.energy.gov/>, OCED's online application portal.
- Applicants must designate primary and backup points-of-contact with whom DOE will communicate to conduct award negotiations. If an application is selected for award negotiations, it is not a commitment to issue an award.

Modifications

Modification 000001 changes to the Funding Opportunity Announcement (FOA) are **HIGHLIGHTED** in the body of the FOA.

Mod. No.	Date	Description of Modification
000001	10/18/2022	• Clarified the location of the FOA Questions and Answers including a direct link. • Clarification under Topic Area 2.1 regarding integrated Solid Oxide Fuel Cell (SOFC) and carbon capture technology that produces hydrogen from natural gas for use in the production of electric energy. • Clarification under Topic Area 3.2 regarding natural gas processing and oil refining technologies. • Updated the Letter of Intent information and requirements. • Section I Funding Opportunity Description, Paragraph A.iii- Community Benefits Plan (CBP) has been updated to remove the reference to OCED exchange website for additional guidance. Applicants are to use the information contained within the FOA for development of the CBP. • Section IV Application and Submission Information, Paragraph D.xxv Intellectual Property Management Plan (IPMP) has been revised to remove the sentence regarding DOE providing additional guidance. No other guidance is available at this. Applicants are to use the information in the FOA to develop the IPMP. • Section VIII-Other Information Paragraph D-Treatment of Application Information has been revised in totality. • Appendix A- Guidance For Applicants, xiii-Initial Community Benefits Plan (CBP) has been updated to remove the reference to OCED exchange website for additional guidance. Applicants are to use the information contained within the FOA for development of the CBP. • Update Appendix N - Waiver Request, Paragraph 2- Waiver for Performance of Work in the United States. The very first sentence has been revised.

Modification 000002 changes to the Funding Opportunity Announcement (FOA) are **HIGHLIGHTED** in the body of the FOA.

Mod. No.	Date	Description of Modification
000002	11/8/2022	• Updated release information regarding FOA 2 under Technology Description and Strategic Goals • Incorporated the Real Property and Equipment term • Clarification of the Summary of the UIC Class VI Permit Application Materials or Off-take Agreement • The Project Management Plan cost plan has been adjusted from cost per month basis to a cost per quarter basis • Community Benefits Plan guidance is now available. • Format update to Community Benefit Plan • Intellectual Property Management Plan guidance is now available.

Modification 000003 changes to the Funding Opportunity Announcement (FOA) are **HIGHLIGHTED in** the body of the FOA.

Mod. No.	Date	Description of Modification
000003	11/22/2022	• Section I D. Community Benefits Plan is modified to state that letters of support and MOUs do not count towards the page limit of this document. • Section IV D. Content and Form of the Full Application and Table 8 are modified to include the State Point Data Table as a required application document along with several other minor updates to this section. • PMP guidance from Appendices L and R has been consolidated into Appendix L and Appendix R is deleted its in entirety and marked reserved. Minor clarifications have also been made in Section IV. • Appendix Q: Statement of Project Objectives is clarified to provide a definition for work package and delete subtask 1.2.

NOTE: REGISTRATION/SUBMISSION REQUIREMENTS

Registration Requirements

There are several one-time actions that must be completed before submitting an application in response to this Funding Opportunity Announcement (FOA) (e.g., register with the System for Award Management (SAM), obtain a Unique Entity Identifier (UEI) number, register and create an account with the OCED Exchange, register with Grants.gov, and if selected for award, be registered in FedConnect). 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.

- **SAM** – Applicants must register with the System for Award Management (SAM) at <https://www.sam.gov/> prior to submitting an application in response to this FOA. 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. Failure to register with SAM will prevent your organization from applying through OCED Exchange. The applicant must maintain an active SAM registration with current information at all times during which it has an active Federal award or application under consideration. More information about SAM registration for applicants is found at: https://www.fsd.gov/gsafsd_sp?id=gsafsd_kb_articles&sys_id=650d493e1bab7c105465eaccac4bcbcb.
- **UEI** – Applicants must obtain a Unique Entity Identifier (UEI) from the SAM to uniquely identify the entity. The UEI is available in the SAM entity registration record.

NOTE: Subawardees/subrecipients at all tiers must also obtain an UEI from the SAM and provide the UEI to the Prime Recipient before the subaward can be issued.

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](#).

- **OCED Exchange** – Applicants must register through the OCED Exchange. OCED Exchange website: <https://oced-exchange.energy.gov/>

- **Grants.gov** – Applicants must register with Grants.gov in order to receive automatic updates, in the event that Amendments to this FOA are posted. However, please note that applications will not be accepted through Grants.gov. More information about the registration steps for Grants.gov is provided at:
<https://www.grants.gov/web/grants/applicants/registration.html>
- **FedConnect.net** – In the event that an application is selected for negotiation of award, Applicants must be registered with FedConnect to receive the award. For more information regarding registration with FedConnect review the FedConnect Ready, Set, Go! Guide at
https://www.fedconnect.net/FedConnect/Marketing/Documents/FedConnect_Ready_Set_Go.pdf.

Submission Requirements

- **OCED Exchange** – All application submissions are to be made via the OCED Exchange at <https://oced-exchange.energy.gov/>. To gain access to the OCED Exchange system, the applicant must first register and create an account on the main OCED Exchange site. This account will allow the user to register for any open OCED FOAs that are currently in OCED 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.

Applicants will receive an automated response when the Application is received; this will serve as a confirmation of OCED receipt. Please do not reply to the automated response. A “User Guide” for the OCED Exchange can be found on the OCED website at <https://oced-exchange.energy.gov/Manuals.aspx> after logging in to the system.

To receive notices via email regarding an FOA in OCED Exchange, such as amendments to the announcement or the posting of new questions and answers from OCED Exchange, you must initiate an application submission to the FOA of interest. Please note that you must finalize and submit your application before the specified due date and time to be considered for award.

Questions

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: CCSdemos@netl.doe.gov.

Questions and comments concerning this FOA shall be submitted not later than three (3) business days prior to the application due date. Please note, feedback on individual concepts will not be provided through Q&A.

NOTE: Please be as clear and concise when asking a question about the FOA and be as specific as possible about the topic area to which your question refers. If it is not clear DOE will be required to ask for additional information and clarity on the question to provide an accurate response which will take additional time.

All questions and answers relating to the content of this FOA will be posted in OCED exchange. Specifically, under the FOA Documents, there will be an Excel file labeled "FOA 2738 Q&A" which will contain questions and responses that have been released to date. The Q&A will be updated periodically as DOE receives questions and has provided responses ([Financial Opportunities: Funding Opportunity Exchange \(energy.gov\)](#)). Please note that you must first select this specific FOA Number in order to view the questions and answers specific to this FOA. DOE will attempt to respond to a question within three (3) business days unless a similar question and answer has already been posted on the website. It is recommended that you register as soon after release of the FOA as possible to have the benefit of all responses. Applicants are encouraged to review previously issued Questions and Answers prior to the submission of questions.

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

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I. Funding Opportunity Description

A. Background and Context

The Department of Energy (DOE) Office of Clean Energy Demonstrations (OCED), in collaboration with the Office of Fossil Energy and Carbon Management (FECM) and National Energy Technology Laboratory (NETL), is issuing this Funding Opportunity Announcement (FOA) for Front-End Engineering Design (FEED) studies for Integrated Carbon Capture, Transport, and Storage systems, as part of the Carbon Capture Demonstration Projects Program. On November 15, 2021, President Joseph R. Biden, Jr. signed the Infrastructure Investment and Jobs Act (Public Law 117-58), also known as the Bipartisan Infrastructure Law (BIL).¹ Awards made under this FOA will be funded through BIL appropriations and are part of a broader government-wide approach to fund domestic commercial-scale Carbon Capture and Storage (CCS) technology demonstration projects to maximize the benefits of the clean energy transition as the nation works to curb the climate crisis, empower workers, and advance environmental justice.²

The mission of OCED is to deliver clean energy technology demonstration projects at scale in partnership with the private sector to accelerate deployment, market adoption, and the equitable transition to a decarbonized energy system. OCED was established in December 2021 and was first authorized and funded through the BIL. The founding of OCED builds on DOE's expertise in clean energy research and development and expands DOE's scope to fill a critical gap on the path to net-zero emissions by 2050.

The BIL is a once-in-a-generation investment in infrastructure, designed to modernize and upgrade American infrastructure to enhance U.S. competitiveness, drive the creation of good-paying jobs with free and fair choice to join a union, tackle the climate crisis, and ensure stronger access to economic and other benefits for disadvantaged communities³. The BIL appropriated more than \$62 billion to DOE⁴ to invest in

¹ Public Law 117-58 (November 15, 2021), 135 Stat 429, available at <https://www.congress.gov/117/plaws/publ58/PLAW-117publ58.pdf>

² Note to Applicants: The term domestic includes onshore facilities of the contiguous 48 states (including the District of Columbia) as well as the states of Alaska and Hawaii. Sites located in offshore insular areas, such as American Samoa, Guam, the Northern Mariana Islands, Puerto Rico, and the U.S. Virgin Islands would not be allowable.

³ 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/>.

⁴ 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>

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 zero-carbon electricity system by 2035, and to put the United States on a path to strengthen our country's energy prosperity and achieve net-zero emissions economy-wide by no later than 2050⁵ to benefit all Americans.

Investment in CCS technologies is a significant portion of DOE's BIL funding. In total, the BIL will invest \$2.537 billion for fiscal years (FY) 2022 through 2025 to fund domestic commercial-scale CCS demonstration projects designed to further the development, deployment, and commercialization of technologies to capture and geologically store carbon⁶ emissions.

Section 962 of the Energy Policy Act of 2005⁷, as amended, requires:

- Two demonstration projects at new or existing, coal electric generation facilities,
- Two demonstration projects at new or existing, natural gas electric generation facilities, and
- Two demonstration projects at new or existing, industrial facilities not purposed for electric generation; and
- Funding for commercial-scale carbon capture technology demonstrations of projects supported by the Department, including projects in addition to the six projects described above.

In addition to the BIL, the passage of the Inflation Reduction Act (IRA)⁸ in 2022 also provides a significant shift to the commercial prospects for carbon capture and storage technology. Specifically, reforms to the 45Q tax credits will likely push a wide range of power and industrial CCS projects into profitability, enable more types of businesses and investors to access these incentives, and create more job opportunities for skilled workers than ever before.

Additionally, DOE is aware of the concerns from environmental justice and climate organizations about how CCS projects could negatively affect communities, local environmental quality, and the overall climate mitigation effort if not developed with appropriate safeguards. CCS deployment can and should reduce emissions of other kinds of pollution in addition to CO₂ pollution, protect communities from increases in cumulative pollution, and maintain and create good, high-wage jobs across the

⁵ [Executive Order \(EO\) 14008](#), "Tackling the Climate Crisis at Home and Abroad," January 27, 2021.

⁶ Note to Applicants: Carbon emissions include both carbon monoxide (CO) and carbon dioxide (CO₂) emissions.

⁷ [EPA Act 2005 Sec. 962 \(42 U.S.C. 16292\)](#)

⁸ [H.R.5376 - 117th Congress \(2021-2022\): Inflation Reduction Act of 2022 | Congress.gov | Library of Congress](#)

country.⁹ Applications to this FOA will include an Initial Community Benefits Plan (CBP) tailored to the scope of this FOA, discussing community and labor engagement; investing in the American workforce; the Justice40 Initiative; and Diversity, Equity, Inclusion and Accessibility (DEIA). These requirements will enable and inform future activities with the intent of developing community-informed CCS demonstrations that serve the cost-effective, efficient, equitable, and environmentally responsible at-scale expansion of CCS operations that enable industry adoption and create quality jobs. Community and labor engagement, quality jobs, energy and environmental justice, and DEIA will be central to the successful implementation of future phases of the Carbon Capture and Storage Demonstration Projects Program, and further requirements are expected to be contained in subsequent FOAs. For example, DOE will require projects to track and report on outcomes and outputs related to community economic and environmental impacts - such as, but not limited to, reporting on changes to non-CO₂ pollution to air, water, and soil - for at least 3 years once the facility is brought online.

NOTICE TO APPLICANTS: Build America, Buy America Act¹⁰ and Davis-Bacon Act requirements¹¹ will be applicable to the design, construction, and operation of the CCS demonstration facility. Applicants should take these requirements into consideration when developing the application under this FOA.

i. Program Purpose

The goal of the BIL Carbon Capture Demonstration Projects Program is to de-risk integrated CCS demonstrations and catalyze significant follow-on investments from the private sector for commercial-scale, integrated CCS demonstrations on carbon emissions sources across industries in the U.S. Demand for low-carbon energy sources and industrial products is growing and will continue to grow in the foreseeable future due to domestic and international climate efforts. CCS is one potential option for power plants and other industrial facilities to lower their carbon emissions. Significant advancements have been made in CCS technologies in recent years. Much of this experience is based on laboratory, pilot, large-scale field, and major demonstration projects that have validated key concepts and technologies. The development of these technologies supports the Biden-Harris Administration's ambitious goals for a net-zero greenhouse gas economy by 2050,

⁹ <https://www.federalregister.gov/documents/2022/02/16/2022-03205/carbon-capture-utilization-and-sequestration-guidance>

¹⁰ The BIL includes Build America, Buy America requirements. See Pub. Law 117–58 §§ 70901–52, 135 Stat. at 1294–313. For more information regarding implementation of the Buy America preference, see the Office of Management and Budget's Memorandum number M-22-11. Memorandum on Initial Implementation Guidance on Application of Buy America Preference in Federal Financial Assistance Programs for Infrastructure (Apr. 18, 2022), <https://www.whitehouse.gov/wp-content/uploads/2022/04/M-22-11.pdf>.

¹¹ The BIL includes wage requirements and directs that all laborers and mechanics employed by contractors or subcontractors in the performance of construction, alteration, or repair work on a project assisted in whole or in part by funding made available through the BIL shall be paid wages at rates not less than those prevailing on similar projects in the locality. See Pub. Law 117–58 § 41101, 135 Stat. at 1130.

a carbon pollution free power sector by 2035, and a fifty percent reduction from 2005 levels in economy-wide net greenhouse gas pollution by 2030.

While the technologies needed to decarbonize most of the U.S. economy are available thanks in part to decades of technology development led by DOE, scale-up and industry adoption of this technology is a critical component of meeting these decarbonization goals. The commercial demonstration of advanced carbon capture technologies integrated with reliable transportation and storage infrastructure will be required for the widespread deployment of CCS technologies in the U.S. Supported CCS demonstration projects will benefit entities intending to commercialize and deploy CCS technologies. Successful projects will also benefit inventors, licensees, financiers, and end-users of commercial CCS technologies through the value creation process. The general population will benefit by having greater access to information about the costs, impacts, and viability of CCS technologies for deep decarbonization.

ii. Technology Space and Strategic Goals

DOE intends to issue two FOAs to fulfill the requirements of Carbon Capture Demonstration Projects Program, under Section 962 of the Energy Policy Act of 2005 (EPA 2005). The staging of two separate FOAs to implement this provision will enable the program to have the greatest impact on catalyzing the field of integrated carbon capture technologies.

This first FOA (DE-FOA-0002738) will provide funding for up to 20 FEED studies for integrated CCS, submission of permit applications (i.e., Underground Injection Control (UIC) Class VI permit to construct, if necessary), preparation of an Environmental Information Volume (EIV), and the initial CBP work and analysis, which will address the first Phase of an integrated CCS demonstration project. For the purpose of this FOA, “site selection” refers to the site chosen for the purpose of the FEED studies and other work within the proposed project; project siting decisions cannot be finalized prior to successful completion of National Environmental Policy Act (NEPA) reviews, as well as any other applicable processes such as satisfactory progress of CBP work. The second FOA (i.e., FOA 2) will not limit eligibility to those applicants receiving awards for the first Phase of work under this FOA.

FOA 2 is expected to be initially released in late 2022 **or early 2023**, with additional application opportunities to follow, and will offer cooperative agreements of up to 50% federal cost share for the entire scope of work for Phases 2 through 4 that includes detailed design, CBP work, construction, and operation of at least seven (7) demonstrations. The minimum 50-50 cost share must be provided in the form of cash or cash equivalents, or in-kind contributions. Cost share must come from non-federal sources (unless otherwise allowed by law) such as project participants, state or local governments, or other

third-party financing. Federal financing, such as DOE Loan Guarantees, cannot be leveraged by applicants to provide the required cost share or to otherwise cover the same scope that is proposed under the commercial demonstration project. A contingency reserve will also be required for all Phase 3 and 4 activities. More guidance on contingency funding will be provided in the FOA 2 issuance. The following is a more detailed description of the types of activities anticipated in Phases 2 through 4 within the scope of the FOA 2. FOA 2 has not yet been developed and these requirements will likely evolve. DOE reserves the right to restructure as needed.

FOA 2: Phase 2 – Project Development, Permitting, and Financing

Phase 2 encompasses advanced planning activities. Integrated CCS demonstration projects will finalize their project development plans, commercial agreements, financial structure, and complete the necessary permitting and approval activities required to begin construction. By the end of Phase 2, engineering designs should be sufficiently mature to support completion and execution of relevant procurement or construction contracts and overall commencement of major project execution tasks. Long-lead procurement activities may be started in Phase 2 with prior DOE approval. Third-party financing and contingency agreements should be completed and relevant offtake or feedstock agreements for the carbon oxides in place. Risk management plans should be revised and updated to reflect progress made and risks mitigated, as well as new or emerging risks, and corresponding management plans. Data Management and Intellectual Property Management Plans should also be finalized.

By the completion of Phase 2, Carbon capture technology should achieve TRL 7 for the proposed application (i.e., coal electricity generation, NG electricity generation or industrial application). Pilot-scale testing to achieve TRL 7 is not allowed under FOA 2 scope but could continue in parallel if selected for award.

By the completion of Phase 2, Environmental Health and Safety (EH&S) plans should be finalized and execution ready. All necessary permits, such as but not limited to a Class VI Underground Injection Control (UIC) permit, and approvals should be in place to prepare for construction, including completion of required NEPA documentation and reviews leading to a NEPA determination. Final pre-implementation Life Cycle Analysis (LCA) should be completed to DOE expectations, and corresponding Quality Assurance/Quality Control (QA/QC) plans should be in place. Community and labor engagement should have progressed towards a comprehensive CBP that reflects community input and implementation experience to date and sets the stage for ongoing engagement, including the potential for formal Workforce and Community Agreements (e.g., community benefits agreements, good neighbor agreements, project labor

agreements, etc.). Community impact targets should be finalized and tracking plans should be in place to monitor economic and social impacts as the project progresses toward implementation.

DOE expects that Phase 2 activities will take approximately 2 years but could be shorter depending on how advanced the integrated CCS demonstration project's analysis, planning, design, and Community Benefit Plan activities are to this point, and if the project is able to complete all the required deliverables. Evidence of a contingency reserve will be required prior to beginning Phase 3 activities.

FOA 2: Phase 3 – Installation, Integration, and Construction

Phase 3 activities will focus on implementation. DOE expects this phase to be the longest in duration and the most cost intensive. Integrated CCS demonstration projects will employ industry standard project management tools and will be required to provide regular status updates and reports. Plans developed in the preceding phases will be revised and updated as appropriate to reflect actual performance. Previously and newly developed risks will be tracked, actively managed, and regularly reported to DOE. Reporting frequencies and content requirements will be unique to each project and negotiated prior to Phase 3 commencement.

While integrated CCS demonstration project teams will manage implementation, DOE will closely monitor progress and evaluate it against the plans developed through Phase 2. DOE and/or its third-party representatives will visit the site(s) regularly to verify progress and collect data, consistent with the established reporting requirements and substantial involvement. DOE expects that Phase 3 activities may take approximately 2 to 4 years, but applicants may propose shorter or longer lengths.

By the completion of Phase 3, Class VI Underground Injection Control (UIC) permit (to inject CO₂) should be in place.

FOA 2 Phase 4 – Ramp-Up and Sustained Operations

In Phase 4, integrated CCS demonstration projects will transition to operations. Phase 4 will commence with completion of project specific criteria, such as mechanical completion or production capacity demonstration, which will be negotiated in prior phases. Phase 4 activities will then focus on integrated system performance and ramp-up. By the end of Phase 4, each project will have demonstrated full commercial-scale design operations over an extended period. DOE expects that Phase 4 activities may take approximately 2 years but may

extend longer depending on project-specific characteristics, including factors such as the rate of production ramp-up.

Similar to Phase 3, contingency funding will also be required for Phase 4. Applicants are also encouraged to review the regulations¹² regarding Program Income and be aware of the ways in which Program Income can be treated during the award.

To meet a key OCED objective that DOE-funded commercial demonstration projects catalyze follow-on private sector investments as well as Justice40 goals, Phase 4 will also include substantial financial, socio-economic, environmental, and operational data collection and reporting to DOE. To the extent practicable, while protecting sensitive and proprietary information, DOE will synthesize, anonymize, or otherwise incorporate site and operations data for the integrated CCS demonstration projects into quantitative and qualitative analyses that can be disseminated to external stakeholders for the purpose of informing future private sector investment decisions.

As the integrated CCS demonstration projects are expected to continue as self-sustaining entities operating fully independent of federal funds, DOE may also request financial sustainability plans or long-term disposition and decommissioning plans as part of future decision points in the FOA 2. This may include proposed sources of funding/revenue and the business model which will support the project beyond the DOE award. This may also include an estimate of profit and loss demonstrating how the project will maintain financial self-sufficiency and strategies to grow beyond the initial integrated CCS demonstration project to catalyze significant follow-on investments from the private sector and spur widespread deployment of commercial-scale, integrated CCS on carbon emissions sources across industries in the U.S.

¹² <https://www.ecfr.gov/current/title-2/subtitle-A/chapter-II/part-200/subpart-D/section-200.307>

Timing and Transition between FOAs

DOE will only initially commit to funding activities under this first FOA (DE-FOA-0002738). No party to an award under this FOA (a successful applicant, DOE or any third-party participating individual or organization) is requested or required to make any commitment, financial or otherwise, to engage in any effort beyond the scope of an award for FEEDs made under this FOA. The FOA 2, expected to be released in 2022 with additional application opportunities to follow, will solicit applications for the entire scope of work for Phases 2 through 4 for integrated CCS demonstration projects. The FOA 2 will not limit eligibility to those applicants receiving Phase 1 awards under this first FOA (DE-FOA-0002738). However, it is envisioned that the scope of work under this first FOA (DE-FOA-0002738) would largely be the prerequisite application requirements for FOA 2.

iii. Community Benefits Plan

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 of certain federal investments flow to disadvantaged communities (the Justice40 Initiative). To ensure these goals are met, applications must include an Initial CBP that addresses these objectives. Due to DOE's intention to issue two FOAs to fulfill the requirements of Carbon Capture Demonstration Projects Program, and therefore the scope of this FOA being primarily a FEED study, the Initial CBP should indicate the applicant's plans to advance DEIA in relation to the FEED study and/or in their organization more broadly, related to engagement, job and job quality impacts, and Justice40. Additional requirements related to community and labor engagement, quality jobs, the Justice40 Initiative, and DEIA will be required in applications to FOA 2 for Phases 2 through 4 and the resulting projects.

If selected for award under this FOA, award recipients must update the information in the Initial CBP throughout the lifecycle of the project, including implementation, evaluation, and updates to the DEIA portion of the plan. DOE will require a final CBP, including updated assessments, accomplishments, and lessons learned, to be included as part of the final report. In addition, applicants will be required to update their assessments on Quality Jobs, Justice40 and Community and Labor Engagement for the final technical report. These priorities are explained in more detail below in Section I.D – Community Benefits Plan.

B. Topic Areas

i. General Information for All Topic Areas

The objective of this FOA is to seek applications to execute and complete front-end engineering design (FEED) studies for integrated carbon capture, transport (if required) and storage (CCS) systems. The integrated CCS systems will separate, transport (if required) and store carbon from new and existing, domestic coal electric generation facilities, natural gas (NG) electric generation facilities, and industrial facilities not purposed for electric generation. Integrated CCS systems include not only the carbon capture technology, but also any relevant carbon oxides¹³ transportation (if required), and carbon storage formation(s) or off-take agreements.

The three topic areas (TAs) are: FEEDs for Integrated CCS Systems at Coal Electric Generation Facilities (**TA-1**); FEEDs for Integrated CCS systems at NG Electric Generation Facilities (**TA-2**); and FEEDs for Integrated CCS systems at Industrial Facilities Not Purposed for Electric Generation (**TA-3**). DOE anticipates funding up to 20 projects in this FOA.

Table 1. Topic and Subtopic Areas

<u>Topic Area</u>	<u>Subtopic Area</u>	<u>Title</u>
Carbon Capture Demonstration Projects Program		
TA-1	TA-1.1	FEEDs ^a for Integrated CCS Systems at Coal Electric Generation-Only Facilities
	TA-1.2	FEEDs for Integrated CCS Systems at Coal CHP ^b Facilities
TA-2	TA-2.1	FEEDs for Integrated CCS Systems at NGCC ^c Electric Generation Facilities or NG SMR ^d Facilities Producing H ₂ for Electricity Generation
	TA-2.2	FEEDs for Integrated CCS Systems at NG Simple Cycle Electricity Generation Facilities or NG CHP Facilities
TA-3	TA-3.1	FEEDs for Integrated CCS Systems at Ammonia Facilities Not Purposed for Electric Generation
	TA-3.2	FEEDs for Integrated CCS Systems at Industrial Facilities Not Purposed for Electric Generation

^aFEEDs: Front-End Engineering and Design Studies; ^bCHP: Combined Heat and Power; ^cNGCC: Natural Gas Combined Cycle; ^dSMR = Steam Methane Reforming;

For all TAs, captured carbon will be stored in a secure, domestic carbon storage facility that has sufficient capacity to store carbon from the proposed CCS facility for at least 12 years of operation. Detailed site characterization of the selected

¹³ Note to Applicants: Carbon oxides include both carbon monoxide (CO) and carbon dioxide (CO₂)

carbon storage site is required to be completed prior to application. Alternatively, an off-take agreement may be utilized.

DOE will request and evaluate full lifecycle emissions for each application and will give preference to meritorious applications that credibly show the potential to reduce GHG emissions to the greatest extent across the full end-to-end project inclusive of upstream and downstream emissions, reference **Appendix K**.

