FINANCIAL ASSISTANCE
FUNDING OPPORTUNITY ANNOUNCEMENT

Department of Energy (DOE)
National Energy Technology Laboratory (NETL)
Office of Fossil Energy and Carbon Management (FECM)
Environmental Protection Agency (EPA)

Inflation Reduction Act (IRA) – Methane Emissions Reduction Program Oil and Gas Methane Monitoring and Mitigation

Funding Opportunity Announcement (FOA) Number: DE-FOA-0003256
FOA Type: Initial
Assistance Listing Number: 81.089 (Fossil Energy Research and Development)

FOA Issue Date:	06/21/2024
Submission Deadline for Full Applications:	08/26/2024 5:00pm ET
Expected Date for DOE Selection Notifications:	December 2024
Expected Timeframe for Award Negotiations:	December 2024

Registration Requirements

- To apply to this FOA, applicants must register with and submit application materials through Grants.gov at: https://www.grants.gov/.

- 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. It is imperative that the applicant/selectee be responsive during award negotiations and meet negotiation deadlines. Failure to do so may result in cancelation of further award negotiations and rescission of the selection.

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 with Grants.gov, and register with FedConnect.net to submit questions). 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.

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

- **SAM** – Each applicant is required to: (1) register in the SAM at https://www.sam.gov/ before submitting an application; (2) provide a valid UEI number in the application; and (3) 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 (unless the applicant is exempt from those requirements under 2 CFR 25.110). DOE may make a Federal award to an applicant until the applicant has complied with all applicable UEI and SAM requirements. If an applicant has not fully complied with the requirements by the time DOE is ready to make a Federal award, DOE will determine that the applicant is not qualified to receive a Federal award and use that determination as a basis for making a Federal award to another applicant.

  NOTE: If clicking the SAM links do not work, please copy and paste the link into your browser.

  Due to the high demand of SAM registrations and UEI requests, entity legal business name and address validations are taking longer than expected to process. Entities should start the SAM and UEI registration process as soon as possible. If entities have technical difficulties with the SAM registration or UEI validation 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.

- **UEI** - Each applicant is required to: (1) register in the SAM at https://www.sam.gov before submitting an application; (2) provide a valid UEI in the application; and (3) 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 (unless the applicant is excepted from those requirements under 2 CFR 25.110). DOE may not make a federal award to an applicant until the applicant has complied with all applicable UEI and SAM requirements. If an applicant has not fully complied with the requirements by the time DOE is ready to make a federal award, DOE will determine that the applicant is not qualified to receive a federal award and use that determination as a basis for making a federal award to another applicant.

- **NOTE: Due to the high number 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 use the HELP feature on SAM.gov. SAM.gov will address 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.**

  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. Full registration in SAM is not required to obtain an UEI for subaward reporting.

- **Grants.gov** – Applicants must register with Grants.gov at https:www.grants.gov/register to set up your WorkSpace. An applicant cannot submit an application through Grants.gov unless an applicant is registered. Please read the registration requirements carefully and start the process immediately.

  1) The Authorized Organizational Representative (AOR) must register at: https://www.grants.gov/register.

  2) An email is sent to the E-Business (E-Biz) POC listed in SAM.

     More information about the registration steps for Grants.gov is provided at: https://apply07.grants.gov/help/html/help/index.htm?callingApp=custom#callingApp=custom&t=Register%2FRegister.html.

     In addition:
     - Add a Profile to a Grants.gov Account: A profile in Grants.gov corresponds to a single applicant organization the user represents (i.e., an applicant) or an individual applicant. If you work for or consult with multiple organizations and have a profile for each, you may log in to one Grants.gov account to access all of

your grant applications. To add an organizational profile to your Grants.gov account, enter the UEI for the organization in the UEI field while adding a profile. For more detailed instructions about creating a profile on Grants.gov, refer to: https://apply07.grants.gov/help/html/help/index.htm?callingApp=custom#callingApp=custom&t=Register%2FAddProfile.htm&rhsearch=Add%20a%20profile.

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

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

Questions relating to the **registration process, system requirements, or how an application form works** must be directed to Grants.gov at 1-800-518-4726 or support@grants.gov.

- **FedConnect.net** – Applicants must register with FedConnect to submit questions. FedConnect website: https://www.fedconnect.net/

  See Section IV. for Application and Submission Information (including how to create a WorkSpace).

SUMMARY OVERVIEW OF KEY INFORMATION

Issuing Agency	Department of Energy - National Energy Technology Laboratory (Office of Fossil Energy and Carbon Management [FECM]) on behalf of Environmental Protection Agency (EPA)
Program Overview	This FOA aligns with DOE's Office of Resource Sustainability's Methane Emissions Mitigation and Quantification Program to minimize emissions of methane during production, processing, and transportation across the oil and natural gas industry, with the goal of eliminating methane emissions from carbon-based fuel supply chains by 2030. Effective methane emissions mitigation strategies are dependent upon accurate quantification of both intentional and fugitive emissions from all elements across the natural gas infrastructure, including low producing oil and gas wells. Therefore, there is a continual need to maintain a state-of-the-industry understanding methane emissions mitigation opportunities and operation performance, through collection of empirical data, across oil and natural gas production and delivery regions of the United States. This is to maximize the value of these efforts to the public with the goals of reducing GHG emissions and improving environmental health and engagement of the affected public, (largely in disadvantaged or frontline communities).
Objective	The FOA objective is to make funds available to a variety of entities for the purpose of mitigating methane emissions from marginal conventional wells (MCWs) and other oil and natural gas assets; accelerating the commercialization, scale-up and application of innovative methane emissions reduction technologies; and advancing the characterization and reduction of methane emissions through multi-scale, measurement-informed data collection and analysis.

Areas of Interest (AOI)	• Area of Interest 1 – Methane Emissions Reduction from Existing Wells and Infrastructure (with three (3) Sub AOIs):
	  o Reducing Methane Emissions from Marginal Conventional Wells;
	  o Reducing Methane Emissions from Small Operators' Wells and Other Oil and Natural Gas Assets;
	  o Reducing Methane Emissions from Marginal Conventional Wells and Oil and Gas Assets on Tribal Lands
	
	• Area of Interest 2 – Accelerating Deployment of Methane Emissions Reduction Solutions (with three (3) Sub AOIs):
	  o Field Deployment of Engine and Compressor Methane Reduction Technologies;
	  o Field Deployment of Gas Flaring Reduction Technologies;
	  o Field Deployment of Emissions Reduction Technologies at Oil and Gas Production Facilities

- Area of Interest 3 – Accelerating Deployment of Methane Emissions Monitoring Solutions (with two (2) Sub AOIs);
    - Improving Access to Monitoring Data for Impacted Communities;
    - Regional Methane Emissions Characterization

Eligible Applicants See Section III.A. of the FOA.

Funding It is anticipated this FOA will provide approximately $850,000,000 in federal funding available for new awards, subject to the availability of appropriated funds.

- AOI 1a: approximately $300,000,000 in Federal funding; no cost share requirement;
- AOI 1b: approximately $210,000,000 in Federal funding; no cost share requirement;
- AOI 1c: approximately $50,000,000 in Federal funding; no cost share requirement;
- AOI 2a: approximately $60,000,000 in Federal funding; 20% cost share requirement;
- AOI 2b: approximately $60,000,000 in Federal funding; 20% cost share requirement;
- AOI 2c: approximately $30,000,000 in Federal funding; 20% cost share requirement;
- AOI 3a: approximately $40,000,000 in Federal funding; no cost share requirement;
- AOI 3b: approximately $100,000,000 in Federal funding; no cost share requirement

Deadlines Full Application Due Date: August 26, 2024 5:00pm ET

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I. Funding Opportunity Description

A. Background and Context

In November 2021, President Biden unveiled the U.S. Methane Emissions Reduction Action Plan redoubling efforts to dramatically reduce U.S. methane emissions while simultaneously cutting consumer costs, protecting workers and communities, growing jobs, and promoting U.S. technology innovation. Aligned with this action was the Administration's pledge the United States would work with global partners through the Global Methane Pledge to reduce the world's methane emissions 30% from 2020 levels by 2030. Second to emissions of carbon dioxide (CO_2), methane emissions are the largest contributor to climate change.

The U.S. Methane Emissions Reduction Action Plan is an ambitious, whole-of-government initiative using all available tools – regulations, financial incentives, transparency and disclosure of data, and public and private partnerships – to identify and cost-effectively reduce methane emissions from all major sources, including those from the oil and natural gas industry, the largest industrial source of methane emissions in the United States, responsible for approximately 28% of total methane emissions.[1] The Administration's targets include a 50 percent reduction in greenhouse gas emissions by 2030[2], 100 percent carbon pollution-free electricity sector by 2035, and net-zero emissions by 2050. These aggressive emissions reduction targets will be met, in part, by advancing technologies reducing and potentially eliminating methane emissions associated with the production and transmission of oil and natural gas. Natural gas emissions mitigation is dependent on our ability to quantify and minimize emissions of methane within the natural gas production, processing, transport, and end use sectors.

In August 2022, Congress passed, and President Biden signed the Inflation Reduction Act of 2022 into law. The Inflation Reduction Act makes a historic commitment to build a new clean energy economy, powered by American innovators, American workers, and American manufacturers, creating high-paying and stable jobs and cut the pollution fueling the climate crisis and driving environmental injustice.

[1] https://www.epa.gov/ghgemissions/overview-greenhouse-gases
[2] FACT SHEET: President Biden Sets 2030 Greenhouse Gas Pollution Reduction Target Aimed at Creating Good-Paying Union Jobs and Securing U.S. Leadership on Clean Energy Technologies | The White House

Section 60113 of the Inflation Reduction Act ("Methane Emissions Reduction Program") amended the Clean Air Act (CAA) by adding section 136 entitled "Methane Emissions and Waste Reduction Incentive Program for Petroleum and Natural Gas Systems" (also referred to as the Methane Emissions Reduction Program) (codified at 42 U.S.C. 7436). CAA section 136 gives EPA the authority, and $1.55 billion in funding, to award grants, rebates, contracts, loans, and other activities for the purpose of providing financial and technical assistance to reduce methane and other greenhouse gas emissions from petroleum and natural gas systems.

i. Program Purpose

In July 2023, EPA entered into an interagency agreement (amended in June 2024) with NETL to provide technical and management support for $1.36 billion through both grant awards to state-based regulatory organizations for voluntary and permanent plugging and abandonment of marginal conventional wells (MCWs)[3], and a competitive solicitation related to the deployment of methane measurement, monitoring, quantification, and mitigation technologies, tools, and processes.

Under the interagency agreement, the U.S. Department of Energy (DOE) is partnering with EPA to release this FOA making funds available to a variety of stakeholders for the purpose of mitigating methane emissions from MCWs and other oil and natural gas assets; accelerating the commercialization, scale-up, and application of innovative methane emissions reduction technologies; and advancing the characterization and reduction of methane emissions through multi-scale, measurement-informed data collection and analysis.

This FOA aligns with DOE's Office of Resource Sustainability's Methane Emissions Mitigation and Quantification Program to minimize emissions of methane during production, processing, and transportation across the oil and natural gas industry, with the goal of eliminating methane emissions from carbon-based fuel supply chains by 2030. Effective methane emissions mitigation strategies are dependent upon accurate quantification of both intentional and fugitive emissions from all elements across the natural gas infrastructure, including low producing oil and gas wells. Therefore, there is a continual need to maintain a state-of-the-industry understanding of methane emissions mitigation opportunities and operation performance, through collection of empirical data, across oil and natural gas production and delivery regions of the United States.

[3] Idle or producing vertical or slightly deviated oil or natural gas well (excludes highly deviated or horizontal wells) with a known owner / operator producing less than or equal to 15 barrels of oil equivalent per day (BOED) or 90 thousand cubic feet (Mcf) gas per day over the prior 12-month period.

This is to maximize the value of these efforts to the public with goals of reducing GHG emissions and improving environmental health and engagement of the affected public (largely in disadvantaged or frontline communities).

This FOA supports the Administration goals laid out above by funding efforts to reduce methane and other greenhouse gas emissions associated with the oil and natural gas supply chain—supporting the Administration's three goals of reducing greenhouse gas emissions by 50 percent by 2030, 100 percent carbon pollution-free electricity sector by 2035, and net-zero carbon emissions economy by 2050. A principal objective of the Administration's goals is to reduce and eventually eliminate methane emissions from all sources within the oil and natural gas supply chain.

As part of the whole-of-government approach to advance equity and encourage worker organizing and collective bargaining,[4, 5, 6] this FOA and any related activities will seek to encourage meaningful engagement and participation of workforce organizations, including labor unions, as well as underserved groups and disadvantaged communities, including Federally Recognized Indian Tribes. Consistent with Executive Order 14008,[7] this FOA is designed to help meet the goal that 40% of the overall benefits of certain Federal investments flow to disadvantaged communities, as defined by the Climate and Economic Justice Screening Tool, pursuant to the Executive Order[8], and to drive creation of accessible, good-paying jobs with the free and fair chance for workers to join a union.

ii. Technology Space and Strategic Goals

Among other sources, approximately 221 million metric tonnes (MMT) of carbon dioxide equivalent (CO_2e)[9] of methane are emitted across the oil and natural gas value chain[10] , which consists of more than two million miles of pipelines; more than four million[11] actively producing, abandoned, or repurposed oil and natural gas wells; and more than 10,000[12] unit operations consisting of natural gas processing plants, compressor stations, and gathering stations.

[4] EO 13985, "Advancing Racial Equity and Support for Underserved Communities Through the Federal Government" January 20, 2021. EO 14091, "Further Advancing Racial Equity and Support for Underserved Communities Through the Federal Government, February 16, 2023.
[5] EO 14025, "Worker Organizing and Empowerment," April 26, 2021.
[6] EO 14052, "Implementation of the Infrastructure Investment and Jobs Act," November 18, 2021.
[7] EO 14008, "Tackling the Climate Crisis at Home and Abroad," January 27, 2021.
[8] The Justice40 initiative, established by EO 14008, sets a goal that 40% of the overall benefits of certain federal investments flow to disadvantaged communities. Consistent with Justice40 guidance, DOE recognizes disadvantaged communities as the census tracts defined and identified as disadvantaged by the Climate and Economic Justice Screening Tool (CEJST), located at https://screeningtool.geoplatform.gov/, as well as all Federally Recognized Tribes (whether or not they have land). See https://www.whitehouse.gov/wp-content/uploads/2023/01/M-23-09_Signed_CEQ_CPO.pdf.
[9] https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2022
[10] https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2022
[11] https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2022
[12] https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2022

Facilities emitting greater than 25,000 metric tons of CO_2e are required to report their emissions to the U.S. EPA Greenhouse Gas Reporting Program (GHGRP). Data reported to the GHGRP from approximately 8,000 facilities, including both direct emitters and upstream suppliers combined, cover 85-90 percent of the total U.S. greenhouse gas emissions.[13]

In addition to data reported to the GHGRP, other inputs including sources not covered by the GHGRP are used to develop the national-level Inventory of U.S. Greenhouse Gas Emissions and Sinks (GHGI). The 2024 GHGI reported 2022 (most recent year of data availability) emissions, which included methane emissions of about 173.1 MMT CO_2e attributed to natural gas systems (Table 1) and 39 MMT CO_2e attributed to petroleum systems (Table 2). In addition, 8.5 MMT CO_2e is attributed to abandoned oil and gas wells (data from table 3-108 of 2024 GHGI, not included in the tables below).[14] The bulk of these emissions come from the production, transmission, and storage portions of the oil and natural gas supply chains.

CH_4 Emissions from Natural Gas Systems (MMT CO_2 Eq.)	
Exploration	**0.2**
Production	**89.7**
Onshore Production	*46.2*
Gathering and Boosting	*42.8*
Offshore Production	*0.6*
Processing	**15.1**
Transmission and Storage	**39.6**
Distribution	**15.2**
Post-Meter	**13.4**
Total	**173.1**

Table 1: 2022 US Methane Emissions, Natural Gas Systems Overview.
Source emissions data adapted from Table 3-73 of the 2024 GHGI inventory (chapter 3). Values may not add up to Total Emissions due to rounding calculations.

[13] GHGRP 2022: Reported Data, 2022 GHGRP Overview Report.
[14] EPA uses a GWP-100 of 28 (EPA, 2021d) in its U.S. Inventory of Greenhouse Gas Emissions and Sinks, consistent with Paris Agreement reporting requirements.

CH_4 Emissions from Petroleum Systems (MMT CO_2 Eq.)	
Exploration	**0.1**
Production	**38.6**
Onshore Production	*33.5*
Offshore Production	*5.1*
Crude Oil Transportation	**0.2**
Refining	**0.7**
Total	**39.6**

Table 2: 2022 US Methane Emissions, Petroleum Systems Overview.
Source emissions data adapted from Table 3-44 of the 2024 GHGI inventory (chapter 3). Values may not add up to Total Emissions due to rounding calculations.

A leading challenge associated with mitigating methane emissions from the oil and natural gas value chain is the complexity of these systems and the magnitude of the number of individual operating components widely distributed across all corners of the country. EPA has estimated significant upstream methane emissions come from point sources such as pneumatic controllers (gas pressure driven valve controllers releasing small amounts of methane every time the valve is opened or closed), gathering and boosting stations (which include compression, dehydration, and transportation components), compressors located along the supply chain used to boost in-line pressure for transmission, combustion slip within gas powered engines used to transport or produce natural gas, and storage tanks on well pads. A relatively large number of other individual types of equipment and operational activities account for the rest of the emissions, including flaring of associated gas where infrastructure or economics are insufficient for transport and utilization.

EPA estimates the sectors responsible for the largest amount of methane emissions are the production sectors for both petroleum (38.6 MMTCO2e in 2022) and natural gas systems (89.7 MMTCO2e in 2022). Production sector emissions account for 98.9 percent of all emissions within the petroleum system and 51.8 percent of emissions within the natural gas system. The transmission and storage sector of the natural gas systems account for 22.3 percent of all natural gas system emissions. Refining from petroleum systems and processing from natural gas systems are the other two sectors composing the majority of the remaining emissions from each system. Refining accounts for 1.7 percent of emissions within petroleum system, while processing accounts for 8.7 percent of emissions within natural gas systems.

iii. Objectives

This FOA seeks applications for mitigating methane emissions from MCWs and other oil and natural gas assets; accelerating the commercialization, scale-up and application of innovative methane emissions reduction technologies; and advancing the characterization and reduction of methane emissions through multi-scale, measurement-informed data collection and analysis to monitor and mitigate methane emissions from the oil and natural gas production sector. Specifically, the overall objectives of this FOA are to:

1. Reduce methane emissions to near-zero levels from oil and natural gas operations using commercially available technology solutions for methane emissions mitigation, monitoring, measurement, and quantification[15]. In all Areas of Interest (AOIs), quantification of methane emissions using direct methane measurements is desired. In instances where direct quantification of an emission rate is not feasible, measured data from various sources combined with an established emission rate estimation methodology is an acceptable option. Where remote sensing is used, methane emissions quantification from measured concentration data must be transparent, with documentation of inputs, models applied, and assumptions.

2. Accelerate the repair of methane leaks from low-producing wells and deployment of early-commercial technology solutions to reduce methane emissions from new and existing equipment such as natural gas compressors, gas-fueled engines, associated gas flares, liquids unloading operations, handling of produced water and other equipment leakage.