At a minimum, by the conclusion of the project, ALL Recipients should have completed or accomplished the following:

- Carbon Capture FEED study (**Appendix C**) for the advanced carbon capture technology at the selected host site;
- Carbon Oxides Transport Pipeline FEED Study (**Appendix D**, if needed;
- Storage Field Development Plan (**Appendix E**) for the selected carbon storage site supported by Authorizations for Expenditure (AFE), if needed, or status of the off-take agreement;
- Submittal of the documentation to the appropriate regulatory agencies to secure permits (i.e., Underground Injection Control (UIC) Class VI permit to Construct) for the selected carbon storage site (**Appendix F**), if needed;
- Submittal of the Environmental Information Volume (EIV) to support the NEPA process that would be required should the proposed integrated CCS demonstration project be selected for funding in FOA 2 (**Appendix G**);
- Completed work outlined in the DEIA section of the CBP and completed a progress report. Updated Quality Jobs, Justice40, and Community and Labor Engagement sections of the CBP (Section I.D);
- **Updated Environmental Health and Safety (EH&S) Analysis** in accordance with the format provided in **Appendix I**. EH&S analysis should include discussion regarding air and water emissions, water utilization, solid waste streams, and potential environmental impacts of the technology including toxicological effects and hazards of emissions and waste streams; and,
- Life Cycle Analysis (LCA) for the project in accordance with the format provided in the **Appendix K**.

Additional information for end of project deliverables is provided in **Appendix B** and the references therein.

Key technical application requirements are provided in **Table 2**. Full Application requirements for applying to the current FOA are located in Section IV and associated appendices. If the Applicant has already conducted, or is currently conducting, activities required under this FOA, the status of such activities should be clearly described in the application. DOE will not fund redundant, previously, or currently sponsored work. Applicants should propose a scope and budget

covering only those additional activities that are necessary to complete the requirements of this FOA.

Table 2. Key Technical Application Requirements

Key Technical Application Requirements	Notes
Carbon capture technology with at least 90% capture efficiency validated at a minimum Technology Readiness Level (TRL) 6 (for TA-2 , and TA-3) and TRL 7 (for TA-1)	• DOE will preference applications that propose carbon capture technologies with greater than 90% efficiency. • DOE will give preference to applications proposing carbon capture technologies at TRL of 7 (for TA-2 and TA-3).
Completed carbon capture technology FEEDs, Pre-FEEDs or techno-economic analysis	DOE will preference applications that have previously initiated FEED studies.
Selected project team, as applicable , [e.g., carbon capture technology developer or licensor, carbon capture host site owner(s) or operator(s), carbon oxides pipeline operator, carbon storage site owner or potential off-take company, Engineering Procurement and Construction (EPC) firm(s), financial partner(s), NEPA consultant, CBP consultant, etc.].	
Selected host site for carbon capture; letter of commitment to participate in the FEED study	
Proposed carbon oxides pipeline transportation route(s) (if applicable)	
Selected carbon storage host site; letter of commitment to participate in the FEED study (if applicable)	Detailed site characterization of the carbon storage site is required to be completed prior to application.
Status of UIC Class VI Permit or off-take agreement	DOE will preference applications for which (i) UIC Class VI Permit is available or (ii) is submitted to relevant regulatory authority.
State Point Data Table for carbon capture technology discussing any differences between the carbon oxide source used for previous work and what is expected to be available for the proposed project. (Appendix H)	<i>The State-Point Data Table is required to be completed and submitted with your application. Applicants that do not submit a State-Point Data Table or submit an incomplete table will be considered non-compliant and DOE will not review or consider noncompliant submissions. See Section III.</i>

ii. Technical Requirements for Each Topic Area

Topic Area 1: FEEDs for Integrated CCS Systems at Coal Electric Generation Facilities

There are two subtopics for **TA-1**:

TA-1.1: *FEEDs for Integrated CCS systems at Coal Electric Generation-Only Facilities,*

and

TA-1.2: *FEEDs for Integrated CCS systems at Coal CHP Facilities.*

The objectives of a project awarded under **TA-1** are (i) to execute and complete FEEDs for an integrated CCS system in a domestic setting; (ii) submit the documentation to the appropriate regulatory agencies to secure permits (i.e., Underground Injection Control (UIC) Class VI permit to Construct, if applicable) (**Appendix F**); and (iii) submit the Environmental Information Volume (EIV) to support the NEPA process that would be required should the proposed integrated CCS demonstration project be awarded in FOA 2. The carbon capture system will separate carbon oxides with at least 90% efficiency from *one full unit* at a new or existing, domestic coal electric generation-only facility. DOE will preference applications that propose carbon capture technologies with greater than 90% carbon capture efficiency. CCS systems planned to be located at coal Combined Heat and Power (CHP) facilities that are not generating electricity to the grid or district energy systems will be considered nonresponsive for the current FOA.

To apply for **TA-1**, the proposed carbon capture technology must have attained a minimum TRL 7 for coal electric generation. Technical specifications for **TA-1** are listed in **Table 3**. Requirements for applying to **TA-1** and items to be discussed in the Technical Volume of the full application are provided in **Table 2** and **Appendix A**.

Table 3. Technical Specifications for TA-1

Carbon Capture Host Site	Feedstock	Carbon Capture	Carbon Transport & Storage	Performance
Coal Electric Generation-Only 50+% grid electricity output ^a Commercial operation through at least 2035 Ability to evaluate for project benefits and disbenefits/harms in affected communities	U.S. mined coal, coal refuse	Carbon capture system that achieved a minimum TRL 7, at 90% efficiency for coal electric generation	Domestic carbon storage facility with capacity for 12+ years operation or off-take agreement If required, pipelines needed to connect proposed carbon capture facility to storage formation(s)	<i>Unit-wide 90% carbon capture efficiency^b</i>

^a Greater than 50% of gross electricity generation is exported to the grid. ^b DOE will preference applications that propose carbon capture technologies with greater than 90% carbon capture efficiency.

Topic Area 2: FEEDs for Integrated CCS Systems at Natural Gas (NG) Facilities

There are two subtopics for **TA-2**:

TA-2.1: *FEEDs for Integrated CCS Systems at NGCC Electric Generation Facilities or NG SMR Facilities Producing H₂ for Electricity Generation,*

and

TA-2.2: *FEEDs for Integrated CCS Systems at NG Simple Cycle Electricity Generation Facilities or NG CHP Facilities.*

The objectives of a project awarded under **TA-2** are (i) to execute and complete FEEDs for an integrated CCS system in a domestic setting; (ii) submit the documentation to the appropriate regulatory agencies to secure permits (i.e., Underground Injection Control (UIC) Class VI permit to Construct, if applicable) (**Appendix F**); and (iii) submit the Environmental Information Volume (EIV) to support the NEPA process that would be required should the proposed integrated CCS demonstration project be awarded in a subsequent FOA. The carbon capture system will separate carbon oxides with at least 90% efficiency from *one full unit* at a new or existing, domestic NG electric generation facility. DOE will preference applications that propose carbon capture technologies with greater than 90% carbon capture efficiency. CHP facilities that are not generating electricity to the grid or district energy systems will be considered not responsive for the current FOA.

To apply for **TA-2**, the proposed carbon capture technology must have attained a minimum TRL 6 for NG generation. Technical specifications for **TA-2** are listed in **Table 4**. Requirements for applying to **TA-2** and items to be discussed in the Technical Volume of the full application are provided in **Table 2** and **Appendix A**.

Table 4. Technical Specifications for TA-2

Carbon Capture Host Site	Feedstock	Carbon Capture	Carbon Oxides Transport & Storage	Performance
NGCC Electric Generation (50+% grid electricity generation)^a SMR that produces hydrogen from natural gas for use in the production of electric energy (e.g., combustion turbines, fuel cells, etc.) (TA-2.1) Commercial operation through at least 2035 Ability to evaluate for project benefits and disbenefits/harms in affected communities	Any fuel consisting in whole or in part of (i) natural gas, (ii) liquid petroleum gas; (iii) synthetic gas derived from petroleum or natural gas liquids; (iv) any mixture of natural gas and synthetic gas; or (v) biomethane	Carbon capture system that achieved a minimum TRL 6, at 90% efficiency for NG generation	Domestic carbon storage facility with capacity for 12+ years operation or off-take agreement If required, pipelines needed to connect proposed carbon capture facility to storage formation(s)	<i>Unit-wide</i> 90% capture efficiency ^b

^a Greater than 50% of gross electricity generation is exported to the grid. ^b DOE will preference applications that propose carbon capture technologies with greater than 90% carbon capture efficiency.

TA-3: FEEDs for Integrated CCS Systems at Industrial Facilities Not Purposed for Electric Generation

There are two subtopics for **TA-3**:

TA-3.1: *FEEDs for Integrated CCS Systems at Ammonia Facilities not Purposed for Electric Generation*

and

TA-3.2: *FEEDs for Integrated CCS Systems Industrial Facilities Not Purposed for Electric Generation.*¹⁴

The objectives of a project awarded under **TA-3** are (i) to execute and complete FEEDs for an integrated CCS system in a domestic setting; (ii) submit the documentation to the appropriate regulatory agencies to secure permits (i.e., Underground Injection Control (UIC) Class VI permit to Construct, if applicable) (**Appendix F**); and (iii) submit the Environmental Information Volume (EIV) to support the NEPA process that would be required should the proposed integrated CCS demonstration project be awarded in a subsequent FOA. The carbon capture system will separate a minimum of 300,000 tonnes carbon oxides per year with at least 90% efficiency from one process slipstream at a new or existing domestic industrial facility not purposed for electric generation. DOE will preference applications that propose carbon capture technologies with greater than 90% carbon capture efficiency. The industrial sectors for **TA-3.2** of interest **include but are not limited to:** (i) chemical production (e.g., petrochemicals) *excluding ethanol production*, (ii) mineral production (e.g., cement and lime), (iii) pulp and paper production, (iv) iron and steel production, **and (v) natural gas processing and oil refining.**

To submit an application for **TA-3**, the proposed carbon capture technology must have attained a minimum TRL 6 for the proposed industrial application, or a process having a similar composition, temperature, and pressure. Technical specifications for **TA-3** are listed in **Table 5**. Requirements for applying to **TA-3** and items to be discussed in the Technical Volume of the full application are provided in **Table 2** and **Appendix A**.

¹⁴ Industrial facilities may generate electric power for internal use, but not export electric power to the grid.

Table 5. Technical Specifications for TA-3

Carbon Capture Host Site	Feedstock	Carbon Capture	Carbon Transport & Storage	Performance
Ammonia Industrial Facility Not Purposed for Electric Generation (TA-3.1) Or Including but not limited to: Chemical Production (e.g., petrochemicals) excluding ethanol production; (ii) Mineral Production (e.g., cement and lime); (iii) Pulp and Paper Production; (iv) Iron and Steel production, and (v) natural gas processing and oil refining (TA-3.2) Commercial operation through at least 2035 Ability to evaluate for project benefits and disbenefits/harms in affected communities	Natural gas, Biomass, Coal, and/or Waste derived fuels	Carbon capture system that achieved a minimum TRL 6, at 90% efficiency for the proposed industrial application	Domestic carbon storage facility with capacity for at least 12 years of operation or an off-take agreement If required, pipelines needed to connect proposed carbon capture facility to storage formation(s)	Achieve 90+% capture efficiency^a from an industrial process stream

^a DOE will preference applications that propose carbon capture technologies with greater than 90% carbon capture efficiency.

iii. **Carbon Matchmaker**

Applicants have access to Carbon Matchmaker, which may be utilized to facilitate the formation of new project teams for this FOA. Carbon Matchmaker is an online information resource to connect users across the carbon capture, utilization, and storage and carbon dioxide removal supply chains. Carbon Matchmaker will:

- Enable a teaming mechanism to support geographically diverse carbon capture, utilization, and storage and carbon dioxide removal projects across the United States;
- Increase awareness and facilitate development of regional carbon management hubs, including alongside hydrogen hub development where relevant;
- Provide domestic and international community, industry, and technology development stakeholders with carbon oxides supply and demand maps for current and planned projects; and
- Highlight past and currently funded DOE carbon management projects in a geospatial map.

Carbon Matchmaker is intended to help facilitate regional carbon management team formation by allowing carbon management producers, end-users, and other stakeholders to self-identify and align potential needs in specific geographic areas within the United States. Carbon Matchmaker allows organizations who may wish to participate on an application to express their interest to other applicants and to explore potential partnerships.

Participation by underrepresented partners and suppliers and labor unions is encouraged. Teams that include representation from diverse entities such as, but not limited to: Minority Serving Institutions (MSIs), including Historically Black Colleges and Universities (HBCUs)/Other Minority Institutions (OMIs),¹ or through linkages with Opportunity Zones², are encouraged.

- Minority Serving Institutions (MSIs), including HBCUs/OMIs as educational entities recognized by the Office of Civil Rights (OCR), U.S. Department of Education, and identified on the OCR's Department of Education U.S. accredited postsecondary minorities' institution list. See <https://www2.ed.gov/about/offices/list/ocr/edlite-minorityinst.html>.
- Opportunity Zones were added to the Internal Revenue Code by section 13823 of the Tax Cuts and Jobs Act of 2017, codified at 26 U.S.C. 1400Z-1. The list of designated Qualified Opportunity Zones can be found in IRS Notices 2018-48 (PDF) and 2019-42 (PDF). Further, a visual map of the census tracts designated as Qualified Opportunity Zones may also be found at Opportunity Zones Resources. Also see, frequently asked questions about Qualified Opportunity Zones.

- Labor unions are organizations that represent workers, recognized under the National Labor Relations Act of 1935, which declares that it is the policy of the United States to support worker organizing and collective bargaining.

Interested applicants can follow the submission instructions on the Carbon Matchmaker website at, <https://www.energy.gov/fecm/carbon-matchmaker>. Please indicate if DOE's Carbon Matchmaker enabled or connected partnerships of participants in the application. If so, please describe. This is merely to evaluate the effectiveness and to continually improve the matchmaker tool.

Note: Participation in the Carbon Matchmaker online resource is voluntary. Participation, or lack thereof, will not have any impact on an organization being selected for award. All provided data is self-reported by interested stakeholders and is not furnished by DOE. DOE does not recommend, endorse, or otherwise evaluate the qualifications or validity of any entities or data that were self-reported on this platform. DOE will not fund 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 Section I.A. and I.B. of the FOA;
- Applications that exceed the maximum DOE share as outlined in Section II Award Information;
- Applications for proposed technologies that are not based on sound scientific principles (e.g., violates the laws of thermodynamics);
- Applications to advance the maturation of post-combustion and pre-combustion carbon capture technologies, apart from the required FEED design;
- Applications to advance the maturation of carbon oxides compression technologies, apart from the required FEED design;
- Applications to advance the maturation of carbon storage technologies apart from the required FEED design;
- Applications to advance the maturation of carbon oxides conversion technologies;
- Applications to advance the maturation technologies to increase carbon oxides concentration in the flue gas (e.g., exhaust gas recirculation), other than engineering analysis;
- Applications to utilize algae-based carbon capture technologies;

- Applications to utilize materials screening (computational or experimental) of novel sorbents, solvents, membrane or electrochemical materials;
- Applications to advance the maturation of carbon removal technologies (e.g., direct air capture, biomass with carbon capture and storage (BiCRS) technologies, enhanced weathering), apart from the required design of a CCS demonstration system if biomass is a feedstock;
- Applications to perform detailed site and subsurface characterization for the proposed carbon storage host site;
- Applications that propose a host site that is not located in the United States;
- Applications proposing an existing host site that is not currently in commercial operation or with an announced closure date before the end of 2035;
- Applications that do not submit a complete State-Point Data Table;
- Applications proposing CCS systems be located at coal CHP facilities that are not generating electricity to the grid or district energy systems (for **TA-1.2**);
- Applications proposing CCS systems located at SMR facilities that are producing hydrogen from natural gas for other purposes than electricity generation to the grid (for **TA-2.1**);
- Applications proposing CCS systems located at natural gas CHP facilities that are not generating electricity to the grid or district energy systems (for **TA-2.2**);
- Applications proposing industrial facilities that export electric power to the grid (for **TA-3**);
- Applications proposing CCS systems at ethanol production facilities (not applicable for **TA-2.1**);
- Applications proposing basic research aimed solely at discovery and/or fundamental knowledge generation; and
- Applications proposing bench- and pilot-scale testing.

D. Community Benefits Plan

Technology deployment will likely be more successful if equity and justice principles, community engagement, and partnership development are integrated into funding opportunities. For example, failing to meaningfully engage with communities and stakeholders has been a contributing factor to delays or cancellations of energy and carbon management projects in the past. However, with meaningful engagement, communities and stakeholders can be project partners whose questions and concerns can improve overall project outcomes. This is clear from feedback obtained from DOE stakeholders, requests for information, published research, and information obtained from DOE project work. Therefore, applicants must submit an Initial CBP as part of their Full Application to this FOA. The below sections set forth the requirements for the Plan. The DEIA portion of the Initial CBP should also be incorporated into the project scope, schedule, and budget.

DOE recognizes that each project and applicant is unique and requires a range of approaches to ensuring community benefits and minimization of harms. Given the scope of the FOA—development of a FEED study—it is understood applicants may not have all of this information at the time of application, however, applicants should complete each portion of the Initial CBP to the ***greatest extent possible***. *Where information is missing, or not applicable, applicants must describe why and the steps that could be taken to complete the Plan.* If the applicant has prior or ongoing efforts to advance energy and environmental justice, DEIA, community and labor engagement, or quality jobs, the applicant should discuss how they are incorporating lessons learned and building on these prior/ongoing efforts. At this stage of the application process, the Initial CBP should indicate the applicant’s plans to advance DEIA in relation to the FEED study and/or in their organization more broadly, related to stakeholders, jobs and job quality, and Justice40. Additional requirements related to community and labor engagement, quality jobs, the Justice40 Initiative, and DEIA will be required in applications to the FOA for Phases 2 through 4 and the resulting projects.

For the DEIA section of the Initial CBP, applicants should propose metrics to measure success. Progress will be tracked through continuous project monitoring. Milestones and work descriptions relevant to the DEIA portion of the plan should be included within the Integrated Project Schedule (IPS) and Workplan. Applicants are encouraged to use SMART (Specific, Measurable, Achievable, Relevant and Timely) milestones whenever possible.

The Initial CBP will be evaluated as part of the technical review process. DOE will provide feedback to awardees and require that they update their Initial CBP during award negotiations. If awarded, applicants must update the information in the Initial CBP throughout the lifecycle of the project, including implementation, evaluation, accountability, and updates to the DEIA portion of the plan. DOE may provide additional guidance to awardees on requirements for updating the Initial CBP which may include new impacts, metrics, ways of measuring the information, or reporting guidance. DOE will require a final CBP, including updated assessments, accomplishments, and lessons learned, to be included as part of the final report.

Detailed guidance and examples on creating each section of the Initial CBP will be provided under the application documents section on the OCED Exchange website at <https://oced-Exchange.energy.gov>. Applicants are encouraged to read these resources prior to writing their initial CBP. Applicants are encouraged to leverage information generated in other portions of this FOA to CBP development (e.g., LCA). Information contained in the CBP applies to both applicants and any subapplicants.

The Initial CBP must not exceed 20 pages and must be uploaded to Exchange as a separate file (see Section IV.D.iii for more information).

Community and Labor Engagement

The Community and Labor Engagement section should provide an analysis of community stakeholders relevant for the project, such as, community-based organizations representing local residents and businesses, workforce development organizations including registered apprenticeship programs, local government, emergency responders, communities with environmental justice concerns, disadvantaged communities, and community-based organizations that support or work with disadvantaged communities. By facilitating labor and community input, social buy-in, and agreements specifying accountability, to these stakeholders, such engagement can substantially reduce or eliminate stalls or slowdowns, litigation, and other risks associated with project implementation.

This section should include the following elements:

1. **Background.** A description of any prior and ongoing efforts by the applicant and its project partners to engage communities, Tribes, and labor stakeholders.
2. **Social Characterization Assessment.** A writeup that describes community dynamics, labor relations, decision-making processes, etc. for the community in which the FEED study is being completed.
3. **Initial Stakeholder Analysis Summary.** A description of how the project team identified stakeholders; what sectors, labor unions, communities, organizations, etc. the stakeholders and project represent; and current or anticipated level of engagement (e.g., advisory committee, working group member, active public participant). If applicable, provide an assessment of and evidence of (e.g., letters of support, MOUs, etc.) existing labor and community support for and/or concerns with the project, including a description of steps taken to gather this information. Letters of support and MOUs do not count towards the page limit.
4. **Statement on community and labor support and opportunities for technical or project modifications.** The application should include a statement discussing the extent to which the host community or communities and labor have indicated support or concerns for the integrated CCS FEED study. If applicable, the statement should also describe what project or technical aspects of the proposed project could be modified based on future engagement, including a discussion of whether there is a pathway for the project to consider changing target site(s) based on social considerations.

If awarded and in conjunction with DOE, awardees will also identify to DOE any federally recognized Indian tribes, including Alaska native village or regional or village corporations (who are not project partners) for whom the proposed project may have implications. The awardee will provide information to support DOE's development of a Tribal engagement plan that acknowledges each Tribe's consultation policies, traditions, and expectations, and adheres to DOE Order 144.1 on Tribal consultation. Appropriate mitigation will be identified through government-to-government consultation to off-set any such potentially adverse implications. DOE is and remains responsible for government-to-government consultation with any federally recognized

Indian tribes, including Alaska native village or regional or village corporations about the proposed project.

Investing in the American Workforce

If applicable, applicants should identify the potential impacts of the project on the workforce including but not limited to: increase or decrease in jobs; changes to the knowledge, skills, and abilities needed within the workforce for installing, maintaining, or operating the project; changing industry structures leading to different employer-employee relationships or changes to collective bargaining agreements, and resultant changes to job quality, wages, fringe benefits, job security, etc.

This section should include the following elements:

1. Assessment of workforce needs and labor unions representing workers or trades that will be needed for construction, operations, and maintenance.
2. An assessment of the jobs that will be created, the occupational distribution, and skills or knowledge gaps that will need to be filled, and, if applicable, the training programs with whom the applicant could work to fill those gaps. Assess the job growth, skill and wage advancement, and improvements in job security.
3. If applicable, an assessment of any negative impacts on the workforce, such as worker displacement resulting from this project, disruption to existing collective bargaining agreements, reduction in wages and benefits, etc.

Justice40 Initiative

Executive Order 14008 created the Justice40 Initiative – which established a goal that 40% of the overall benefits of certain federal investments flow to disadvantaged communities. This calculation of overall benefits of certain federal investments is not on a per-project basis, meaning that individual projects may contribute more or less substantially to this goal (i.e., have a higher or lower percentage) based on factors unique to the project.

Applicants to this FOA are required to develop a Justice40 component of the Initial CBP regardless of whether or not a project or work site is located within a disadvantaged community.

This section should include the following elements:

1. **An assessment of impacted communities and groups.** Applicants should describe all applicable communities or groups which could experience impacts from the project. Applicants should identify which of these are considered disadvantaged communities¹⁵ and characterize the existing burdens they are facing using

¹⁵ 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 disadvantaged communities. These resources can be located at <https://energyjustice.egs.anl.gov/>. DOE will also recognize disadvantaged

EJSCREEN,¹⁶ disadvantaged communities' definition tools, or other analytical tools. Applicants should include which tool was used in their analysis. Impacts to communities and Tribes/Alaska Native Corporations (ANC) should be considered for all inputs and outputs along all phases of the projects, in addition to impacts at the project site(s) or work location(s).

2. **An assessment of project benefits and where they flow.** Applicants should describe in detail all anticipated project benefits of the current project. . This description should clearly enumerate: a) specific project benefits including to the greatest extent possible metrics that will be used to track these benefits; b) where/to whom project benefits are expected to flow with the greatest amount of specificity possible (e.g., census block group or census-tract level), and the extent to which these benefits flow to disadvantaged communities; and c) describe how well the anticipated project benefits and impacts align with community priorities. Benefits could include measurable direct or indirect investments or positive project outcomes that contribute to the eight DOE Justice40 policy priorities 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.
3. **An assessment of project negative impacts and where they flow.** If applicable, Applicants should describe all anticipated negative impacts of the project. This description should clearly enumerate: a) specific project negative impacts including, to the greatest extent possible, metrics that will be used to track these impacts; b) where/to whom impacts are expected to flow with the greatest amount of specificity possible, and whether disadvantaged communities will experience negative impacts disproportionately; and c) how additional project negative impacts will interact with existing cumulative burdens. Negative impacts could include ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic, historic, cultural, economic, social, or health impacts. Consider direct impacts, indirect impacts, and cumulative impacts.
4. **Assessment of information gaps:** For elements of the Assessment where additional work is needed to fully assess or measure potential impacts, applicants can outline research and analytical goals to clarify the unknowns.

communities as defined and identified by the White House Council on Environmental Quality's Climate and Economic Justice Screening Tool (CEJST), which can be located at <https://screeningtool.geoplatform.gov/>

¹⁶ <https://www.epa.gov/ejscreen>

5. **Assessment of risks to realizing benefits and minimizing negative impacts:** For items outlined in the Assessment, discuss potential barriers to realizing project benefits, minimizing negative impacts, and plans for mitigating those risks.

Project impacts should be quantifiable, measurable, and trackable to the greatest extent possible; DOE expects applicants to include both qualitative and quantitative metrics. If no project sites or related activities are located within or near a community and/or disadvantaged communities, applicants should provide a detailed explanation to support this conclusion.

Diversity, Equity, Inclusion, and Accessibility (DEIA)

Applicants should submit a DEIA section within the Initial CBP that describes the actions the applicant will take, if selected for award, to foster a welcoming and inclusive environment, support people from groups underrepresented in Science, Technology, Engineering, and Mathematics (STEM) and in blue-collar energy jobs, advance equity, and encourage the inclusion of individuals from these groups in all phases of the project. Applicants should outline the participation of the workforce in designing DEIA initiatives, establishing goals, and ensuring accountability. 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 DEIA plan should correspond to activities within the scope of this FOA, i.e., related to the FEED study project team or applicant organization more broadly. This plan will be implemented throughout the project.

Minority Serving Institutions, Minority Business Enterprises, Minority Owned Businesses, Woman Owned Businesses, Veteran Owned Businesses, Tribal Colleges and Universities, or entities located in an underserved community that meet the eligibility requirements (See Section III) are encouraged to participate in meaningful and substantial ways on the application team. The Selection Official may consider the inclusion of these types of entities as part of the selection decision (See Section V.C.i. Program Policy Factors).

Elements of the DEIA plan should include the following:

1. **Background.** Describe prior and ongoing efforts by the project team relevant to DEIA, based on findings from an initial assessment that examines the context of DEIA in organizations related to the project team.
2. **Strategies, Milestones, and Timelines.** Describe targeted DEIA outcomes and implementation strategies, including milestones, include a DEIA schedule for execution, and address accountability measures. Milestones and work descriptions should be included within the IPS and Workplan. Applicants are encouraged to use SMART (Specific, Measurable, Achievable, Relevant and Timely) milestones whenever possible.

3. **Resource Summary.** Describe project resources dedicated to implementing DEIA activities including staff, facilities, capabilities, and budget.

E. Authorizing Statutes

The programmatic authorizing statutes are:

- Energy Policy Act of 2005, (Public Law 109-58) Sec. 962
- DOE Organization Act (Public Law 95-91), 42 U.S.C. § 7101, et seq. DOE Organization Act, 42 U.S.C. CHAPTER 84 – DEPARTMENT OF ENERGY § 7101., et seq. (Public Law 95-91), as amended. PL 117-58, Infrastructure Investment and Jobs Act (IIJA) SEC. 41004(b)

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

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 \$189,000,000, of federal funding available for new awards under this FOA, subject to the availability of BIL funds. DOE anticipates making up to 20 awards under this FOA. DOE may issue one, multiple, or no awards. Individual awards may vary between \$5,500,000 and \$12,500,000 of federal funds, or less if a significant amount of work has already been completed either at private expense or on another DOE award.

DOE may issue awards in one, multiple, or none of the following TAs.

Table 6. Anticipated Award Sizes

Topic Area	Estimated Maximum Total DOE Funding	Anticipated No. of Awards	Anticipated Individual Award Size*		
			Maximum DOE Share \$/%	Cost Share \$/%	Total \$
1.1	\$62,500,000	Up to 5	\$12,500,000 / 50%	\$12,500,000 / 50%	\$25,000,000
1.2	\$13,000,000	Up to 2	\$6,500,000 / 50%	\$6,500,000 / 50%	\$13,000,000
2.1	\$50,000,000	Up to 5	\$10,000,000 / 50%	\$10,000,000 / 50%	\$20,000,000
2.2	\$13,000,000	Up to 2	\$6,500,000 / 50%	\$6,500,000 / 50%	\$13,000,000
3.1	\$5,500,000	Up to 1	\$5,500,000 / 50%	\$5,500,000 / 50%	\$11,000,000
3.2	\$45,000,000	Up to 5	\$9,000,000 / 50%	\$9,000,000 / 50%	\$18,000,000
Total	\$189,000,000	Up to 20			

*The DOE share listed under the anticipated individual award size is the maximum amount of DOE funding that can be proposed for each topic area. **Applications that propose a DOE share in excess of the maximum limits will not be evaluated and will be considered noncompliant to the FOA.**

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.

ii. Period of Performance

Table 7. Period of Performance per TA

TA	Technical Period of Performance
1	Up to 24 months
2	Up to 24 months
3	Up to 24 months

Typically, budget periods are established on an annual basis. In some cases, shorter or longer budget periods may be established for compelling programmatic or administrative reasons, such as to allow for project phases not evenly divisible with 12-month increments or to provide program personnel with logical decision points to evaluate whether the project should proceed. At the end of each budget period, DOE may, at its discretion, authorize the following actions: (1) release contractual holds to approve the project to proceed with the proposed scope and budget of the follow-on budget period(s); (2) recommend redirection of work under the project; (3) maintain 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.

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. DOE anticipates that Cooperative Agreements will be issued under this FOA.

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.

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

The proposed prime recipient and subrecipient(s) must be domestic entities. The following types of domestic entities are eligible to participate as a prime recipient or subrecipient of this FOA:

1. Institutions of higher education;
2. For-profit entities;
3. Non-profit entities; and
4. State and local governmental entities, and Tribal Nations.

To qualify as a domestic entity, the entity must be organized, chartered or incorporated (or otherwise formed) under the laws of a particular state or territory of the United States; have majority domestic ownership and control; and have a physical place of business in the United States.

DOE/NNSA FFRDCs are eligible to apply for funding as a subrecipient but are not eligible to apply as a prime recipient. **NETL is not eligible for award under this announcement and may not be proposed as a subrecipient on another entity's application. An application that includes NETL as a prime recipient or subrecipient will be considered non-responsive.**

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

Notwithstanding the above, 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 U.S. 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 501I(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

In limited circumstances, DOE may approve a waiver to allow a foreign entity to participate as a prime recipient or subrecipient. A foreign entity may submit a Full Application to this FOA, but the Full Application must be accompanied by an explicit written waiver request as described in **Appendix N**.

Likewise, if the applicant seeks to include a foreign entity as a subrecipient, the applicant must submit a separate explicit written waiver request in the Full Application for each proposed foreign subrecipient.

Appendix N lists the information that must be included in a foreign entity waiver request. 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 participate 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 (or otherwise formed) in a foreign country, 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.

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 N**.

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 qualify as a domestic entity.

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 N**.

B. Cost Sharing

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

The cost share must be at least 50% of the total project costs.^{17,18} The cost share must come from non-federal sources unless otherwise allowed by law. Federal financing, such as DOE Loan Guarantees, cannot be leveraged by applicants to provide the required cost share or to otherwise cover the same scope that is proposed in response to this FOA. Tax credits may be considered in the overall project business case but cannot be counted towards the cost share requirements.

DOE understands that projects selected under this FOA may require the use of existing data. For purposes of this FOA, DOE will consider data that is commercially available at an established market price to be an allowable cost under the project (either as DOE share or non-federal cost share) but DOE will not consider in-kind data (e.g., data, owned by an entity, that is not routinely sold commercially but is instead donated to the project and assigned a value) to be an allowable cost under the project, including as Recipient cost share. Estimation methods used by the Recipient to assign a value to in-kind data cannot be objectively verified by DOE and therefore will not be accepted by DOE as an allowable cost under any project selected from this FOA. Consequently, DOE will not recognize in-kind data costs in any resulting approved DOE budget.

Cost share may come from project participants, state or local governments or other third-party financing. Federal financing, such as DOE Loan Guarantees, cannot be leveraged by applicants to provide the required cost share. Also, in general deferred or avoided costs such as tax credits may not be used as cost share. However, non-federal cost share can include Tennessee Valley Authority power sales revenue, which is specifically allowed under the Energy Policy Act of 2005. See, 42 U.S.C § 16352(c) (Section 988 of Energy Policy Act of 2005) and 2 CFR 910.130(d)(2)(v).

¹⁷ Total project costs is the sum of the government share, including FFRDC costs if applicable, and the recipient share of project costs.

¹⁸ 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.

To assist applicants in calculating proper cost share amounts, DOE has included a cost share information sheet and sample cost share calculation as **Appendix M** 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 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.H.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 M** 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 cumulative cost share for each billing period should reflect at least the overall cost share ratio negotiated by the parties (i.e., the total amount of cost sharing on each invoice when considered cumulatively with previous invoices must reflect, at a minimum, the cost sharing percentage negotiated).

In limited circumstances, and where it is in the government's interest, the 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

Letters of Intent and Full Applications must meet all compliance criteria listed below or they will be considered noncompliant. OCED will not review or consider noncompliant submissions.

All applicant submissions must:

- Submit a compliant Letter of Intent;
- Comply with the maximum DOE share of the individual award size in Section II.C of the FOA;
- Comply with the applicable content and form requirements listed in Section IV of the FOA;
- Include all required documents;
- Be successfully uploaded in OCED Exchange <https://oced-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 OCED Exchange, submissions submitted after the applicable deadline, or incomplete submissions.

Applicants are strongly encouraged to submit their Letters of Intent and Full Applications at least 48 hours in advance of the submission deadline. Under normal

conditions (i.e., at least 48 hours in advance of the submission deadline), applicants should allow at least 1 hour to submit a Full Application. Once Full Application is submitted in OCED 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 Full Application 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

A review of all submitted documents and information is performed to determine if the submissions are responsive to the FOA requirements. **All submitted information and documents must meet all of the Responsiveness Criteria listed below to be eligible for review or the submission will be considered non-responsive. DOE will NOT review or consider non-responsive submissions.**

Full Applications are deemed responsive if:

- The application meets the technical requirements as described in the “Objectives/Topic Areas” contained in Section I.C of the FOA; and
- The Applicant/application meets the Eligibility Criteria in Section III of the FOA.

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

Only compliant/responsive applications will be eligible for a comprehensive merit review.

E. Other Eligibility Requirements

i. Requirements for DOE/NNSA and non-DOE/NNSA FFRDC 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:

- i. *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.
- ii. *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.

iii. *Value/Funding*

The value of, and funding for, the FFRDC/NL portion of the work will be included in the award to a successful applicant. DOE/NNSA will not fund a DOE/NNSA FFRDC/NL through the DOE field work authorization process and other FFRDC/NLs through an interagency agreement with the sponsoring agency. FFRDCs/NLs will be treated as subawards for applicants. Subawards to other FFRDCs will utilize the terms and conditions of the sponsoring agency.

iv. *Cost Share*

The applicant's cost share requirement will be based on the total cost of the project, including the applicant's and the FFRDC/NL's portions of the effort.

v. *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.

vi. *Limit on FFRDC Effort*

The FFRDC effort, in aggregate, shall not exceed 10% of the total estimated cost of the project, including the applicant's and the FFRDC's portions of the effort.

NETL is not eligible for award under this announcement and may not be proposed as a sub-recipient on another entity's application. An application that includes NETL as a prime recipient or sub-recipient will be considered non-responsive.

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

DOE/NNSA FFRDC/NLs participating as a subrecipient on a project are strongly encouraged to establish a Cooperative Research and Development Agreement¹⁹ (CRADA) or, if the role of the DOE/NNSA FFRDC/NL is limited to technical assistance and intellectual property is not anticipated to be generated from the DOE/NNSA FFRDC/NL'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 patent 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.

F. Limitation on Number of Full Applications Eligible for Review

Applicants must submit a Letter of Intent, and receive a control number from OCED Exchange, by the specified due date and time to be eligible to submit a Full Application. An entity may submit more than one Full Application to this FOA, provided that each application describes a unique, scientifically distinct project. If an entity intends to submit multiple Full Applications to this FOA, an individual Letter of Intent and associated control number is required for each Full Application intended for submission. Control numbers will be assigned to each individual Letter of Intent and can then only be associated with a single 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.

¹⁹ 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>

IV. Application and Submission Information

A. Application Process

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 OCED 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.**

Applicants are responsible for meeting each submission deadline. **Applicants are strongly encouraged to submit their Full Applications at least 48 hours in advance of the submission deadline.** Under normal conditions (i.e., at least 48 hours in advance of the submission deadline), applicants should allow at least 1 hour to submit a Full Application. Once the Full Application is submitted as specifically stated in the FOA, 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 Full Application before the applicable deadline.

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

B. Application Forms

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

Note: The maximum file size that can be uploaded to the OCED 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 Letter of Intent

Applicants must fill out and submit a Letter of Intent directly in the OCED Exchange system by clicking on the create Letter of Intent button (<https://oced-exchange.energy.gov/>) by the specified due date and in time to be eligible to submit a Full Application. If an entity intends to submit multiple Full Applications to this FOA, an individual Letter of Intent and associated control number is required for each Full Application intended for submission. Control numbers will be assigned to each individual Letter of Intent and can then only be associated with a single Full Application.

Letters of Intent will be used by OCED to plan the merit review process. **The letters should not contain any proprietary or sensitive business information.** The letters will not be used for down-selection purposes, and do not commit an applicant to submit an application. Applicants are not bound to the statements made in the Letter of Intent, it is reasonable for project partners, locations, or other factors to change during the application development process. DOE will not provide feedback on the Letters of Intent. OCED will not review or consider ineligible Letters of Intent (see Section III. of the FOA).

Each applicant must fill out all of the required information contained in the OCED Exchange system by clicking on create Letter of Intent. The fields that must be completed are:

- Submission Initiated By;;
- Project title;

- Abstract – **Applicants should start the abstract by identifying the Topic Area in this field.** The abstract provided should be not more than 4000 words in length, and should provide a truncated explanation of the proposed project;
- UEI Number;
- Organization Type;
- Lead Organization;
- Lead Organization Percent Effort;
- Team Member information; and
- Primary Area of Expertise

D. Content and Form of the Full Application

Applicants must complete the following application forms found on the OCED Exchange website at <https://oced-exchange.energy.gov/>.

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. Full Applications must conform to the following requirements and must not exceed the stated page limits. **If Applicants exceed the maximum page lengths indicated below, DOE will review only the authorized number of pages and disregard any additional pages.**

Table 8. Full Application Content and Form Requirements

Component	File Format	Page Limit	File Name
Technical Volume	PDF	40	ControlNumber_LeadOrganization_TechnicalVolume
Initial Community Benefits Plan	PDF	20 (not inclusive of letters of support and MOUs)	ControlNumber_LeadOrganization_ICBP
Resumes	PDF	2 pages each	ControlNumber_LeadOrganization_Resumes
Cost Share Commitment Letter(s), if applicable	PDF	N/A	ControlNumber_LeadOrganization_CSCL
Host Site Commitment Letter(s)	PDF	N/A	ControlNumber_LeadOrganization_HostSCL
Storage Site Commitment Letter(s), if applicable	PDF	N/A	ControlNumber_LeadOrganization_StoreSCL
Team Commitment Letter(s), if applicable	PDF	N/A	ControlNumber_LeadOrganization_TeamCL

Summary of Carbon Capture FEED Study, Pre-FEED Study, or Techno-economic Analysis	MS Word	15	ControlNumber_LeadOrganization_CC_FEEDs
Summary of the UIC Class VI Permit Application Materials or Off-take Agreement, if applicable	MS Word	10	ControlNumber_LeadOrganization_Class VI_storage
Statement of Project Objectives	MS Word	15	ControlNumber_LeadOrganization_SOPO
Project Management Plan	MS Word	15	ControlNumber_LeadOrganization_PMP
SF-424: Application for Federal Assistance	Form	N/A	ControlNumber_LeadOrganization_App424
Budget Justification Workbook	MS Excel	N/A	ControlNumber_LeadOrganization_Budget_Justification
Summary for Public Release	PDF	1	ControlNumber_LeadOrganization_Summary
Summary Slide Deck	MS PowerPoint	3	ControlNumber_LeadOrganization_Slide
Subrecipient Budget Justification	MS Excel	N/A	ControlNumber_LeadOrganization_Subrecipient_Budget_Justification
Authorization from cognizant Contracting Officer for FFRDC, if applicable	PDF	N/A	ControlNumber_LeadOrganization_FFRDCAuth
SF-LLL Disclosure of Lobbying Activities	Form	N/A	ControlNumber_LeadOrganization_SF-LLL
Foreign Entity Waiver Requests and Foreign Work Waiver Requests, if applicable	PDF	N/A	ControlNumber_LeadOrganization_Waiver ControlNumber_LeadOrganization_Subrecipient_Waiver
Buy America Requirements for Infrastructure Projects Waiver Requests	PDF	N/A	ControlNumber_LeadOrganization_BAWaiver.pdf
Data Management Plan	PDF	N/A	ControlNumber_LeadOrganization_DMP
Preliminary Life Cycle Analysis (LCA)	PDF	N/A	ControlNumber_LeadOrganization_PLCA
Initial Environmental, Health, & Safety Assessment	PDF	N/A	ControlNumber_LeadOrganization_EHSA
Current and Pending Support	PDF	N/A	ControlNumber_LeadOrganization_CPS
Intellectual Property Management Plan	PDF	N/A	ControlNumber_LeadOrganization_IPMP
Locations of Work	MS Excel	N/A	ControlNumber_LeadOrganization_LOW
State Point Data Table	MS Excel	N/A	ControlNumber_LeadOrganization_SPDT

Note: The maximum file size that can be uploaded to the OCED 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 will not consider additional information contained in the cited sources in their review or scoring.

The Technical Volume to the Full Application may not be more than **40 pages single-spaced**, 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.

Table 9. Technical Volume Content Requirements

Technical Volume Content Requirements	
SECTION/PAGE LIMIT	DESCRIPTION
Cover Page	The cover page should include the control number, 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 the senior/key personnel and their organizations, the project location(s) (including host site and storage site), and any statements regarding confidentiality.
Project Overview (Approximately 20% of the Technical Volume)	The Project Overview should contain, at a minimum, the following information: • Background: The applicant should discuss the background of their organization, including the history, successes, and current 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. • 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 and Impact (Approximately 35% of the Technical Volume)	The Technical Description should contain, at a minimum, the following information: • Relevance and Outcomes: The applicant should provide a detailed description of the proposed CCS demonstration project, 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 this project. • Carbon Capture Technology Competitive Assessment: The applicant should describe the current state-of-the-art in the applicable field, the specific advantages of the proposed carbon capture technology in the chosen application over competing technologies. A thorough competitive assessment on how the proposed technology would demonstrate substantial improvements in the efficiency, effectiveness, cost, and environmental performance of carbon capture technologies for power, industrial, or other commercial applications. Anticipated benefits, as well as challenges for the technology should also be discussed in detail. The overall impact on advancing the state-of-the-art/technical baseline if the project is successful. • Carbon Capture Technology Readiness Level Evaluation: The applicant should provide a discussion of the proposed CCS demonstration project from technical, environmental, cost effectiveness, and integrated systems perspectives. Scientific, engineering, and technical information and data should be provided to support evidence of the readiness of the proposed technology for demonstration at the scale proposed. It is expected that the applicants have already validated their carbon capture technology at TRL 7 (for TA-1) or TRL 6 (for TA-2 and TA-3) in an integrated, continuous, pilot-scale system with actual flue gas and achieved at least 90% carbon oxides capture. The performance of the proposed carbon capture technology should be substantiated by providing experimental evidence measured under actual flue gas conditions. Furthermore, the applicants should discuss the specific

	impurity/contaminant profile in the selected application, and its expected short- and long-term effect on the overall carbon capture system performance. • Carbon Capture Technology Description. The applicants are required to describe key parameters of the advanced carbon capture technology, or how the parameters will be developed. The description of the system should include, but is not limited to, the following: a. Preliminary process flow diagrams; b. Mass and energy balances; c. Steam and power requirements; d. As applicable, a discussion of the absorption/desorption chemistry and operating cycle for solvent and sorbent systems; and e. As applicable, a description of relevant membrane chemistry, including transport mechanism. • Host Site Description and Carbon Capture Process Integration. Applicants are required to describe the new or existing selected, domestic carbon capture host site facility, including, but not limited to, process diagrams, emissions profiles, and availability and quality of land, water, steam and/or waste heat (as applicable). A corresponding narrative is required to provide application reviewers a clear understanding of the proposed capture process and project from technical, cost effectiveness, and integrated systems perspectives. At a minimum, the description shall include the following or a plan to obtain the following: a. Anticipated feed conditions (e.g., pressure, temperature, flow rate, gas composition, and contaminant levels), b. Electrical, water and waste management. Applicants should describe how electricity consumption, heat, water, and waste will be managed in the proposed CCS demonstration project and tied into the existing host facility. c. Contaminants Controls. Applicants should describe how the flue gas contaminants (e.g., NO_x, SO_x, PMs) are managed in the existing host facility and their potential effect on the carbon capture system. d. Carbon oxides product disposition. Applicants must demonstrate that the proposed carbon capture technology will produce a carbon oxide stream of required temperature and quality suitable for cost-effective compression and transport/disposition of the stream, without adversely affecting existing operations, compressors, pipelines or geologic-storage formations. e. Description of the carbon capture equipment design concept (e.g., membrane module architecture, absorber/desorber design, etc.). f. Description of the testing plan. Activities to be performed and data to be collected to validate the performance of the integrated CCS demonstration system. • Carbon Capture Host Site Selection. Applicants are required to select a new or existing carbon capture host site (i.e., coal or natural gas electric generating facility, industrial facility) that is located exclusively in the
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	United States. Applicants must discuss the adequacy of the proposed carbon capture host site for the CCS demonstration project. • Readiness of Carbon Storage Site or Off-take Agreement. Applicants are required to discuss the current status of the off-take agreement or the proposed carbon storage site, characterization, and permitting activities conducted to date. If applicable, detailed site characterization of the selected carbon storage site is required to be completed prior to application. The host site letter of commitment to participate in the proposed FEEDs project is due at the time of proposal submittal. The specific facility must be located exclusively in the United States. Applicants must discuss the current status of, and plans for submitting, the UIC Class VI permit to construct application or the status of the currently submitted/granted application. Applicants must provide supporting information showing that the UIC Class VI permit to construct for the proposed storage facility has been granted or the application to obtain such permit is under preparation for submission to the U.S. Environmental Protection Agency (USEPA) or the corresponding state agency. If the permit is not granted at the time of the application, the Applicant should discuss the timing when the permit is expected to be granted, including any remaining tasks or deliverables necessary to complete the application. If the Applicant has already conducted or is currently conducting activities meeting the FOA requirements under a different DOE award (i.e., DE-FOA-0001999) or at private expense, the status of such activities should be clearly described in the application, and only complimentary (but not redundant) additional activities should be proposed under this FOA. If the Applicant has a current application into DOE (e.g., DE-FOA-0002711) but DOE has not made selections yet, duplicate scope is appropriate in this FOA. • 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. The applicant should provide justification that the proposed carbon capture technology has attained applicable entry requirements (Table 2) and is capable of meeting specific TA technical specifications (i.e., Table 3 (TA-1), Table 4 (TA-2) or Table 5 (TA-3)). 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.
Technical Approach and Project Management Plan (Approximately 20% of the Technical Volume)	The Technical Approach should include a summary of the Project Objectives, Technical Scope, and Work Breakdown Structure (WBS), Go/No-Go decision points, and Integrated Project Schedule. A Project Management Plan is separately requested. The Technical Approach should contain, at a minimum, 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 develop the FEED study and achieve the objective(s). The overall work scope is to be divided by performance periods defined by discrete work objectives/milestones. The applicant should describe the specific expected end result of each performance period. ○ Work Breakdown Structure (WBS) and Task Description Summary: The Workplan should describe the work to be accomplished to support development of the FEED study 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 tasks 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 associated with the project critical path schedule throughout the life of the project that demonstrate acceptable progress. The applicant should also provide the means by which the milestones will be verified. The summary provided should be consistent with the Milestone Summary Table in the SOPO. ○ 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 (companies/organizations) ○ 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
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	project management practices that will enable continuous monitoring of project performance. ○ 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 The summary provided should be consistent with the PMP (see Appendix L). The PMP will contain more detailed information.
Technical Qualifications and Resources (Approximately 25% of the Technical Volume)	Applicants are required to propose project teams that demonstrate the capability to complete the FEED Study and associated work. Describe the capabilities of the overall team to support the development of the FEED study. The Technical Qualifications and Resources should contain, at a minimum, 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. • This section should also include relevant, previous work efforts (of similar size, scope, and complexity), demonstrated innovations, and how these enable the applicant to achieve the project objectives. • Describe the time commitment of the key team members to support the project. • Describe the technical services to be provided by DOE/NNSA FFRDCs, if applicable. • For multi-organizational or multi-director projects, describe succinctly: ○ The roles and the work to be performed by the Project Director and senior/key personnel; ○ Business agreements between the applicant and other key organizations; ○ How the various efforts will be integrated and managed; ○ Process for making decisions on scientific/technical direction; ○ Publication arrangements; ○ Intellectual Property issues; and ○ Communication plans.

iii. Initial Community Benefits Plan

The Initial CBP must be submitted in PDF format and must conform to the following content and form requirements, including maximum page lengths. **This document must address the requirements described under the Initial CBP header in Section I.D and the associated technical review criteria as discussed in Section V.A of the FOA.** Save the Initial CBP in a single PDF file using the following convention for the title “ControlNumber_LeadOrganization_ICBP.”

Applicants should provide sufficient data and references to justify the claims and approaches made in the Initial CBP. However, DOE and reviewers are under no obligation to review cited sources.

The Initial CBP for the Full Application may not be more than 20 pages, including 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.A) when preparing the Initial CBP. The Initial CBP must conform to the following content requirements:

Table 10: Initial Community Benefits Plan Content Requirements

Initial Community Benefits Plan Content Requirements	
SECTION/PAGE LIMIT	DESCRIPTION
Community and Labor Engagement	The Community and Labor Engagement section should contain the following information: ☐ Background ☐ Social Characterization Assessment ☐ Initial Stakeholder Analysis Summary ☐ Statement on community and labor support and opportunities for technical or project modifications
Investing in the American Workforce	Investing in the American Workforce section should contain the following information: ☐ An assessment of workforce needs and relevant labor unions and training partners ☐ An assessment of jobs benefits and improvements in job quality ☐ An assessment of potential negative impacts for workers
Justice40 Initiative	The Justice40 Initiative section should contain the following information: ☐ An assessment of impacted communities and groups ☐ An assessment of project benefits and where they flow ☐ An assessment of project negative impacts and where they flow ☐ Assessment of information gaps

	☐ Assessment of risks to realizing benefits and minimizing negative impacts
DEIA	The DEIA section should contain the following information: ☐ Background ☐ Strategies, Milestones, and Timelines ☐ Resource summary

iv. Resumes

A resume provides information that can be used by reviewers to evaluate the relevant skills and experience of the key project personnel. Applicants must submit a two-page resume for the project director and other key personnel that includes the following:

1. Contact Information;
2. Education: Include all academic institutions attended, major/area, degree;
3. Training: (e.g.,) certification or credential from a Registered Apprenticeship or Labor Management Partnership;
4. Professional Experience: Beginning with the current position, list professional/academic positions in chronological order with a brief description; and
5. There should be no lapses in time over the past ten years or since age 18, whichever time period is shorter.