3. Accelerate community participation in monitoring and access to data, and enhance local and regional characterization of methane emissions through the continued implementation of multi-scale methane monitoring and quantification technologies and approaches across the oil and natural gas producing regions of the U.S. to provide public-facing datasets available to operators, regulators, and other key entities, in addition to informing

[15] **Mitigation:** Reducing the risk of loss of methane from chronic and acute emissions sources through the replacement or modification of oil and natural gas assets, or modification of operating procedures.

Monitoring: Observing the level of methane emissions associated with routine and non-routine operations, through a combination of detection or sensing and measurement devices, with the intent of utilizing the gathered information or data for mitigation or reporting purposes.

Measurement: Evaluating the variance or flux of methane emissions in comparison to baseline atmospheric conditions to determine the methane concentrations (e.g., mass/time, ppm) related to routine or non-routine operations.

Quantification: Directly measuring or indirectly calculating methane emission concentrations and rates of emissions using suitable and proven technologies or algorithms for a facility, well pad, piece of equipment, or other operational component both spatially and temporally. Specific to AOI 1, quantification and health effects in low-income and disadvantaged communities should be utilized for mitigation prioritization as well as for post-mitigation confirmation of methane emissions reduction.

emissions estimates such as those in the GHGI, and leading to broad emissions mitigation.

Within the context of each of the above objectives, this FOA is expected to achieve measurable positive impacts with respect to skilled workforce training and development, and environmental justice[16] through community involvement.

Accordingly, this FOA has three (3) Areas of Interest (AOIs) aligned with these objectives. The AOIs, listed below, are described in detail in Section I.B.

The AOIs of this Announcement are:

- AOI 1 – Methane Emissions Reduction from Existing Wells and Infrastructure, with three (3) sub AOI's
- AOI 2 – Accelerating Deployment of Methane Emissions Reduction Solutions, with three (3) sub AOI's
- AOI 3 – Accelerating Deployment of Methane Emissions Monitoring Solutions, with two (2) sub AOI's

Detailed technical descriptions of the specific Areas of Interest are provided in the following sections.

B. Areas of Interest

i. Area of Interest 1: Methane Emissions Reduction from Existing Wells and Infrastructure

Within the U.S., approximately 7% to 8% of oil and natural gas production is generated from approximately 770,000 MCWs. While MCWs account for a small volume of production in the U.S., they make up the vast majority (79%) of all wells (Figure 5). **For the purposes of this FOA, an MCW is defined as an idle or producing vertical or slightly deviated oil or natural gas well (excludes highly deviated or horizontal wells) with a known owner / operator producing less than or equal to 15 barrels of oil equivalent per day (BOED) or 90 thousand cubic feet (Mcf) gas per day over the prior 12-month period**.

[16] Executive Order 14096 "Revitalizing Our Nation's Commitment to Environmental Justice for All" defines environmental justice as "Environmental justice" means the just treatment and meaningful involvement of all people, regardless of income, race, color, national origin, Tribal affiliation, or disability, in agency decision-making and other Federal activities that affect human health and the environment so that people: are fully protected from disproportionate and adverse human health and environmental effects (including risks) and hazards, including those related to climate change, the cumulative impacts of environmental and other burdens, and the legacy of racism or other structural or systemic barriers; and, have equitable access to a healthy, sustainable, and resilient environment in which to live, play, work, learn, grow, worship, and engage in cultural and subsistence practices.

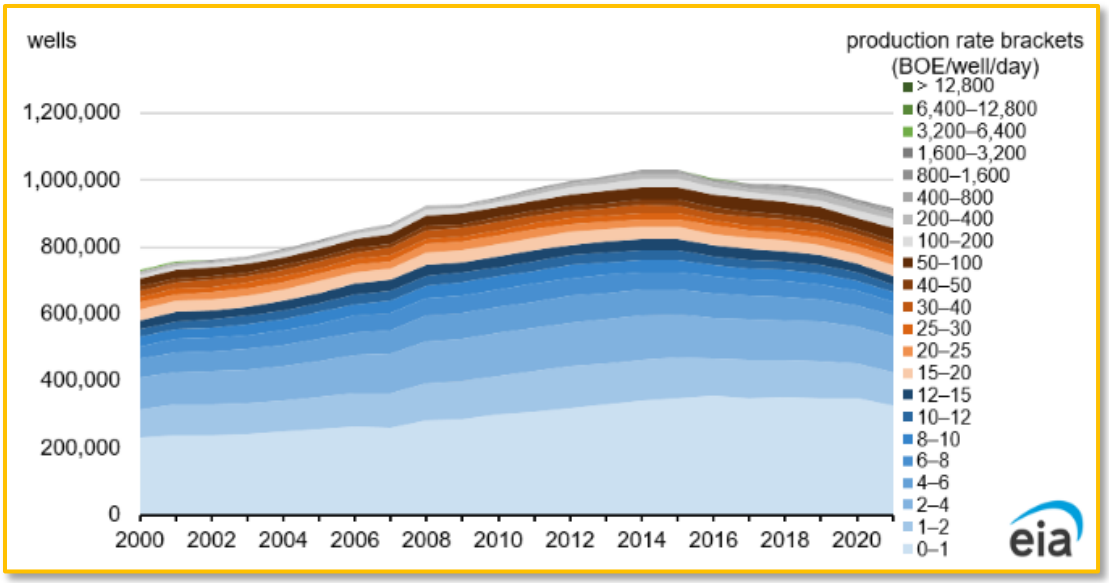


Figure 5: Production Rate by bracket for all producing wells in the US Energy Information Administration (EIA)[17]

Recent studies have shown MCWs tend to have a higher methane leak rate, as emissions, than other wells. The top 15% of MCWs, based on methane loss rate, that were monitored in a recent study showed that their emissions rates exceeded 32% of their methane production. Furthermore, the top 5% of MCWs, based on methane loss rate, in that study exhibited methane emission rates of >90% of their production.[18]

With over 770,000 MCWs in the U.S. and disproportionally high emissions rates, there is a need for the EPA/DOE collaboration to focus on the elimination or reduction of emissions from MCWs. This AOI focuses, in large part, on methane emissions from MCWs by utilizing commercially available technologies and necessary modifications to reduce emissions from oil and natural gas production and transportation sources. The primary foci will be to eliminate and reduce emissions from MCWs and other low producing wells and associated infrastructure with high methane emission intensity.

To transport natural gas from well sites, the gas is initially placed into gathering lines, eventually leading to downstream customers. In the U.S., there are more than 2.5 million miles of pipelines, including gathering, transmission and distribution systems,[19] and 1,650 compressor stations.[20]

[17] https://www.eia.gov/petroleum/wells/
[18] https://www.nature.com/articles/s41467-022-29709-3
[19] https://primis.phmsa.dot.gov/comm/PipelineBasics.htm#:~:text=The%20energy%20transportation%20network%20of,3%2C000%20companies%2C%20large%20and%20small
[20] Michael Hendryx, Juhua Luo, Natural gas pipeline compressor stations: VOC emissions and mortality rates, The Extractive Industries and Society, Volume 7, Issue 3, 2020, Pages 864-869, ISSN 2214-790X, https://doi.org/10.1016/j.exis.2020.04.011

A gathering system typically includes multiple pipelines brought together at a central point, which can be a compressor station, storage facility, processing point, larger pipeline, or sales point. A gathering system can consist of a small handful of wells and pipelines or can include hundreds of miles of pipelines and hundreds of producing wells.[21] Generally, compressor stations are positioned every 25 to 100 miles along natural gas transmission systems to ensure efficient operations. In 2022, it was estimated in the U.S. there was 29.2 trillion cubic feet of natural gas transported via pipeline.[22]

It is anticipated more than 10,000 repairs could be made across the oil and gas infrastructure under AOI 1.

a. Area of Interest 1a: Reducing Methane Emissions from Marginal Conventional Wells

i. Objectives and Background (AOI 1a)

The objective of AOI 1a is to enable and accelerate methane emissions mitigation from MCWs by measuring, prioritizing, and voluntarily reducing methane emissions. Methane mitigation efforts are to include but not be limited to: 1.) upstream operational improvements, 2.) identification and repair of leak sources, 3.) training skilled workforce on measurement and mitigation procedures, 4.) installation of new leak preventive technologies (e.g., zero bleed pneumatic controllers, tank leak prevention technologies), 5.) voluntary plugging of high emitting MCWs on non-federal lands.

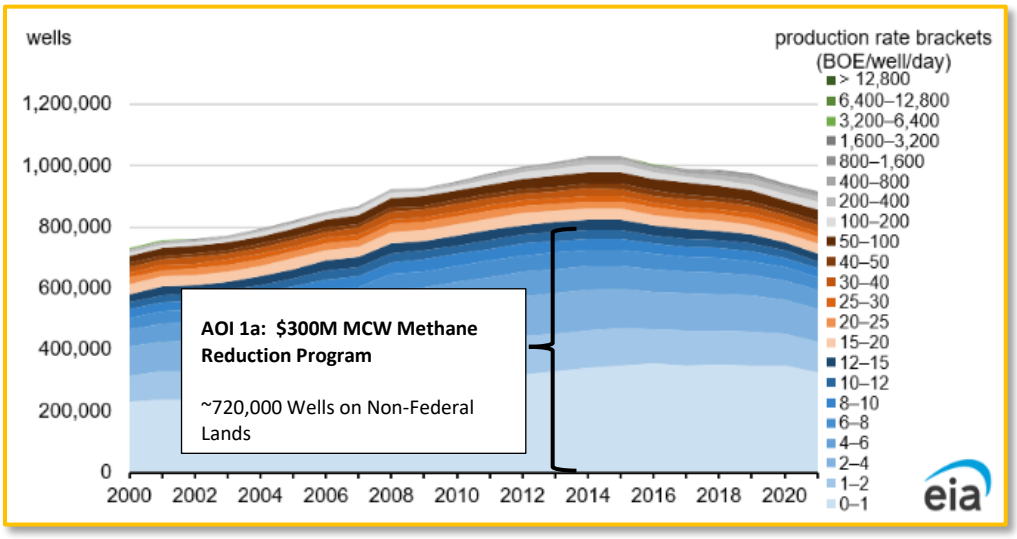


Figure 6: BOE Production by bracket and the impact of AOI 1a

[21] Midstream 101: Gas gathering, Williams, https://www.williams.com/2016/03/10/midstream-101-gas-gathering/
[22] Natural gas explained, Natural gas pipelines, https://www.eia.gov/energyexplained/natural-gas/natural-gas-pipelines.php

These mitigation activities are expected to fully eliminate methane emissions from voluntarily plugged and abandoned MCWs and significantly reduce methane emissions from retrofitted and repaired MCWs owned by small operators[18] (Figure 7) and in the case of well plugging, provide long-term environmental benefit through regulation compliant site restoration completed as part of environmental monitoring and mitigation requirements through the appropriate Federal, state, and local agencies. Based on an estimate of the average methane emission rate of 820 grams/hour per well[23], it is estimated MCWs owned by small operators potentially emit 41.58 MMT CO2e per year. The objective of AOI 1a is to reduce the emissions as much as possible.

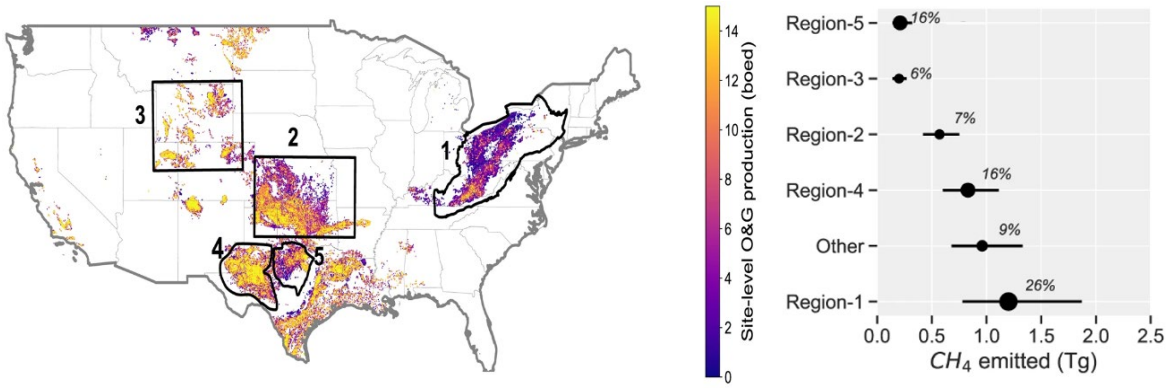


Figure 7: Location of Marginal Wells in the U.S. and Regional estimates of low production well site CH_4 emissions[2] (1 Tg is equal to 1 MMT)

Results of these activities are also anticipated to provide potential benefits to impacted and disadvantaged communities such as improved air quality, mitigation of legacy air pollution, creation of high-quality jobs, improved surface and groundwater quality, and improvements to overall human health.

MCWs are located throughout the U.S. but are concentrated in areas such as Appalachia (Pennsylvania, Ohio, West Virginia, Kentucky, New York), Mid Continent (Oklahoma, Kansas, Arkansas), Permian Basin (Texas, New Mexico), Barnett Shale (Texas), and the Mountain Region (Colorado, Utah, Wyoming).[24]

To meet the objectives under AOI 1a, a single lead organization is being sought to develop and execute a program, in collaboration with DOE, facilitating the purchase and distribution of commercially available, "off-the-shelf" methane emissions mitigation technologies to support effective emissions abatement from MCWs, including the development of guidelines for MCW emissions mitigation prioritization, equipment procurement and distribution, and

[23] https://www.nature.com/articles/s41467-022-29709-3
[24] Omara, M., Zavala-Araiza, D., Lyon, D.R. et al. Methane emissions from US low production oil and natural gas well sites. Nat Communications 13, 2085 (2022). https://doi.org/10.1038/s41467-022-29709-3

methane emissions measurement at MCW locations both before and after emissions mitigation action(s) have taken place in general alignment with the DOE/NETL developed methane measurement guidelines. The organization is encouraged but not required to make use of NETL's open-source MCW prioritization and mitigation optimization decision-support framework, "PRIMO", to prioritize which well sites to target, while also optimizing emissions abatement campaigns for maximum impact and efficiency.

Projects may also support elements of environmental restoration required for full compliance with applicable State or Federal standards and regulations.

The single lead organization will be responsible for:

1. Developing and implementing an Annual Operating and Funds Distribution Plan to identify, prioritize, and select methane emissions sources for mitigation, including plans for procurement and funds dispersal to third party companies for repairs.
2. Defining and implementing a funds implementation process, including all necessary technical and financial verification and auditing efforts.
3. Developing communication and data tracking tools to effectively and accurately quantify and communicate the emission reduction impacts of the efforts.

Organizations applying to lead efforts under AOI 1a should have characteristics including but not limited to:

1. Expertise in oil and gas operations (including but not limited to MCWs)
2. Expertise in measurement, reporting, and mitigation of methane emissions
3. Ability to develop and implement a skilled workforce training program, (which may include coordination with unions, higher education institutions, technical schools, and/or other workforce training providers)
4. Knowledge of effective scientific communication methods
5. Database development and management

ii. Technical Elements Required in Applications to AOI 1a

<u>Applications to AOI 1a must include the following technical elements</u>:

1. A **Workplan** including:
    - An explanation of sources of emissions at well sites and associated infrastructure the applicant intends to address and their respective impact on overall emissions.

- A **Design and Implementation Plan** for the project including:
  - Explanation of the proposed process to identify, prioritize, and select methane emissions sources for mitigation, including a plan for procurement, funds dispersal, and integration with DOE.
  - Explanation of the proposed approach to work with owners/operators of oil and natural gas assets to purchase, distribute, and install/implement commercially available "off-the-shelf" methane emissions mitigation technologies.
  - Explanation of the methane emissions mitigation solutions utilized within the prescribed effort and an explanation of the proposed approach to quantify methane emissions through direct measurement, or other suitable measurement method when direct measurements are not viable, to estimate methane emissions before and after the deployment of each solution, including:
    - A clear discussion and assessment of existing emissions reduction solutions and how the proposed effort will choose or has already chosen which solutions to utilize.
  - An explanation of workforce training and development initiatives (if/when applicable on-the-job training, potential upskill, etc.), including a discussion and plan for providing standard oilfield safety training for hazardous environments, confined spaces, slips/trips/falls, fire safety, climbing/rigging, and personal protective equipment.
  - Explanation of how funds will be optimized to maximize the volume of methane emissions mitigated.
- An explanation of communication and data reporting methods on emissions mitigations.
- An explanation of the impacts of the proposed project, including:
  - Estimated methane emissions expected to be eliminated or reduced by deploying the prescribed reduction strategy.
  - Total number of well sites and associated infrastructure expected to be impacted by the project's efforts.
  - The estimated total production of oil and natural gas affected by mitigation efforts.

2. A **Statement of Project Objectives (SOPO)** describing all project Tasks to be completed, including a description of what activities will be completed under each Task and how they will be accomplished.
3. A **Project Management Plan (PMP)** establishing baselines (technical scope, budget, schedule) for the project and describes the approach to manage project performance relative to those baselines. The PMP should also include an organizational structure for the project team explaining the: roles and responsibilities of team members, integration of team

members to achieve the project objectives, approach to communication among participants and with DOE, the process for making decisions on technical direction, procedures for resolving conflict, and questions regarding intellectual property.

4. Explanation of the **Technical Qualifications and Resources**, including:
    - Description of the qualifications of the project team to administer the project and optimally distribute project funds to owners/operators of oil and natural gas assets to mitigate methane emissions at their facilities.
    - Confirmation of the qualifications and availability of each team member to complete the effort.
    - Detailed explanation of how the capabilities of the individual members or entities in the application will be integrated to achieve the project objectives.

iii. Activities Not of Interest to AOI 1a

Activities NOT of interest under AOI 1a include the following, and applications including them will be deemed non-responsive:

- Efforts solely designed to collect data or analyze data without physically eliminating or reducing methane emissions.
- Solutions only detecting and measuring methane leaks without implementing a mitigation solution.
- Modeling or simulation efforts designed to determine a methane mitigation strategy for MCWs or other small operator sites without physically eliminating or reducing methane emissions.
- Efforts affecting wells producing more than 15 BOED or 90 thousand cubic feet (Mcf) gas per day over the prior 12-month period at the time of application.
- Applications from entities considered Super Major or Major oil and gas producers or associated oil and gas subsidiaries. (This AOI is focused on small operators which are defined as an entity generating a revenue of less than $40 million in a fiscal year).

b. Area of Interest 1b: Reducing Methane Emissions from Small Operators' Wells and Other Oil and Natural Gas Assets

i. Objectives and Background (AOI 1b)

The overall objective of AOI 1b is to fully eliminate or significantly reduce methane emissions from wells anticipated to become MCWs in the near future, their associated infrastructure, as well as gathering and transmission pipelines

associated with these wells. This focus on wells anticipated to become MCWs in the near future will expand upon the traditional MCW definition to target wells having production volumes between 15 and 40 BOED (Figure 8). This area will also focus on eliminating methane emissions from other oil and gas assets, i.e., facilities, equipment, and infrastructure associated with existing wells and local production assets owned by small operators including sites such as tanks, valves, seals, compressors, pumps, and gathering lines.

Wells and facilities of interest for AOI 1b include producing vertical or slightly deviated oil or natural gas wells (excludes highly deviated slant wells or horizontal wells) owned by small operators which produce more than 15 BOED or 90 thousand cubic feet (Mcf) of natural gas per day but less than 40 BOED or less than 240 Mcf gas per day over the prior 12-month period. The total number of these wells is estimated to be 22,456. Adding this number to the total 578,906 of MCWs owned by small operators, the total number of potential wells that can be targeted through AOI1a and AOI 1b is 601,362.[25]

A primary focus of the efforts within AOI 1b will be to expand the elimination and reduction potential of methane emissions generated at well sites and associated infrastructure owned by small owners/operators. For these purposes, small operators are defined as an entity generating a revenue of less than $40 million in a fiscal year.[26]

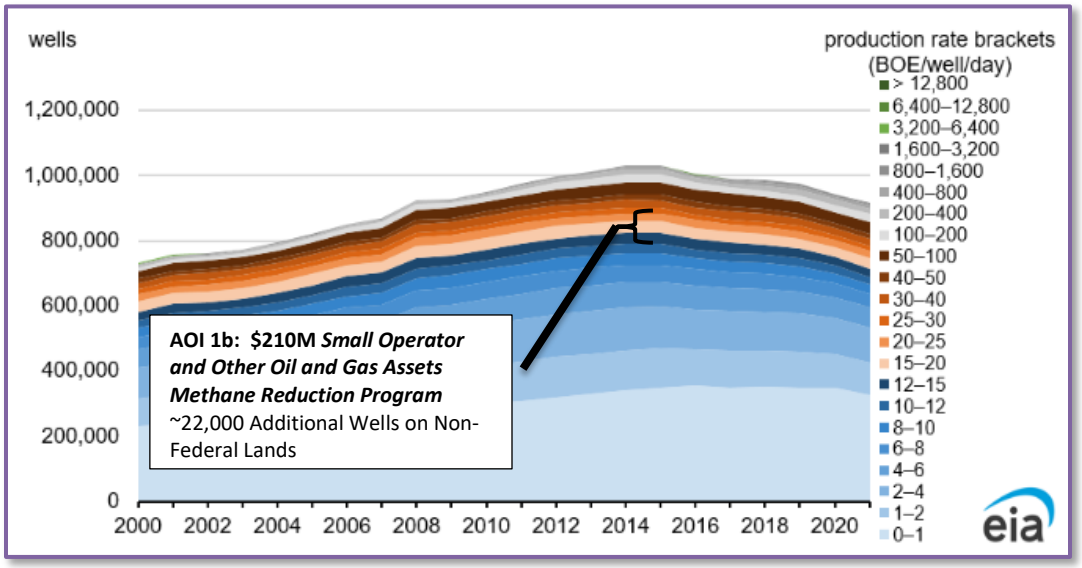


Figure 8: BOE Production by bracket and the impact of AOI 1b

[25] Enverus data export, October 2023, www.enverus.com
[26] https://www.census.gov/library/stories/2021/01/what-is-a-small-business.html

SMALL OPERATORS *(as defined by US Census)*			
CATEGORY	**Production Brackets**		
Oil and Nat Gas Production Max (BOED)	*≥0 to ≤15*	*>15 to ≤40*	*Total*
Well Count	578,906	22,456	601,362
Oil Production (BBLs/day)	392,064	231,233	623,297
Natural Gas Production (MCFD)	3,239,866	2,155,243	5,395,109

Table 3: Small Operators Well Count and Production (ENVERUS)

Also included within AOI 1b are infrastructure components such as gathering and transmission pipelines associated with wells falling under the MCW and small operator definitions. DOE and EPA have an interest in mitigating emissions from pipeline components and facilities, including but not limited to valves, flanges, and compressor stations along the natural gas supply chain directly connected to the wells and associated upstream infrastructure as designated above.

Emissions from wells producing between 15 and 40 BOED and associated infrastructure owned by small operators can be estimated to total 2.2 MMTCO2e/year (based on an average methane emission rate of 820 grams/hour per well[27]). Efforts within AOI 1b would attempt to mitigate as much of these emissions as possible.

Mitigation solutions under AOI 1b can include bolt-on existing technology, automated operating systems, predictive analysis tools, advanced sensors, and any methane emissions reduction technology or method. Applicants will be required to accurately quantify the amount of emissions mitigated by reporting methane emission levels before and after the implementation of the emission reduction solutions.

Results of these activities are also anticipated to provide potential benefits to impacted low-income and disadvantaged communities such as improved air quality, mitigation of legacy air pollution, creation of high-quality jobs, improved surface and groundwater quality, and improvements to overall human health.

To meet the objectives under AOI 1b, a single lead organization is being sought to develop and execute a program, in collaboration with DOE, facilitating the purchase and distribution of commercially available, "off-the-shelf" methane emissions mitigation technologies to support effective emissions abatement from well sites producing between 15 and 40 BOED. This area will also focus on eliminating methane emissions from other oil and gas assets, i.e., facilities, equipment, gathering lines, and infrastructure associated with existing wells, owned by small operators at any production rate. This will include the

[27] https://www.nature.com/articles/s41467-022-29709-3

development of guidelines by the project recipient for emissions mitigation prioritization, equipment procurement and distribution, and methane emissions measurement and/or quantification at locations selected for methane emissions abatement both before and after emissions mitigation action(s) have taken place. Applicants may consider the DOE/NETL developed methane measurement guidelines for MCW plugging and abandonment, as applicable.

Projects may also support elements of environmental restoration required for full compliance with applicable State or Federal standards and regulations.

The single lead organization will be responsible for:

1. Developing and implementing an Annual Operating and Funds Distribution Plan to identify, prioritize, and select methane emissions sources for mitigation, including plans for procurement and funds dispersal to third party companies for repairs.
2. Defining and implementing a funds implementation process, including all necessary technical and financial verification and auditing efforts
3. Developing communication and data tracking tools to effectively and accurately quantify and communicate the emission reduction impacts of the efforts

Organizations applying to lead efforts under AOI 1b should have characteristics including but not limited to:

1. Expertise in oil and gas operations
2. Expertise in measurement, reporting, and mitigation of methane emissions
3. Ability to develop and implement a skilled workforce training program, (which may include coordination with unions, higher education institutions, technical schools, and/or other workforce training providers)
4. Knowledge of effective scientific communication methods
5. Database development and management

ii. Technical Elements Required in Applications to AOI 1b

<u>Applications to AOI 1b must include the following technical elements</u>:

1. A **Workplan** including:
    - An explanation of sources of emissions at well sites and associated infrastructure the applicant intends to address and their respective impact on overall emissions.

- A **Design and Implementation Plan** for the project including:
  - Explanation of the proposed process to identify, prioritize, and select methane emissions sources for mitigation, including a plan for procurement, funds dispersal, and integration with DOE.
  - Explanation of the proposed approach to work with owners/operators of oil and natural gas assets to purchase, distribute, and install/implement commercially available "off-the-shelf" methane emissions mitigation technologies.
  - Explanation of the methane emissions mitigation solutions utilized within the prescribed effort and an explanation of the proposed approach to quantify methane emissions through direct measurement, or other suitable measurement method when direct measurements are not viable, to estimate methane emissions before and after the deployment of each solution, including:
    - A clear discussion and assessment of existing emissions reduction solutions and how the proposed effort will choose or has already chosen which solutions to utilize.
  - An explanation of workforce training and development initiatives (if/when applicable on-the-job training, potential upskill, etc.), including a discussion and plan for providing standard oilfield safety training for hazardous environments, confined spaces, slips/trips/falls, fire safety, climbing/rigging, and personal protective equipment.
  - Explanation of how funds will be optimized to maximize the volume of methane emissions mitigated.
- An explanation of communication and data reporting methods on emissions mitigations.
- An explanation of the impacts of the proposed project, including:
  - Estimated methane emissions expected to be eliminated or reduced by deploying the prescribed reduction strategy.
  - Total number of well sites and associated infrastructure metrics (e.g. miles of pipeline, number of controllers, etc.) expected to be impacted by the project's efforts.
  - The estimated total production of oil and natural gas affected by mitigation efforts.

2. A **Statement of Project Objectives (SOPO)** describing all project Tasks to be completed, including a description of what activities will be completed under each Task and how they will be accomplished.
3. A **Project Management Plan (PMP)** establishing baselines (technical scope, budget, schedule) for the project and describes the approach to manage project performance relative to those baselines. The PMP should also include an organizational structure for the project team explaining

the: roles and responsibilities of team members, integration of team members to achieve the project objectives, approach to communication among participants and with DOE, the process for making decisions on technical direction, procedures for resolving conflict, and questions regarding intellectual property.

4. Explanation of the **Technical Qualifications and Resources**, including:
    - Description of the qualifications of the project team to administer the project and optimally distribute project funds to owners/operators of oil and natural gas assets to mitigate methane emissions at their facilities.
    - Confirmation of the qualifications and availability of each team member to complete the effort.
    - Detailed explanation of how the capabilities of the individual members or entities in the application will be integrated to achieve the project's objectives.

iii. Activities Not of Interest to AOI 1b

Activities NOT of interest under AOI 1b include the following, and applications including them will be deemed non-responsive:

- Efforts solely designed to collect data or analyze data without physically eliminating or reducing methane emissions.
- Solutions only detecting and measuring methane leaks without implementing a mitigation solution.
- Modeling or simulation efforts designed to determine a methane mitigation strategy for MCWs or other small operator sites without physically eliminating or reducing methane emissions.
- Efforts affecting wells producing less than 15 BOED or more than 40 BOED at the time of application.
- Applications from entities considered Super Major or Major oil and gas producers or associated oil and gas subsidiaries. (This AOI is focused on small operators which are defined as an entity generating a revenue of less than $40 million in a fiscal year).
- Applications including intent to use plugging and abandonment as mitigation efforts.

c. Area of Interest 1c: Reducing Methane Emissions from Marginal Conventional Wells and Oil and Gas Assets on Tribal Lands

i. Objectives and Background (AOI 1c)

The objective of AOI 1c is to significantly reduce methane emissions from both MCWs and/or well sites producing between 15 and 40 BOED and associated equipment, facilities, and infrastructure located on Tribal lands (see section IV.xxiv.) through the deployment of methane mitigation technologies, methods, and strategies. Solutions can include but are not limited to bolt-on existing technology, automated operating systems, predictive analysis tools, advanced sensors, any methane emissions reduction technology or method including voluntary plugging and abandonment activities. Applicants will be required to accurately quantify the amount of emissions having been mitigated by reporting pre- and post-deployment emission levels of their prescribed solution. Additionally, efforts within AOI 1c will significantly reduce methane emissions generated at well sites and other oil and gas assets on Tribal lands owned by small operators or Tribes[28]. For these purposes, small operators are defined as an entity generating a revenue of less than $40 million in a fiscal year.[29]

As of 2023, there are approximately 57,000 MCWs on Tribal lands in the United States. Including well sites producing between 15 and 40 BOED adds approximately 7,000 wells, for a total of approximately 64,000 wells producing up to 40 BOED within Tribal lands. Small operators maintain a majority of approximately 77% of these wells. In total, these marginal wells are producing approximately 141,814 BBL of oil or 1,417,468 MCF of natural gas per day.[30] Figure 9 shows the location of wells on Tribal lands.

[28] An Indian Tribe is defined as any Indian tribe, band, nation, or other organized group or community, including any Alaska Native village or regional or village corporation which is recognized as eligible for the special programs and services provided by the United States to Indians because of their status as Indians. (CAA Sect 302) [42 U.S. Code § 7602 Definitions]
[29] https://www.census.gov/library/stories/2021/01/what-is-a-small-business.html
[30] Enverus data export with American Indian, Alaska Native, and Native Hawaiian Areas geographic feature layer, utilizing National Geospatial Data Asset (NGDA) data from the U.S. Census Bureau, displaying reservations, lands, statistical areas, and joint-use areas recognized as Federal, State, and Tribal entities (Esri ArcGIS Online, Esri US Federal Data)

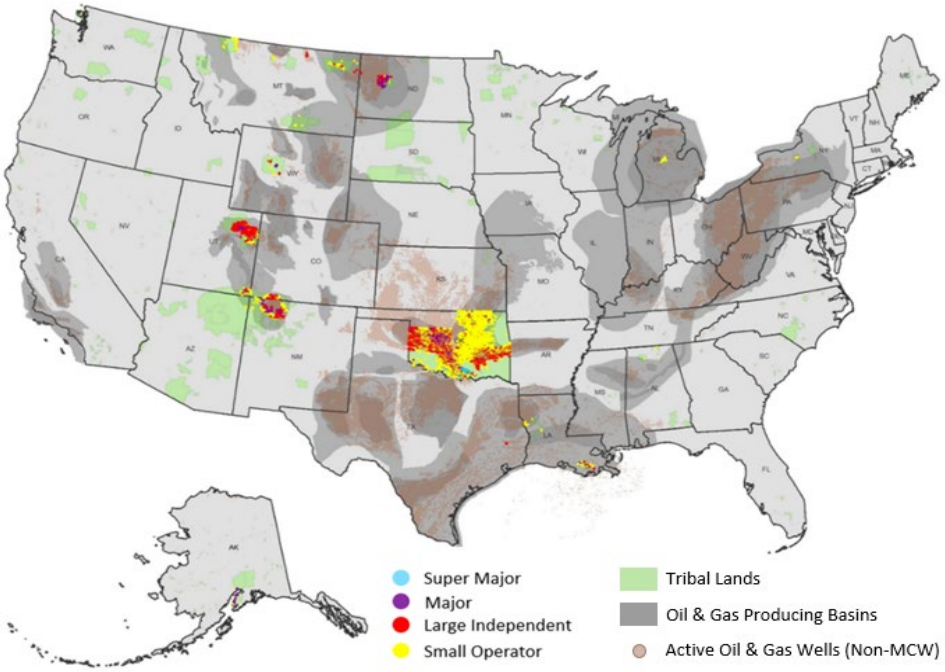


Figure 9: Wells by Operator Size on Tribal Lands

Calculated small operator MCWs and wells producing between 15 and 40 BOED well count and production on Tribal lands are shown in Table 4.[31]

SMALL OPERATORS ON TRIBAL LANDS *(as defined by US Census)*			
CATEGORY	**Production Brackets**		
Oil and Nat Gas Production Max (BOED)	*≥0 to ≤15*	*>15 to ≤40*	*Total*
Well Count	36,899	12,180	49,079
Oil Production (BBLs/day)	60,749	21,750	82,499
Natural Gas Production (MCFD)	49,528	716,741	766,269

Table 4: Small Operator MCW and Wells Producing Between 15 and 40 BOED Well Count and Production (ENVERUS) on Tribal Lands

AOI 1c combines AOI 1a (MCW) and AOI 1b (Small Operators and other Petroleum and Natural Gas Systems) and focuses on fully eliminating methane emissions through voluntary plugging and abandonment of eligible wells and significantly reducing emissions from retrofitted and repaired wells producing up to 40 BOED and other oil and gas assets on Tribal lands.

[31] Enverus data export with American Indian, Alaska Native, and Native Hawaiian Areas geographic feature layer, utilizing National Geospatial Data Asset (NGDA) data from the U.S. Census Bureau, displaying reservations, lands, statistical areas, and joint-use areas recognized as Federal, State, and Tribal entities (Esri ArcGIS Online, Esri US Federal Data)

Results of these activities are also anticipated to provide potential benefits to impacted and disadvantaged communities such as improved air quality, mitigation of legacy air pollution, creation of high-quality jobs, improved surface and groundwater quality, and improvements to overall human health.

To meet the objectives under AOI 1c, a single lead organization in collaboration with multiple, Tribal entities is being sought to develop and execute a program, in collaboration with DOE, facilitating the purchase and distribution of commercially available, "off-the-shelf" methane emissions mitigation technologies to support effective emissions abatement from MCW and/or well sites producing between 15 and 40 BOED, and associated infrastructure and other oil and natural gas assets located on Tribal lands. This will include the development of guidelines for emissions mitigation prioritization, equipment procurement and distribution, and methane emissions measurement and/or quantification at locations selected for methane emissions abatement on Tribal lands both before and after emissions mitigation action(s) have taken place. Applicants should consider the DOE/NETL-developed MCW methane measurement guidelines, as applicable.

Projects may also support elements of environmental restoration required for full compliance with applicable State or Federal standards and regulations.

The single lead organization will be responsible for:

1. Developing and implementing an annual operating and funds distribution plan to identify, prioritize, and select methane emissions sources for mitigation, including plans for procurement and funds dispersal to third party companies for repairs.
2. Defining and implementing a funds implementation process, including all necessary technical and financial verification and auditing efforts
3. Developing communication and data tracking tools to effectively and accurately quantify and communicate the emission reduction impacts of the efforts.
4. Communicating and obtaining required documentation from Tribal Communities (see section IV.xxiv.)

Organizations applying to lead efforts under AOI 1c should have characteristics including but not limited to:

1. Experience working with Tribal governments (inclusive of being a Tribal government)
2. Experience in oil and gas operations, including measurement, mitigation. and reporting of methane emissions
3. Ability to develop and implement a skilled workforce training program (which may include coordination with unions, higher education institutions, technical schools, and/or other workforce training providers)

4. Knowledge of effective scientific communication methods
5. Database development and management

ii. Technical Elements Required in Applications to AOI 1c

<u>Applications to AOI 1c must include the following technical elements</u>:

1. A **Workplan** including:
    - An explanation of sources of emissions at well sites and associated infrastructure the applicant intends to address and their respective impact on overall emissions.
    - A **Design and Implementation Plan** for the project including:
        - Explanation of the proposed process to identify, prioritize, and select methane emissions sources for mitigation, including a plan for procurement, funds dispersal, and integration with DOE.
        - Explanation of the proposed approach to work with owners/operators of oil and natural gas assets to purchase, distribute, and install/implement commercially available "off-the-shelf" methane emissions mitigation technologies.
        - Explanation of the methane emissions mitigation solutions utilized within the prescribed effort and an explanation of the proposed approach to quantify methane emissions through direct measurement, or other suitable measurement method when direct measurements are not viable, to estimate methane emissions before and after the deployment of each solution, including:
            - A clear discussion and assessment of existing emissions reduction solutions and how the proposed effort will choose or has already chosen which solutions to utilize.
        - An explanation of workforce training and development initiatives (if/when applicable on-the-job training, potential upskill, etc.), including a discussion and plan for providing standard oilfield safety training for hazardous environments, confined spaces, slips/trips/falls, fire safety, climbing/rigging, and personal protective equipment.
        - Explanation of how funds will be optimized to maximize the volume of methane emissions mitigated.
    - An explanation of communication and data reporting methods on emissions mitigations.
    - An explanation of the impacts of the proposed project, including:
        - Estimated methane emissions expected to be eliminated or reduced by deploying the prescribed reduction strategy.
        - Total number of well sites and associated infrastructure metrics (e.g., miles of pipeline, number of controllers, etc.) expected to be

impacted by the project's efforts.
    - The estimated total production of oil and natural gas affected by mitigation efforts.
- Explanation of the proposed process for coordinating and/or collaborating with Tribal government entities as necessary in the conduct of planned project activities.
    - Define any anticipated coordination among Tribal government entities required to be involved in the activities planned under the project, including identification of those entities and their anticipated role / responsibility associated with project activities.
    - Describe the proposed process for coordinating as relevant with the Tribal government(s) or other types of relevant bodies for the identification, prioritization, voluntary plugging and abandonment activities, retrofitting and repairing other oil and gas assets, and methane emissions measurement pre- and post-mitigation action.