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

v. Cost Share Commitment Letter(s) (if applicable)

Cost share commitment letter(s) are required from any party (other than the organization submitting the application) proposing to provide all or part of the required cost share (including sub-recipients). If applicable, the letter should identify the name of the organization, state the party is committed to providing a specific minimum dollar amount of cost share or value of in-kind contributions allocated to cost sharing, identify the type of proposed cost share (e.g., cash or in-kind contribution) to be contributed, and be signed by the person authorized to commit the expenditure of funds by the entity. The applicant should submit the letter(s) in PDF format. Save this information in a single file named "ControlNumber_LeadOrganization_CSCL".

vi. Host Site Commitment Letter(s)

A host site commitment letter is required to demonstrate commitment of the selected, domestic carbon capture host site for the proposed integrated FEED

project. The letter should state the party is committed to provide access to information and data needed to satisfy the required deliverables, detail the scope of engagement with the host site owner/operator and employees, and be signed by the person authorized to commit access to the host site. Applicants should refer to **Appendix A** for specific requirements pertaining to host site utilization. The applicant should submit the letter(s) in PDF format. Save this information in a single file named "ControlNumber_LeadOrganization_HostSCL".

vii. Storage Site Commitment Letter(s), if applicable

Storage site commitment letters are required to demonstrate commitment of the selected, domestic carbon storage site for the proposed FEED project. The letter should state the party is committed to provide access to information and data needed to satisfy the required deliverables, detail the scope of engagement with the storage site owner/operator and employees, and be signed by the person authorized to commit access to the storage site. Applicants should refer to **Appendix A** for specific requirements pertaining to storage site selection. The applicant should submit the letter(s) in PDF format. Save this information in a single file named "ControlNumber_LeadOrganization_StoreSCL".

viii. Team Commitment Letter(s)

In addition to the commitment letters listed above, applicants are required to submit a letter of commitment from each team member that agrees to participate in the FEEDs for integrated CCS system including the following organizations, at a minimum: carbon capture technology developer or licensor, carbon oxides pipeline operator (if applicable), Engineering, Procurement, and Construction Firm(s) (EPCs) and CBP consultant(s). These letters are required and must be signed by the person authorized to commit resources on behalf of that team member's organization. Letters should demonstrate the team member's level of commitment to the project, such as data access, consultation, etc. The applicant should submit the letter(s) in PDF format. Save this information in a single file named "ControlNumber_LeadOrganization_TeamCL".

Letters of support or endorsement for the project from entities that do not have a substantive role in the project will not be considered for review.

ix. Summary of Carbon Capture FEED Study, Pre-FEED Study or Techno-economic Analysis.

If available, applicants are required to submit summary results of a FEED study, or pre-FEED study for the proposed carbon capture technology and designed for at least a carbon capture efficiency of 90%. Alternatively, If the FEED or pre-FEED studies were not completed, Applicants should submit a summary of a Techno-economic Analysis (TEA) for the proposed carbon capture technology. Applicants shall prepare the summary of the carbon capture FEED study, pre-FEED study or

TEA in a separate document. If the Applicant has already conducted or is currently conducting activities meeting the FOA requirements under a different DOE award (e.g., DE-FOA-0002515, DE-FOA-0002058) or at private expense, the status of such activities should be clearly described in the application, and only complimentary (but not redundant) additional activities should be proposed under this FOA. The summary of FEED(s), Pre-FEED(s), or TEA must not exceed **15** pages including cover page, table of contents, footnotes/endnotes, charts, graphs, maps, photographs, and other pictorial presentations, when printed using standard 8.5" by 11" paper with 1" margins (top, bottom, left and right) single spaced with font no smaller than 11 point. The applicant should submit the summary of FEED(s), Pre-FEED(s), or TEA in PDF format. Save this information in a single file named "ControlNumber_LeadOrganization_CC_FEEDs".

x. Summary of the UIC Class VI Permit Application Materials or Off-take Agreement

If **available previously developed and/or submitted**, Applicants shall submit a summary of the UIC Class VI permit application materials or off-take agreement in a separate ten (10) page document to the technical volume. Applicants are required to provide a summary of the UIC Class VI permit application materials in the format provided in **Appendix F**. The summary of the UIC Class VI permit application materials or off-take agreement must not exceed 10 pages including cover page, table of contents, footnotes/endnotes, charts, graphs, maps, photographs, and other pictorial presentations, when printed using standard 8.5" by 11" paper with 1" margins (top, bottom, left and right) single spaced with font no smaller than 11 point. The applicant should submit the summary of the UIC Class VI permit application materials or off-take agreement in PDF format. Save this information in a single file named "ControlNumber_LeadOrganization_ClassVI_storage".

xi. Statement of Project Objectives

Applicants are required to complete a Statement of Project Objectives (SOPO). A SOPO template is available as **Appendix Q**. The SOPO must not exceed **15** pages when printed using standard 8.5 x 11 paper with 1" margins (top, bottom, left, and right) with font not smaller than 12 point (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".

xii. Project Management Plan

Applicants are required to complete a Project Management Plan (PMP). **PMP Guidance is provided in Appendix L**. The PMP must not exceed **15** pages including cover page, table of contents, footnotes/endnotes, charts, graphs, maps, photographs, and other pictorial presentations, when printed using standard 8.5" by 11" paper with 1" margins (top, bottom, left and right) single

spaced with font no smaller than 11 point. Save the PMP in a single Microsoft Word file using the following convention for the title "ControlNumber_LeadOrganization_PMP".

xiii. SF-424: Application for Federal Assistance

Applicants can find the 424 application at the following location:

(<https://www.grants.gov/web/grants/forms/sf-424-individual-family.html>).

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, budget period, 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".

xiv. Budget Justification Workbook

Applicants must complete the Budget Justification Workbook which is available on OCED Exchange at <https://oced-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 compliance with all regulations and requirements, including the implementation of the CBP, 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".

xv. Summary for Public Release

Applicants must submit a one-page summary of their Carbon Capture and Storage Demonstration FEED 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, the project title, the approach to completing 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, and the project's commitments and goals described in the CBP. This document must not include any proprietary or sensitive business information as DOE may make it available to the public after selections are made. The project summary must not exceed 1 page when printed using standard 8.5 x 11 paper with 1" margins (top, bottom, left, and right) with font not smaller than 12 point.

Save the Summary for Public Release in a single PDF file using the following convention for the title "ControlNumber_LeadOrganization_Summary".

xvi. Summary Slide Deck

Applicants must provide a slide deck (no more than three slides) summarizing the proposed project.

The Summary Slide Deck must include the following information:

- The proposed FEED Study summary;
- A description of the methodology to be used;
- Proposed project schedule and goals;
- Any key graphics (illustrations, charts and/or tables);
- Highlights of Initial CBP;
- Project title, prime recipient, Project Director, and senior/key personnel information; and
- Requested DOE funds and proposed applicant cost share.

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

xvii. 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), which is available on OCED Exchange at <https://oced-Exchange.energy.gov/>. Note that FFRDCs/NLs are treated as subrecipients and are included in this required submittal if they meet the threshold. 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".

xviii. 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".

xix. 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".

xx. Waiver Requests (if applicable)

i. Foreign Entity Participation

For projects selected under this FOA, as set forth in Section III.A.iii., all recipients and subrecipients 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 N** lists the information that must be included in a waiver request.

ii. Foreign Work Waiver Request

As set forth in [Section IV.I.iii.](#), all work for 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 N** 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" and/or ControlNumber_LeadOrganization_Subrecipient_Waiver.

iii. Waiver of the Buy America Requirements for Infrastructure Projects

As set forth in [Section IV.I.vi.](#), federally assisted projects which involve, 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.

In limited circumstances, DOE may grant a waiver of this requirement.

Appendix D to this FOA provides guidance on how “infrastructure work” is defined, explains the applicable justifications under which a waiver may be granted, and lists the information that must be included in the waiver request.

Save the Waivers in a single PDF file using the following naming convention for the title “ControlNumber_LeadOrganization_BAWaiver.pdf” and click on “Add Optional Other Attachment” to attach.

xxi. Data Management Plan

Applicants are required to submit a Data Management Plan (DMP) as part of their Full Application. The DMP is a document that outlines the proposed plan for data sharing or preservation. Submission of this plan is required with the full application, and failure to submit the plan may result in rejection of the application without further consideration. Applicants shall prepare the DMP in the format provided in **Appendix J** of this FOA. Save this plan in a single file named “ControlNumber_LeadOrganization_DMP”.

xxii. Preliminary Life Cycle Analysis

Applicants are required to submit a Preliminary Life Cycle Analysis (LCA) of the proposed CCS demonstration project in accordance with the guidance provided in **Appendix K**. Save this plan in a single file named “ControlNumber_LeadOrganization_PLCA”.

xxiii. Initial Environmental, Health, & Safety Assessment

Applicants are required to submit an initial EH&S assessment of the proposed technologies in accordance with the format provided in **Appendix I**. The EH&S assessment should include discussion regarding air and water emissions and co-benefits, water utilization, solid waste streams, noise, and potential environmental impacts of the technology including toxicological effects and hazards of emissions and waste streams. Save this plan in a single file named “ControlNumber_LeadOrganization_EHSA”.

xxiv. 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 for the project. As part of the application, the Project Director (PD) 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.

PDs 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 project 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 research, development, and demonstration (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 RD&D project proposed to be carried out with DOE award.²⁰

xxv. Intellectual Property Management Plan (if applicable)

Applicants must submit an executed IPMP between the members of the consortia or team.

The award will set forth the treatment of and obligations related to intellectual property rights between 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.K.-VIII.N. of this FOA for more details on applicable federal intellectual property laws and regulations). Guidance regarding the contents of IPMP is available in OCED Exchange as a separate guidance document under the FOA.

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);

²⁰ 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.

- 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.

Save the Intellectual Property Management Plan in a single PDF file using the following naming convention for the title “ControlNumber_Lead Organization_IPMP”.

xxvi. 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)), which is available on OCED Exchange at <https://oced-Exchange.energy.gov/>. Save the Location of Work in a single Microsoft Excel file using the following naming convention for the title “ControlNumber_LeadOrganization_LOW”.

xxvii. State Point Data Table

Applicants are required to complete a State Point Data Table for their carbon capture technology. Applicants shall prepare the State Point Data Table for flue gas conditions similar to the ones in the proposed host site, in the format provided in **Appendix H**. Any notable differences between the flue gas conditions used in prior scale work and the conditions expected in the proposed host site should be discussed. Applicants shall submit the State Point Data Table as a separate document to the FOA technical volume. **Note: The State-Point Data Table is required to be completed and submitted with your application. Applicants that do not submit a State-Point Data Table or submit an incomplete table will be considered non-compliant and DOE will not review or consider noncompliant submissions. See Section III.**

Save the **State Point Data Table** in a single PDF file using the following naming convention for the title “ControlNumber_LeadOrganization_SPDT”.

E. Post Selection Information Requests

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

- Cybersecurity Plan;
- NEPA Questionnaire;
- Personnel proposed to work on the project and collaborating organizations (See Section VI.B.xviii. Participants and Collaborating Organizations);
- Current and Pending Support (See Sections IV.E.xvii and VI.B.xix. 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.x Intellectual Property Management Plan;
- Indirect cost information;
- Other budget information;
- Commitment Letters from Third Parties Contributing to Cost Share, if applicable;
- Name and phone number of the Designated Responsible Employee for complying with national policies prohibiting discrimination (See 10 CFR 1040.5);
- Representation of Limited Rights Data and Restricted Software, if applicable;
- Information related to Davis-Bacon Act Requirements; and
- Information related to any proposed Workforce and Societal Considerations and Benefits, as defined above in “CBPs” that applicants may have made with the relevant community.

F. 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.

G. Submission Dates and Times

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

H. Intergovernmental Review

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

I. 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 Part 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. DOE 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 of the direct labor cost for the project (including subrecipient labor) 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 N** 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. 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 U.S. flag carrier, if service is available. Foreign travel costs are allowable only with the written prior approval of the Contracting Officer assigned to the award.

v. Equipment and Supplies

Property disposition may be required at the end of a project if the current fair market value of property purchased with project (Federal or cost share) funds 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.

vi. Buy America Requirements for Infrastructure Projects

Federally assisted projects which 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 O** 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.

NOTICE TO APPLICANTS: Build America, Buy America Act, and Davis-Bacon Act requirements will be applicable to the design, construction, and operation of the CCS demonstration facility. Applicants should take these requirements into consideration when developing your application under this FOA.

vii. 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 U.S. 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; and
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>.

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.

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>.

NOTICE TO APPLICANTS: Build America, Buy America Act, and Davis-Bacon Act requirements will be applicable to the design, construction, and operation of the CCS demonstration facility. Applicants should take these requirements into consideration when developing applications under this FOA.

viii. 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.

ix. 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.

x. Invoice Review and Approval

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.

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

i. 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.

ii. 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 U.S. 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.

xii. 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 subcontractor; and
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 Guide²¹ should be consulted to gain an understanding of the requirements and possible actions the recipients, subrecipients, contractors and subcontractors must take.

²¹ 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>

V. Application Review Information

A. Technical Review Criteria

i. Letters of Intent

Feedback will not be provided on letters of intent; they will only be used for DOE planning purposes.

ii. Full Applications

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

Merit Review Criterion 1: Technology Merit and Site Suitability (35%)

All Applicants

- Thoroughness of the proposed FEED Study approach in describing the technology and degree to which the proposed technology or methodology meets the stated objectives, application requirements and technical specifications of the FOA and TA.
- Adequacy of the Applicant's discussion of the proposed project's potential to develop a complete FEED Study for an integrated CCS project from technical, environmental, cost effectiveness, and integrated systems perspectives.
- Evidence that the project is proposed at an appropriate scale. The likelihood that development of this FEED study will result in a successful deployment at the proposed scale and lead to follow-on market uptake. (Note: DOE will give preference to applications proposing carbon capture technologies at TRL of 7 for TA-2 and TA-3.)
- Adequacy of the Applicant's discussion of anticipated benefits over the current state of the art and technical challenges; the degree to which the Applicant comprehensively advances arguments and details how the proposed carbon capture technology would demonstrate significant improvements in the efficiency, effectiveness, cost, and environmental performance of carbon capture technologies for power, industrial, or other commercial applications.
- Soundness, adequacy, and significance of the scientific, engineering, and technical information and data provided to support readiness of the proposed capture, transport and storage technologies. (Note: DOE will preference applications that have previously initiated FEED studies.)
- Adequacy and completeness of information provided in the State Point Data Table.
- Adequacy of information provided to justify the selection for the specific carbon capture host site; the degree to which the Applicant provided a

complete description of the selected domestic carbon capture host site, and how the carbon capture technology will be integrated within the host site.

- **If applicable**, extent to which the Applicant submitted preliminary evidence that provides confidence that the Applicant will be able to select and secure access to a suitable domestic carbon oxides pipeline transportation route for the proposed project.
- **If applicable**, Adequacy and completeness of information provided to justify the selection for the specific carbon storage host site, and the degree to which the Applicant provided a complete description of the selected domestic carbon storage host site or off-take agreement, including level of commitment, characterization, and proposed or completed permitting activities conducted to date. (Note: DOE will preference applications for which (i) UIC Class VI Permit is available or (ii) is submitted to relevant regulatory authority.)
- Adequacy of the preliminary LCA to meet FOA objectives and the degree to which a complete description of the preliminary LCA was provided. (Note: DOE will give preference to applications that credibly show the potential to reduce GHG emissions to the greatest extent across the full end-to-end project inclusive of upstream and downstream emissions.)
- Soundness, adequacy, thoroughness, and significance of the Initial Environmental, Health & Safety Risk Assessment, including identification of risks and evaluation of criteria pollutant co-benefits and noise impacts.

TA-1.1, TA-1.2, TA2.1, and TA-2.2 Only

- Adequacy and completeness of information provided in the summary of the carbon capture TEA, pre-FEEDs (if available), or FEED (if available) study to achieve at least **a unit-wide carbon** capture efficiency of 90%, including mass and energy balances, estimates of heating and cooling duties and electric power requirements covering the carbon capture system and balance-of-plant, cost of capture, and LCOE. (Note: DOE will preference applications that propose carbon capture technologies with greater than 90% carbon capture efficiency.)

TA-3.1 and TA-3.2 Only

- Adequacy and completeness of information provided in the summary of the carbon capture TEA, pre-FEED (if available), and/or FEED (if available) study to achieve at least a carbon capture efficiency of 90% from the **proposed process slipstream**, including mass and energy balances, estimates of heating and cooling duties and electric power requirements covering the carbon capture system and balance-of-plant, cost of capture, and levelized cost of product. (Note: DOE will preference applications that propose carbon capture technologies with greater than 90% carbon capture efficiency.)

Merit Review Criterion 2: Technical Approach and Project Management Plan (20%)

All Applicants

- Adequacy and feasibility of the Applicant's approach to achieving the objectives of the FOA and TA.
- Feasibility, appropriateness, rationale, and completeness of the proposed Statement of Project Objectives (SOP), such that there is a logical progression of work.
- The adequacy and completeness of the Project Management Plan (PMP) in establishing baselines (technical scope, budget, schedule), performance metrics that will be assessed during the proposed Integrated CCS FEED project and in managing project performance relative to those baselines; defining the actions that will be taken when these baselines must be revised; and identification of project risks and strategies for mitigation. The following aspects of the PMP shall be evaluated:
 - Soundness and completeness of the Integrated Project Schedule; including all tasks necessary for successful completion of the project; incorporating and showing inter-relationships among all technical, financial, NEPA, CBP, and permitting and other appropriate factors; including a critical path schedule with milestones and decision points; allocating sufficient and appropriate time to complete the project deliverables;
 - Adequacy of the Baseline Cost Plan for establishing the baseline cost for the project and incorporating costs for all tasks necessary for performing the proposed project;
 - Adequacy of the project management system to monitor and control project scope, cost, and schedule;
 - Adequacy of the Project Communication Protocol for ensuring effective communication between the Recipient, Subrecipients, and DOE; and
 - Adequacy of the Risk Management Plan for quantitatively and qualitatively assessing, identifying, tracking, and managing project risk; completeness of the identification of potential risk elements with potential impacts, quality and adequacy of the approach to assessing and managing risk, conformance of risk management approach with industry standards, and adequacy of the approaches to risk mitigation.
 - Adequacy of the Initial Environmental Health & Safety Assessment for assessing, monitoring, and reporting the potential environmental impacts to air, land and water resources, and potential impacts of waste production.

Merit Review Criterion 3: Applicant/Team Capabilities and Commitments (25%)

All Applicants

- Demonstrated experience of the Applicant and partnering organizations in the technology areas addressed in the application and in managing projects of similar size, scope, and complexity.
- Adequacy of the credentials, capabilities, and experience of key personnel and partnering organizations.
- Clarity and likely effectiveness of the project organization and structure, including sub-recipients or partners, to successfully complete the project.
- Adequacy and availability of proposed personnel, facilities, and equipment to perform project tasks.
- Completeness of proposed team structure that includes, as applicable, carbon capture technology developer or licensor, carbon capture host site owner(s) or operator(s), carbon oxides pipeline operator, carbon storage site owner or potential off-take company, Engineering Procurement and Construction (EPC) firm(s), financial partner(s), NEPA consultant, Community Benefits Plan consultant, etc.
- Thoroughness of the depth and clarity of the discussion of previous or current CCS projects involving one or more of the proposed partners to demonstrate the experience of the partners, including evidence of past cooperation among various partners to make CCS a viable carbon management practice.
- Strength of the commitment(s) of the selected domestic, carbon capture host site, domestic carbon oxides pipeline transportation route (if applicable) and/or selected domestic carbon storage site (if different than the carbon capture host site) to support the proposed project.

Merit Review Criterion 4: Initial Community Benefits Plan (20%)

All Applicants

- The extent to which the plan adequately and accurately assesses relevant impacted community and labor stakeholders.
- The extent to which the project includes efforts that address community, labor, and workforce desires and/or concerns which go beyond the requirements for technical, analytical, performance, or regulatory compliance.
- Extent to which workforce needs and gaps are identified.
- Extent to which the project assesses opportunities to improve jobs and job quality outcomes in.
- If applicable, extent to which potential negative outcomes for workers have been identified, with a plan to mitigate.
- The extent to which the CBP 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.
- Adequacy of response to the plans and extent to which plans provided are thorough and include measurable actions to advance goals and meet requirements as defined within the DEIA section of the plan.
- Extent to which the team and resources—including staff, facilities, capabilities, and budget—are capable of fully developing and adequately implementing the DEIA section of the CBP.
- The extent to which the CBP identifies specific and measurable benefits, how the benefits will flow, and how negative impacts would be mitigated—and specifically describes these impacts on disadvantaged communities.
- The extent to which the project illustrates the ability to support the overall goal of the Justice40 Initiative that 40% of the overall benefits of certain federal investments flow to disadvantaged communities.

Budget Information Evaluation Criteria

The budget and, which is not point scored, will be conducted to determine the following:

- Reasonableness, allowability, and allocation of the proposed cost and cost share.
- Completeness and adequacy of the supporting documentation for the cost estimate.
- Statement of Project Objectives and proposed budget are provided in the same format, by Phase, task, etc.
- Degree of integration between project objectives and project tasks (including CBP) and proposed budget that demonstrate a viable success path. Correspondence between the SOPO and budget, and adequacy of associated supporting documentation.
- Correspondence between the budget estimate and the magnitude of the work proposed.

B. Standards for Application Evaluation

Applications that are determined to be eligible will be evaluated in accordance with this FOA 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:

- It may be desirable to select for award a project, or group of projects, that represent a diversity of technologies under this FOA;
- It may be desirable to select for award a project, or group of projects, with a broad or specific geographic distribution under this FOA;
- It may be desirable to select for award a project, or group of projects, that leverage existing public-private partnerships and/or Federal resources;
- It may be desirable to select a project, or group of projects, if such a selection will optimize use of available funds;

- It may be desirable to select a project, or group of projects, if such a selection presents lesser schedule risk, lesser budget risk, lesser technical risk, lesser community impacts risk, and/or lesser environmental risks. Environmental risk includes, but is not limited to, an adverse impact to air, soil, water, or increase in overall cradle-to-grave greenhouse gas footprint (carbon equivalent, CO₂e).
- It may be desirable to select a project, or group of projects which incorporate 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.
- It may be desirable to select a project or group of projects, that will procure U.S. iron, steel, manufactured products and construction materials.
- It may be desirable to select a project or group of projects, when compared to the existing DOE project portfolio and other projects to be selected from the subject FOA, contributes to the total portfolio meeting Justice40 goals.

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. 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.

iii. 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

DOE 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 Letters of Intent 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 OCED Exchange. The notification letter will state the basis upon which the Letter of Intent or the Full Application is ineligible and not considered for further review.

ii. 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 OCED 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.

iii. 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 could take up to 120 days. Applicants must designate a primary and a backup point-of-contact in OCED 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.H.ii. of the FOA for guidance on pre-award costs.

iv. 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.

v. 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. Detailed instructions are provided in the introduction of the FOA. These requirements are as follows:

1. System for Award Management
2. Unique Entity Identifier
3. OCED Exchange
4. Grants.gov
5. FedConnect
6. Electronic Authorization of Applications and Award Documents

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 (September 2021)

All applicants selected for an award under this FOA may be required to provide information to DOE in order to satisfy requirements for foreign nationals' access to DOE sites, information, technologies, equipment, programs or personnel. A "foreign national" is defined as any person who is not a U.S. citizen by birth or naturalization. If a selected applicant (including any of its subrecipients, contractors or vendors) anticipates involving foreign nationals in the performance of its award, the selected applicant may be required to provide DOE with specific

information about each foreign national to ensure compliance with the requirements for access approval. National laboratory personnel already cleared for site access may be excluded. Approval for foreign nationals from countries identified on the U.S. Department of State's list of State Sponsors of Terrorism must be obtained from DOE before they can participate in the performance of any work under an award.

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.

The applicant is also responsible for providing and maintaining any changes to this information on behalf of their subrecipients.

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 contractors from lawfully reporting waste, fraud, or abuse to a designated investigative or law enforcement representative of a federal department or agency authorized to receive such information.
- 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 and project management aspects of the project as a whole. Substantial involvement includes, but is not limited to, the following:

Recipient's Responsibilities. The Recipient is responsible for:

- Performing the activities supported by this award in accordance with the Project Management Plan, including providing the required personnel, facilities, equipment, supplies and services;
- Managing and controlling project activities in accordance with established processes and procedures to ensure tasks and subtasks are completed within schedule and budget constraints defined by the current Project Management Plan;
- Implementing an approach to identify, analyze, and respond to project risks that is commensurate with the complexity of the project;
- Defining and revising approaches and plans, submitting the plans to DOE for review, and incorporating DOE comments;
- Coordinating related project activities with subrecipients and external suppliers, including contractors, to ensure effective integration of all work elements;
- Notifying the DOE Project Officer in a timely manner of issues that arise

during the course of the project that jeopardize the technical, schedule and/or budget objectives;

- Attending or hosting periodic project review meetings and reporting project status;
- Participating in peer review evaluations of the project;
- Submitting technical reports and publicly releasable documents that incorporate DOE comments;
- Facilitating DOE inspection and/or evaluation of project work on the premises of the Recipient or a subrecipient, at all reasonable times and in a manner that will not unduly delay the work. The Recipient shall furnish and shall require subrecipients to furnish all reasonable facilities and assistance for the safe, efficient and convenient performance of these duties; and
- Presenting the project results at appropriate technical conferences or meetings as directed by the DOE Project Officer.

DOE Responsibilities. DOE has the right to intervene in the conduct or performance of project activities for programmatic reasons. Intervention includes the interruption or modification of the conduct or performance of project activities. Suspension or termination of the cooperative agreement under 2 CFR part 200, as amended by 2 CFR part 910 (DOE Financial Assistance Regulations) does not constitute intervention in the conduct or performance of project activities.

DOE is responsible for:

- Reviewing in a timely manner project plans, including project management, testing and technology transfer plans, and recommending alternate approaches, if the plans do not address critical programmatic issues;
- Participating in project management planning activities, including risk analysis, to ensure DOE's program requirements or limitations are considered in performance of the work elements;
- Conducting periodic project review meetings to ensure adequate progress and that the work accomplishes the program and project objectives. Recommending alternate approaches or shifting work emphasis, if needed;
- Providing significant involvement to ensure that project results address critical system and programmatic goals established by the DOE Offices of Clean Energy Demonstrations and Fossil Energy and Carbon Management, in coordination with DOE's Point Source Carbon Capture and Carbon Storage Programs;
- Promoting and facilitating technology transfer activities, including disseminating program results through presentations and publications;
- Significant direct operational involvement or participation is anticipated to ensure compliance with statutory requirements, such as environmental protection;

- At the DOE's discretion, physically inspecting and evaluating the work performed or being performed under the Cooperative Agreement, including associated documentation, and the premises where the work is being performed;
- Ensuring DOE personnel or representatives are properly trained for site access and adhere to all site safety requirements.
- Serving as scientific/technical liaison between awardees and other program or industry staff;
- Support the recipient in CBP activities as needed;
- Reviewing and concurring with ongoing technical and project performance to ensure that adequate progress has been obtained within the current Budget Period authorized by DOE before work can commence on subsequent Budget Periods; and
- DOE, at its discretion, may employ a third -party representative (such as an independent engineer) to perform or assist DOE in the performance of any of these activities.

xi. Intellectual Property Management Plan (IPMP)

As part of negotiations for award, selected applicants must submit an executed IPMP between the members of the consortia or team.