2. A **Statement of Project Objectives (SOPO)** describing all project Tasks to be completed, including a description of what activities will be completed under each Task and how they will be accomplished.
3. A **Project Management Plan (PMP)** establishing baselines (technical scope, budget, schedule) for the project and describes the approach to manage project performance relative to those baselines. The PMP should also include an organizational structure for the project team explaining the: roles and responsibilities of team members, integration of team members to achieve the project objectives, approach to communication among participants and with DOE, the process for making decisions on technical direction, procedures for resolving conflict, and questions regarding intellectual property.
4. Explanation of the **Technical Qualifications and Resources**, including:
    - Description of the qualifications of the project team to administer the project and optimally distribute project funds to owners/operators of oil and natural gas assets to mitigate methane emissions at their facilities.
    - Confirmation of the qualifications and availability of each team member to complete the effort.
    - Detailed explanation of how the capabilities of the individual members or entities in the application will be integrated to achieve the project's objectives.

iii. Activities Not of Interest to AOI 1c

<u>Activities that are NOT of interest under AOI 1c include the following, and applications including them will be deemed non-responsive</u>:

- Efforts that are solely designed to collect data or analyze data without physically eliminating or reducing methane emissions.
- Solutions that only detect and measure methane leaks without implementing a mitigation solution.
- Modeling or simulation efforts designed to determine a methane mitigation strategy for MCWs or other small operator sites without physically eliminating or reducing methane emissions.
- Applications from entities that are considered Super Major or Major oil and gas producers or associated oil and gas subsidiaries. (This AOI is focused on small operators which are defined as an entity generating a revenue of less than $40 million in a fiscal year).

ii. Area of Interest 2: Accelerating Deployment of Methane Emissions Reduction Solutions

EPA's annual Inventory of U.S. Greenhouse Gas Emissions and Sinks tracks U.S. greenhouse gas emissions by source, economic sector, and type of greenhouse gas. The 2022 methane emissions by the oil and gas industry are presented on the EPA's website showing the emissions from individual components across the production, processing, transmission, and distribution segments.[32] Figure 10 shows the component breakdown for the production segment including exploration, onshore and offshore production, and gathering and boosting which accounts for 58% of the total oil and natural gas industry's methane emissions.

[32] https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2022

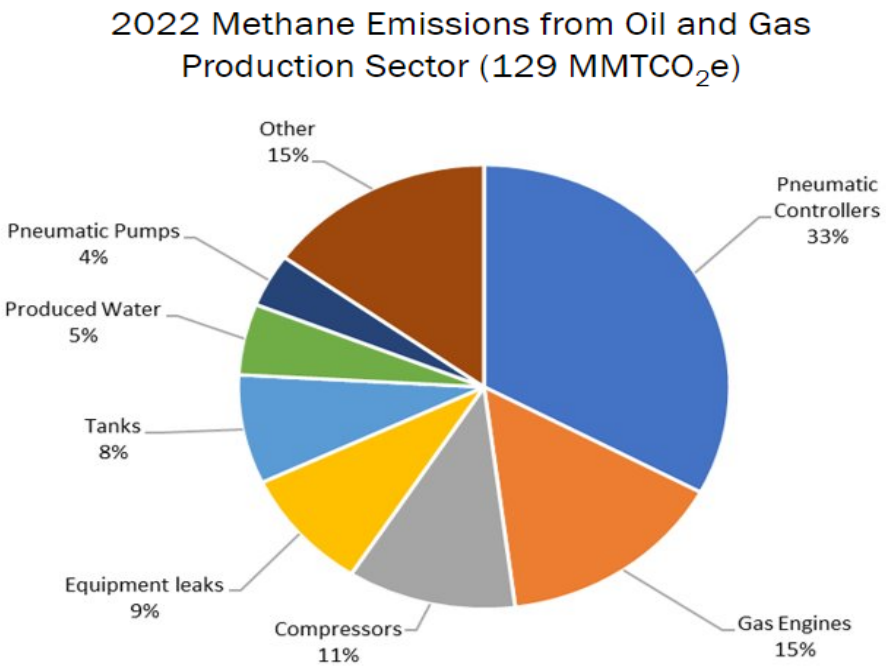


Figure 10: 2022 EPA estimated methane emissions from the oil and natural gas production segment

The overall objective of AOI 2 is the field deployment, full scale validation, and commercialization of new technologies that are capable of mitigating methane emissions caused by the following sources in the oil and natural gas production segment:

- AOI 2a – Un-combusted methane in natural gas-fired engines, vented gas from expansion turbines for engine start-up, methane leaks and vents from natural gas compressors, and methods of avoidance for natural gas venting caused by blowdown events.
- AOI 2b – Emissions caused by flaring and non-safety related venting practices upstream at the well.
- AOI 2c – Point source emission types associated with the production segment, particularly for liquids unloading, the handling of produced water, equipment leaks, leaks from tanks, and natural gas-driven process controllers with no access to power.

a. Area of Interest 2a: Field Deployment of Engine and Compressor Methane Reduction Technologies

i. Objectives and Background (AOI 2a)

The objective of AOI 2a is the field deployment, full scale validation, and commercialization of new technologies that are capable of mitigating the methane emissions caused by un-combusted methane in natural gas-fired engines, vented gas from expansion turbines for engine start-up, methane leaks and vents from natural gas compressors, and methods of avoidance for natural gas venting caused by blowdown events. Field deployment is strongly recommended to be at multiple locations at various scales representative of the breadth of operational capability of the proposed system. Field validation efforts are strongly recommended to include permanent installation of the proposed technology, such that it remains capable of operation after the funding period ends. Commercialization efforts shall include technoeconomic analysis that adequately informs industry adoption of the technologies using the operational, economic, and methane emissions data from the field deployments undertaken from this AOI.

Today, there are approximately 13,000 to 15,000[33] centrifugal and reciprocating compressors used at various points in the upstream and midstream sectors of the oil and gas industry to transport, store, and process natural gas. Gathering and boosting stations collect natural gas from production sites and dehydrate and compress the gas to send it to transmission pipelines or gas processing facilities.[34] Further, recent EPA estimates show that there are an estimated 1,881 compressor stations with a total of 7,589 individual compressors[35] located along transmission pipelines to overcome friction losses that accumulate over long distances and to account for elevation changes in the pipeline.[36] The large majority of these compressors are powered by gas reciprocating combustion engines that are fueled by the natural gas that is being transported. Although compressors are also powered with electric motors or natural gas combustion turbines,[37] these likely only account for a few hundred of the total number of compressor drivers in operation. For example, one recent estimate shows that only 10% of transmission pipeline compressor stations have electric-powered

[33] https://netl.doe.gov/sites/default/files/netl-file/Brun.pdf
[34] EPA, Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2022, p. 3-90, 2024, https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2022
[35] https://www.epa.gov/system/files/documents/2023-11/ghgi-webinaroct2023_activity.pdf
[36] "Enbridge Compressor Stations." Compressor Stations - Enbridge Inc., www.enbridge.com/About-Us/Natural-Gas-Transmission-Midstream-and-LNG/Natural-Gas-101/Transporting-Natural-Gas/Compressor-Stations#:~:text=Natural%20gas%20is%20highly%20pressurized,a%20motor%20or%20an%20engine Accessed 8 Dec. 2023.
[37] "Compressor Starts | US EPA." Natural Gas STAR Program, U.S. Environmental Protection Agency, www.epa.gov/natural-gas-star-program/compressor-starts Accessed 8 Dec. 2023.

compressors.[38] Figure 11 shows a simplified view of typical points where compressors and engines are used during the transport of natural gas from production at the well to end point utilization.[39]



Figure 11: Simplified Diagram of Typical Points in where Compressors and Natural Gas Engines are used in the Upstream and Midstream Sectors

EPA estimated that in 2022, approximately 87.5 MMT CO_2e in methane emissions occur from, among other point sources, leaks at compressor stations, methane slip in gas powered engines, and through venting in gas expansion startup turbines, and from blowdown events when these infrastructure components are serviced during routine maintenance operations.[40]

Applications focused on natural gas engines will be required to identify an industry partner(s) and a specific upstream or midstream field location(s) such as gathering and boosting operations or along transmission pipelines at compressor stations. For natural gas reciprocating engines, projects may consider compressor station field locations with integral engine-compressors or other sites using reciprocating natural gas engines that are providing mechanical or electrical power either for compression or for other oil and gas operations. It is strongly recommended that multiple field test sites are selected such that the technology is demonstrated and validated against a full range of operating conditions. For example, a retrofit technology for mitigating methane emissions in natural gas engines should complete field demonstrations across multiple engine sizes with varying degrees of retrofit complexity.

For technologies mitigating blowdown event methane emissions, projects shall identify an industrial partner(s) and a field validation site(s) relevant to the technology, such as a compressor station or at another location along the infrastructure with sufficient access to mitigate blow down venting. For this application, multiple field site installations are strongly recommended such that they span the full range of conditions and installation complexity that the final system is expected to operate within.

[38] https://www.sciencedirect.com/science/article/pii/S1040619023000180
[39] Kurz, Rainer and Brun, Klaus. (2012). Upstream and Midstream Compression Applications: Part 1—Applications. Proceedings of the ASME Turbo Expo. 6. 10.1115/GT2012-68005.
[40] https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2022

Efforts in AOI 2a can include but are not limited to:

- Retrofit technologies for existing natural gas fired engines.
- New engine and engine component designs.
- New systems that can replace natural gas expansion starter turbines and avoid methane venting to the atmosphere.
- Field site deployment of efficient, low-cost, and contaminate resistant catalytic systems that function as part of the engine exhaust system.
- Gas capture and control systems or leak mitigation technologies that operate on natural gas compressors and engines in the field ensuring minimal losses of methane to the atmosphere.
- Technologies integrated at compressor stations in the field or modularly deployed at pipelines to enable avoidance of methane emissions to the atmosphere during blowdown events.

Results of these activities are also anticipated to provide potential benefits to impacted low-income and disadvantaged communities such as improved air quality, mitigation of legacy air pollution, creation of high-quality jobs, improved surface and groundwater quality, and improvements to overall human health.

The goal of AOI 2a is to permanently install retrofit technologies that reduce methane emissions associated with natural gas engines and compressors and enable the operation at scale beyond the duration of the project's federal funding period in order to facilitate future industrial operation. Solutions are sought starting at TRL 6 or 7 and achieving a TRL of 8 at the end of the project in justification of the commercial viability of the approach. Solutions must show field validated results supporting an operational near-zero emissions profile with a measurable reduction of methane lost to the atmosphere at the field demonstration location.

Project teams under this AOI 2a must include a business that intends to commercialize the technologies to be demonstrated, as evidenced by a letter of commitment. Project teams must also include a letter of commitment from an industry partner who will provide access to field sites for the demonstration of those technologies.

ii. Technical Elements Required in Applications to AOI 2a

Applications to AOI 2a must include the following technical elements:

1. A **Workplan** including:
    - An explanation of the current state-of-the-art of the technology or process that is being targeted for improvement, including current industry practices regarding application.

- An explanation of the current state of the proposed technology, the expected advantages over the current state-of-the-art solutions (if any exist), and the specific elements of the approach that are expected to be further validated in the field environment.
- At least one defined field test site for all proposed field testing must be established at the time of application and include direct collaboration with an industry partner. More than one field test site is strongly recommended to fully characterize the expected operational capability of the proposed technology, with the end of the project resulting in permanent installation at several locations capable of continued operation after the funding period ends. A letter of commitment from the industry partner must be submitted at the time of application that defines the planned well site location, time frame for operation, an initial estimated labor hour commitment, and an outline of expected tasks to ensure the safe and effective operation of the compressor, engine, gas processing, reactor, flare, or other mitigation system in the field. All projects must identify and characterize methane emissions from the established field demonstration site(s) and then design, procure, permanently install, and operate retrofit technology solutions at-scale at one or more field sites. Multiple field site installations are strongly recommended. The project must be capable of demonstrating and achieving a stable reduction in methane emissions at the field site(s) no later than September 30, 2028, accompanied by a detailed plan for long-term permanent operation of the technology.
- A realistic quantified assessment, based on the measured field test data of the ability of the engine, compressor, or other methane mitigation system to achieve “near zero emissions” operation at the well site or field location. This assessment shall be quantified in terms of volume of methane and any other hydrocarbons lost to atmosphere per volume processed by the system over the span of steady state field operation. Applicants shall also include realistic estimates for the expected emissions reduction that can be achieved with final implementation of the technology and how the mitigation impact would scale with increasing industry adoption.
- A preliminary economic analysis of the technology being proposed. Note: A final techno-economic analysis (TEA) is due at project conclusion that is based on the measured performance results completed during the testing phase in the field. The TEA must include estimates of the expected capital cost, expected operating costs, other required raw materials, labor, and the treatment and handling of any waste streams.

- A description of the length of time that the proposed technology will be deployed for field testing. Note: The length of time for field testing at each location is recommended to be at least 12 months, but the actual duration should be established by the applicant based on a discussion around the required successful continuous steady state operation for their system to reduce commercialization risks to a level that would enable immediate industrial adoption. By the end of the project, it is anticipated that the installation of the technology could be permanent, and that the operation of the system could continue beyond the required field test duration and beyond the funding period.
- Applicants must clearly define how the proposed solution will enable operators to maintain data logging of emissions and system performance.
- Clearly defined statement of the likely challenges and obstacles to completing the proposed work and planned strategies for meeting these challenges and overcoming obstacles.

2. A **Statement of Project Objectives (SOPO)** describing all project Tasks to be completed, including a description of what activities will be completed under each Task and how they will be accomplished. These tasks should clearly show how the field ready design will be procured and constructed to a state suitable for field deployment.
3. A **Project Management Plan (PMP)** establishing baselines (technical scope, budget, schedule) for the project and describes the approach to manage project performance relative to those baselines. The PMP should also include an organizational structure for the project team explaining the roles and responsibilities of team members, integration of team members to achieve the project objectives, approach to communication among participants and with DOE, the process for making decisions on technical direction, procedures for resolving conflict, and questions regarding intellectual property.
4. Explanation of the **Technical Qualifications and Resources**, including:
    - Description of the qualifications of the project team to administer the project, advance the proposed technology for field demonstration(s), and move the technology towards commercialization.
    - Confirmation of the qualifications and availability of each team member to complete the effort.
    - Detailed explanation of how the capabilities of the individual members or entities in the application will be integrated to achieve the project's objectives.

iii. Activities Not of Interest to AOI 2a

Activities NOT of interest under AOI 2a include the following, and applications including them will be deemed non-responsive:

- Commercially available natural gas driven process and pneumatic controllers with access to onsite grid power are excluded from consideration in this FOA.
- Solutions only detecting and measuring methane leaks without implementing a mitigation solution.
- Projects using only laboratory validation, computer simulations, or the development of modeling tools or methods not ultimately progressing to field deployment of a physical design capable of testing at multiple field sites.
- Systems venting hydrogen or other direct or indirect greenhouse gases to the atmosphere as part of the process without consideration of the capture and utilization or transport and sale of these gases.
- Technologies centered on hydrogen production.

b. Area of Interest 2b: Field Deployment of Gas Flaring Reduction Technologies

i. Objectives and Background (AOI 2b)

The objective for AOI 2b is the field deployment, full scale validation, and commercialization of new technologies capable of mitigating the methane emissions caused by flaring and non-safety related venting practices upstream at the well. Similar to AOI 2a, field deployment is strongly recommended to be at field locations representative of the breadth of operational capability of the technology, such as multiple well sites with various associated gas composition and volume. The technologies should also be deployed under a variety of environmental conditions to account for the fullest possible range of operating conditions. Field deployment efforts are strongly recommended to include permanent installation of the proposed well site methane mitigation system, remaining capable of operation after the funding period ends and for the duration of the active time the well is in production. Commercialization efforts shall include the quantification of the field test operational, economic, and emissions data used for technoeconomic analysis supporting rapid industry adoption.

Satellite-based estimates in the World Bank's Global Gas Flaring Tracker Report found a reduction in flaring of 3% from 144 billion cubic meters (bcm) per year in 2021 to 139 bcm in 2022 despite oil production increasing by 5%. Even with this reduction, the report estimates global flaring operations in 2022 still resulted in

315 million metric tonnes of direct carbon dioxide and 42 million metric tonnes of CO_2 equivalent in the form of methane slip, assuming 98% methane destruction efficiency in the flare, 80% methane content for the gas being flared, and a Global Warming Potential (GWP) of 28 for methane.[41] For the United States, the flaring operations emit approximately 38 MMT of CO2 and 3 MMT CO2e of methane.[42] The report also discusses how the methane destruction efficiency of the flare impacts the amount of methane slip, particularly for the Bakken, Eagle Ford, and Permian basins. The report found the 2021 methane slip estimates from flares in the Bakken, Eagle Ford, and Permian basins would increase by a factor of more than 5 if field-measured destruction removal efficiency (DRE) values are used, and by a factor of more than 9 if the efficiency is adjusted to account for unlit flares, as seen in Figure 12.[43]

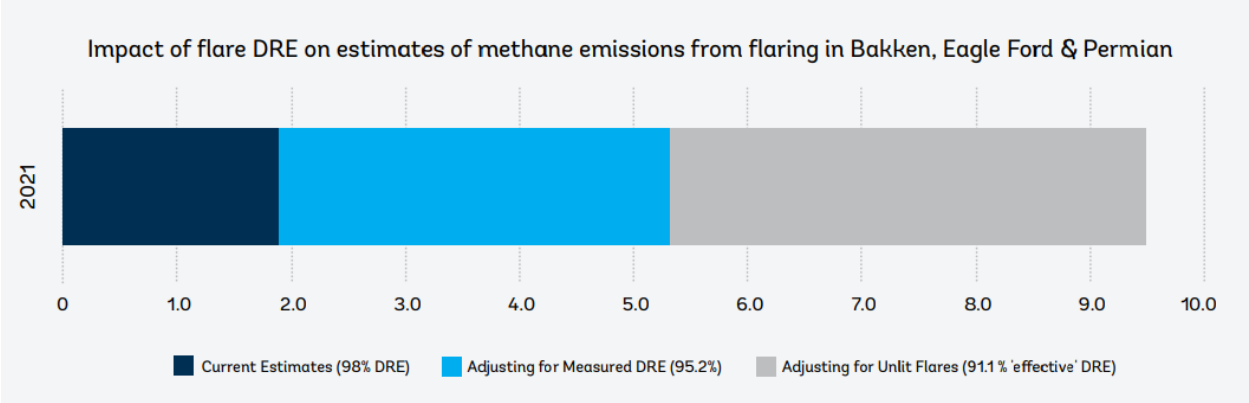


Figure 12: The increase in 2021 estimates of methane emissions from flaring in the Bakken, Eagle Ford, and Permian when the measured destruction efficiency and estimated percentage of unlit flares are applied.

For AOI 2b, DOE seeks to reduce the contributions of methane emissions caused by unwanted gas being flared in the United States by deploying new technologies capable of gathering well-site gas that would otherwise be emitted, including associated gases intended for flaring, and facilitating the beneficial use of the gas by:

1. Onsite natural gas processing enabling routing to a sales line,
2. Conversion (upcycling) of the otherwise flared natural gas to high value industrial products that can be more easily transported off-site, and/or
3. Using natural gas for emissions-free on-site power generation systems capable of adjusting to changing electricity demand.

[41] "Global Gas Flaring Data." World Bank, www.worldbank.org/en/programs/gasflaringreduction/global-flaring-data Accessed 10 Jan. 2024.
[42] https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2022
[43] "Global Gas Flaring Tracker Report: March 2023", World Bank, World Bank Publications, The World Bank Group, Washington, DC, March 2023, https://thedocs.worldbank.org/en/doc/5d5c5c8b0f451b472e858ceb97624a18-0400072023/original/2023-Global-Gas-Flaring-Tracker-Report.pdf

Solutions in this area can be combined. Technologies processing the gas at the well can be integrated with novel methods of transport of pipeline quality natural gas to a sales line, subsequent chemical manufacture, or used for onsite power generation. However, all systems will need to be field validated and demonstrate near zero methane emissions profiles at the well site, with a measurable reduction of methane emissions at the field test location. Gas processing technologies in this area must create natural gas meetings the local pipeline tariff requirements relevant to the well site used for field testing and also create a marketable product stream of extracted Natural Gas Liquids (NGLs). For cases where the routing of processed natural gas to a sales line is out of the control of the well operator and no other alternative storage and transport is viable, approaches shall integrate novel methods of chemical production whereby the processed gas is used as a feedstock in onsite modular reactors for the production of marketable industrial chemicals or solid carbon products more readily transportable to market. Onsite power generation approaches must include gas buffering, electrical energy storage, synchronization and sale back to the grid, or some other means of flexibility allowing for changes in onsite electrical demands.

Efforts in this area can include but are not limited to:

- Technologies advanced from prototype stage to pre-commercial scale for near zero emission modular gas processing systems capable of contaminate removal and NGL extraction, including stable condensate and crude oil storage and waste stream handling.
- Modular well site chemical reactor systems functioning as standalone or ancillary to modular gas processing systems that are capable of synthesizing industrial liquid chemicals or high value solid carbon products at the well site with a near zero emissions profile.
- Methods for creating electrical energy from natural gas approaching the heat rate-based efficiencies of large-scale combined cycle power plants, do not result in methane slip or greenhouse gas (GHG) emissions at the well, and can adjust for changing electrical demands without wasting electrical energy.

This AOI is also seeking new technologies supporting cases where the beneficial use of unwanted natural gas is determined to be technically infeasible as defined by EPA's final rule to reduce methane and other pollution from oil and natural gas operations titled, "Standards of Performance for New, Reconstructed, and Modified Sources and Emissions Guidelines for Existing Sources: Oil and Natural Gas Sector Climate Review."[44]

[44] 89 FR 16820 (March 8, 2024). Standards are codified at 40 CFR part 60 Subparts OOOOb and OOOOc. Additional information can be found at: www.epa.gov/controlling-air-pollution-oil-and-natural-gas-operations/epas-final-rule-oil-and-natural-gas. Accessed 11 Jan. 2024.

In this case, DOE is seeking technologies reducing the methane slip from suboptimal flare performance caused by changing gas composition, unmeasured and uncontrolled combustion levels, and flame outs.

For this Area of Interest, DOE seeks the field deployment of new flare tip designs, sensors and controls ensuring flare stability and maintain continuous DRE of at least 98% in terms of the combustion of methane and other hydrocarbons including aromatics in the flare gas stream and include data logging of flare performance and lit flame status. The DRE for individual combustible hydrocarbon species shall be defined as one minus the ratio of the production rate of the species exiting the flare to the flow rate of the species entering in fuel stream as seen in Equation 1, where i represents each combustible hydrocarbon species present in the gas to be flared.[45]

The DRE of individual components of the gas stream may be less than 98%, but the targeted DRE for the overall flare control system shall be at least 98% as defined by Equation 1.

$$DRE_{total}(\%) = \left(1 - \frac{\sum_i remaining\ hydrocarbon\ emitted}{\sum_i total\ hydrocarbon\ feed}\right) x\ 100 \qquad (1)$$

The goal of the demonstration of these devices will be both the confirmation of the developed flare system to maintain destruction efficiency across changing environmental conditions and the validation of the associated flare performance data logging system. Quantification of methane emissions reduced can be made through direct measurement or another suitable measurement method when direct measurements are not viable.

Efforts in this area can include but are not limited to field demonstration of the following technologies:

- New complete flare or burner designs with integrated sensors and control feedback systems ensuring and document stable ultra-high destruction removal efficiency of at least 98% of all combustible hydrocarbons present in the gas stream.
- New sensors or other monitoring and recording technologies in the form of sensor platforms advancing to field scale and deployed via retrofit on well sites with existing assisted flares and are capable of integration with flare control systems in order to maintain destruction removal efficiency of all combustible hydrocarbons.

[45] Corbin, Darcy J., and Matthew R. Johnson. "Detailed expressions and methodologies for measuring flare combustion efficiency, species emission rates, and associated uncertainties." Industrial and Engineering Chemistry Research, vol. 53, no. 49, 2014, pp. 19359–19369, https://doi.org/10.1021/ie502914k.

Projects under AOI 2b shall identify an industry partner(s) and well site location(s) for field testing. Economic viability discussions and calculations shall include relevant retrofit or new installation costs, operating costs (including the transport cost of the final processed natural gas, NGLs, oils, or converted chemical products and any co-products to an appropriate midstream location, where applicable), and equipment transport costs.

Results of these activities are also anticipated to provide potential benefits to impacted low-income and disadvantaged communities such as improved air quality, mitigation of legacy air pollution, creation of high-quality jobs, improved surface and groundwater quality, and improvements to overall human health.

The goal of the AOI is to use data from field demonstrations to show economic feasibility of solutions starting at TRL 6 to 7 and achieving a TRL of 8 at the end of the project in justification of the commercial viability of the approach. Solutions must show field validated results supporting an operational near-zero emissions profile and demonstrate a measurable reduction in the amount of methane emissions for the selected field site. The technological advancement and potential methane mitigation impact of the proposed method must be clearly established as compared to existing commercial solutions.

Project teams under AOI 2b must include a business that intends to commercialize the technologies to be demonstrated as evidenced by a letter of commitment. Project teams must also include a letter of commitment from an industry partner who will provide access to field sites for the demonstration of those technologies.

ii. Technical Elements Required in Applications to AOI 2b

Applications to AOI 2b must include the following technical elements:

1. A **Workplan** including:
    - An explanation of the current state-of-the-art of the technology or process that is being targeted for improvement, including current industry practices regarding application.
    - An explanation of the current state of the proposed technology, the expected advantages over the current state-of-the-art solutions (if any exist), and the specific elements of the approach that are expected to be further validated in the field environment.
    - At least one defined field test site for all proposed field testing must be established at the time of application and include direct collaboration with an industry partner. More than one field test site is strongly recommended to fully characterize the expected operational capability of the proposed technology, with the end of the project

resulting in permanent installation at several locations capable of continued operation after the funding period ends. A letter of commitment from the industry partner must be submitted at the time of application that defines the planned well site location, time frame for operation, an initial estimated labor hour commitment, and an outline of expected tasks to ensure the safe and effective operation of the compressor, engine, gas processing, reactor, flare, or other mitigation system in the field. All projects must identify and characterize methane emissions from the established field demonstration site(s) and then design, procure, permanently install, and operate retrofit technology solutions at-scale at one or more field sites. Multiple field site installations are strongly recommended. The project must be capable of demonstrating and achieving a stable reduction in methane emissions at the field site(s) no later than September 30, 2028, accompanied by a detailed plan for long-term permanent operation of the technology.

- A realistic quantified assessment, based on the measured field test data of the ability of the engine, compressor, or other methane mitigation system to achieve “near zero emissions” operation at the well site or field location. This assessment shall be quantified in terms of volume of methane and any other hydrocarbons lost to atmosphere per volume processed by the system over the span of steady state field operation. Applicants shall also include realistic estimates for the expected emissions reduction that can be achieved with final implementation of the technology and how the mitigation impact would scale with increasing industry adoption.
- A preliminary economic analysis of the technology being proposed. Note: A final techno-economic analysis (TEA) is due at project conclusion that is based on the measured performance results completed during the testing phase in the field. The TEA must include estimates of the expected capital cost, expected operating costs, other required raw materials, labor, and the treatment and handling of any waste streams. For AOI 2b, the TEA must include transport cost of the final processed natural gas, NGLs, oils, or converted chemical products and any co-products to an appropriate midstream location, where applicable.
- A description of the length of time that the proposed technology will be deployed for field testing. Note: The length of time for field testing at each location is recommended to be at least 12 months, but the actual duration should be established by the applicant based on a discussion around the required successful continuous steady state operation for their system to reduce commercialization risks to a level that would enable immediate industrial adoption. By the end of the project, it is anticipated that the installation of the technology could

be permanent, and that the operation of the system could continue beyond the required field test duration and beyond the funding period.
    - Applicants must clearly define how the proposed solution will enable operators to maintain data logging of emissions and system performance.
    - Clearly defined statement of the likely challenges and obstacles to completing the proposed work and planned strategies for meeting these challenges and overcoming obstacles.
2. A **Statement of Project Objectives (SOPO)** describing all project Tasks to be completed, including a description of what activities will be completed under each Task and how they will be accomplished. These tasks should clearly show how the field ready design will be procured and constructed to a state suitable for field deployment.
3. A **Project Management Plan (PMP)** establishing baselines (technical scope, budget, schedule) for the project and describes the approach to manage project performance relative to those baselines. The PMP should also include an organizational structure for the project team explaining the roles and responsibilities of team members, integration of team members to achieve the project objectives, approach to communication among participants and with DOE, the process for making decisions on technical direction, procedures for resolving conflict, and questions regarding intellectual property.
4. Explanation of the **Technical Qualifications and Resources**, including:
    - Description of the qualifications of the project team to administer the project, advance the proposed technology for field demonstration(s), and move the technology towards commercialization.
    - Confirmation of the qualifications and availability of each team member to complete the effort.
    - Detailed explanation of how the capabilities of the individual members or entities in the application will be integrated to achieve the project's objectives.

iii. Activities Not of Interest to AOI 2b

Activities that are NOT of interest under AOI 2b include the following, and applications including them will be deemed non-responsive:

- Natural gas driven process and pneumatic controllers with access to onsite grid power are excluded from consideration in this FOA. It is noted that all natural gas driven process controllers are a significant source of methane emissions (44.0 MMT CO_2e/year as of 2022).
- Solutions that only detect and measure methane leaks without implementing a mitigation solution.

- Projects using only laboratory validation, computer simulations, or the development of modeling tools or methods that do not ultimately progress to field deployment of a physical design capable of testing at multiple field sites.
- Systems that vent hydrogen or other direct or indirect greenhouse gases to the atmosphere as part of the process without consideration of the capture and utilization or transport and sale of these gases.
- Technologies centered on hydrogen production.

c. Area of Interest 2c: Field Deployment of Emissions Reduction Technologies at Oil and Gas Production Facilities

i. Objectives and Background (AOI 2c)

The objective of AOI 2c is field deployment, full scale validation, and commercialization of new technologies that are capable of mitigating the methane emissions caused by point source emission types associated with the production segment, particularly for liquids unloading, the handling of produced water, equipment leaks, leaks from tanks, and natural gas-driven process controllers with no access to power.

For liquids unloading, technologies are sought that mitigate the methane lost during blowdowns, during the use of a plunger lift, or during the use of other techniques or technologies to remove accumulated fluids from the wellbore for produced water; such technologies should reduce methane lost during underground injection, treatment, recycling, and discharge, including reduction of methane from tanks or open pit water storage. Technologies can also mitigate methane lost from equipment leaks such as those from oil wellheads, separators, heater/treaters, and oil headers. For tanks and tank batteries, technologies are sought that notify operators to mitigate the methane lost due to leaks from improperly reseated pressure relief valves or worn gaskets on thief hatches. For natural gas-driven process controllers with no access to power, technologies are sought that help convert process controllers to zero methane emissions while minimizing secondary impacts.

All field demonstrations of the technologies in this AOI should clearly show a reduction of potential human error factors that could lead to accidental malfunction or any suboptimal application of the mitigation technology. Methane emissions should be prevented, captured, or otherwise redirected for further processing and sale with the full system operating with a near-zero emissions profile. For this Area of Interest, a significant reduction of the methane emissions for the field site must be demonstrated during liquids unloading operations, during the handling of produced water, or through

equipment leak mitigation, through leak mitigation from tanks, or the conversion of natural gas-driven process controllers with no access to power to zero-emissions.

Projects must identify an industry partner(s) and a location(s) for field demonstration of the proposed technology. Economic viability discussions and calculations shall include relevant retrofit or new installation costs and operating costs of the technology supporting pre-commercial validation of the approach. **Projects under this AOI shall have a starting TRL 6 or 7 and achieve a TRL of 8 at the end of the project.**

Efforts in this area can include but are not limited to the below examples:

- Automated advanced processes (like automated lift systems) that can eliminate planned or unplanned atmospheric venting and add the benefit of maintaining reservoir energy and well production while virtually eliminating the methane emissions associated with traditional well blowdowns used during liquids unloading.
- Leak Detection and Repair (LDAR) systems capable of integration with vapor recovery unit (VRU) equipped storage tanks for the automated capture of methane that would otherwise be vented to the atmosphere from produced water tank storage.
- Methods of methane mitigation from lined and unlined open waste pits used for produced water storage that consider the toxicity of treatment chemicals, well-stimulation chemicals, corrosion inhibitors, and other additives that may be present in the water.
- Development of new, low-energy automated technologies that effectively process produced water and eliminate future off-gassing during transport and storage (pre-treatment).
- LDAR technologies that predict future leaks and provide instantaneous alerts to catch leaks sooner from oil wellheads, separators, heater/treaters, and oil headers.
- Integrated systems that are capable of automating equipment operations like hatches and valve recovery systems and include elements that remove human error during operation.
- Novel pressure sensor platforms that enable instantaneous detection and automated response to inadequate seals on gas handling equipment.

Results of these activities are also anticipated to provide potential benefits to impacted low-income and disadvantaged communities such as improved air quality, mitigation of legacy air pollution, creation of high-quality jobs, improved surface and groundwater quality, and improvements to overall human health.

Project teams under AOI 2c must include a business, as evidenced by a letter of commitment, that intends to commercialize the technologies to be demonstrated. Project teams must also include a letter of commitment from an industry partner who will provide access to field sites for the demonstration of those technologies.

ii. Technical Elements Required in Applications to AOI 2c

Applications to AOI 2c must include the following technical elements:

1. A **Workplan** including:
    - An explanation of the current state-of-the-art of the technology or process that is being targeted for improvement, including current industry practices regarding application.
    - An explanation of the current state of the proposed technology, the expected advantages over the current state-of-the-art solutions (if any exist), and the specific elements of the approach that are expected to be further validated in the field environment.
    - At least one defined field test site for all proposed field testing must be established at the time of application and include direct collaboration with an industry partner. More than one field test site is strongly recommended to fully characterize the expected operational capability of the proposed technology, with the end of the project resulting in permanent installation at several locations capable of continued operation after the funding period ends. A letter of commitment from the industry partner must be submitted at the time of application that defines the planned well site location, time frame for operation, an initial estimated labor hour commitment, and an outline of expected tasks to ensure the safe and effective operation of the compressor, engine, gas processing, reactor, flare, or other mitigation system in the field. All projects must identify and characterize methane emissions from the established field demonstration site(s) and then design, procure, permanently install, and operate retrofit technology solutions at-scale at one or more field sites. Multiple field site installations are strongly recommended. The project must be capable of demonstrating and achieving a stable reduction in methane emissions at the field site(s) no later than September 30, 2028, accompanied by a detailed plan for long-term permanent operation of the technology.
    - A realistic quantified assessment, based on the measured field test data of the ability of the engine, compressor, or other methane mitigation system to achieve “near zero emissions” operation at the well site or field location. This assessment shall be quantified in terms of volume of methane and any other hydrocarbons lost to

atmosphere per volume processed by the system over the span of steady state field operation. Applicants shall also include realistic estimates for the expected emissions reduction that can be achieved with final implementation of the technology and how the mitigation impact would scale with increasing industry adoption.

- A preliminary economic analysis of the technology being proposed. Note: A final techno-economic analysis (TEA) is due at project conclusion that is based on the measured performance results completed during the testing phase in the field. The TEA must include estimates of the expected capital cost, expected operating costs, other required raw materials, labor, and the treatment and handling of any waste streams.
- A description of the length of time that the proposed technology will be deployed for field testing. Note: The length of time for field testing at each location is recommended to be at least 12 months, but the actual duration should be established by the applicant based on a discussion around the required successful continuous steady state operation for their system to reduce commercialization risks to a level that would enable immediate industrial adoption. By the end of the project, it is anticipated that the installation of the technology could be permanent, and that the operation of the system could continue beyond the required field test duration and beyond the funding period.
- Applicants must clearly define how the proposed solution will enable operators to maintain data logging of emissions and system performance.
- Clearly defined statement of the likely challenges and obstacles to completing the proposed work and planned strategies for meeting these challenges and overcoming obstacles.

2. A **Statement of Project Objectives (SOPO)** describing all project Tasks to be completed, including a description of what activities will be completed under each Task and how they will be accomplished. These tasks should clearly show how the field ready design will be procured and constructed to a state suitable for field deployment.
3. A **Project Management Plan (PMP)** establishing baselines (technical scope, budget, schedule) for the project and describes the approach to manage project performance relative to those baselines. The PMP should also include an organizational structure for the project team explaining the roles and responsibilities of team members, integration of team members to achieve the project objectives, approach to communication among participants and with DOE, the process for making decisions on technical direction, procedures for resolving conflict, and questions regarding intellectual property.

4. Explanation of the **Technical Qualifications and Resources**, including:
    - Description of the qualifications of the project team to administer the project, advance the proposed technology for field demonstration(s), and move the technology towards commercialization.
    - Confirmation of the qualifications and availability of each team member to complete the effort.
    - Detailed explanation of how the capabilities of the individual members or entities in the application will be integrated to achieve the project's objectives.

iii. Activities Not of Interest to AOI 2c

Activities that are NOT of interest under AOI 2c include the following, and applications including them will be deemed non-responsive:

- Natural gas driven process and pneumatic controllers with access to onsite grid power are excluded from consideration in this FOA. It is noted that all natural gas driven process controllers are a significant source of methane emissions (44.0 MMT CO_2e/year as of 2022).
- Solutions that only detect and measure methane leaks without implementing a mitigation solution.
- Projects using only laboratory validation, computer simulations, or the development of modeling tools or methods that do not ultimately progress to field deployment of a physical design capable of testing at multiple field sites.
- Systems that vent hydrogen or other direct or indirect greenhouse gases to the atmosphere as part of the process without consideration of the capture and utilization or transport and sale of these gases.
- Technologies centered on hydrogen production.

iii. Area of Interest 3: Accelerating Deployment of Methane Monitoring Solutions

The primary driver behind AOI 3 is the need for consistent, accurate, and transparent multi-scale, multi-modal methane emissions measurement and characterization across the oil and natural gas production segment in the U.S. A wide range of stakeholders and Tribes need to be able to rely on accurate emissions measurements: producers seeking to reduce their emissions, regulators seeking to monitor compliance with regulations, natural gas marketers seeking to transparently certify gas as having been produced under reduced-emissions conditions, natural gas customers seeking assurance that their product has been produced according to stated standards, and local communities seeking to understand methane emissions in their communities.