The award will set forth the treatment of and obligations related to intellectual property rights between 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.K.-VIII.N. of this FOA for more details on applicable federal intellectual property laws and regulations). **Guidance regarding the contents of IPMP is available in OCED Exchange as a separate guidance document under the FOA.**

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

- Evidence that the recipient has secured the rights to practice all necessary intellectual property to complete the proposed project;
- 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 sample 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, and recycling capacity

- Number and types of training provided, certificates and training credentials received by employees, ratio of apprentice-to-journey level workers employed
- 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 CBP,
- 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 may be subject to periodic project evaluations 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 technical and project management 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, schedule and cost performance metrics, adherence to the project critical path schedule, the retirement or addition of risks to the risk matrix (or similar) and corresponding change in contingency funding needs, adequacy of CBP implementation, 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 and project management progress compared to the Integrated Project Schedule and 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 any supplemental information necessary to inform the decision, and (8) written approval of the continuation application by the Contracting Officer.

As a result of a 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, cost overruns, change in strategic direction, or lack of funding.

A 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, 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 collaborating organizations within 30 days after the applicant is notified of the selection. 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 a new Project Director or any new 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 Project Director or new 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.C.xxii.

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 U.S. industry and labor. Therefore, in exchange for receiving taxpayer dollars to support an applicant's project, the applicant must agree to a U.S. Competitiveness provision requiring 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 U.S. manufacturing plan. The statement or plan would contain specific and enforceable commitments that would be beneficial to the U.S. economy and competitiveness. Examples of such commitments could include manufacturing specific products in the U.S., making a specific investment in a new or existing U.S. manufacturing facility, keeping certain activities based in the U.S. or supporting a certain number of jobs in the U.S. related to the technology. DOE may, in its sole discretion, determine that the proposed modification or waiver promotes commercialization and provides substantial U.S. 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>

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 Policy

The DOE interim Conflict of Interest Policy for Financial Assistance (COI Policy)²² 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 Recipient who is planning to participate in, or is participating in, the project funded wholly or in part under the DOE financial assistance award. 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 or unmanageable) in their initial and ongoing FCOI reports.

²² 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](#).

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 negotiations must: ensure all Recipients 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 or 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. 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.

xxiv. 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 \(SC\) \(osti.gov\)](#).

xxv. Cybersecurity Plan

Pursuant to 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 project will be maintained.

xxvi. Indemnity

Awards resulting from this FOA will contain the following provision reminding Recipients of DOE's rights of indemnification.

The Recipient shall indemnify the Government and its officers, agents, or employees for any and all liability, including litigation expenses and attorneys' fees, arising from suits, actions, or claims of any character for death, bodily injury, or loss of or damage to property or to the environment, resulting from the project, except to the extent that such liability results from the direct fault or negligence of Government officers, agents or employees, or to the extent such liability may be covered by applicable allowable costs provisions.

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: CCSdemos@netl.doe.gov.

Questions must be submitted not later than three (3) business days prior to the application due date and time. Please note, feedback on individual concepts will not be provided through Q&A.

NOTE: Please be as clear and concise when asking a question under the FOA and be as specific as possible to which TA you are asking the question. If it is not clear DOE will be required to ask for additional information and clarity on the question to provide an accurate response which will take additional time

All questions and answers relating to the content of this FOA will be posted in OCED exchange. Specifically, under the FOA Documents, there will be an Excel file labeled "FOA 2738 Q&A" which will contain questions and responses that have been released to date. The Q&A will be updated periodically as DOE receives questions and has provided responses ([Financial Opportunities: Funding Opportunity Exchange \(energy.gov\)](https://www.energy.gov/financial-opportunities/funding-opportunity-exchange)). OE will attempt to respond to a question within 3 business days unless a similar question and answer has already been posted on the website. DOE recommends that you register as soon after release of the FOA as possible to have the benefit of all responses. Applicants are encouraged to review previously issued Questions and Answers prior to the submission of questions.

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

VIII. Other Information

A. FOA Modifications

Amendments to this FOA will be posted on the OCED Exchange website at: <https://oced-exchange.energy.gov/> and the Grants.gov system at <https://grants.gov>. 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. DOE 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 trade secrets or commercial or financial information that is privileged or confidential in their application unless such information is necessary to convey an understanding of the proposed project or to comply with a requirement in the FOA. Applicants are advised to not include any critically sensitive proprietary detail.

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

Full Applications, and other submissions containing confidential, proprietary, or privileged information must be marked as described below. Failure to comply with these marking requirements may result in the disclosure of the unmarked information under the Freedom of Information Act or otherwise. The U.S. Government is not liable for the disclosure or use of unmarked information, and may use or disclose such information for any purpose.

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

Notice of Restriction on Disclosure and Use of Data:

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

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

E. Evaluation and Administration by Non-Federal Personnel

In conducting the merit review evaluation or the Go/No-Go 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.xx. 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; and
- DOE may issue and publish on the website above further DEC's 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 U.S. government retains certain rights.

i. Government Use License

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

ii. March-In Rights

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

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

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

Any determination that march-in rights are warranted must follow a fact-finding process in which the recipient has certain rights to present evidence and witnesses, confront witnesses and appear with counsel and appeal any adverse decision.

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

Government Rights in Technical Data Produced Under Awards: The U.S. government normally retains unlimited rights in technical data produced under government financial assistance awards, including the right to distribute to the public. However, pursuant to special statutory authority, certain categories of data generated under 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 award’s 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.

For this FOA, the funding program may determine that an extended period of protection (more than five years and not to exceed thirty years) is reasonably required for commercialization and will apply to certain categories of data first produced under the resulting awards in accordance with 15 U.S.C. § 3710a(c)(7)(B)(ii) and the Energy Policy Acts of 1992 and 2005, or 42 U.S.C. § 7256(g)(5) for OTAs, if applicable. Information regarding the categories of data and period of protection will be provided during the negotiation process.

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 U.S. government regulates the transfer of information, commodities, technology, and software considered to be strategically important to the U.S. to protect national security, foreign policy, and economic interests without imposing undue regulatory burdens on legitimate international trade. There is a network of federal agencies and regulations that govern exports that are collectively referred to as “Export Controls”.

All recipients and subrecipients are responsible for ensuring compliance with 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. Real Property and Equipment

Real property and equipment purchased with project funds (federal share and recipient cost share) are subject to the requirements at 2 CFR 200.310, 200.311, and 200.316 (non-Federal entities, except for-profit entities) and 2 CFR 910.360 (for-profit entities). For projects selected for award under this FOA, the recipient may (1) take disposition action on the real property and equipment; or (2) continue to use the real property and equipment after the conclusion of the award period of performance, with Contracting Officer approval.

The recipient's written Request for Continued Use must identify the property and include: a summary of how the property will be used (must align with the authorized project purposes); a proposed use period, (e.g., perpetuity, until fully depreciated, or a calendar date where the recipient expects to submit disposition instructions); acknowledgement that the recipient shall not sell or encumber the property or permit any encumbrance without prior written DOE approval; current fair market value of the property; and an Estimated Useful Life or depreciation schedule for equipment.

When the property is no longer needed for authorized project purposes, the recipient must request disposition instructions from DOE. 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 310-200.316.

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APPENDIX A: GUIDANCE FOR APPLICANTS

Applicants must meet the specific application requirements (see **Table 2**) and clearly describe their current state of readiness for, and plans to complete, the proposed project. Under the current FOA, the projects will be carried out in an expected period of performance of up to 24 months. While addressing all elements within the Technical Volume specified in Section IV, applicants are expected to include with their applications:

- i. **Carbon Capture Technology Competitive Assessment.** The applicant should describe the current state-of-the-art in the applicable field, the specific advantages of the proposed carbon capture technology in the chosen application over competing technologies. A thorough competitive assessment on how the proposed technology would demonstrate substantial improvements in the efficiency, effectiveness, cost, and environmental performance of carbon capture technologies for power, industrial, or other commercial applications. Anticipated benefits, as well as challenges for the technology should also be discussed in detail. The overall impact on advancing the state-of-the-art/technical baseline if the project is successful.
- ii. **Carbon Capture Technology Readiness Level Evaluation.** The applicant should provide a discussion of the proposed CCS demonstration project from technical, environmental, cost effectiveness, and integrated systems perspectives. Scientific, engineering, and technical information and data should be provided to support evidence of the readiness of the proposed technology for demonstration at the scale proposed. It is expected that the applicants have already validated their carbon capture technology at TRL 7 (for TA-1) or TRL 6 (for TA-2 and TA-3) above in an integrated, continuous, pilot-scale system with actual flue gas and achieved at least 90% carbon oxides capture. The performance of the proposed carbon capture technology should be substantiated by providing experimental evidence measured under actual flue gas conditions. Furthermore, the applicants should discuss the specific impurity/contaminant profile in the selected application, and its expected short- and long-term effect on the overall carbon capture system performance. DOE will preference applications that propose carbon capture technologies with greater than 90% carbon capture efficiency.
- iii. **Carbon Capture Technology Description.** The applicants are required to describe key parameters of the advanced carbon capture technology, or how the parameters will be developed. The description of the system should include, but is not limited to, the following:
 - a. Preliminary process flow diagrams;
 - b. Mass and energy balances;
 - c. Steam and power requirements;
 - d. As applicable, a discussion of the absorption/desorption chemistry and

- operating cycle for solvent and sorbent systems; and
- e. As applicable, a description of relevant membrane chemistry, including transport mechanism.

- iv. Host Site Description and Carbon Capture Process Integration.** Applicants are required to describe the new or existing selected, domestic carbon capture host site facility, including, but not limited to, process diagrams, emissions profiles, and availability and quality of land, water, steam and/or waste heat (as applicable). A corresponding narrative is required to provide application reviewers a clear understanding of the proposed capture process and project from technical, cost effectiveness, and integrated systems perspectives. At a minimum, the description shall include the following or a plan to obtain the following:
 - a. *Anticipated feed conditions* (e.g., pressure, temperature, flow rate, gas composition, and contaminant levels),
 - b. *Electrical, water and waste management.* Applicants should describe how electricity consumption, heat, water, and waste will be managed in the proposed CCS demonstration project and tied into the existing host facility.
 - c. *Contaminants Controls.* Applicants should describe how the flue gas contaminants (e.g., NO_x, SO_x, PM_s) are managed in the existing host facility and their potential effect on the carbon capture system.
 - d. *Carbon oxides product disposition.* Applicants must demonstrate that the proposed carbon capture technology will produce a carbon oxide stream of required temperature and quality suitable for cost-effective compression and transport/disposition of the stream, without adversely affecting existing operations, compressors, pipelines or geologic-storage formations.
 - e. *Description of the carbon capture equipment design concept* (e.g., membrane module architecture, absorber/desorber design, etc.).
 - f. *Description of the testing plan.* Activities to be performed and data to be collected to validate the performance of the integrated CCS demonstration system.
- v. Carbon Capture Host Site Selection.** Applicants are required to select a new or existing carbon capture host site (i.e., coal or natural gas electric generating facility, industrial facility) that is located exclusively in the United States. Applicants must discuss the adequacy of the proposed carbon capture host site for the CCS demonstration project. Applicants must also discuss the fit of the site from a social and environmental justice standpoint (including social characterization of nearby communities, community support for the project, and workforce availability), with reference to the CBP as appropriate. The host site letter of commitment to participate in the FEEDs project is due at the time of proposal submittal.
- vi. State Point Data Table.** Applicants are required to complete a State Point Data Table for their carbon capture technology. Applicants shall prepare the State Point

Data Table for flue gas conditions similar to the ones in the proposed host site, in the format provided in **Appendix H**. Any notable differences between the flue gas conditions used in prior scale work and the conditions expected in the proposed host site should be discussed. Applicants shall submit the State Point Data Table as a separate document to the FOA technical volume. **Note: The State-Point Data Table is required to be completed and submitted with your application. Applicants that do not submit a State-Point Data Table or submit an incomplete table will be considered non-compliant and DOE will not review or consider noncompliant submissions. See Section III.**

- vii. Carbon Capture Technology - Summary of a FEED study, pre-FEED study or Techno-economic Analysis.** If available, Applicants are required to submit summary results of a FEED study, or pre-FEED study for the proposed carbon capture technology and designed for at least a carbon capture efficiency of 90%. Alternatively, If the FEED or pre-FEED studies were not completed, Applicants should submit a summary of a TEA for the proposed carbon capture technology. If the Applicant has already conducted or is currently conducting activities meeting the FOA requirements under a different DOE award (e.g., DE-FOA-0002515, DE-FOA-0002058) or at private expense, the status of such activities should be clearly described in the application, and only complimentary (but not redundant) additional activities should be proposed under this FOA. Applicants shall prepare the summary of the carbon capture FEED study, pre-FEED study or TEA in a separate fifteen (15) page document to the technical volume.
- viii. Summary of the UIC Class VI Permit Application Materials or Off-take Agreement** If **available previously developed and/or submitted**, Applicants shall submit a summary of the UIC Class VI permit application materials or off-take agreement in a separate ten (10) page document to the technical volume. Applicants are required to provide a summary of the UIC Class VI permit application materials in the format provided in **Appendix F**.
- ix. Project Team.** Applicants are required to propose project teams that demonstrate the capability to complete the FEED Study and associated work. Describe the capabilities of the overall team to support the development of the FEED study. Applicants must submit a letter of commitment from each team organization that agrees to participate in the proposed FEEDs project. The letter is required and must be signed by the person authorized to commit resources on behalf of that team member's organization. Letters should demonstrate the team member's level of commitment to the project, such as host site access, data access, advisory services, etc. Applicants shall submit commitment letters as separate documents to the FOA Technical Volume.

- x. Readiness of Carbon Storage Site or Off-take Agreement.** Applicants are required to discuss the current status of the off-take agreement or the proposed carbon storage site, characterization, and permitting activities conducted to date. If applicable, detailed site characterization of the selected carbon storage site is required to be completed prior to application. The carbon storage host site letter of commitment to participate in the proposed FEEDs project is due at the time of proposal submittal. The specific carbon storage facility must be located exclusively in the United States. Applicants must discuss the current status of, and plans for submitting, the UIC Class VI permit to construct application or the status of the currently submitted/granted application. Applicants must provide supporting information showing that the UIC Class VI permit to construct for the proposed storage facility has been granted or the application to obtain such permit is under preparation for submission to the U.S. Environmental Protection Agency (USEPA) or the corresponding state agency. If the permit is not granted at the time of the application, the Applicant should discuss the timing when the permit is expected to be granted, including any remaining tasks or deliverables necessary to complete the application. If the Applicant has already conducted or is currently conducting activities meeting the FOA requirements under a different DOE award (i.e., DE-FOA-0001999) or at private expense, the status of such activities should be clearly described in the application, and only complimentary (but not redundant) additional activities should be proposed under this FOA. If the Applicant has a current application into DOE (e.g., DE-FOA-0002711) but DOE has not made selections yet, duplicate scope is appropriate in this FOA.
- xi. Carbon Oxides Pipeline Transportation Route Proposed (if applicable).** Applicants will propose a carbon oxides pipeline transportation route to connect the selected carbon oxides capture and storage host sites. Alternatively, Applicants will discuss the details and status of a carbon off-take agreement. If the Applicant has a current application into DOE (i.e., DE-FOA-0002730) but DOE has not made selections yet, duplicate scope is appropriate in this FOA.
- xii. Initial Environmental Health and Safety (EH&S) Analysis.** Applicants are required to submit an initial EH&S analysis of the proposed technologies in accordance with the format provided in **Appendix I**. EH&S analysis should include discussion regarding air and water emissions and co-benefits, water utilization, solid waste streams, noise, and potential environmental impacts of the technology including toxicological effects and hazards of emissions and waste streams. Applicants shall submit the Initial EH&S Analysis as a separate document to the technical volume.
- xiii. Initial Community Benefits Plan (CBP).** Applicants are required to prepare and submit an Initial CBP as a separate document to the technical volume. Please note that the full requirements are in Section I.D of the FOA, and applicants are encouraged to consult guidance documents posted on the OCED Exchange website

at <https://oed-Exchange.energy.gov> under the FOA for assistance with preparing each section of the Initial CBP.

- xiv. **Preliminary Life Cycle Analysis.** Applicants shall submit a Preliminary Life Cycle Analysis (LCA) as a separate document to the technical volume. Applicants should follow the guidance in **Appendix K**.

APPENDIX B: ADDITIONAL SUPPORTING INFORMATION FOR END OF PROJECT DELIVERABLES

See also Section D. (Deliverables) of Appendix Q Statement of Project Objectives.

- (1) **Carbon Capture FEED Study.** Recipients must produce a FEED study for the carbon capture technology integrated with the selected host site and designed for at least a carbon capture efficiency of 90%. Recipients shall prepare the carbon capture FEED study in the format provided in **Appendix C**, as well as update the TEA provided with the original application.
- (2) **Carbon Oxides Transport Pipeline FEED Study.** Recipients must submit a Carbon Oxides Transport Pipeline FEED Study (if needed) for infrastructure required to connect the selected carbon capture and storage host sites. Recipients shall prepare the carbon oxides Pipeline FEED study in the format provided in **Appendix D**.
- (3) **Storage Field Development Plan (if applicable).** Recipients must submit a report describing the completion of the relevant aspects of the Storage Field Development Plan (**Appendix E**) for the selected carbon storage site supported by Authorization for Expenditures (AFEs);
- (4) **Submittal of UIC Class VI Permits (if applicable).** Recipients must submit the documentation to the appropriate regulatory agencies to secure permits (i.e., Underground Injection Control (UIC) Class VI permit to Construct for the selected carbon storage site. (**Appendix F**) Alternatively, the recipients must submit a report describing the status of the off-take agreement.
- (5) **Submittal of the Environmental Information Volume.** Recipients must prepare and submit an Environmental Information Volume (EIV) (**Appendix G**) for the proposed integrated CCS FEED work. The completed EIV will provide environmental data and details about the components of the integrated CCS FEED project.
- (6) **Community Benefits Plan (CBP) Implementation, Update and Report**
Recipients are expected to conduct the DEIA section of the Initial CBP work through the completion of the FEED Study. Applicants are also required to update the other sections of the Plan at the end of the project for the final report. This involves, for example, understanding and addressing potential energy and environmental justice issues during the planning and design of their CO₂ transport project.

A public End-of-Project CBP Progress Report is required, which includes a summary of work completed during this FOA, accomplishments, and findings, and updated Justice40 and Community and Labor engagement section assessments. Awardees will also be required to update their CBP to outline future work.

- (7) **Environmental Health and Safety (EH&S) Analysis.** Building on the preliminary EH&S plan submitted with the application, Recipients must submit an EH&S analysis in accordance with the format provided in **Appendix I**. EH&S analysis should include discussion regarding air and water emissions, water utilization, solid waste streams, and potential environmental impacts of the technology including toxicological effects and hazards of emissions and waste streams.
- (8) **Life Cycle Analysis (LCA).** Recipient must submit a LCA for the CCS demonstration project at the first FOA completion in accordance with the format provided in the **Appendix K**.

APPENDIX C: CARBON CAPTURE FEED STUDY GUIDANCE

The carbon capture FEED study is a FOA deliverable required from projects selected under this FOA. Activities include, but are not limited to, those listed below:

- 1. Project Scope and Design** that includes deployment / business objectives and the summary of the proposed project. The roles and scope of work for the different parties involved in the project should be clearly delineated. The arrangement with the base plant during the planning/construction phase and capture plant operation phase should be made clear.
- 2. Project Design Basis** including, but not limited to site characteristics and ambient conditions, fuel feedstock and flue gas characteristics, and host site environmental requirements. The design basis shall clearly identify all permits and environmental reviews necessary to initiate construction. All internal or corporate approvals required by the host site to initiate construction shall be identified. If after completing the FEED, it is decided that a different plant configuration should be considered, and that the reported design is not viable, this information should be communicated clearly up front. If major design changes are required, this should be reflected in the project timeline, and a path forward clearly outlined.
- 3. Engineering Design Package.** Design of the carbon capture system shall result in equipment sizing fully substantiated with kinetic, heat and mass transfer data, as well as justification for choice of materials of construction. The cost estimate shall include preparation of a capital cost estimate, including the cost of capture in \$/tonne carbon oxides captured, levelized cost of electricity (LCOE) for **TA-1 and TA-2** and levelized cost of product for **TA-3**. The FEED shall include, at a minimum: process flow diagrams; carbon capture process model scaled-up for the proposed industrial facility; utility flow diagrams; piping and instrumentation diagrams; heat and material balances; plot plan; final layout drawings; complete engineered process and utility equipment lists with all major equipment (e.g., for a solvent-based system: direct contact cooler, absorber, solvent heat exchangers, stripper, CO₂ compressors etc.) with specifications and sizing; single line diagrams for electrical; electrical equipment and motor schedules; vendor quotations; detailed project execution plans; resourcing and work force plans; a hazard and operability study (HAZOP) review; and a constructability review. The FEED shall incorporate all engineering disciplines necessary to perform the final design and construction, which include, but are not limited to: process, civil, architectural, structural, mechanical, piping, electrical, and control systems engineering. A list of all referenced work should be provided.

Engineering design shall cover both the carbon capture system and balance-of-plant. Balance-of-plant includes, but is not limited to, utilities such as compression, cooling water, water treatment, waste treatment, and the sources of energy, electricity, and/or steam,

necessary to power the carbon capture system. The latter may include integration of an external energy source (e.g., natural gas-fueled, solar, wind, geothermal) or integration of the carbon capture system into the existing plant. If the carbon capture system is designed to purchase renewable electricity or to generate it on site, then the plant must include a method of energy storage or back-up power generation to supply electricity when renewable electricity is not available. If the carbon capture system requires co-generation of power or steam for its operation, it must include carbon oxides capture, compression, and storage from both the base facility and co-generation plant.

The engineering design package should also cover the integration of the carbon capture process within the power or industrial facility, including but not limited to the following: novel approaches to recover waste heat from the facility and integrate it with the carbon capture system; and design of pollution control systems upstream of the carbon capture system. If multiple major emission sources exist at the facility, the applicant should describe whether aggregation of the sources into one stream, upstream of the carbon capture facility, is proposed. Details of the base plant should be highlighted before and after retrofit. This includes: the year the plant was built, expected plant life, and any plans for extension of plant life; plant gross and net power before and after retrofit for TA-1 and TA-2 (any effects to production for TA-3); and the current and expected capacity factor and operational mode (base load or flexible operation).

Successful projects will be required to submit the following documents, when complete:

- i. **an initial engineering design package that includes, at a minimum, process flow diagrams, the results of the heat and material balances, sizing of the main pieces of equipment for the carbon capture plant and BOP based on a validated process model, and**
- ii. **the final engineering design package, including project cost estimate prior to project completion.**

Design of the capture system shall support a capital cost estimate consistent with AACE (Association of the Advancement of Cost Engineering) Class 3 with an accuracy of -15% on the low side and +15% on the high side.

FEED Study – Requirements

It is understood that the content to be included in a Front-End Engineering and Design (FEED) study package is tailored by the type of project and the needs of the owner. Often Engineering, Procurement, and Construction (EPC) firms practicing in a given industry (e.g., power generation or industrial sectors) will have an in-house standard in the absence or lack of owner definition. The goal of the FEED study is for the owner and EPC firm to collaboratively define as much of the project's scope as possible to reduce risk and uncertainty prior to executing the project. Often, Items 1 – 3 of the list below are provided by the owner to the EPC firm. The following is a list of content to be included in the FEED study package developed by the end of the project for this FOA. Recipients are encouraged to include additional materials outside this list that resulted from the uniqueness of their respective project or the needs of the owner.

Recipients are also encouraged to integrate FEED study activities with relevant Community Benefits Plan (CBP) requirements and activities as appropriate for the project into an overall integrated project schedule. ALL sections of the report should be cross checked to ensure that the values agree between report(s). Missing appendices, section headings, and mislabeled figures should be avoided. Image quality should be checked; figures with unreadable text should not be included.

- 1.) Project Background
 - a. Discusses Project need or Deployment /Business Objective
 - b. The executive summary should also include major aims and conclusions of each of the subsequent chapters.
- 2.) Project Scope
 - a. Provides a summary of the proposed project and how it will meet the objective
 - b. Provides the system boundaries, or battery limits, of the proposed project
- 3.) Project Design Basis
 - a. Site Characteristics
 - i. Location, topography, available land, transportation access, available utilities,
 - ii. Social characterization, including regional analysis of communities and disadvantaged communities, and whether those communities rely on limited resources (e.g., water) that could be impacted by the project. This information should be consistent with the Initial CBP.
 - b. Site Ambient Conditions
 - i. Elevation, atmospheric pressure, temperature averages/extremes, prevailing wind, seismic data, air composition.
 - c. Fuel Feedstock and Flue Gas Characteristics
 - i. Design compositional analyses of the fuel (coal, natural gas, biomass, etc.)
 - ii. Design compositional analyses of the flue gas (flow rate, composition, etc.)
 - d. Environmental Requirements - as dictated by the authority(s) having jurisdiction (e.g., State DEP, EPA, etc.)
 - i. Air emission permitting limitations and required control technologies
 - ii. Water discharge permitting limitations and required control technologies
 - iii. Waste disposal (e.g., coal ash, spent absorbents, etc.) permitting limitations and required control technologies
 - e. Site Specific Design Considerations
 - i. Flood plain, soil conditions, rainfall/snowfall criteria, building/enclosure permitting, noise regulations, local community requirements (plumes visibility) for the proposed site

- f. Modularization Design Requirements
- 4.) Basic contracting and purchasing strategy
 - a. Strategy for tracking cost and schedule performance such as cost performance indicators from an earned value management system.
 - b. Answers to the following questions should be provided:
 - i. Who operates the capture plant?
 - ii. What is the arrangement with the base plant?
 - iii. Are personnel shared, or is the capture plant operated independently?
 - iv. How is the base plant compensated for any derate or utilities provided to the capture plant?
- 5.) Engineering Design Packages
 - a. Process Engineering
 - i. Process area descriptions
 - ii. Block Flow Diagram (BFD), Process Flow Diagram (PFD), and Process & Instrumentation Diagram (P&ID)
 - 1. Minimum Stream Requirements:
 - a. Flue gas from the base plant
 - b. Flue gas from any other sources (e.g., auxiliary boiler)
 - c. Absorber influent after flue gas conditioning
 - d. Gas effluent from the absorber (with detailed emissions)
 - e. CO₂ product from the regenerator
 - f. CO₂ product after compression (with detailed impurities)
 - g. CO₂-rich solvent leaving the absorber
 - h. CO₂-lean solvent leaving the stripper
 - iii. Process simulation output and heat and material balances (H&MB)
 - iv. Capture technology specific design details
 - 1. Initial solvent fill, solvent make up rates, and reclamation requirements for solvent-based technologies; sorbent or membrane lifetime.
 - 2. Performance metrics:
 - a. solvent systems: reboiler duty
 - b. membrane systems: permeance, selectivity, vacuum pressure, differential pressure, membrane area
 - c. sorbent systems: working capacity, selectivity, regeneration energy, vacuum pressure
 - v. HAZOP/PHA documentation
 - vi. Major Process Equipment specifications/data sheets including sizing
 - vii. Equipment and instrumentation lists
 - 1. Key parameters and their value for equipment costing (i.e., height, diameter, heat duty, delta Temperature, power, materials of construction, etc.)