The overall objective of AOI 3 is to accelerate the deployment of methane measurement and monitoring technologies in the following Areas of Interest:

- AOI 3a – Improving Access to Monitoring Data for Impacted Communities
- AOI 3b – Regional Methane Emissions Characterization

a. Area of Interest 3a: Improving Access to Monitoring Data for Impacted Communities

i. Objectives and Background (AOI 3a)

The objectives of AOI 3a are to enhance the deployment of methane measurement and monitoring technologies, improve access to data collected by entities utilizing these technologies, improve measurement standards for emissions reporting, and inform emission inventories such as EPA's GHGI, while also improving Federal, State, and Tribal mitigation efforts by providing emissions data to inform future mitigation efforts and more accurate methods for calculating emissions.

The desired outcome is the wider deployment of consistent, continuous, accurate, granular, and transparent methane emission measurement technologies. This effort will focus directly on technology deployment and data gathering and reporting in disadvantaged communities and at oil and natural gas assets located near disadvantaged communities[46], including facilities managed by small operators.

Legacy oil and natural gas producing areas (often but not always rural) often overlap with economically distressed areas that are home to disadvantaged communities. The monitoring activities initiated through this AOI are expected to improve methane emissions data available to disadvantaged communities and provide long-term environmental benefits by improving emissions inventories (e.g., EPA's GHGI) that inform methane emissions mitigation strategies. The benefits would include improved air quality, mitigation of legacy air pollution, creation of good-paying emissions monitoring and mitigation jobs, and improvements to human health.

Methane monitoring efforts under AOI 3a could include but are not limited to: optical direct measurement, fence line measurement, aerial monitoring data, tower-based measurement, vehicle-based monitoring, and satellite data. These technologies could be installed/deployed at or near, but not be limited to,

[46] To identify disadvantaged communities, see footnote 8 above (citing to M-23-09 and the CEJST, https://screeningtool.geoplatform.gov/). Additional information that may be of interest to communities is available at: DOE's Energy Justice website, see: https://www.energy.gov/justice/articles/energy-justice-mapping-tool-disadvantaged-communities-reporter

disadvantaged communities, upstream facilities including wellheads, pumping units, production equipment and fluid storage tanks, and gas gathering systems and compressor stations.

To meet the objectives under AOI 3a, applicants are being sought to develop and execute projects, in collaboration with DOE, that will facilitate the purchase, distribution, and installation of commercially available, "off-the-shelf" methane emissions monitoring technologies to support effective emissions detection and measurement and/or quantification in disadvantaged communities and from oil and natural gas assets located near disadvantaged communities.

Projects will also be required to include comprehensive oil and gas operator and community training efforts on the use of methane measurement technologies and the interpretation of data.

Project teams under this AOI shall include, but are not limited to, technology solution providers, oil and natural gas operators, and disadvantaged communities. Applications must include Letters of Commitment from Industry partners and disadvantaged communities for access to locations to be used for the installation of methane monitoring equipment.

Applications must include but are not limited to:

- A description of the proposed approach to work with operators and disadvantaged communities to install and monitor methane emissions.
- An explanation of communication and data reporting methods on emissions monitoring systems in the field. All data will be required to be "open-source" and publicly available.
- Evidence of collaborative relationships with disadvantaged communities and producers operating facilities near disadvantaged communities, where the monitoring technologies will be deployed.

ii. Technical Elements Required in Applications to AOI 3a

Applications to AOI 3a must include the following technical elements:

1. A **Workplan** including:
    - An explanation of sources of emissions in the disadvantaged communities, and at oil and natural gas assets located near disadvantaged communities that the applicant intends to monitor and their respective impact, with emphasis on methane as the primary objective and other GHG emissions as secondary objective.
    - A description of the proposed approach to work with operators, technology solution providers, and disadvantaged communities to install/deploy methane emissions monitoring technologies.

- An explanation of communication and data reporting methods on emissions monitoring systems in the field. All data will be required to be "open-source" and publicly available.
- Evidence of collaborative relationships with disadvantaged communities and producers operating facilities near disadvantaged communities, where the monitoring technologies will be deployed.
- An explanation of the methane emissions monitoring solutions that will be utilized within the prescribed effort. Explanation of the proposed approach for the selection of the methane emissions monitoring technologies.
- An explanation of the impacts of the proposed project, including:
  - Estimated number of communities and point sources that will be monitored in the proposed effort.
  - Total number of disadvantaged communities (e.g. census tract) and oil and natural gas assets located near disadvantaged communities that are expected to be impacted by the project's efforts.

2. A **Statement of Project Objectives (SOPO)** describing all project Tasks to be completed, including a description of what activities will be completed under each Task and how they will be accomplished.
3. A **Project Management Plan (PMP)** establishing baselines (technical scope, budget, schedule) for the project and describes the approach to manage project performance relative to those baselines. The PMP should also include an organizational structure for the project team explaining the: roles and responsibilities of team members, integration of team members to achieve the project objectives, approach to communication among participants and with DOE, the process for making decisions on technical direction, procedures for resolving conflict, and questions regarding intellectual property.
4. Explanation of the **Technical Qualifications and Resources**, including:
   - Description of the qualifications of the project team to monitor methane emissions from oil and natural gas sources in and around, disadvantaged communities.
   - Confirmation of the qualifications and availability of each team member to complete the effort.
   - Detailed explanation of how the capabilities of the individual members or entities in the application will be integrated to achieve the project's objectives.
   - Description of the projects teaming arrangement including, but is not limited to, industry partners and disadvantaged communities as evidenced by Letters of Commitment (LOCs).

iii. Activities Not of Interest to AOI 3a

<u>Activities that are NOT of interest under AOI 3a include the following, and applications including them will be deemed non-responsive</u>:

- Projects that do not include all of the above technical elements including required teaming arrangements.
- Efforts that are solely designed to physically eliminate or reduce methane emissions.
- Modeling or simulation efforts designed to determine a methane monitoring strategy.
- Efforts that rely solely on the use of satellites or low-earth orbit technologies without using complementary ground-based measurements to validate emissions estimates.

b. Area of Interest 3b: Regional Methane Emissions Characterization

i. Objectives and Background (AOI 3b)

The objectives of AOI 3b are to:

1. Develop consistent, accurate, granular, and transparent multi-scale (e.g., optical, tower, aerial, satellite) methane emission measurement approaches over different time scales (e.g., snapshot in time versus annual emissions) that help inform EPA's programs such as the Inventory of U.S. Greenhouse Gas Emissions and Sinks and the Greenhouse Gas Reporting Program, as well as assist State, Tribal, and industry mitigation efforts.
2. Build off regional "top-down"/ "bottom-up" methane assessments and fill in critical information gaps through collection, validation, and near real-time dissemination of regional methane emissions data.
3. Collect, validate, and disseminate point source to regional-scale methane emissions data.

Regions being considered for projects under AOI 3b are depicted in Figure 13.

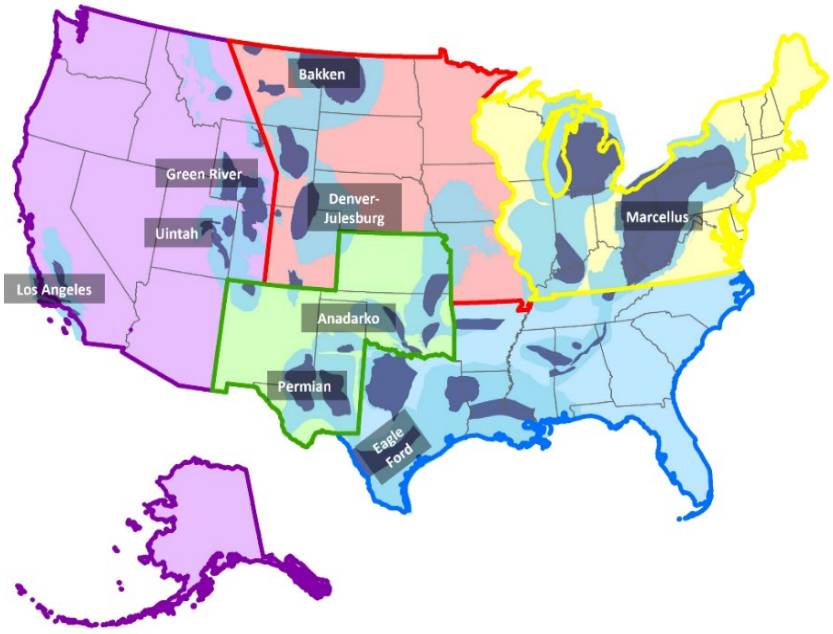


Figure 13: Regions Identified for Methane Emissions Characterization Projects

Note: For an Applicant's convenience, a "shapefile" and a .pdf snapshot of the Regional boundaries is included as an attachment to this announcement.

AOI 3b builds on previous completed and ongoing DOE FECM funded basin-scale methane emissions characterization projects[47] initiated in 2023 that expand the temporal and spatial characterization of methane emissions across the U.S. In addition, this AOI 3b builds off the DOE FECM funded projects focused on developing updated equipment and process-related methane emission factors. Accurate regional-scale methane assessments are critical to track long-term reductions in oil and natural gas sector methane emissions. The need to accurately characterize methane emissions is also being driven by natural gas producers seeking to demonstrate that their gas has been produced with low emissions intensity. Expanding the reconciliation between engineered estimates of methane emissions (bottom-up estimates) and atmospheric methane concentration measurements and modeling (top-down estimates) on a regional scale over time can help further refine datasets, better quantify emissions intensity, and better account for weather, geography, and emissions source attribution.

The U.S. EPA has maintained an Inventory of U.S. Greenhouse Gas Emissions and Sinks since the early 1990s. This annual report provides a comprehensive accounting of total anthropogenic greenhouse gas emissions sources in the U.S. Methane emissions are included in this annual inventory, with emissions data

[47] https://netl.doe.gov/resource-sustainability/mmt

collected from a variety of individual facilities and equipment types within the oil and natural gas production, transportation, and distribution sectors.
Emission factors[48] are factors that relate quantities of emissions to an activity. To develop an emissions factor that is statistically relevant, annually reported and verified or peer reviewed research study, emissions data is collected. This data is later reviewed by the EPA, relevant stakeholders, and will go through annual public and United Nations Framework Convention on Climate Change (UNFCCC) expert review. The data collected through this AOI will be utilized to improve the accuracy of available emissions factors and calculation methods throughout petroleum and natural gas systems.

Example basin-scale efforts that could be referenced or leveraged in meeting the objectives of AOI 3b include:

- Five recently funded DOE FECM basin-scale field projects initiated in 2023 covering the following basins: San Joaquin Basin, Uinta Basin, Denver-Julesburg Basin, Fayetteville Shale Play, Haynesville Play, Marcellus Play.
- Multiple ongoing basin/play assessments (including Upper Green River Basin, Anadarko Basin and follow-on enhanced assessments of previously assessed basins/plays).

The obstacles to easily achieving the objectives of the AOI are many, but the most important include:

- Oil and gas production operations are dynamic and variable over both short and longer time scales; this variability results from dynamic surface operations and dynamic subsurface activity.
- The development and application of oil and natural gas production technology is also dynamic, meaning assumptions about the relationships between technology and emissions must continually evolve.
- Methane emissions from the oil and natural gas sector are often intermittent and sometimes hard to predict, resulting from technology failures, weather events and human-induced events (e.g., accidents, mistakes, improper maintenance, etc.).
- It can be difficult to differentiate oilfield methane emissions from emissions resulting from multiple overlapping sectors (e.g., coal mine venting, agricultural and animal production, landfill venting, industrial venting, and natural sources such as wetlands).
- There is uncertainty in the measurements being gathered using current technology.

[48] https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2022

Improving Source-Specific Emissions Data Downstream of Production

It is anticipated that projects awarded under AOI 3b will provide improved emissions data at many scales, including equipment scale.

In recent years, a number of resources[49], including studies funded by DOE, and data collected through subpart W of EPA's GHG Reporting Program have improved data available to quantify emissions from natural gas and petroleum systems in the GHGI. However, there are several emission sources for which data are limited (for example, where EPA uses default international IPCC factors for the GHGI). Emissions data for these sources in the U.S. is very limited, or in some cases, non-existent.

Projects awarded under AOI 3b will collect data that can be used to improve emissions estimates. Examples of high priority areas for emission estimate updates include:

1. gathering pipelines
2. transmission pipelines
3. distribution pipeline damage resulting from excavation activities
4. natural gas meters at industrial facilities (vented emissions are a priority)

Gathering pipelines. Gathering pipelines receive natural gas from production sites and transfer it to transmission pipelines or processing facilities. Gathering pipeline methane emissions were estimated to be 96,300 tonnes (2.7 MMT CO2e) in 2022, a 14 percent increase from 1990[50]. In the Inventory of U.S. Greenhouse Gas Emissions and Sinks, due to lack of emissions data for gathering pipelines, emissions from gathering pipelines are currently estimated using emission factors developed from data collected on distribution pipelines.

Transmission pipelines. Natural gas transmission involves high pressure, large diameter pipelines that transport gas long distances from field production and processing areas to distribution systems or large volume customers such as power plants or chemical plants. Transmission pipeline methane emissions were estimated to be 93,300 tonnes (0.1 MMT CO2e) in 2022, a 3 percent increase from 1990[51]. In the Inventory of U.S. Greenhouse Gas Emissions and Sinks, due to lack of detailed and recent data for transmission pipelines, emissions from transmission pipelines are currently estimated using a single emission factor, which does not vary by year or material type and was developed in a study published in 1996.

[49] https://www.epa.gov/ghgemissions/natural-gas-and-petroleum-systems
[50] https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2022
[51] https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2022

In the U.S., approximately 20% of incidents along natural gas pipelines that result in spills or releases are due to excavation activities. Between 2010 and 2018, there have been 8 deaths attributed to excavation incidents along pipelines. To improve EPA's GHGI emission factors associated with pipeline excavation leaks, the AOI also seeks projects that will conduct assessments (without excavation and field inspection) of the condition and methane emissions associated with installed steel and composite sleeves throughout their lifecycle. Dig-in methane emissions were estimated to be 69,700 tonnes (2.0 MMT CO2e) in 2022, a 47 percent increase from 1990[52]. In the Inventory of U.S. Greenhouse Gas Emissions and Sinks, due to lack of detailed and recent data for dig ins (excavation activities), emissions from dig ins are currently estimated only for distribution pipelines and using a single emission factor which does not vary by year, material type or incident counts and was developed in a study published in 1996.

Industrial facility meters (venting as priority source) are used to track natural gas consumption at residential, commercial, and industrial facilities. For industrial meters, current emissions estimates in the Inventory of U.S. Greenhouse Gas Emissions and Sinks include only leak emissions data. In 2022, methane emissions from all customer meters were estimated to be 236,300 tonnes (6.6 MMT CO2e), and methane emissions from industrial meters were estimated to be 19,100 tonnes (0.5 MMT CO2e)[53]. A previous study with limited sample size indicated that industrial meter venting emissions may be substantial, and a more recent study observed but did not quantify venting emissions from industrial meters.

The operational, geographical, environmental, and regulatory variability across oil and gas producing regions calls for methane emissions characterization to be tackled by multiple, well-coordinated regional projects, ideally through a partnership of state agencies, oil and natural gas operators, academic researchers, and emission-monitoring-technology-providers. Each of these projects will provide the expertise needed to address the three objectives in ways that reflect the unique features of their respective regions. But these projects will also work together to identify synergies and "best practices" that can support state-based emissions inventories and nationwide methane emission characterization efforts that are robust, accurate and trusted by industry, regulators and the marketplace.

The intent of the AOI is to identify, characterize, and improve the understanding of the emissions from these sources. Data collection, curation, and analysis techniques will need to be provided in detail. All manner of data collection

[52] https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2022
[53] https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2022

technologies (including manually operated, remotely operated, autonomous, and intermittent) should be considered.

Project activities should include efforts designed to:

- Accurately characterize leak detection and quantification (LDAQ) methods (extension of ongoing projects).
- Identify critical equipment monitoring requirements and collect data to improve emissions data for the EPA GHGI.
- Complement existing basin-scale emissions measurement efforts, such as those being funded by DOE and NETL.
- Encourage and support cooperation with operators to develop and implement practices to ensure that LDAQ solutions achieve practical results.
- Validate and improve methods that directly estimate region scale emissions
- Engage operators to understand how mitigation efforts and operational activities affect emissions, in ways that balance a need for operator confidentiality with a need for transparency and consistency across emissions estimation methods
- Generate data that could be used by U.S. EPA and other regulatory agencies to inform updates to the GHGI and GHGRP, including ensuring that emission factor data gathered and reported as part of the research is representative and suitable for inclusion in the GHGI.
    - Note: For additional information on research that has been incorporated in the GHGI, the referenced studies[54] are currently used to develop emissions estimates for the sources listed as examples in AOI 3b
- Coordinate among other characterization projects, NETL, and DOE to ensure effective management and utilization of project data and ensure effective outreach opportunities with key stakeholders.

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[54] ***For natural gas gathering and transmission pipelines:***
M. R. Harrison, T. M. Shires, J. K. Wessels, and R. M. Cowgill (1996) Methane Emissions from the Natural Gas Industry, Volume 9: Underground Pipelines. https://www.epa.gov/sites/default/files/2016-08/documents/9_underground.pdf.

For distribution pipeline excavation damage:
M. R. Harrison, T. M. Shires, J. K. Wessels, and R. M. Cowgill (1996) Methane Emissions from the Natural Gas Industry, Volume 7: Blow and Purge Activities. https://www.epa.gov/sites/default/files/2016-08/documents/7_blowandpurge.pdf.