- viii. Cause and Effect diagrams
 - ix. Overpressure Relief/Flare Study
- b. Civil Engineering
 - i. Soil Load Analysis
 - ii. Storm water runoff plan
 - iii. Geologic assessment
 - iv. Spill containment assessment
- c. Structural Engineering
 - i. Foundation design drawings (e.g., concrete sonotubes & slabs, helical pillars)
 - ii. Structural and Architectural drawings (e.g., process equipment/piping structural supports, access gangways/ladders, building enclosures, etc.)
 - iii. Material take-offs
- d. Mechanical Engineering
 - i. General site plan view(s)
 - ii. 3-D model and/or equipment elevation sections & plan drawings
 - iii. Piping/tracing/insulation line list and material specification
 - iv. Piping isometrics
 - v. Piping layout/routing drawings
- e. Electrical Engineering
 - i. Electrical load lists
 - ii. One-line diagram(s)
 - iii. Electrical equipment (e.g., substation, motor control centers, switchgear) specifications
 - iv. Cable/cable tray routing drawings
 - v. Lighting drawings
- f. Instrumentation & Controls Engineering (System Integration)
 - i. Control system architecture specification
 - ii. Instrument/equipment lists and specifications
 - iii. Loop drawings
 - iv. Communications infrastructure (e.g., remote SCADA ability, telephone, internet) specifications
- g. Fire Protection Engineering
 - i. Fire protection system (e.g., sprinkler, foam, water cannons, etc.) design specifications and drawings
- h. Facilities Engineering
 - i. Building/Security Infrastructure Plans
 - 1. Front Office/Administration
 - 2. Control Room(s)
 - 3. Maintenance/Shop Area
 - ii. HVAC

- i. Project Security
 - i. Site physical security
- j. Cybersecurity and associated information protection systems.
- k. Logistics
- l. Constructability
 - i. Construction access
 - ii. Lay-down areas
 - iii. Sequencing of construction work
- m. Project Cost Estimate (+/- 15%) – Must specify year dollars basis and nominal vs real
 - i. Individual component capital cost (i.e., absorber, regenerator, etc.)
 - 1. preferably includes costs for individual pieces of equipment, but at a minimum provides totals for the capture system, compression system, BOP and plant life extension costs (if applicable). Details regarding what is included in the capital cost estimate (labor, materials, equipment, contingency, engineering fees, delivery, etc. need to be provided).
 - ii. Breakdown of operating costs
 - 1. Detailed accounting of O&M costs should be provided. This includes labor rates and personnel requirements, maintenance assumptions, consumable consumption rates and unit costs, waste generation rates and disposal costs, and power and fuel costs. Justifications for the unit costs should be provided where appropriate (e.g., power purchase agreements, waste classification as hazardous/nonhazardous etc.)
 - 2. Auxiliary power requirements for different sub-systems of the capture system and balance of plant systems must be specified. An electrical load list should be provided.
 - 3. The power source should also be specified (e.g., derate from the plant, purchased from grid, purchased from the plant, auxiliary CHP etc.).
 - iii. Owner's Costs
 - iv. Overall cost of capture (\$/tonne of carbon oxides product)
 - v. Quantitative Risk Analysis and associated funding contingency requirements. Financial factors must be detailed. The methodology used to calculate the cost of carbon oxides capture must be clearly outlined. Requested details include:
 - 1. Interest rate, project life, debt-equity arrangement, taxes, insurance, contingency and other cost escalation
 - 2. Owner's cost calculation details
 - 3. Annualization calculation details

4. Do the calculated costs take into account expected capacity factor and operational mode (base load or flexible)?
- n. Integrated Project Schedule
 - i. Identification of the project critical path
 - ii. A Level 2 schedule identifying associated milestones
 - iii. Strategy for tracking schedule performance such as schedule performance indicators from an earned value management system.

FEED Study Checklist

Based on prior experience with FEED study reporting, the following checklist is being provided to emphasize key piece of information that should be contained in the FEED study reports (as a minimum). The items shown in the checklist are all included in the above explanation but are being called out in this chart to increase the emphasis.

Category	Issue	Description	Location in Text/ Page Numbers
General	Potential changes to design	If after completing the FEED it is decided that a different plant configuration should be considered, and that the reported design is not viable, this information should be communicated clearly up front. If major design changes are required, this should be reflected in the project timeline, and a path forward clearly outlined.	
	Definition of roles	The roles and scope of work for the different parties involved in the project should be clearly delineated. The arrangement with the base plant during the planning/construction phase and capture plant operation phase should be made clear.	
	Sources used	A list of sources for data should be provided.	
Performance	Base plant details	Details of the base plant should be highlighted before and after retrofit. This includes: 1 - Year the plant was built, expected plant life, and any plans for extension of plant life 2 - Plant gross and net power before and after retrofit	

		3 - Current and expected capacity factor and operational mode (base load or flexible operation)	
	Carbon Oxides capture process configuration	1 - The overall process flow diagram with main input and output streams should be highlighted. 2 - Detailed P&ID should be included. 3 - An equipment list with all major equipment (direct contact cooler, absorber, solvent heat exchangers, stripper, carbon oxides compressors etc.) specifications and sizing should be provided.	
	Capture system details	Capture technology details allowing comparison with other technologies is requested. This includes: 1 - Initial solvent fill, solvent make up rates, and reclamation requirements for solvent-based technologies; sorbent or membrane lifetime. 2 - Performance metrics: - i - solvent systems: reboiler duty - ii - membrane systems: permeance, selectivity and vacuum pressure, differential pressure, membrane area - iii - sorbent systems: working capacity, selectivity, regeneration energy, vacuum pressure	
	Compression system details	Compression technology details allowing comparison with other technologies is requested. This includes: 1 - Compressor type 2 - Number of stages 3 - Electricity or steam requirement details 4 - Output pressure	

	Stream tables	Energy and mass balance details should be provided. At a minimum this includes the flow rate, composition, temperature, pressure and enthalpy for the following streams: 1 - flue gas from the base plant 2 - flue gas from any other sources (e.g., auxiliary boiler) 3 - absorber influent after flue gas conditioning 4 - gas effluent from the absorber (with detailed emissions) 5 – Carbon oxides product from the regenerator 6 – Carbon oxides product after compression (with detailed impurities) 7 – Carbon oxides rich solvent leaving the absorber 8 – Carbon oxides lean solvent leaving the stripper	
	Steam requirement	The source, quality, and quantity of steam required by the process must be specified for each application, including: 1 - Solvent/sorbent regeneration steam 2 - Solvent reclamation steam 3 - Compression system steam (if applicable) 4 - Other miscellaneous applications such as TEG drying	
	Auxiliary power	1 - Auxiliary power requirements for different sub-systems of the capture system and balance of plant systems must be specified. An electrical load list should be provided. 2 - The power source should also be specified (e.g., derate from the plant, purchased from grid, purchased from the plant, auxiliary CHP etc.).	

	Justification of design	Justification for all major design decisions should be provided. This includes: 1 - results from any case studies performed when deciding on the specific configuration 2 - capture system modeling details including, model basis and validation, system modeling results, and justification for any design decisions that deviate from the modeled system 3 - justification for carbon oxides product stream purity and pressure	
Cost	Dollars	The year of dollar must be provided and nominal vs. real dollars specified for clarity.	
	Cost details	Detailed costs should be provided. This includes: 1 - Capital cost: preferably includes costs for individual pieces of equipment, but at a minimum provides totals for the capture system, compression system, BOP and plant life extension costs (if applicable). Details regarding what is included in the capital cost estimate (labor, materials equipment, contingency, engineering fees, delivery, etc. need to be provided). 2 - O&M costs: a detailed accounting of O&M costs should be provided. This includes labor rates and personnel requirements, maintenance assumptions, consumable consumption rates and unit costs, waste generation rates and disposal costs, and power and fuel costs. Justifications for the unit costs should be provided where appropriate (e.g., power purchase agreements, waste classification as hazardous/nonhazardous etc.) 3 - Owner's cost 4 - Cost of carbon oxides capture	

	Costing methodology	Financial factors must be detailed. The methodology used to calculate the cost of carbon oxides capture must be clearly outlined. Requested details include: 1 - interest rate, project life, debt-equity arrangement, taxes, insurance, contingency and other cost escalation 2 - owner's cost calculation details 3 - Annualization calculation details	
	Operational plan	Answers to the following questions should be provided: 1 - Who operates the capture plant? 2 - What is the arrangement with the base plant? 3 - Are personnel shared, or is the capture plant operated independently? 4 - How is the base plant compensated for any derate or utilities provided to the capture plant? 5 - Do the calculated costs take into account expected capacity factor and operational mode (base load or flexible)?	
Reporting	Report organization	The FOA gives an outline for important sections to be included in the FEED report; the executive summary should also include major aims and conclusions of each of the subsequent chapters.	
	Quality control	There should be no inconsistencies in reported values for streams and costs etc., in different sections of the report. Missing appendices, section headings, and mislabeled figures should be avoided. Image quality should be checked; figures with unreadable text should not be included.	

FEED Study Value Template

Based on prior experience with FEED study reporting, the template will be REQUIRED to be submitted with the completed FEED to facilitate the understanding of the final design parameters collected in one place. The values in this table should agree with the values throughout the report(s). Reported quantities can be adjusted based upon the Area of interest or capture technology.

Checklist Values			
Parameter	Units	Value	Pages in Text Discussing Parameter
Base Plant, pre-retrofit			
Gross Power, pre-retrofit	MW		
Auxiliary Load, pre-retrofit	MW		
Net Power, pre-retrofit	MW		
Steam to LP steam turbine	lb/hr		
	psia		
Flue Gas, pre-retrofit	lb/hr		
	F		
	psia		
CO ₂ Flow Rate in Flue Gas, pre-retrofit	lb/hr		
	mol% CO ₂ or wt% CO ₂		
Capacity Factor	%		
Startup Time	min		
Turndown Ability	%		
Base Plant + Capture			
Gross Power, post-retrofit	MW		
Auxiliary Load of Base Plant	MW		
Auxiliary Load of CO ₂ Capture Island	MW		
Auxiliary Load of CO ₂ Compression	MW		
Net Power, post-retrofit	MW		
Steam to LP steam turbine	lb/hr		
	psia		
Steam to Capture System	lb/hr		
	psia		
Flue Gas	lb/hr		
	F		
	psia		
Capacity Factor	%		

Startup Time	min		
Turndown Ability	%		
CO₂ Capture Plant - Solvent Systems			
Percent of Flue Gas Sent to Capture Facility	%		
CO ₂ Capture Rate	%		
Captured CO ₂ Stream Leaving the Regenerator	lb/hr		
	F		
	psia		
	mol % CO ₂		
CO ₂ Product	lb/hr		
	F		
	psia		
	mol % CO ₂		
Water Consumption of the Capture Island Facility	lb/hr		
Initial Solvent Fill	tons		
Solvent Make-up Rate	tons/yr		
Caustic Initial Fill for DCC	tons		
Caustic Make-up Rate for DCC	tons/yr		
Caustic Content in Solution	%		
Costs - Solvent Systems			
Dollar Year Basis	Year		
CO ₂ Removal System			
Equipment	\$		
Material	\$		
Labor	\$		
Engineering Contracting	\$		
Process Contingencies	\$		
Project Contingencies	\$		
CO ₂ Compression System			
Equipment	\$		
Material	\$		
Labor	\$		
Engineering Contracting	\$		
Process Contingencies	\$		
Project Contingencies	\$		
BOP Modifications			
Equipment	\$		
Material	\$		

Labor	\$		
Engineering Contracting	\$		
Process Contingencies	\$		
Project Contingencies	\$		
Initial Solvent Fill	\$		
Solvent Make-up	\$/yr		
Caustic Initial Fill for DCC	\$		
Caustic Make-up for DCC	\$/yr		
Waste/Hazardous Waste	\$/yr		
CO₂ Capture Plant - Membrane Systems			
Percent of Flue Gas Sent to Capture Facility	%		
CO ₂ Capture Rate, total	%		
CO ₂ Capture Rate per membrane section	%		
CO ₂ Purity in Each Permeate Section	mol%		
Captured CO ₂ Stream Leaving the Reboiler	lb/hr		
	F		
	psia		
	mol % CO ₂		
CO ₂ Product	lb/hr		
	F		
	psia		
	mol % CO ₂		
Water Consumption of the Capture Island Facility	lb/hr		
Total Number of Membranes	#		
Total Contact Area of the Membranes	ft ²		
Membrane Permeance	GPU		
Membrane Selectivity	CO ₂ /N ₂		
Caustic Initial Fill for DCC	tons		
Caustic Make-up Rate for DCC	tons/yr		
Caustic mol Percent in Solution	%		
Costs - Membrane Systems			
Year Dollar Basis	Date		
CO ₂ Removal System			
Equipment	\$		
Material	\$		
Labor	\$		

Engineering Contracting	\$		
Process Contingencies	\$		
Project Contingencies	\$		
CO ₂ Compression System			
Equipment	\$		
Material	\$		
Labor	\$		
Engineering Contracting	\$		
Process Contingencies	\$		
Project Contingencies	\$		
BOP Modifications			
Equipment	\$		
Material	\$		
Labor	\$		
Engineering Contracting	\$		
Process Contingencies	\$		
Project Contingencies	\$		
Cost per Membrane Unit Area	\$/ft ²		
Cost per Membrane Skid	\$		
Membrane Replacement Costs	\$/yr		
Membrane Average Lifetime	yr		
Caustic Initial Fill for DCC	\$		
Caustic Make-up for DCC	\$/yr		
Waste/Hazardous Waste	\$/yr		

APPENDIX D: CARBON OXIDES PIPELINE CONCEPT AND FEED STUDIES

DOE is working with our partners including the U.S. Department of Transportation (DOT) Pipeline and Hazardous Materials Safety Administration (PHMSA) to ensure a safe and reliable carbon oxides transport network that supports the deployment of CCS. As part of these FEED study deliverables, additional critical safety and risk requirements may support future regulatory development processes. Under this FOA, selected FEED projects will perform the scope of work needed to produce deliverables including, but not limited to, those listed below:

1. Project Scope and Design that includes business objectives and a summary of the proposed project. This document must describe whether the pipeline(s) will be an open access or common carrier pipeline and how the proposed pipeline system(s) can help accelerate CCS development.
2. Project Parameters including, but not limited to:
 - a. Site characteristics and ambient conditions;
 - b. Product gas compositions;
 - c. Permit list and review and approval agencies;
 - d. Land use, right-of-way, utility corridors, property boundaries, and title research;
 - e. Project Environmental Health and Safety (EH&S) criteria including pipeline construction and operational impacts to communities and the environment, as well as pipeline failure risk analysis and risk acceptance criteria for pipeline operations;
 - f. Project management plan and risk register; and
 - g. Overall integrated project schedule in a Gantt chart.
3. Engineering Design Package including, but not limited to:
 - a. A Proposed Route Report and Maps, complete with:
 - i. A Geographic Information Systems (GIS) database to house all route and survey information;
 - ii. Pipeline route map incorporating aerial photography, right-of-way and workspace, environmental features, topography, elevation profiles, hydrological data, pipeline materials, foreign crossings, and others;
 - iii. Crossing and right-of-way investigation or survey including elevation, crossing methods, constructability, proposed mitigation, land use, access, workspace configuration, and other relevant information at key locations;
 - iv. Geotechnical and hydrotechnical investigations (desktop or field) that consider extreme weather scenarios and other ground movement force considerations aligned with DOT PHMSA's Integrity Management Program and relevant advisory bulletins for all pipelines such as the June 2022 bulletin (Docket PHMSA-2022-0063) titled "Pipeline Safety: Potential for Damage to

Pipeline Facilities Caused by Earth Movement and Other Geological Hazards;”^[1]

- v. Wetland and environmental survey or investigation information;
 - vi. Cultural and archeological survey or investigation information;
 - vii. Population density study including major roads and waterway crossings and preliminary High Consequence Area (HCA) determination; and
 - viii. Site selection for aboveground facilities including booster stations, meter stations, launchers and receivers, and mainline block valves.
- b. A Design Basis document that covers:
- i. Operating philosophy;
 - ii. All applicable codes, regulations, standards, specifications, and procedures;
 - iii. Design criteria including metallurgical requirements to address ductile fracture propagation;
 - iv. Route selection process;
 - v. Material and pipe coating specifications including specifications for fracture arrest (maximum arrest distance) and selection;
 - vi. Crossing design including waterways, roads, interstate highways, and railroads including horizontal directional drilling requirements;
 - vii. Corrosion control including location of ground beds;
 - viii. Integrity management including inline inspection of the pipeline;
 - ix. Location of mainline valves for isolation including public safety, waterbody crossings and rupture isolation and detection;
 - x. Supervisory Control and Data Acquisition (SCADA) System and Leak Detection System with pressure and flow monitoring;
 - xi. Determination of Maximum Operating Pressure and Minimum Operating Pressure including placement of overpressure safety devices;
 - xii. Pipeline “venting design” and location options at pump stations, mainline valves, and laterals for public safety and minimizing gashouse gas protection; and
 - xiii. Building monitoring designs and equipment to detect and notify personnel of unsafe conditions.
- c. Key Design Calculations and Drawings that cover:
- i. Pressure design and Maximum Operating Pressure (MOP) determination;
 - ii. Hydraulic analysis;
 - iii. Pipeline and equipment sizing;
 - iv. Material take-off;
 - v. Process flow diagram (PFD) and Preliminary Piping and Instrumentation diagram (P&ID); and
 - vi. Power requirements, sources, costs, and timing.

^[1] [PHMSA Land Movement Advisory Bulletin.pdf \(dot.gov\)](https://www.phmsa.dot.gov/sites/phmsa.dot.gov/files/2022-05/PHMSA%20Land%20Movement%20Advisory%20Bulletin.pdf) -
<https://www.phmsa.dot.gov/sites/phmsa.dot.gov/files/2022-05/PHMSA%20Land%20Movement%20Advisory%20Bulletin.pdf>

- d. Technical Specifications for major materials and activities, including but not limited to pipe, valves, facilities, rotating or static equipment, construction, surveying, and others.
 - e. Preliminary Hazard and Operability Analysis (HAZOP).
 - f. If converting a pipeline to carbon oxides service, a preliminary conversion-to-service plan for DOT PHMSA regulatory compliance that includes an integrity assessment plan to demonstrate fitness for service.
 - g. Additional critical safety and risk assessments:
 - i. Conducting an Air Dispersion and Potential Impact Radius (PIR) study including terrain and overland flow considerations for determining the effect on any populated areas. It may be required to consider pipeline set-back distances from dwellings for human occupancy;
 - ii. Providing an Emergency Response Plan (ERP) including training and outreach for emergency responders and local communities, as appropriate;
 - iii. Consideration of additional safety critical equipment and redundant safety design such as crack arrestors (or pipe toughness (Charpy Impact Value) and enhanced shut off capabilities in the event of a catastrophic failure;
 - iv. Consideration of odorant additives for carbon oxides; and
 - v. Consideration of additional distance for pipeline setback in populated areas.
 - h. Construction Specifications to meet 49 CFR Part 195:
 - i. Right of way clearing, grading, and ditching;
 - ii. Depth of soil cover;
 - iii. Welding Requirements;
 - iv. 100% Non-Destructive Testing of pipeline girth weld;
 - v. Pressure testing at a minimum of 1.25 times Maximum Operating Pressure (MOP) for 8 hours;
 - vi. Coating;
 - vii. Backfill to protect the pipe and coating;
 - viii. Pipe Bending requirements; and
 - ix. Clean-up of the right of way.
 - i. Environmental Specifications:
 - i. Monitoring;
 - ii. Structures, such as for waterbody crossings, to minimize construction damage to the environment;
 - iii. Wetland crossings and horizontal directional drills; and
 - iv. Soil erosion mitigation measures and structures.
 - j. Commissioning
4. **Project cost estimate.** Design of the pipeline system shall support an itemized capital cost estimate consistent with AACE (Association of the Advancement of Cost Engineering) Class 3 with an expected accuracy range of -15% on the low side and +15% on the high side. The cost estimate should include a basis of estimate for each item. Successful applicants should provide a benchmark study for the overall cost estimate, if

available. Each recipient is required to submit a pipeline buildout plan with a P-10, P-50 and P-90 project cost analysis based on the acquisition and installation of carbon oxides transport pipeline networks that fulfill the Build America, Buy America Act (BABA) provisions in the Infrastructure Investment and Jobs Act (IIJA).

APPENDIX E: STORAGE FIELD DEVELOPMENT PLAN

The Storage Field Development Plan should: (1) explain the strategy for developing the storage field to maximize its potential utility; (2) describe all elements of the proposed storage field facilities and establish a logical order and timing for the development of all anticipated facilities, accounting for changing needs for monitoring and use of pore space and changing CO₂ delivery rates over time; and (3) present a cost plan over the proposed life of the project. It is expected that the facilities description within the Storage Field Development Plan would be based on information associated with the relevant permits (e.g., UIC or OCS permit application and associated permit terms and conditions, NPDES permit, monitoring well permits, site access road permit), along with regulatory rules and guidance. The Plan should include, if relevant, the assessment and repurposing or plugging of legacy wells and other existing infrastructure. It is understood that this Plan will be only a draft or preliminary until after relevant permits are received, financing is arranged, and other considerations are settled.

There are several major cost categories related to the development of a CO₂ storage site, including wells, infrastructure, and monitoring deployment. Each of these will bring their own cost uncertainty due to outside influences such as oilfield contractor demand, steel price, supply chain disruptions, and inflation. To set the correct expectations, each Plan is required to include a project cost breakdown with a P-10, P-50 and P-90 project cost analysis. Project risks and their effect on cost should be clearly explained. In addition, each proposed well should have a full Authorization for Expenditures (AFE) with cost uncertainty ranges defined for each line item.

The Storage Field Development Plan should additionally report the progression of the storage resource status through Prospective, Contingent, and Capacity based on the SRMS guidelines described at [SPE CO₂ Storage Resource Management System \(SRMS\)](#). Projects should follow the SRMS process to classify the status of the storage resource(s). The estimated classification of the resource(s) and capacity(ies) will be used by DOE to demonstrate how IJA-funded projects are increasing storage capabilities in the U.S.

Suggested contents of the Storage Field Development Plan are described below. Please note however that DOE will accept the Plan in whatever format is company standard for the Recipient, assuming that the Plan has all needed information to understand the build-out, operations and costs for the planned storage of CO₂.

Suggested contents of the Field Development Plan:

1. Executive Summary

2. Storage Development Description and Rationale for Development Plan

- Field Characterization Results
- Seismic Interpretation and Structural Configuration
- Geological Interpretation and Reservoir Description

- Volumetrics
- Reservoir Pressure and Reservoir Fluids
- Reservoir Units and Modelling Approach
- Injection Rate and Mass Over Time
- Area of Review Calculation
- Legacy Well Evaluation

3. Development and Management Plan

- Development Plan
- Well Construction and Legacy Well Mitigation Plans
- Injection Facilities
- Monitoring Plan
- Injection Operations
- Decommissioning & PISC Plan
- Costs
 - Pre-Project Costs (Seismic, Exploration Drilling, Appraisal Drilling, Studies)
 - Drilling and completion of wells
 - Assessment and repurposing or plugging of legacy wells, pipelines and other existing infrastructure
 - Facilities
 - Field OpEx, excluding tariffs
 - Decommissioning & PISC costs
- Project Risks & Mitigations
- Storage Management Plan

APPENDIX F: UNDERGROUND INJECTION CONTROL (UIC) CLASS VI PERMIT TO CONSTRUCT

Recipients shall **submit a** complete and submit to the U.S. Environmental Protection Agency (USEPA) application(s) for an Underground Injection Control (UIC) Class VI permit to construct an injection well and participate in good faith in the permitting process. A UIC Class VI permit(s) to construct will specify that the applicant is authorized to construct the injection wells (or convert existing wells).

The USEPA's guidance documents and the regulatory requirements for submission of the application for a UIC Class VI permit(s) to construct will help guide recipients' activities under this FOA. For a complete listing of the requirements for permit applications, see the USEPA website at <https://www.epa.gov/uic/class-vi-wells-used-geologic-sequestration-co2>. The activities for preparing an application for a Class VI permit to construct include, at a minimum:

- Site Characterization
- Determination of Area of Review and Corrective Action
- Injection Well Construction Plan
- Plans for Pre-Operational Testing
- Proposed Injection Well Operations
- Proposed Monitoring Plan
- Proposed Mechanical Integrity Testing
- Proposed Injection Well Plugging
- Proposed Post-Injection Site Care and Site Closure Plan
- Emergency and Remedial Response Plan
- Demonstration of Volume Containment
- Demonstration of Financial Responsibility
- Public Participation
- Carbon Oxides Source(s) and Chemical Makeup of Carbon Oxides Stream(s)

APPENDIX G: PREPARATION OF THE ENVIRONMENTAL INFORMATION VOLUME

Recipients will be required to prepare an Environmental Information Volume by the end of the project for this FOA. The [Environmental Information Volume \(EIV\)](#) is being provided here for information and planning purposes. The Environmental Information Volume prepared during this project shall provide, in detail, all information as outlined in 'NETL F 541.1-1/6' for the integrated CCS FEED project.

DOE is responsible for determining the level of NEPA review required prior to authorizing federal funds for construction and operation and for determining potential impacts to the human environment associated with the components of the integrated CCS FEED study. The information provided in the EIV will inform DOE's determination of the level of NEPA review required and the NEPA review process. DOE anticipates that an integrated CCS demonstration project will require the preparation of an environmental assessment (EA) or environmental impact statement (EIS).