For industrial meters:
Gas Technology Institute and Innovative Environmental Solution (2009), Field Measurement Program to Improve Uncertainties for Key Greenhouse Gas Emission Factors for Distribution Sources. https://www.otd.org/wp-content/uploads/2021/05/77b-OTD-10-0002-Improve-Uncertainties-Surrounding-Key-Distribution-Greenhouse-Gas-Sources-SummaryReport.pdf.
Gas Technology Institute and US Department of Energy (2019), Classification of Methane Emissions from Industrial Meters, Vintage vs Modern Plastic Pipe, and Plastic-lined Steel and Cast-Iron Pipe. https://www.osti.gov/servlets/purl/1556081

- Participate in working groups for the coordination of efforts among the (5) regions and development of source-specific emission estimates from sources identified under "Improving Source-Specific Emissions Data Downstream of Production"

It is anticipated that one project will be selected from each region. An ideal, multidisciplinary regional project team could consist of oil and natural gas owners and operators, research universities, technology developers, state regulatory agencies, non-governmental organizations, and Federally Funded Research and Development Centers and National Laboratories.
Applicants are encouraged to collaborate with relevant organizations and interested parties to form strong teaming arrangements including a broad range of the relevant parties in their region and ensure coordination with other regional projects. Important elements of a strong team may include, but are not limited to:

- **Multiple producing industry partners willing to provide access to their operations** for monitoring equipment installation and to provide relevant operational and activity data to project team researchers for the purposes of emissions attribution, and willing to expeditiously share measured emissions data publicly
- **Methane emissions monitoring technology developers** to provide equipment for activities that will result in public release of data
- **Team members with direct experience in the analysis of methane emissions data** gathered at multiple scales and under a wide range of conditions
- **Team members with direct experience in methane monitoring equipment installation/data collection operations** under a range of operating conditions and facility types.

ii. Technical Elements Required in Applications to AOI 3b

<u>Applications to AOI 3b must include the following technical elements</u>:

1. A **Workplan** including:
    - An explanation of the current state-of-the-art of the technologies or processes that exist or are being developed for the monitoring, reconciliation, and assessment of methane emissions.
    - A Plan for collection of a representative sample of methane emissions data for each source.
    - A clear discussion and assessment of existing LDAQ solutions and how the proposed program will characterize them.
    - A clear discussion and assessment of existing methane emissions data and how the proposed strategy will enable future improvements and validation.

- A thorough discussion of the data and information sources utilized, and the framework required for the assessment and validation of the research being undertaken.
- A clear rationale for statistically relevant data collection and validation for use in improving emissions factors as part of the EPA GHGRP and GHGI.
- A plan for broad collaboration, data dissemination, "best practices" development, and public outreach/stakeholder engagement opportunities with other projects along with DOE and NETL.
- A clearly defined statement of the likely challenges, obstacles, and risks to completing the proposed work as planned and strategies for meeting those challenges, overcoming obstacles, and minimizing the risks.
- Plans for engaging operators in ways that will support participation in monitoring efforts and accelerate methane emissions mitigation efforts.
- A plan for integrating the project's activities with other regional project teams in ways producing synergies and enable the collection of emissions data that is consistent and comparable across regions through the participation in program-based working groups, coordination with EPA and DOE, and the development of best practices documents to clarify overall lessons learned.

2. A **Statement of Project Objectives (SOPO)** describing all project Tasks to be completed, including a description of what activities will be completed under each Task and how they will be accomplished.
3. A **Project Management Plan (PMP)** establishing baselines (technical scope, budget, schedule) for the project and describes the approach to manage project performance relative to those baselines. The PMP should also describe the organizational structure for the project explaining the: roles and responsibilities of team members, how the project team will be integrated to achieve the project objectives, the approach to communication among participants and with DOE, the process for making decisions on technical direction, procedures for resolving conflict, and questions regarding intellectual property.
4. Explanation of the **Technical Qualifications and Resources**, including:
   - Description of the qualifications of the project team to administer the project and achieve the goals and objectives of the proposed work.
   - Confirmation of the qualifications and availability of each team member to complete the effort.
   - Detailed explanation of how the capabilities of the individual members or entities in the application will be integrated to achieve

the project's objectives.
- Availability of the proposed facilities, equipment, and field site(s) to perform project tasks and meet the objectives of the AOI.

iii. Activities Not of Interest to AOI 3b

Activities NOT of interest under AOI 3b include the following, and applications including them will be deemed non-responsive:

- Projects not including all of the above technical elements including required teaming arrangements.
- Efforts designed solely to analyze or model existing data, not including efforts to collect data and validate emissions estimates in ways producing a more accurate characterization of regional or basin level emissions.
- Applications not demonstrating and validating the LDAQ technology or process in an operating oil or natural gas production, transport, and storage setting.
- Applications utilizing only simulated data as a means to validate the technology solutions being proposed or utilized.
- Efforts relying solely on the use of satellites or low-earth orbit technologies without using complementary ground-based measurements to validate emissions estimates.
- Project and associated organizations not able to support broad coordination and collaborative opportunities with other projects, DOE, and NETL.

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 falling outside the technical parameters specified in Sections I.A. and I.B. of the FOA.

  For additional information on activities not of interest in each AOI see the following sections:

  - AOI 1a: Section I.B.i.a.iii. "Activities Not of Interest to AOI 1a"
  - AOI 1b: Section I.B.i.b.iii. "Activities Not of Interest to AOI 1b"
  - AOI 1c: Section I.B.i.c.iii. "Activities Not of Interest to AOI 1c"
  - AOI 2a: Section I.B.ii.a.iii. "Activities Not of Interest to AOI 2a"
  - AOI 2b: Section I.B.ii.b.iii. "Activities Not of Interest to AOI 2b"
  - AOI 2c: Section I.B.ii.c.iii. "Activities Not of Interest to AOI 2c"

- AOI 3a: Section I.B.iii.a.iii. “Activities Not of Interest to AOI 3a”
- AOI 3b: Section I.B.iii.b.iii. “Activities Not of Interest to AOI 3b”

- Applications for proposed technologies that are not based on sound scientific principles (e.g., violates the laws of thermodynamics).

D. Community Benefits Plan: Job Quality and Equity

To support the goal of building a clean and equitable energy economy, IRA-funded projects are expected to (1) support meaningful community and labor engagement; (2) invest in quality jobs; (3) advance diversity, equity, inclusion, and accessibility (DEIA); 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).[55] To ensure these goals are met, applications must include a Community Benefits Plan describing how the proposed project would incorporate the four objectives stated above.

Applicants are encouraged to submit Community and Labor Partnership Documentation from Federally Recognized Indian Tribes and established labor and community-based organizations demonstrating the applicant’s ability to achieve the above goals as outlined in the Community Benefits Plan. Within the Community Benefits Plan, the applicant is encouraged to provide details on how to ensure the delivery of measurable community and jobs benefits, ideally using negotiated agreements between the applicant and the community, and/or the applicant and labor unions referred to collectively here as “Workforce and Community Agreements.” These include community benefits agreements, Tribal agreements, community workforce agreements, project labor agreements, and other collective bargaining agreements. See Section IV.C.xix. for the Community Benefits Plan content requirements.

E. Authorizing Statutes

This FOA is issued in accordance with programmatic authorizing statute:

Clean Air Act , Section 136, as added by Inflation Reduction Act (IRA), Section 60113, (codified at 42 U.S.C. 7436).

[55] The Justice40 Initiative, established by EO 14008, sets a goal that 40% of the overall benefits of certain federal investments flow to disadvantaged communities. Consistent with Justice40 guidance, DOE recognizes disadvantaged communities as the census tracts defined and identified as disadvantaged by the Climate and Economic Justice Screening Tool (CEJST), located at https://screeningtool.geoplatform.gov/, as well as all Federally Recognized Tribes (whether or not they have land). See https://www.whitehouse.gov/wp-content/uploads/2023/01/M-23-09_Signed_CEQ_CPO.pdf.

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

F. Notice of Inflation Reduction Act (IRA) Specific Requirements

Be advised that special terms and conditions apply to projects funded by the IRA 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 IRA-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 IRA 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 $850,000,000 of federal funding available for new awards under this FOA, subject to the availability of appropriated funds. DOE may issue one, multiple, or no awards in the Areas of Interest identified below:

Area of Interest Number	**Area of Interest Title**	**Anticipated Number of Awards**	**Anticipated Minimum Award Size for Any One Individual Award (Fed Share)**	**Anticipated Maximum Award Size for Any One Individual Award (Fed Share)**	**Approximate Total Federal Funding Available for All Awards**	**Anticipated Maximum Period of Performance** (End date no later than 9/30/2028)
1a	Reducing Methane Emissions from Marginal Conventional Wells	1	$299,000,000	$300,000,000	$300,000,000	~44 months
1b	Reducing Methane Emissions from Small Operators' Wells and Other Oil and Natural Gas Assets	1	$209,000,000	$210,00,000	$210,00,000	~44 months
1c	Reducing Methane Emissions from Marginal Conventional Wells and Oil and Gas Assets on Tribal Lands	1	$49,000,000	$50,000,000	$50,000,000	~44 months
2a	Field Deployment of Engine and Compressor Methane Reduction Technologies	Up to 10	$1,500,000	$6,000,000	$60,000,000	~44 months
2b	Field Deployment of Gas Flaring Reduction Technologies	Up to 10	$1,500,000	$6,000,000	$60,000,000	~44 months
2c	Field Deployment of Emissions Reduction Technologies at Oil and Gas Production Facilities	Up to 6	$1,000,000	$5,000,000	$30,000,000	~44 months
3a	Improving Access to Monitoring Data for Impacted Communities	Up to 4	$8,000,000	$10,000,000	$40,000,000	~44 months
3b	Regional Methane Emissions Characterization	Up to 5	$18,000,000	$20,000,000	$100,000,000	~44 months

APPLICATIONS THAT EXCEED THE "MAXIMUM DOE SHARE OF AWARD" SPECIFIED ABOVE WILL BE CONSIDERED NONCOMPLIANT (SEE SECTION III, "ELIGIBILITY INFORMATION; COMPLIANCE CRITERIA"). DOE WILL NOT REVIEW OR CONSIDER NONCOMPLIANT APPLICATIONS.

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

DOE anticipates making awards with ***project periods of performance with end dates no later than September 30, 2028***. Project will be comprised of one or more budget periods. Project continuation will be contingent upon several elements, including satisfactory performance and DOE's Go/No-Go decision. For a complete list and more information on the Go/No-Go review, see Section VI.B.xv.

iii. New Applications Only

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

B. DOE Funding Agreements

Through grants and cooperative 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 U.S. government.

i. Cooperative Agreements

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

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

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

ii. Funding Agreements with Federally Funded Research and Development Center (FFRDCs)[56]

When FFRDCs are not funded as subrecipients, FFRDCs are funded independently of the remainder of the project team. The FFRDC then executes an agreement with any non-FFRDC project team members to arrange work structure, project execution, and any other matters. Regardless of these arrangements, the entity that applied as the prime recipient for the project will remain the prime recipient for the project. See Section III.E.

[56] FFRDCs are public-private partnerships that conduct research for the United States government. A listing of FFRDCs can be found at http://www.nsf.gov/statistics/ffrdclist/.

III. Eligibility Information

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

A. Eligible Applicants

i. Domestic Entities

Domestic entities are eligible to apply as prime recipients or subrecipients. 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. Nonprofit entities;
4. State and local governmental entities; and
5. Indian Tribes, as defined in section 4 of the Indian Self-Determination and Education Assistance Act, 25 U.S.C. § 5304[57]

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 or under the laws 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.

[57] "**Indian Tribe**," for the purposes of this FOA and as defined in in section 4 of the Indian Self-Determination and Education Assistance Act (25 U.S.C. § 5304), [1]means any Indian tribe, band, nation, or other organized group or community, including any Alaska Native village or regional or village corporation as defined in or established pursuant to the Alaska Native Claims Settlement Act (85 Stat. 688) [43 U.S.C. § 1601, et seq.], which is recognized as eligible for the special programs and services provided by the United States to Indians because of their status as Indians. Federally Recognized Indian Tribes are also considered disadvantaged communities for the purposes of Justice40 requirements in this FOA per https://www.whitehouse.gov/wp-content/uploads/2023/01/M-23-09_Signed_CEQ_CPO.pdf.

Non-DOE/NNSA FFRDCs are eligible to participate as a subrecipient, but are not eligible to apply as a prime recipient.
Federal agencies and instrumentalities (other than DOE) are eligible to participate as a subrecipient, but are not eligible to apply as a prime recipient.

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

Nonprofit organizations described in section 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 general, foreign entities are not eligible to apply as either a prime recipient or subrecipient. 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. 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 B 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.

B. Cost Sharing

Cost share requirements are summarized below:

Areas of Interest	Cost Share Requirement
AOI 1a	0%
AOI 1b	0%
AOI 1c	0%
AOI 2a	20%
AOI 2b	20%
AOI 2c	20%
AOI 3a	0%
AOI 3b	0%

For Areas of Interest 2a, 2b, and 2c, the cost share must be at least 20% of the total project costs[58]. The cost share must come from non-federal sources unless otherwise allowed by law.

To help applicants calculate proper cost share amounts, DOE has included a cost share information sheet as Appendix A to this FOA.

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.

iii. Legal Responsibility

Although the cost share requirement applies to the entire project, 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.

iv. 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 entire project is met.

v. 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.

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

Cost share may 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.

DOE Loan Guarantees cannot be leveraged by applicants to provide the required cost share or otherwise support the same scope that is proposed under a project.

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 federal government did not provide the funding to the state or local government.

The prime recipient and subrecipient(s) may not use the following sources to meet its cost share obligations:

- 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 as adopted and supplemented by 2 CFR 910.130 for additional cost sharing requirements.

vi. 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.

vii. Cost Share Verification

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

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

viii. Cost Share Payment

DOE requires prime recipients to contribute the cost share amount incrementally over the life of the award. Specifically, the prime recipient's cost share for each billing period must always reflect the overall cost share ratio negotiated by the parties (i.e., the total amount of cost sharing on each invoice when considered cumulatively with previous invoices must reflect, at a minimum, the cost sharing percentage negotiated). Additionally, prime recipients will be required to provide project cost share at a percentage commensurate with the FFRDC costs, on a budget period basis, resulting in a higher interim invoicing cost share ratio than the total award ratio.

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

C. Compliance Criteria

All applicant submissions must:

- comply with the applicable content and form requirements listed in Section IV. of the FOA;
- include all required documents;
- be successfully uploaded in Grants.gov at https://www.grants.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 Grants.gov, submissions submitted after the applicable deadline, or incomplete submissions.

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 Letter of Intent, Concept Paper, Full Application, or Reply to Reviewer Comments. Once the Letter of Intent, Concept Paper, Full Application, or Reply to Reviewer Comments are submitted by means specified 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 Letter of Intent, Concept Paper, Full Application, or Reply to Reviewer Comments before the applicable deadline. DOE will not extend the submission deadline for applicants that fail to submit required information by the applicable deadline due to server/connection congestion.

D. Responsiveness Criteria

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

E. Other Eligibility Requirements

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

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

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. *Funding, Cost Share, and Subaward with FFRDCs*
DOE will **NOT** fund DOE/NNSA FFRDCs participating as a subrecipient through the DOE field work authorization process. DOE will **NOT** fund non-DOE/NNSA FFRDCs through an interagency agreement with the sponsoring agency. Therefore, the prime recipient and FFRDC are responsible for entering into an appropriate subaward that will govern, among other things, the funding of the FFRDC portion of the work from the prime recipient under its DOE award. Such an agreement must be entered into before any project work begins.

The applicant should prepare the budgets using rates appropriate for funding the FFRDCs through subawards. The applicant's cost share requirement will be based on the total cost of the project, including the applicant's, the subrecipient's, and the FFRDC's portions of the project.

iv. *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.

v. *Limit on FFRDC Effort*

The FFRDC effort, in aggregate, ***shall not exceed twenty (20)%*** of the total estimated cost of the project, including the applicant's and the FFRDC's portions of the effort.

F. Limitation on Number of Full Applications Eligible for Review

An entity may submit more than one Full Application to this FOA, provided that each application describes a unique, scientifically distinct project.

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 apply in response to this FOA lies solely with the applicant.

IV. Application and Submission Information

A. Application Process

The application process includes a Full Application phase.

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;
- 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.

B. Application Forms

The application forms and instructions are available on Grants.gov at https://www.grants.gov/.

Note: The maximum file size that can be uploaded to the Grants.gov 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 Full Application

Applicants must complete the following application forms found on the Grants.gov website at https://www.grants.gov/.

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.

Component	File Format	Page Limit	File Name
SF-424: Application for Federal Assistance	PDF	N/A	N/A
Project/Performance Site Location(s)	Form	N/A	N/A
Technical Volume	PDF	20	TechnicalVolume.pdf
Resumes	PDF	3 pages each	Resumes.pdf
Letters of Commitment	PDF	1 page each	LOC.pdf
Community Partnership Documentation	PDF	10	PartnershipDocs.pdf
Statement of Project Objectives	MS Word	8	SOPO.doc or docx
Project Management Plan	MS Word	8	PMP.doc or docx
Environmental Plan	PDR	3	EnvPlan.pdf
Budget Justification Workbook	MS Excel	N/A	Budget_Justification.xls or xlsx
Summary for Public Release	PDF	1	Summary.pdf
Summary Slide	MS PowerPoint	1	Slide.ppt or pptx
Subrecipient Budget Justification	MS Excel	N/A	Subrecipient_Budget_Justification.xls or xlsx
Authorization from cognizant Contracting Officer for FFRDC	PDF	N/A	FFRDCAuth.pdf
SF-LLL Disclosure of Lobbying Activities	Form	N/A	N/A
Waiver Requests	PDF	N/A	FN_Waiver.pdf
Community Benefits Plan: Job Quality and Equity	PDF	12	Cbenefits.pdf
Current and Pending Support	PDF	N/A	CPS.pdf
Locations of Work	PDF	N/A	LOW.xls or xlsx
Transparency of Foreign Connections	PDF	N/A	BusinessSensitive.pdf
Potentially Duplicative Funding Notice	PDF	N/A	PDFN.pdf
Impacted Indian Tribes Documentation	PDF	N/A	ImpactedTribes.pdf

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

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

ii. SF-424: Application for Federal Assistance

Applicants must complete the SF-424 Application for Federal Assistance form first to populate data in other forms. 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: https://www.energy.gov/management/financial-assistance-forms-and-information-applicants-and-recipients, under Certifications and Assurances.

Effective January 1, 2020, the System for Award Management (SAM) is the central repository for common government-wide certifications and representations required of Federal grants recipients. As registration in SAM is required for eligibility for a federal award and registration must be updated annually, Federal agencies use SAM information to comply with award requirements and avoid increased burden and costs of separate requests for such information, unless the recipient fails to meet a federal award requirement, or there is a need to make updates to their SAM registration for other purposes.

Note: The dates (Block 17) and dollar amounts (Block 18) on the SF-424 are for the complete project period and not just the first project year, first phase, or other subset of the project period.

iii. Project/Performance Site Location(s)

Indicate the primary site where the work will be performed by the prime recipient or subrecipient(s). If a portion of the project will be performed at any other site(s), identify the site location(s) in the blocks provided.
Note that the Project/Performance Site Congressional District is entered in the format of the 2-digit state code followed by a dash and a 3-digit Congressional district code, for example VA-001. Hover over this field for additional instructions.

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

iv. 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 "TechnicalVolume.pdf" and click on "Add Mandatory Other Attachment" to attach.

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

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

Technical Volume Content Requirements	
SECTION/PAGE LIMIT	**DESCRIPTION**
Cover Page	The cover page should include the project title, the specific FOA Area of Interest being addressed, both the technical and business points of contact (including the Administrative Officer, if applicable), names of all team member organizations, names of project managers, senior/key personnel and their organizations, the project location(s), and any statements regarding confidentiality.
Project Overview (Approximately 10% of the Technical Volume)	The Project Overview should contain the following information: • Background: The applicant should discuss the background of its organization, including the history, successes, and current research and development status (i.e., the technical baseline) relevant to the technical topic being addressed in the Full Application. • Project Goal: The applicant should explicitly identify the targeted goal for the project 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 project. • Impact: The applicant should discuss the impact that the funding would have on the proposed project. Applicants should specifically explain how the funding, relative to prior, current, or anticipated funding from other public and private sources, is necessary to achieve the project objectives. • Constraints on Resources: The applicant should identify any potential long-term constraints the project will have on the community's access to natural resources (e.g., water) and Tribal cultural resources.