Additional information will be required to inform the NEPA review process. Recipients will be requested to submit a wide array of information about the integrated CCS demonstration project including options under consideration for the proposed project, reasonable alternatives to the proposed project, the affected environment (including both the natural environment and the human environment), the socio-economic setting of the proposed project and affected area surrounding the proposed site, trends regarding changes in the surrounding environment (natural, socio-economic, human) and the potential impacts (both positive and negative) for the proposed project, its options, and its reasonable alternatives. The Recipient will be expected to cooperate fully with those who prepare the NEPA documents and implement the NEPA process.

APPENDIX H: STATE-POINT DATA TABLES

APPLICANT REMINDER: The State-Point Data Table is required to be completed and submitted with your application. Applicants that do not submit a State-Point Data Table or submit an incomplete table will be considered non-compliant and DOE will not review or consider noncompliant submissions. See Section III.

Instructions for completing data tables: The tables that follow in this attachment shall be populated with data provided by the applicant and included as part of an application's Scientific and Technical Merit section. Applicants proposing projects shall complete the appropriate combinations of Tables 1, 2 and 3 that relate to their proposed process concept. Merit scoring of application will correspond to the completeness of the data table and supporting information.

Key data or estimates provided in the table(s) shall be supported with short narratives in bullet form within the Scientific and Technical Merit section. These bullets shall describe the sources for the individual data provided. This may be measurements made directly by the applicant and shall identify the apparatus and methodology used in the measurement(s). Due to page limitations, citations may be utilized to describe the sources for the individual data provided by the applicant or others, or by example calculations for noncritical data. Other acceptable sources of data are the open literature (with citation and description), or estimated or extrapolated data (with description of method/model used for the estimate, or the procedure used for extrapolation). Arguments supported by theory/mechanisms shall be provided for projected performance for new, advanced solvent, sorbent, or membrane materials. If there are any differences between the gas stream(s) used for the prior scale technology development and the gas stream(s) to be used in the proposed project, applicants must discuss these differences and any potential impacts on the proposed project.

For **TA-1**, Applicants are required to provide the demonstrated performance data for their solvent, sorbent, or membrane technology. Applicants shall prepare the State Point Data Table for coal-based relevant flue gas conditions. Applicants should substantiate performance of the proposed technology by providing pilot-scale validation (i.e., total system) with coal relevant flue gas conditions.

For **TA-2**, Applicants are required to provide the demonstrated performance data for their solvent, sorbent, or membrane technology. Applicants shall prepare the State Point Data Table for natural gas relevant flue gas conditions. Applicants should substantiate performance of the proposed technology by providing pilot-scale validation (i.e., total system) with NG relevant flue gas conditions.

For **TA-3**, Applicants are required to provide the demonstrated performance data for their solvent, sorbent, or membrane technology. Applicants shall prepare the State Point Data Table for flue gas conditions similar to the ones in the selected industrial application. Applicants

should substantiate performance of the proposed capture technology by providing pilot-scale validation (i.e., total system) with actual flue gas having a similar CO₂ concentration as to the one in the selected industrial application.

Table 1. State-Point Data for Solvent Based Systems

	Units	Measured/ Estimated Performance	Projected Performance
Pure Solvent			
Molecular Weight	mol-1		
Standard Boiling Point	°C		
Standard Freezing Point	°C		
Vapor Pressure @ 15°C	bar		
Working Solution			
Concentration	kg/kg		
Specific Gravity (15 °C/15 °C)	-		
Specific Heat Capacity @ STP	kJ/kg·K		
Viscosity @ STP	cP		
Surface Tension @ STP	dyn/cm		
CO ₂ Mass Transfer Rate [KL]	m/s		
CO ₂ Reaction Rate	-		
Thermal Conductivity	W/(m·K)		
Absorption			
Pressure	bar		
Temperature	°C		
Equilibrium CO ₂ Loading	gmol CO ₂ /kg		
Heat of Absorption	kJ/kg CO ₂		
Solution Viscosity	cP		
Desorption			
Pressure	bar		
Temperature	°C		
Equilibrium CO ₂ Loading	gmol CO ₂ /kg		
Heat of Desorption	kJ/kg CO ₂		
Pilot Scale Data			
Location			
The following information should be provided for the longest steady-state duration test performed at pilot scale			
Scale	tCO ₂ /year		

Duration of Long-Term Test (consecutive hours)	hr		
CO ₂ concentration in the feed stream (e.g, flue gas, process stream)	Mol %		
Carbon Capture Efficiency	%		
Solvent Make-up rate	%/yr		
Reboiler Duty	KJ/Kg CO ₂		
Details on solvent reclamation or refreshing			
CO ₂ Product Purity	Mol % dry		
CO ₂ Product Oxygen Concentration	Mol% (or ppm)		

Definitions for Table 1:

STP – Standard Temperature and Pressure (15 °C, 1 atm)

Pure Solvent – Agent(s), working alone or as a component of a working solution, responsible for enhanced CO₂ absorption. For example: the amine monoethanolamine (MEA) in an aqueous solution.

Working Solution – The solute-free (i.e., CO₂-free) liquid solution used as the working solvent in the absorption/desorption process. For example: the liquid mixture of MEA and water.

Absorption – The conditions of interest for absorption are those that prevail at maximum solvent loading, which typically occurs at the bottom of the absorption column. Measured data are preferable to estimated data.

Desorption – The conditions of interest for desorption are those that prevail at minimum solvent loading, which typically occurs at the bottom of the desorption column. Operating pressure and temperature for the desorber/stripper are process dependent. Measured data are preferable to estimated data.

Pressure – The pressure of CO₂ in equilibrium with the solution. If the vapor phase is pure CO₂, this is the total pressure, and if it is a mixture of gases, this is the partial pressure of CO₂.

Concentration – Mass fraction of pure solvent in working solution.

Loading – The basis for CO₂ loading is moles of pure solvent.

Mass Transfer Rate – Overall liquid phase mass transfer coefficient.

CO₂ Reaction Rate – A characterization of the CO₂ absorption trend with respect to time, as complete in the range of time as possible.

Details on solvent reclamation or refreshing – Include information about reclamation rates or solvent replacement/refreshing during the long-term test

CO₂ Product Purity – Average purity of the CO₂ product from the capture system during the long-term testing

CO₂ Product Oxygen Concentration – Oxygen content of the CO₂ produced during the long-term testing

Table 2. State-Point Data for Sorbent Based Systems

	Units	Measured Performance (Powder form)	Projected or Measured Performance (structured material system)
Sorbent			
True Density @ STP	kg/m ³		
Bulk Density	kg/m ³		
Average Particle Diameter	mm		
Particle Void Fraction	m ³ /m ³		
Packing Density	m ² /m ³		
Solid Heat Capacity @ STP	kJ/kg·K		
Crush Strength	kgf		
Attrition Index	-		
Thermal Conductivity	W/(m·K)		
Adsorption			
Pressure	bar		
Temperature	°C		
Equilibrium Loading	gmol CO ₂ /kg		
Heat of Adsorption	kJ/gmol CO ₂		
CO ₂ Adsorption Kinetics	gmol/time		
Desorption			
Pressure	bar		
Temperature	°C		
Equilibrium Loading	gmol CO ₂ /kg		
Heat of Desorption	kJ/gmol CO ₂		
CO ₂ Desorption Kinetics	gmol/time		
Pilot Scale Information			
Location			
The following information should be provided for the longest steady-state duration test performed at pilot scale			
Scale	tCO ₂ /year		
Duration of Long-Term Test (consecutive hours)	hrs		
CO ₂ concentration in feed stream (e.g, flue gas, process stream)	%		
Carbon Capture Efficiency	%		

Cycle Time	Hr		
Sorbent Make-up rate	%/yr		
Details on sorbent reactivation or refreshing			
Heat Duty	KJ/Kg CO ₂		
CO ₂ Product Purity	Mol % dry		
CO ₂ Product Oxygen Concentration	Mol% (or ppm)		

Definitions for Table 2:

Attrition Index – [Add a definition]

STP – Standard Temperature and Pressure (15 °C, 1 atm)

Sorbent – Adsorbate-free (i.e., CO₂-free) and dry material as used in adsorption/desorption cycle.

Adsorption – The conditions of interest for adsorption are those that prevail at maximum sorbent loading. Measured data are preferable to estimated data.

Desorption – The conditions of interest for desorption are those that prevail at minimum sorbent loading. Operating pressure and temperature for the desorber/stripper are process dependent. Measured data are preferable to estimated data.

Pressure – The pressure of CO₂ in equilibrium with the sorbent. If the vapor phase is pure CO₂, this is the total pressure, and if it is a mixture of gases, this is the partial pressure of CO₂.

Packing Density – Ratio of the active sorbent area to the bulk sorbent volume.

Loading – The basis for CO₂ loading is mass of dry sorbent.

Kinetics – A characterization of the CO₂ adsorption/desorption trend with respect to time, as complete in the range of time as possible.

Cycle Time – time for entire absorption and regeneration cycle utilized during long term testing

Details on sorbent reactivation or refreshing – Include information about reactivation process and rates or sorbent replacement during the long-term test

CO₂ Product Purity – Average purity of the CO₂ product from the capture system during the long-term testing

CO₂ Product Oxygen Concentration – Oxygen content of the CO₂ produced during the long-term testing

Table 3. State-Point Data for Membrane Based Systems

	Units	Measured/ Estimated Performance	Projected Performance
Materials Properties			
Materials of Fabrication for Selective Layer			
Materials of Fabrication for Support Layer (if applicable)			
Nominal Thickness of Selective Layer (mm)			
Membrane Geometry			
Max Trans-Membrane Pressure	bar		
Hours tested without degradation	significant		
Membrane Performance			
Temperature	°C		
Pressure Standardized Flux for Permeate (CO ₂)	GPU or equivalent		
CO ₂ /H ₂ O Selectivity	-		
CO ₂ /N ₂ Selectivity	-		
Type of Measurement (Ideal or mixed gas)	-		
Proposed Module Design			
Flow Arrangement	-		
Packing Density	m ² /m ³		
Shell-Side Fluid	-		
Pilot Scale Information			
Location			
The following information should be provided for the longest steady-state duration test performed at pilot scale			
Scale	tCO ₂ /yr.		
CO ₂ concentration in feed stream (e.g, flue gas, process stream)	%		
Duration of Long-Term Test (consecutive hours)	hrs		
Average CO ₂ capture Efficiency	%		
Starting CO ₂ Capture Efficiency	%		

Ending CO ₂ Capture Efficiency	%	
Membrane Performance Degradation	%/year	
CO ₂ Product Purity	Mol % dry	
CO ₂ Product Oxygen Concentration	Mol% (or ppm)	
Membrane Feed Pressure*	psia	
Permeate Pressure*	psia	

Definitions for Table 3:

Membrane Geometry – Flat discs or sheets, hollow fibers, tubes, etc.

Pressure Standardized Flux – For materials that display a linear dependence of flux on partial pressure differential, this is equivalent to the membrane's permeance.

GPU – Gas Permeation Unit, which is equivalent to $10^{-6} \text{ cm}^3/(\text{cm}^2 \cdot \text{s} \cdot \text{cmHg})$ at 1 atm and 0 °C. For non-linear materials, the dimensional units reported shall be based on flux measured in $\text{cm}^3/(\text{cm}^2 \cdot \text{s})$ (at 1 atm and 0 °C) with pressures measured in cm Hg. Note: $1 \text{ GPU} = 3.3464 \times 10^{-6} \text{ kgmol}/(\text{m}^2 \cdot \text{s} \cdot \text{kPa})$ [SI units]

Type of Measurement – Either mixed or pure gas measurements; projected permeance and selectivities shall be for mixture of gases found in de-sulfurized flue gas.

Flow Arrangement – Typical gas-separation module designs include spiral-wound sheets, hollow-fiber bundles, shell-and-tube, and plate-and-frame, which result in either co-current, counter-current, cross-flow arrangements, or some complex combination of these.

Packing Density – Ratio of the active surface area of the membrane to the volume of the module.

Shell-Side Fluid – Either the permeate or retentate stream.

Details on membrane reactivation or replacement – Include information about reactivation process and rates or membrane replacement during the long-term test

Starting CO₂ Capture Efficiency – Capture efficiency achieved in the first hour of long-term testing

Ending CO₂ Capture Efficiency – Capture efficiency achieved in the last hour of long-term testing

CO₂ Product Purity – Average purity of the CO₂ product from the capture system during the long-term testing

CO₂ Product Oxygen Concentration – Oxygen content of the CO₂ produced during the long-term testing

Membrane Feed Pressure – Pressure of gas fed to the membrane for separation during the long-term test. *Repeat this parameter for each stage of membrane used during the long-term test

Permeate Pressure – Pressure of the corresponding permeate of the membrane that accounts for the trans membrane pressure drop and any vacuum used. * Repeat this parameter for each stage of membrane used during the long-term test

APPENDIX I: BASIS FOR CCS TECHNOLOGY EH&S ASSESSMENT

A preliminary assessment of EH&S risks is required with the application as well as a final version as an end of project deliverable. The final EH&S assessment shall be coordinated and consistent with the carbon oxides capture and Pipeline FEED Studies, and the Storage Field Development Plan .

The purpose of this EH&S analysis is to assess the environmental friendliness and safety of any future process based on the materials and process being proposed under the subject DOE FOA. This is the major concern for solvents in use today. Exposure to nanoparticles is also coming under increasing scrutiny by the U.S. Environmental Protection Agency (EPA), National Institute for Occupational Safety and Health (NIOSH) and others. The EH&S risk assessments shall be conducted by qualified and experienced organizations and professionals (*e.g.*, environmental scientists, industrial hygienists, safety engineers). *Unanticipated or uncontrolled EH&S risks will impede commercialization of CCS technologies, and the EH&S assessment is a critical element of the demonstration project.*

Required elements for the EH&S Assessment are:

- 1) All potential ancillary or incidental air and water emissions, and solid wastes produced from the proposed technology shall be identified and their magnitude estimated. In addition to solvents or sorbents used, project teams should have already characterized any possible by-products of side reactions that might also occur in the system and developed mitigation strategies, accumulated waste products, and the fate of contaminants from the feed gas stream. Environmental degradation products shall be addressed. Bioaccumulation, soil mobility, and degradability shall be considered. Conditions at the point of discharge shall be examined.
- 2) If possible, a concise but complete and comprehensible description of the various toxicological effects of the substances identified in (1) above shall be provided. A thorough literature search shall be conducted to examine potential human health effects and ecotoxicity. Where information is lacking for a particular material, it shall be compared to similar substances or classes of substances.
- 3) Properties related to volatility, flammability, explosivity, other chemical reactivity, and corrosivity shall also be collected from existing databases or if necessary, through direct measurement in cases where the substance is not in common use.
- 4) The compliance and regulatory implications of the proposed CCS technology shall be addressed with reference to applicable U.S. EH&S laws and associated standards including the Comprehensive Environmental Response and Liability Act of 1980 (CERCLA), Toxic Substances Control Act (TSCA), Clean Water Act (CWA), Clean Air Act (CAA), Superfund

Amendments and Reauthorization Act (SARA) Title III, and the Occupational Safety and Health Act (OSHA).

- 5) An engineering analysis shall be conducted for any potentially hazardous materials identified to look for ways their use can be eliminated or minimized. Less hazardous materials should be substituted where possible. For any new materials being proposed, synthetic options shall be examined that may lead to similar, less-hazardous compounds with the required functionality. Possible engineering controls and other mitigation strategies shall be described as appropriate.
- 6) Precautions for safe handling and conditions for safe storage shall be identified, including any incompatibilities with other materials that may be used in the process. Waste treatment and offsite disposal options shall be examined. Accidental release measures shall also be discussed.

APPENDIX J: DATA MANAGEMENT PLAN

A Data Management Plan (“DMP”) explains how data generated in the course of the project or work performed under an assistance award will be shared and preserved or, when justified, explains why data sharing or preservation is not possible or scientifically appropriate.

DMP Requirements

In order for a DMP to be considered acceptable, the DMP must address the following:

At a minimum, the DMP must describe how data sharing and preservation will enable validation of the results from the proposed work, or how results could be validated if data are not shared or preserved.

The DMP must provide a plan for making all project data displayed in publications resulting from the proposed work digitally accessible at the time of publication. This includes data that are displayed in charts, figures, images, etc. In addition, the underlying digital data used to generate the displayed data should be made as accessible as possible in accordance with the principles stated above. This requirement could be met by including the data as supplementary information to the published article, or through other means. The published article should indicate how these data can be accessed.

The DMP must protect confidentiality, personal privacy, Personally Identifiable Information, and U.S. national, homeland, and economic security; recognize proprietary interests, business confidential information, and intellectual property rights; avoid significant negative impact on innovation, and U.S. competitiveness; and otherwise be consistent with all laws (i.e., export control laws), and DOE regulations, orders, and policies.

Data Determination for a DMP

The Recipient should determine which data should be the subject of the DMP and, in the DMP, propose which data should be shared and/or preserved in accordance with the DMP Requirements noted above.

For data that will be generated through the course of the proposed work, the Recipient should indicate what types of data should be protected from immediate public disclosure by DOE (referred to as “protected data”) and what types of data that DOE should be able to release immediately. Similarly, for data developed outside of the proposed work at private expense that will be used in the course of the proposed work, the Recipient should indicate whether that type of data will be subject to public release or kept confidential (referred to as “limited rights data”). Any use of limited rights data or labeling of data as “protected data” must be consistent with the DMP Requirements noted above.

Suggested Elements for a DMP

The following list of elements for a DMP provides suggestions regarding the data management planning process and the structure of the DMP:

Data Types and Sources: A brief, high-level description of the data to be generated or used through the course of the project.

Content and Format: A statement of plans for data and metadata content and format including, where applicable, a description of documentation plans, annotation of relevant software, and the rationale for the selection of appropriate standards. Existing, accepted community standards should be used where possible. Where community standards are missing or inadequate, the DMP could propose alternate strategies for facilitating sharing, and should advise the sponsoring program of any need to develop or generalize standards.

Sharing and Preservation: A description of the plans for data sharing and preservation. This should include, when appropriate: the anticipated means for sharing and the rationale for any restrictions on who may access the data and under what conditions; a timeline for sharing and preservation that addresses both the minimum length of time the data will be available and any anticipated delay to data access after findings are published; any special requirements for data sharing, for example, proprietary software needed to access or interpret data, applicable policies, provisions, and licenses for re-use and re-distribution, and for the production of derivatives, including guidance for how data and data products should be cited; any resources and capabilities (equipment, connections, systems, software, expertise, etc.) requested in the proposal that are needed to meet the stated goals for sharing and preservation (this could reference the relevant section of the associated proposal and budget request); and whether/where the data will be preserved after direct project funding ends and any plans for the transfer of responsibilities for sharing and preservation. A description of how the recipient intends to make the results of any resulting DOE-funded work available to the public, including the relevant technical and commercial community.

Protection: A statement of plans, where appropriate and necessary, to protect confidentiality, personal privacy, Personally Identifiable Information, and U.S. national, homeland, and economic security; recognize proprietary interests, business confidential information, and intellectual property rights; and avoid significant negative impact on innovation, and U.S. competitiveness.

Rationale: A discussion of the rationale or justification for the proposed data management plan including, for example, the potential impact of the data within the immediate field and in other fields, and any broader societal impact.

Additional Guidance

In determining which data should be shared and preserved, applicants must consider the data needed to validate findings as described in the Requirements and are encouraged to consider the potential benefits of their data to the scientific and engineering community and society at large.

DMPs should reflect relevant standards and community best practices and make use of community accepted repositories whenever practicable.

Costs associated with the scope of work and resources articulated in a DMP may be included in the proposed budget as permitted by the applicable cost principles.

To improve the discoverability of and attribution for datasets created and used in the course of project execution, DOE encourages the citation of publicly available datasets within the reference section of publications, and the identification of datasets with persistent identifiers such as Digital Object Identifiers (DOIs). In most cases, DOE can provide DOIs free of charge for data resulting from DOE-funded projects through its Office of Scientific and Technical Information (OSTI) DataID Service.

Definitions

Data Preservation: Data preservation means providing for the usability of data beyond the lifetime of the project that generated them.

Data Sharing: Data sharing means making data available to people other than those who have generated them. Examples of data sharing range from bilateral communications with colleagues, to providing free, unrestricted access to anyone through, for example, a web-based platform.

Digital Project Data: The term digital data encompasses a wide variety of information stored in digital form including: experimental, observational, and simulation data; codes, software and algorithms; text; numeric information; images; video; audio; and associated metadata. It also encompasses information in a variety of different forms including raw, processed, and analyzed data, published and archived data.

Project Data: The recorded factual material commonly accepted in the scientific community as necessary to validate project findings, but not any of the following: preliminary analyses, drafts of scientific papers, plans for future project work, peer reviews, or communications with colleagues. This 'recorded' material excludes physical objects (e.g., laboratory samples). Project Data also do not include:

(A) Trade secrets, commercial information, materials necessary to be held confidential by the project until they are published, or similar information which is protected under law; and

(B) Personnel and medical information and similar information the disclosure of which would constitute a clearly unwarranted invasion of personal privacy, such as information that could be used to identify a particular person in a study.

Validate: In the context of DMPs, validate means to support, corroborate, verify, or otherwise determine the legitimacy of the findings. Validation of findings could be accomplished by reproducing the original experiment or analyses; comparing and contrasting the results against those of a new experiment or analyses; or by some other means.

APPENDIX K: LIFE CYCLE ANALYSIS

Applicants will submit a preliminary Life Cycle Analysis (LCA) with their application. Recipients will submit an updated LCA as an end of project deliverable.

Under **TA-1** and **TA-2**, the Life Cycle Analysis (LCA) shall be conducted to demonstrate the potential environmental impacts of capturing at least 90% of unit-wide carbon oxides emissions and storing the captured carbon oxides in secure geologic formations. The scope of the LCAs for areas **TA-1** and **TA-2** is cradle-to-delivered electricity, inclusive of transmission of the electricity to the final customer. For combined heat and power (CHP) facilities (**TAs 1.2, 2.2**), the scope will also include the exported heat.

Under **TA 2.1** (excluding NGCC facilities), the scope of the LCA is cradle-to-gate where the gate is defined as the production of hydrogen from Natural Gas Steam Methane Reforming (SMR) and ready for transport. The LCAs shall be conducted to demonstrate the potential environmental impacts of capturing at least 90% of unit-wide carbon oxides emissions and storing the captured carbon oxides in domestic facilities.

Under **TAs 3.1**, and **3.2** (referred to as **TA-3** hereafter), the scope of LCA is cradle-to-gate, where the gate is defined as the production of industrial products ready for transport from the industrial facility.

Preliminary LCA Guidance

1. Applicants shall provide a screening-level, greenhouse-gas only analysis with scopes and functional units as defined above for **TAs 1, 2, and 3** and a contribution analysis showing at a minimum the impacts from fuel extraction and delivery, plant direct emissions, and carbon oxides transport and storage.
2. The documentation and report do not necessarily need to follow the [NETL CO2U LCA Guidance Document](#), all sources of life cycle inventory should be clearly documented in the application.
3. Applicants must use NETL data where possible. Any alternative sources of life cycle inventory will need to be justified. The following is a list of NETL life cycle inventory data sources:
 - a. [Upstream dashboard version 3](#)
 - b. [Grid Mix Explorer 4.2](#)
 - c. [NETL CO2U openLCA LCI Database Version 2.1 \(or latest\)](#)
 - d. [NETL CO2U Documentation Spreadsheet](#)

4. If the CO₂ captured from the modeled CCS technology will be utilized as an injectant for CO₂ Enhanced Oil Recovery (EOR), the LCA shall include the EOR operations and the fate of the produced products in the system boundary. This can be achieved by using the following factor derived from NETL's analysis of EOR on the basis of megagrams (Mg), which is equivalent to metric tons, CO₂ sold to EOR operator. The basis for this factor is documented in NETL research publications^{23,24} and a corresponding model.²⁵ Additional cases may be submitted if EOR operating parameters differ substantially from the operations characterized in the NETL assessments. The parameter values used in any supplementary cases must be documented as part of the LCA. All calculations for any supplementary cases should be performed using NETL's CELiC model.

Emissions species	Emissions from Enhanced Oil Recovery Minus U.S. Average Crude Production
Carbon dioxide	53.6 kg/Mg CO ₂ delivered to EOR
Methane	0.384 kg/Mg CO ₂ delivered to EOR
Nitrous oxide	0.00204 kg/Mg CO ₂ delivered to EOR

LCA Guidance

1. TA-1 and TA-2

- a. Required life cycle inventory data:
 - i. Energy inputs to the facility including fuels and electricity
 - ii. Combustion emissions at the facility
 - iii. Chemical inputs to the facility
 - iv. Construction of the facility and manufacturing impacts for the required materials/equipment (e.g., structural steel, concrete, etc.)
 - v. Carbon dioxide transport and saline aquifer storage life cycle inventory values (gate-to-grave emissions data to be used for all projects using saline storage) are available in the [NETL CO2U openLCA LCI Database \[Version 2.1 \(or latest\)\]](#) and the [NETL CO2U Documentation Spreadsheet](#) as "Saline aquifer transport and storage"

²³ Gate-to-Gate Life Cycle Inventory and Model of CO₂-Enhanced Oil Recovery - <https://netl.doe.gov/energy-analysis/details?id=a4c42c51-f528-41dd-b3f1-2b391fe8cb9d>

²⁴ Evaluating the Climate Benefits of CO₂-Enhanced Oil Recovery Using Life Cycle Analysis - <https://pubs.acs.org/doi/full/10.1021/acs.est.5b00700>

²⁵ Carbon Dioxide Enhanced Oil Recovery Life Cycle (CELiC) Model - <https://www.netl.doe.gov/energy-analysis/details?id=3233>

vi. Electricity transmission and distribution life cycle inventory values (gate-to-gate emissions data to be use for **TA-1** and **TA-2** life cycle modeling projects):

1. Sulfur Hexafluoride 7.87E-05 kg/kg CO₂ stored
2. Electricity transmission and distribution electricity loss rate to be used for **TA-1** and **TA-2** life cycle modeling projects are determined by state from the table below (derived from [EIA State Electricity Profiles](#)):

State	T&D Loss Rate	State	T&D Loss Rate	State	T&D Loss Rate
AL	3.5%	LA	5.3%	OH	5.3%
AK	5.5%	ME	5.2%	OK	4.3%
AZ	4.2%	MD	5.3%	OR	4.5%
AR	4.7%	MA	5.3%	PA	3.5%
CA	5.3%	MI	4.9%	RI	4.7%
CO	5.3%	MN	5.3%	SC	4.4%
CT	3.7%	MS	4.0%	SD	5.0%
DE	5.3%	MO	5.3%	TN	5.3%
FL	5.3%	MT	3.5%	TX	5.2%
GA	5.3%	NE	4.8%	UT	4.8%
HI	5.6%	NV	5.3%	VT	1.8%
ID	5.3%	NH	3.7%	VA	5.3%
IL	4.4%	NJ	5.3%	WA	4.0%
IN	5.3%	NM	4.1%	WV	3.2%
IA	4.9%	NY	5.2%	WI	5.3%
KS	4.0%	NC	5.3%	WY	2.1%
KY	5.3%	ND	2.4%		

b. LCA results:

- i. **TAs 1** and **2** shall be normalized to 1 MWh of electricity.
- ii. A contribution analysis shall be provided so that impacts can be differentiated by major operation/input.
- iii. A sensitivity analysis shall be provided for key model inputs with known technical variability and/or expected variability from different site-specific commercialization scenarios.

c. Emissions scope:

- i. The scope of environmental impacts shall include all the additional impact categories listed in Section 2.1.8.2 of the [NETL CO2U LCA Guidance Document](#). To accomplish this the environmental inventory will need to include data beyond greenhouse gas emissions, as discussed in Section 2.2.2.2 of the [NETL CO2U LCA Guidance Document](#).
- ii. For GHG emissions, the global warming potential shall be reported using the 100-year global warming potential (GWP) characterization factors as the default values from the Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report (AR4) and the Fifth Assessment Report (AR5), sensitivity cases using the 20-year GWP values is encouraged:

GHG	AR4 (IPCC 2007) ²⁶		AR6 (IPCC 2013) ²⁷	
	100-year (Default)	20-year	100-year (Default)	20-year
CO ₂	1	1	1	1
CH ₄	25	72	36	85
N ₂ O	298	289	298	264
SF ₆	22,800	16,300	23,500	17,500

Note: These GWP characterization factors may be updated by NETL to reflect the latest science.

- d. Resources – DOE has tools that may be helpful in completing the LCA requirement. These tools are not exhaustive but can be used to provide some life cycle inventory data for some energy and material inputs. The following resources are recommended:
 - i. General LCA guidance – [NETL CO2U LCA Guidance Document](#)
 - ii. NETL Life Cycle Inventory Data – [NETL CO2U openLCA LCI Database](#)
 - iii. Electricity Consumption LCI Data – [NETL Grid Mix Explorer](#)
- e. LCA Submission Requirements for Final Project Deliverables
 - i. LCA Report – see [NETL CO2U LCA Guidance Document](#), Chapter 6 “Completing the NETL CO2U LCA Report Template”

²⁶ IPCC (2007). *Climate Change 2007: The Physical Science Basis*. New York: Cambridge University Press: Intergovernmental Panel on Climate Change Retrieved December 16, 2020, from <https://www.ipcc.ch/report/ar4/wg1/>

²⁷ IPCC. (2013). *Climate Change 2013 The Physical Science Basis*. New York: Cambridge University Press: Intergovernmental Panel on Climate Change Retrieved December 12, 2013, from <https://www.ipcc.ch/report/ar5/wg1/>

- ii. LCA Model with Life Cycle Inventory Data – see [NETL CO2U LCA Guidance Document](#), for modeling guidance (no specific LCA software type is required)
 - f. List of all licensed LCA data used within the model with external reviewer limited-license access for DOE review
- 2. **TA-3** for Industrial Facilities
 - a. System Boundary: cradle-to-gate where the gate is defined as the production of industrial products ready for transport from the industrial facility. The transport and storage of captured carbon oxides is included within the system boundary of **TA-3**. The transportation, use, and end-of-life management of the industrial products is excluded from the life cycle system boundary for **TA-3**.
 - b. Reporting Metric: kg of CO₂e/unit of industrial product produced.
 - i. “unit of industrial product produced” shall be replaced with quantity of products produced from the industrial operation referenced to 1 unit of the primary product of interest. This will result in multi-product functional unit.
- 3. Assignment of environmental burdens to a single product of value may be reported as secondary reporting metric. The method for assigning environmental burdens to multiple products shall be clearly documented and follow the guidance outlined in the [NETL CO2U LCA Guidance Document](#), see Guidance Document Appendix C “Alternative Co-product Management Methods”.

Appendix L: Project Management Plan Guidance

A Project Management Plan for implementing the proposed project and achieving the objectives of the Announcement is required with the application. The Project Management Plan establishes the baseline for the scope, schedule, and budget for the project and shall include the information given below.

Project Management Plan Requirements
Work Breakdown Structure
Integrated Project Schedule
Project Budget
Baseline Cost Plan
Description of Project Management System
Project Communication Protocol
Risk Management Plan

- A Work Breakdown Structure in sufficient detail to describe the tasks to be performed, generally 1-2 levels below the detail of the SOPO;
- An Integrated Project Schedule for the entire project at the task level of detail. The schedule shall follow the task structure of the Work Breakdown Structure. The schedule should include all tasks necessary for successful completion of the project; incorporating and showing inter-relationships among all technical, financial, NEPA, CBP, and permitting and other appropriate factors; including a critical path schedule with milestones and decision points; allocating sufficient and appropriate time to complete the project deliverables. The Integrated project schedule should include critical path project milestones [no less than 2 Specific, Measurable, Achievable, Relevant, and Timely (SMART) per calendar year] for the entire project;
- A proposed Project Budget which should align to the budget justification;
- A Baseline Cost Plan to establish the budget for accomplishing the planned work. The Baseline Cost Plan should identify the planned cost for each task on a quarterly basis. The Baseline Cost Plan should follow the task structure of the Work Breakdown Structure;
- A description of the project management system to be used for monitoring and control of scope, schedule, and cost including the methodology and implementation of reporting earned value;
- Project Communication Protocol, to establish the frequency and type of communication between the Recipient, subcontractors as applicable and DOE, dependent on the complexity, value, and program significance of the project, to ensure the team has the information necessary to affect timely and effective project management. DOE will have unfettered access to project management tracking and

performance data. The Project Communication Protocol should be adequate for ensuring effective communication between the Recipient, Subrecipients, and DOE;

- A Risk Management Plan that includes a summary description of the proposed approach to identify, analyze, and respond to perceived and actual risks associated with the development of FEED Study. Project risk events are uncertain future events that, if realized, impact the success of the project. As a minimum, include the initial identification of significant technical, resource, and management issues that have the potential to impede project progress and strategies to minimize impacts from those issues. Risks are to be quantified and used to develop the project budget and schedule contingency; and
- An Initial Environmental Health & Safety Assessment (EH&S) to establish a protocol for managing the potential environmental impacts of the project. DOE expects that the boundaries of the initial EH&S for the application may be further refined over the course of the project. The EH&S shall monitor the potential impacts to air, land, and water resources, and waste production in terms of compliance monitoring, unregulated pollutant monitoring, and NEPA monitoring. The EH&S shall establish a protocol for reporting the results of the monitoring effort.

APPENDIX M: 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. 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 \$15,000,000 in federal funds with a minimum 50% non-federal cost sharing requirement:

- Formula: Federal share (\$) divided by federal share (%) = Total Project Cost
Example: \$30,000,000 divided by 50% = \$15,000,000
- Formula: Total Project Cost (\$) minus federal share (\$) = Non-federal share (\$)
Example: \$30,000,000 minus \$15,000,000 = \$15,000,000
- Formula: Non-federal share (\$) divided by Total Project Cost (\$) = Non-federal share (%)
Example: \$30,000,000 divided by \$15,000,000 = 50%

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 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.

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 a contribution of 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. In the event that the project or activity is subject to Davis Bacon Act, these wages must be based on actual wages paid and also meet or exceed the prevailing wage for the skill set and location.
- (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. 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 N: WAIVER REQUESTS FOR: 1. FOREIGN ENTITY PARTICIPATION; AND 2. FOREIGN WORK

1. Waiver for Foreign Entity Participation

Many of the technology areas DOE funds fall in the category of critical and emerging technologies (CETs). CETs are a subset of advanced technologies that are potentially significant to U.S. national and economy security.²⁸ For projects selected under this FOA, all recipients and subrecipients must be organized, chartered or incorporated (or otherwise formed) under the laws of a state or territory of the United States; have majority domestic ownership and control; 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 U.S. industry and U.S. 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 U.S. 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 U.S. 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 U.S. 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 of 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

²⁸ See [Critical and Emerging Technologies List Update \(whitehouse.gov\)](https://www.whitehouse.gov/critical-emerging-technologies/).

- 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 U.S. economy;
 - How the project will benefit U.S. deployment and manufacturing, including contributions to employment in the U.S. and growth in new markets and jobs in the U.S.;
 - How the project will promote domestic American manufacturing of products 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 U.S., 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.I.iii., all of the direct labor cost for the project (including subrecipient labor) 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 U.S. ("foreign work");
2. A description of the work proposed to be performed outside the U.S.;
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 US 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 U.S. deployment and manufacturing, including contributions to employment in the U.S. and growth in new markets and jobs in the U.S.;
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 O: 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, 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 additives²⁹—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.

In addition to the above, the infrastructure in question must be publicly-owned or must serve a public function; privately owned infrastructure that is solely utilized for private use is not considered “infrastructure” for purposes of Buy America applicability. 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, 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:

²⁹ BIL, § 70917(c)(1).

(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 materials³⁰ 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 applies 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 a Buy America requirement 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.

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.

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>

C. DOE Submission Requirements for Full Application

³⁰ Excludes cement and cementitious materials, aggregates such as stone, sand, or gravel, or aggregate binding agents or additives.

Within the first two pages of the workplan, applicants must provide a short statement on whether the project will involve the construction, alteration, and/or repair of infrastructure in the United States. The ultimate determination about whether a project includes infrastructure remains with DOE, but the applicant's statement will assist project planning and integration of domestic preference requirements, which may impact the project's proposed budget.

D. Waivers

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 P: DEFINITION OF TECHNOLOGY READINESS LEVELS

Relative Level of Technology Development	Technology Readiness Level	TRL Definition	Description
System Operations	TRL 9	Actual system operated over the full range of expected mission conditions.	The technology is in its final form and operated under the full range of operating mission conditions. Examples include using the actual system with the full range of wastes in hot operations.
System Commissioning	TRL 8	Actual system completed and qualified through test and demonstration.	The technology has been proven to work in its final form and under expected conditions. In almost all cases, this TRL represents the end of true system development. Examples include developmental testing and evaluation of the system with actual waste in hot commissioning. Supporting information includes operational procedures that are virtually complete. An Operational Readiness Review (ORR) has been successfully completed prior to the start of hot testing.
	TRL 7	Full-scale, similar (prototypical) system demonstrated in relevant environment	This represents a major step up from TRL 6, requiring demonstration of an actual system prototype in a relevant environment. Examples include testing full-scale prototype in the field with a range of simulants in cold commissioning (1). Supporting information includes results from the full-scale testing and analysis of the differences between the test environment, and analysis of what the experimental results mean for the eventual operating system/environment. Final design is virtually complete.
Technology Demonstration	TRL 6	Engineering/pilot-scale, similar (prototypical) system validation in relevant environment	Engineering-scale models or prototypes are tested in a relevant environment. This represents a major step up in a technology's demonstrated readiness. Examples include testing an engineering scale prototypical system with a range of simulants. (1) Supporting information includes results from the engineering scale testing and analysis of the differences between the engineering scale, prototypical system/environment, and analysis of what the experimental results mean for the eventual operating system/environment. TRL 6 begins true engineering development of the technology as an operational system. The major difference between TRL 5 and 6 is the step up from laboratory scale to engineering scale and the determination of scaling factors that will enable design of the operating system. The prototype should be capable of performing all the functions that will be required of the operational system. The operating environment for the testing should closely represent the actual operating environment.

Relative Level of Technology Development	Technology Readiness Level	TRL Definition	Description
Technology Development	TRL 5	Laboratory scale, similar system validation in relevant environment	The basic technological components are integrated so that the system configuration is similar to (matches) the final application in almost all respects. Examples include testing a high-fidelity, laboratory scale system in a simulated environment with a range of simulants (1) and actual waste (2). Supporting information includes results from the laboratory scale testing, analysis of the differences between the laboratory and eventual operating system/environment, and analysis of what the experimental results mean for the eventual operating system/environment. The major difference between TRL 4 and 5 is the increase in the fidelity of the system and environment to the actual application. The system tested is almost prototypical.
Technology Development	TRL 4	Component and/or system validation in laboratory environment	The basic technological components are integrated to establish that the pieces will work together. This is relatively "low fidelity" compared with the eventual system. Examples include integration of ad hoc hardware in a laboratory and testing with a range of simulants and small-scale tests on actual waste (2). Supporting information includes the results of the integrated experiments and estimates of how the experimental components and experimental test results differ from the expected system performance goals. TRL 4-6 represent the bridge from scientific research to engineering. TRL 4 is the first step in determining whether the individual components will work together as a system. The laboratory system will probably be a mix of on hand equipment and a few special purpose components that may require special handling, calibration, or alignment to get them to function.
Research to Prove Feasibility	TRL 3	Analytical and experimental critical function and/or characteristic proof of concept	Active research and development (R&D) is initiated. This includes analytical studies and laboratory-scale studies to physically validate the analytical predictions of separate elements of the technology. Examples include components that are not yet integrated, or representative tested with simulants. (1) Supporting information includes results of laboratory tests performed to measure parameters of interest and comparison to analytical predictions for critical subsystems. At TRL 3 the work has moved beyond the paper phase to experimental work that verifies that the concept works as expected on simulants. Components of the technology are validated, but there is no attempt to integrate the components into a complete system. Modeling and simulation may be used to complement physical experiments.

Relative Level of Technology Development	Technology Readiness Level	TRL Definition	Description
Research to Prove Feasibility	TRL 2	Technology concept and/or application formulated	Once basic principles are observed, practical applications can be invented. Applications are speculative, and there may be no proof or detailed analysis to support the assumptions. Examples are still limited to analytic studies. Supporting information includes publications or other references that outline the application being considered and that provide analysis to support the concept. The step up from TRL 1 to TRL 2 moves the ideas from pure to applied research. Most of the work is analytical or paper studies with the emphasis on understanding the science better. Experimental work is designed to corroborate the basic scientific observations made during TRL 1 work.
Basic Technology Research	TRL 1	Basic principles observed and reported	This is the lowest level of technology readiness. Scientific research begins to be translated into applied R&D. Examples might include paper studies of a technology's basic properties or experimental work that consists mainly of observations of the physical world. Supporting Information includes published research or other references that identify the principles that underlie the technology.

¹ Simulants should match relevant chemical and physical properties.

² Testing with as wide a range of actual waste as practicable and consistent with waste availability, safety, ALARA, cost and project risk is highly desirable.

Source: U.S. Department of Energy, "Technology Readiness Assessment Guide". Office of Management. 2011.

APPENDIX Q: STATEMENT OF PROJECT OBJECTIVES

STATEMENT OF PROJECT OBJECTIVES

Title of Project

(Insert the title of the work to be performed. Be concise and descriptive)

This should be a standalone document that states the work to be conducted and should not include any proprietary/confidential information.

A. OBJECTIVES

Include one paragraph on the overall objective(s) of the work. Note: if the project will be performed in phases, include specific objective(s) for each phase of the work.

B. SCOPE OF WORK

This section should not exceed one-half page and should summarize the effort and approach to achieve the objective(s) of the work. Note: if the project will be performed in phases, includes specific scope statement(s) for each phase.

C. TASKS TO BE PERFORMED

This section provides a brief summary of the planned approach to this project. Tasks/subtasks, concisely written, should be provided in a logical sequence and should be divided into the phases of the project, as appropriate. Proper project controls such as milestones, go/no-go decision points, and other metrics should be included in the task structure. In writing the Statement of Project Objectives (SOPO), avoid 1) the use of proper nouns to minimize SOPO modifications in the event of changes to the project team, facilities, etc.; 2) figures and equations; 3) references to other documents and publications; and 4) details about past work and discussion of technical background (which should be covered elsewhere in the application technical volume). Applicants should only provide sufficient task and subtask detail to support the major project activities and objectives. Subtasks do not need to be discussed at the work package or activity level. A work package is defined as the effort required to produce a deliverable within a project, which may be a single task or it could be several related tasks.

Task 1.0 - Project Management and Planning (REQUIRED; APPLICANT INSERT THIS TASK)

Subtask 1.1 - Project Management Plan (REQUIRED; APPLICANT INSERT THE LANGUAGE PROVIDED BELOW IN QUOTES)

“The Recipient shall manage and direct the project in accordance with a Project Management Plan to meet all technical, scope, schedule and budget objectives and requirements. The Recipient will coordinate activities in order to effectively accomplish the work. The Recipient will ensure that project plans, results, and decisions are appropriately documented, and project reporting and briefing requirements are satisfied.

The Recipient shall update the Project Management Plan 30 days after award and as necessary throughout the project to accurately reflect the current status of the project. Examples of when it may be appropriate to update the Project Management Plan include: (a) project management policy and procedural changes; (b) changes to the technical, cost, and/or schedule baseline for the project; (c) significant changes in scope, methods, or approaches; or (d) as otherwise required to ensure that the plan is the appropriate governing document for the work required to accomplish the project objectives.

Management of project risks will occur in accordance with the risk management methodology delineated in the Project Management Plan in order to identify, assess, monitor and mitigate technical, uncertainties as well as schedule, budgetary and environmental risks associated with all aspects of the project. The results and status of the risk management process will be presented during project reviews and in periodic progress reports with emphasis placed on the medium- and high-risk items.

The Recipient is also required to implement the project in accordance with the negotiated Community Benefits Plan (CBP). It is expected that key milestones associated with the DEIA portion of the CBP will be incorporated into the milestone log as part of the overall Workplan. The final technical report shall include updates on the progress and challenges throughout the course of the award”.

Subtask 1.2 – Community Benefits Plan (REQUIRED; APPLICANT INSERT THE LANGUAGE PROVIDED BELOW IN QUOTES AND CONTINUE TO COMPLETE. REFERENCE SECTION 1:D FOR SUGGESTED FORMAT.)

Task 2.0 - Community Benefits Plan (REQUIRED; APPLICANT INSERT THE LANGUAGE PROVIDED BELOW IN QUOTES AND CONTINUE TO COMPLETE. REFERENCE SECTION 1:D FOR SUGGESTED FORMAT.)

“The Recipient will implement, evaluate, and update their Community Benefits Plan throughout the life of the project. The Recipient will report on their Community Benefits Plan progress and outcomes throughout the project lifecycle and the topical and final reports.”

APPLICANT continue with tasks/sub-tasks as necessary. If the project is structured in Phases, clearly delineate which tasks/subtasks are in each Phase.

Task descriptions should include a concise description of the work to be conducted for each task. If the task includes subtasks, provide a general description of how each subtask is related to the overall scope of the task.

Subtask 2.1 - (Title)

Subtask descriptions should include a concise description of the work to be conducted for each subtask.

Subtask 2.2 - (Title)

Task 3.0 – Carbon Capture FEED Study

Task 4.0 – Pipeline FEED Study (if applicable)

Task 5.0 – Storage Field Development Plan

Task 6.0 - Environmental Information Volume

Task 7.0 - Permits for Carbon Storage

(Continued task numbering)

- D. DELIVERABLES** (Required: Applicant insert the Language provided below in quotes and continue to complete.)

“The periodic and final reports shall be submitted in accordance with the “Federal Assistance Reporting Checklist” and the instructions accompanying the checklist. In addition to the reports specified in the “Federal Assistance Reporting Checklist”, the Recipient must provide the following to the DOE Project Manager (identified in Block 15 of the Assistance Agreement as the Program Manager).”

“The following guidance applies to all tasks performed under this FOA:

- In accordance with Executive and DOE Orders, any data products generated as a result of federally funded research and development shall be provided to NETL for inclusion in the Energy Data eXchange (EDX), <https://edx.netl.doe.gov/>. The data owner should work with its OCED Federal Project Manager to assess if there is data that should be submitted to EDX and identify the proper file formats prior to submission. Data products resulting from federally funded research and development include but are not limited to software code, tools, applications,

webpages, portfolios, images, videos, and datasets.

- It is strongly encouraged that all published project deliverables obtain an OSTI Digital Object Identifier (DOI) to ensure more visibility in other search repositories (i.e., osti.gov, data.gov, Google Scholar, etc.). EDX has a custom-built API within the standard contribution workflow that allows contributors the option for obtaining an OSTI DOI by completing just a few additional fields.
- If there are questions about contributions to EDX, the Project Directors should work with their Federal Project Manager. EDX help information is also available at <https://edx.netl.doe.gov/about> or edxsupport@netl.doe.gov.

Common Data Product Submission Formats: ASC, AmiraMesh, AVI, CAD, CSV, DAT, DBF, DOC, DSV, DWG, GIF, HDF, HTML, JPEG2000, JPG, MOV, MPEG4, MSH/CAS/DAT, NetCDF, PDF, PNG, PostScript, PPT, RTF, Surface, TAB, TIFF, TIFF Stacks, TXT, XLS, XML, Xradio, ZIP, and others.

Geographic Formats: APR, DBF, DEM, DLG, DRG, DXF, E00, ECW, GDB, GeoPDF, GeoTIFF, GML, GPX, GRID, IMG, KML, KMZ, MDB, MrSID, SHP, and others.”

Task / Subtask Number	Deliverable Title	Target Due Date (or when complete)
1.1	Project Management Plan (PMP)	Update due 30 days after award to DOE Project Manager. Revisions shall be submitted as requested by the DOE Project Manager.
X.0	Community Benefits Plan	Update due 30 days after award to DOE Project Manager. Revisions shall be submitted as requested by the DOE Project Manager.
X.0	Environmental Information Volume (EIV)	Due 6 months after award to DOE Project Manager. Revisions shall be submitted as required by the DOE Project Manager.
X.0	Initial Engineering Design Package	Due 6 months after the project start to DOE Project Manager.
X.0	Final Engineering Design Package	Due 90 days prior to project completion to DOE Project Manager.
X.0	Carbon Capture FEED Study	Due 90 days prior to project completion to DOE Project Manager.
X.0	Carbon Oxides Pipeline FEED Study (if applicable)	Due 90 days prior to project completion to DOE Project Manager.
X.0	Storage Field Development Plan	Due 90 days prior to project completion to DOE Project Manager.
X.0	Required Permit Applications for UIC Class VI Permit to Construct for the selected carbon storage site.	Due at project completion for inclusion in Final Report.

X.0	Environmental Health and Safety (EH&S) Assessment	Due at project completion for inclusion in Final Report.
X.0	Life Cycle Analysis (LCA)	Due at project completion for inclusion in Final Report.

APPLICANT continue to identify deliverables (other than those identified on the “Federal Assistance Reporting Checklist”) that will be delivered using the format provided in the table above. Ensure the delivery date to DOE is also identified. For examples: Delivery to DOE X months after completion of task/subtask X.

NOTE: If the application is selected for award, DOE may require the Recipient to include additional deliverables, provided that such deliverables are consistent with the budget, schedule, and scope of the project.

E. BRIEFINGS/TECHNICAL PRESENTATIONS (Required: Applicant insert the language provided below in quotes and continue to complete.)

“The Recipient shall prepare detailed briefings for presentation to the DOE Project Manager either at a face-to-face meeting or through virtual means. The Recipient shall make a presentation to the DOE Project Manager at a project kick-off meeting held within ninety (90) days of the project start date. At a minimum, annual briefings shall also be given by the Recipient to explain the plans, progress, and results of the technical effort and a final project briefing at the close of the project shall also be given.”

At the Applicant’s discretion, other briefings/presentations may be added to Section E of the SOPO.

NOTE: If the application is selected for award, DOE may require the Recipient to include additional briefings/presentations, provided that such briefings/presentations are consistent with the budget, schedule, and scope of the project.

APPENDIX R: RESERVED

APPENDIX S: LIST OF ACRONYMS

AFE	Authorizations for Expenditures
ANC	Alaska Native Corporations
BiCRS	Biomass with Carbon Capture and Storage
BIL	Bipartisan Infrastructure Law
CBP	Community Benefits Plan
CCS	Carbon Capture and Storage
CFR	Code of Federal Regulations
CHP	Combined Heat and Power
COI	Conflict of Interest
CRADA	Cooperative Research and Development Agreement
DEC	Determination of Exceptional Circumstances
DEIA	Diversity, Equity, Inclusion, and Accessibility
DMP	Data Management Plan
DOE	Department of Energy
DOL	Department of Labor
EA	Environmental Assessment
EH&S	Environmental Health and Safety
EIS	Environmental Impact Statement
EIV	Environmental Informational Volume
EPAct	Energy Policy Act
EPC	Engineering, Procurement, and Construction
FAR	Federal Acquisition Regulation
FECM	Fossil Energy and Carbon Management
FFATA	Federal Funding and Transparency Act of 2006
FEED	Front-End Engineering Design
FFRDC	Federally Funded Research and Development Center
FOA	Funding Opportunity Announcement
GHG	Greenhouse Gas
GWP	Global Warming Potential
HBCUs	Historically Black Colleges and Universities
IIJA	Infrastructure Investment and Jobs Act
IPMP	Intellectual Property Management Plan
IPS	Integrated Project Schedule
IRA	Inflation Reduction Act
LCA	Life Cycle Analysis
LCOE	Levelized Cost of Electricity
MOU	Memorandum of Understanding
MPIN	Marketing Partner ID Number
MSI	Minority-Serving institution
NDA	Non-Disclosure Acknowledgement
NEPA	National Environmental Policy Act
NETL	National Energy Technology Laboratory

NG	Natural Gas
NGCC	Natural Gas Combined Cycle
NNSA	National Nuclear Security Agency
NSF	National Science Foundation
OCED	Office of Clean Energy Demonstrations
OCR	Office of Civil Rights
OMB	Office of Management and Budget
OMI	Other Minority Institutions
OSTI	Office of Scientific and Technical Information
PD	Project Director
PII	Personal Identifiable Information
PMP	Project Management Plan
QA/QC	Quality Assurance/Quality Control
R&D	Research and Development
RD&D	Research, Development, and Demonstration
SAM	System for Award Management
SOPO	Statement of Project Objectives
SMART	Specific, Measurable, Achievable, Relevant, and Timely
SMR	Steam Methane Reforming
STEM	Science, Technology, Engineering, and Mathematics
TA	Topic Area
TAA	Technical Assistance Agreement
TEA	Techno-Economic Analysis
TRL	Technology Readiness Level
UCC	Uniform Commercial Code
UEI	Unique Entity Identifier
UIC	Underground Injection Control
WBS	Work Breakdown Structure
WP	Work Proposal