	If applicable, describe a long-term cleanup strategy ensuring communities and neighborhoods remain healthy, safe, and not burdened with cleanup costs and waste. • Climate Strategy: The applicant should outline a climate resilience strategy accounting for climate impacts and extreme weather patterns, such as high winds (tornadoes and hurricanes), heat and freezing temperatures, drought, wildfire, and floods.
Technical Description, Innovation, and Impact (Approximately 15% of the Technical Volume)	The Technical Description should contain the following information: • Relevance and Outcomes: The applicant should provide a detailed description of the technology or focus area, including the scientific and other principles and objectives pursued during the project. This section should describe the relevance of the proposed project to the goals and objectives of the FOA, including the potential to meet specific DOE technical targets or other relevant performance targets. The applicant should clearly specify the expected outcomes of the project. • Feasibility: The applicant should demonstrate the technical feasibility of the proposed technology and capability of achieving the anticipated performance targets, including a description of previous work done and prior results. This section should also address the project's access to necessary infrastructure (e.g. transportation, water, electricity transmission), including any use of existing infrastructure, as well as to a skilled workforce. • Innovation and Impacts: The applicant should describe the current state-of-the-art in the applicable field, the specific innovation of the proposed technology or focus area, the advantages of proposed technology over current and emerging technologies, and the overall impact on advancing the state-of-the-art/technical baseline if the project is successful.
Workplan (Approximately 60% of the Technical Volume)	In this Section, an Applicant should address the specific Workplan elements identified in the following sections of each AOI: • **AOI 1a:** Section I.B.i.a.ii. "Technical Elements Required in Applications to AOI 1a" • **AOI 1b:** Section I.B.i.b.ii. "Technical Elements Required in Applications to AOI 1b" • **AOI 1c:** Section I.B.i.c.ii. "Technical Elements Required in Applications to AOI 1c" • **AOI 2a:** Section I.B.ii.a.ii. "Technical Elements Required in Applications to AOI 2a" • **AOI 2b:** Section I.B.ii.b.ii. "Technical Elements Required in Applications to AOI 2b" • **AOI 2c:** Section I.B.ii.c.ii. "Technical Elements Required in Applications to AOI 2c" • **AOI 3a:** Section I.B.iii.a.ii. "Technical Elements Required in Applications to AOI 3a" • **AOI 3b:** Section I.B.iii.b.ii. "Technical Elements Required in Applications to AOI 3b"

	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 C for applicable definitions and other information to inform this statement.
Technical Qualifications and Resources (Approximately 15% of the Technical Volume)	In this Section, an Applicant should address the specific Technical Qualifications and Resources elements identified in the following sections of each AOI: • **AOI 1a:** Section I.B.i.a.ii. "Technical Elements Required in Applications to AOI 1a" • **AOI 1b:** Section I.B.i.b.ii. "Technical Elements Required in Applications to AOI 1b" • **AOI 1c:** Section I.B.i.c.ii. "Technical Elements Required in Applications to AOI 1c" • **AOI 2a:** Section I.B.ii.a.ii. "Technical Elements Required in Applications to AOI 2a" • **AOI 2b:** Section I.B.ii.b.ii. "Technical Elements Required in Applications to AOI 2b" • **AOI 2c:** Section I.B.ii.c.ii. "Technical Elements Required in Applications to AOI 2c" • **AOI 3a:** Section I.B.iii.a.ii. "Technical Elements Required in Applications to AOI 3a" • **AOI 3b:** Section I.B.iii.b.ii. "Technical Elements Required in Applications to AOI 3b"

v. Resumes

A resume provides information that can be used by reviewers to evaluate an individual's relevant skills and experience of the key project personnel. Applicants must submit a resume (***not to exceed 3-pages***) for each project manager and Senior/Key personnel including the following:

1. Contact Information;
2. Education: 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;
5. List all academic, professional, or institutional appointments, foreign or domestic, at the applicant institution or elsewhere, whether or not remuneration is received, and, whether full-time, part-time, or voluntary over the past five years; and
6. There should be no lapses in time over the past 10 years or since age 18, whichever period is shorter.

Save the resumes in a single PDF file using the following naming convention for the title "Resumes.pdf" and click on "Add Optional Other Attachment" to attach.

vi. Letters of Commitment

Submit letters of commitment (as applicable) from the following:

- Subrecipients;
- Asset owner/operators providing access to field sites;
- Industry Partners;
- Disadvantaged Communities;
- Technology commercialization partners; and
- Third-party cost share providers

The letter must state the role of the partner and their specific contribution to the project. If applicable, the letter must state that the third party is committed to providing a specific minimum dollar amount or value of in-kind contributions allocated to cost sharing.

The following information for each third party contributing to cost sharing should be identified: (1) the name of the organization; (2) the proposed dollar amount to be provided; and (3) the proposed cost sharing type – (cash or in-kind contributions).

Each letter must not exceed 1 page.
Save the letters of commitment in a single PDF file using the following naming convention for the title "LOC.pdf" and click on "Add Optional Other Attachment" to attach.

Note: Letters of support or endorsement for the project from entities not having a substantive role in the project are not accepted.

vii. Community Partnership Documentation

In support of the Community Benefits Plan, applicants are encouraged to submit documentation to demonstrate existing or planned partnerships with community entities, such as organizations that work with local stakeholders most vulnerable to or affected by the project. Examples of such entities include organizations that carry out workforce development programs, labor unions, Indian Tribes, Tribal organizations, and community-based organizations that work with disadvantaged communities. The partnership documentation can be a letter on a partner's letterhead outlining the planned partnership and signed by an officer of the entity, a Memorandum of Understanding, or another similar agreement. Such letters must state the specific nature of the partnership and

must not be general letters of support. If the applicant intends to enter into Workforce and Community Agreements as part of the Community Benefits Plan, they should include letters from proposed partners.

Each letter must not exceed one page. In total, the partnership documentation must not exceed 10 pages.

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

viii. Project Management Plan

The Project Management Plan (PMP) ***must not exceed 8 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) **double** spaced with font no smaller than 12 point.

Applicants shall prepare the PMP by utilizing the "Project Management Plan Template" in Appendix I of the FOA.

Save this information in a file named "PMP.pdf," and click on "Add Optional Other Attachment" to attach.

ix. Environmental Plan

Applicants must submit an Environmental Plan (EP) that outlines their processes for identifying and communicating to the DOE any "locations of concern" selected for project activities. These locations of concern are potential work locations that, based on surrounding conditions, could trigger the applicability of non-exempt Federal authorities (including but not limited to the Endangered Species Act and the National Historic Preservation Act (NHPA)). The EP will explain the processes the applicants will utilize to identify work locations in areas where sensitive resources may exist, requiring additional consultation and coordination with DOE and other federal or state agencies. The sensitive resources that need to be evaluated, include, but are not limited to, threatened and endangered species and their habitats under the Endangered Species Act; historic and prehistoric/archaeological sites/resources under the Archaeological Resources Protection Act and NHPA; wetlands/floodplains under the Clean Water Act; migratory bird flyways under the Migratory Bird Treaty Act; underground sources of drinking water under the Safe Water Drinking Act; and Tribal lands or areas of cultural or religious significance to Tribal Nations under the Native American Graves Protection and Repatriation Act. The EP should include a process of notifying the DOE Project Officer (PO) of any identified locations of concern where sensitive resources may exist and conveying

sufficient information to the DOE PO so that DOE can initiate any required associated actions. Associated actions include, but are not limited to, reviews of site-specific details at "locations of concern," consultations with personnel at applicable Fish and Wildlife Service/U.S. Army Corps of Engineers/state historic preservation offices and Tribal Historic Preservation Officers regarding potential impacts, development of mitigation action plans at locations of concern, and final approval prior to proceeding with federally funded work at the identified location.

Recipients will be required to adhere to their EP throughout the Period of Performance to assist in the timely and effective identification of locations of concern and to complete required environmental and regulatory review process(es) at their proposed work locations. If DOE determines that certain records must be prepared to complete the environmental and regulatory review process (e.g., biological evaluations, identification of historic properties, consultations with other federal agencies and Tribal Nations, mitigation action 31 plans), 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. Recipients will be restricted from taking any action towards an identified "location of concern" until DOE completes all required environmental and regulatory reviews.

Save the Environmental Plan in a single PDF file named "EnvPlan.pdf" and click on "Add Mandatory Other Attachment" to attach.

x. Statement of Project Objectives (SOPO)

Applicants are required to complete a SOPO. A SOPO template is available as an Appendix F of the FOA.

The SOPO, including the Cover Page and the Deliverable Table, ***must not exceed 8 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 naming convention for the title "SOPO.doc or docx" and click on "Add Optional Other Attachment" to attach.

xi. Budget Justification Workbook

Applicants must complete the Budget Justification Workbook. This workbook is included as an attachment to this announcement for use and to describe the level of detail required in the budget justification. Although the data requested is mandatory, the use of the budget justification workbook is not, however,

strongly encouraged. If an applicant chooses not to use the suggested template, the applicant must also submit an SF-424A Budget Information form (available on https://www.grants.gov) and include a breakdown of all costs by Budget Category, as outlined in the SF-424A and the Budget Justification suggested template. 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 subcontractors.

Applicants should include costs associated with implementing award requirements (e.g., Buy America requirements for infrastructure projects, Davis-Bacon, Community Benefits Plan, reporting, oversight, construction signage[59]) and with required annual audits and incurred cost proposals in their proposed budget documents. Such costs may be reimbursed as a direct or indirect cost.

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 naming convention for the title "Recipient_Budget_Justification.xls or xlsx" and click on "Add Optional Other Attachment" to attach.

xii. Summary for Public Release

Applicants must submit a one-page summary of their project that is suitable for dissemination to the public. It should be a self-contained document that identifies the name of the applicant, the lead project manager/project director/principal investigator(s), the project title, the objectives of the project, a description of the project, including methods to be employed, the potential impact of the project (e.g., benefits, outcomes), major participants (for collaborative projects), and the project's commitments and goals described in the Community Benefits Plan. This document must not include any proprietary or sensitive business information as DOE may make it available to the public after selections are made.
The summary must not exceed 1 page when printed using standard 8.5 x 11 paper with 1" margins (top, bottom, left, and right) with font not smaller than 12-point.

Save the Summary for Public Release in a single PDF file using the following naming convention for the title "Summary.pdf" and click on "Add Optional Other Attachment" to attach.

[59] After receiving a DOE award, recipients are encouraged to display DOE Investing in America signage during and after construction. Guidance can be found at: (https://www.energy.gov/design). Proposed signage costs that meet these specifications are an allowable cost and should be included in the proposed project budget.

xiii. Summary Slide

Applicants must provide a single slide summarizing the proposed project.

A template is not provided but the Summary Slide must include the following information:

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

Save the Summary Slide in a single Microsoft PowerPoint file using the following naming convention for the title "Slide.ppt or pptx" and click on "Add Optional Other Attachment" to attach.

xiv. Subrecipient Budget Justification (if applicable)

Applicants must provide a separate budget justification for each subrecipient that is expected to perform work estimated to be more than $250,000 or 25 percent of the total work effort, whichever is less.

The budget justification must include the same justification information described in the "Budget Justification Workbook" section above.

Note: FFRDCs/NLs are treated as subrecipients and should be included on the "Contractual" line item of the Prime Budget. FFRDCs must provide a separate Subrecipient Budget Justification if they meet, or are in excess of, the threshold noted above.

Save each subrecipient budget justification in a Microsoft Excel file using the following naming convention for the title "Subrecipient_Budget_Justification.xls or xlsx" and click on "Add Optional Other Attachment" to attach.

xv. 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 naming convention for the title "FFRDCAuth.pdf" and click on "Add Optional Other Attachment" to attach.

xvi. 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" (grants.gov/forms/forms-repository/sf-424-individual-family) 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".

xvii. Waiver Requests (if applicable)

i. Foreign Entity Participation

For projects selected under this FOA, 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 B lists the information that must be included in a waiver request.

ii. Performance of Work in the United State (foreign Work Waiver Request)

As set forth in Section IV.H.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 B lists the information that must be included in a foreign work waiver request.

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

xviii. RESERVED

xix. Community Benefits Plan: Job Quality and Equity

The Community Benefits Plan: Job Quality and Equity (Community Benefits Plan or Plan) must set forth the applicant's approach to ensuring that federal investments advance four goals: 1) community and labor engagement; 2) investing in quality jobs; 3) advancing DEIA; and 4) contributing to the Justice40 Initiative. The Community Benefits Plan should indicate the applicant's intention to engage meaningfully with labor and community stakeholders on these goals, including the potential of entering into formal Workforce and Community Agreements. Given project complexity and sensitivities, applicants should consider pursuing multiple agreements.

For your convenience, a Community Benefits Plan Template is available. Applicants are strongly encouraged to use the Demonstration and Deployment Project Template to complete their specific Plan by downloading the "Community Benefits Plan Template for Demonstration and Deployment Projects" at: About Community Benefits Plans.

If the template is not used, the Plan must address all of the elements described below, and as outlined in the template.

The applicant's Community Benefits Plan should include at least one Specific, Measurable, Achievable, Relevant, and Timely (SMART) milestone per budget period to measure progress on the proposed actions. The Plan will be evaluated as part of the technical review process. If DOE selects a project, the selectee is responsible for developing a Community Benefits Outcomes and Objectives (CBOO) document. DOE will incorporate the CBOO into the award and the recipient must implement its CBOO when carrying out its project. Public transparency around the plan and SMART commitments ensure accountability. As such, DOE plans to make the content of each CBOO available publicly. In addition, DOE will evaluate the recipient's progress during the award period of performance, including as part of the Go/No-Go review process.
The Community Benefits Plan ***must not exceed 12 pages.*** It must be submitted in PDF format. This Plan must address the technical review criterion titled, "Community Benefits Plan: Job Quality and Equity." See Section V. of the FOA. For additional information, see About Community Benefits Plans.

Save the Community Benefits Plan in a single PDF file using the following naming convention for the title "CBenefits.pdf" and click on "Add Optional Other Attachment" to attach.

The Community Benefits Plan must address the following:

1. Community and Labor Engagement: The Community Benefits Plan must describe the applicant's actions to date and plans to engage with community partners, such as state and local governments, Indian Tribes, labor unions, and community-based organizations that support or work with underserved populations, as well as disadvantaged communities as defined for purposes of the Justice40 Initiative[60]. By facilitating community input, social buy-in, and accountability, such engagement has the potential to substantially reduce or eliminate delays, litigation, and other risks associated with project implementation.

Although Tribal governments are included in this section on community and labor stakeholders, American Indian and Alaska Native Tribal Nations have rights as sovereign governments recognized under the Constitution of the United States, treaties, statutes, Executive Orders, and court decisions. Applicants are required to make Indian Tribes aware of potential impacts and obtain letters of support when projects are on Tribal land or intersect with Tribal subsurface rights, as required under "Impacted Indian Tribes Documentation" of Section IV.C.xxiv. of this FOA.

Community and labor engagement should lay the groundwork for the negotiation of Workforce and Community Agreements, which could take the form of one or more kinds of negotiated agreements with Indian Tribes, communities, labor unions, or, ideally, each. Registered apprenticeship programs, labor-management training partnerships, quality pre-apprenticeship programs, and local and targeted hiring goals are key components of workforce agreements. Community agreements can include economic benefits for Tribes and local and disadvantaged communities as well as provisions such as a community-governed fund, a community steering committee, and environmental, wealth-building, energy or other benefits for communities or Tribes.

[60] Pursuant to EO 14008, "Tackling the Climate Crisis at Home and Abroad," January 27, 2021, and the Office of Management and Budget's Interim Justice40 Implementation Guidance M-21-28 and Addendum M-23-09, DOE recognizes disadvantaged communities as the census tracts identified as disadvantaged by the Climate and Economic Justice Screening Tool (CEJST), located at https://screeningtool.geoplatform.gov/, as well as all Federally Recognized Tribes (whether or not they have land). See https://www.whitehouse.gov/wp-content/uploads/2023/01/M-23-09_Signed_CEQ_CPO.pdf. DOE's Justice40 Implementation Guidance is located at https://www.energy.gov/media/277188

Applicants should also provide Community and Labor Partnership Documentation from representative organizations reflecting substantive engagement and feedback on the applicant's approach to community benefits, including quality jobs; diversity, equity, inclusion, and accessibility; and the Justice40 Initiative detailed below.

2. Investing in Quality Jobs: A well-qualified, skilled, and trained workforce is necessary to ensure project stability, continuity, and success, and to meet program goals. High-quality jobs are critical to attracting and retaining the qualified workforce required.

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

The National Labor Relations Act requires that employees have the right to organize and bargain collectively through labor organizations of their choosing, thereby creating a workplace more amenable to resolving disputes before work disruptions occur. This helps assure project efficiency, continuity, and multiple public benefits.

The Plan should include:

1) A summary of the applicant's plan to attract, train, and retain a skilled and well-qualified workforce for planning, construction, *and* ongoing operations/production activities, as applicable. A collective bargaining agreement, labor-management partnership, or other similar agreement could provide evidence of such a plan. Alternatively, applicants may describe:
    a) Wages, benefits, and other worker supports to be provided, benchmarked against prevailing wages for construction and local median wages for other relevant occupations as well as other measures of job quality;
    b) Commitments to invest in workforce education and training, including measures to reduce attrition, increase productivity from a committed and engaged workforce, and support the development of a resilient, skilled, and stable workforce for the project; and
    c) Efforts to engage employees in the design and execution of workplace safety and health plans.

2) It is the policy of the United States to eliminate the causes of certain substantial obstructions to the free flow of commerce by encouraging the practice and procedure of collective bargaining and by protecting the exercise by workers of full freedom of association. Applicant should

provide a description of how and if they plan to affirmatively support worker organizing and collective bargaining. For example, this might include a commitment to negotiate pre-hire project labor agreements for construction activity, a pledge to remain neutral during any union organizing campaigns, intention or willingness to permit union recognition through card check (as opposed to requiring union elections), intention or willingness to enter into binding arbitration to settle first contracts, a pledge to allow union organizers access to appropriate onsite non-work places (e.g., lunch rooms), a pledge to refrain from holding captive audience meetings, and other supportive commitments or pledges.

3. DEIA: The Community Benefits Plan must include a section describing how DEIA objectives will be incorporated into the project. The section should detail how the applicant will partner with underrepresented[61] businesses, residents of disadvantaged communities, educational institutions, and training organizations that serve workers who face barriers to accessing quality jobs, and/or other project partners to help address DEIA.

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

A) Commit to partnering or contracting with Minority Serving Institutions[62] or businesses majority owned or controlled by residents of disadvantaged communities, underrepresented persons or groups of underrepresented persons;

B) To fill open positions for the DOE-funded project, partner with workforce training organizations serving underrepresented populations and those facing systemic barriers to quality employment, such as those with disabilities, women, returning citizens, opportunity youth, and veterans;

C) Provide workers with comprehensive support services, such as childcare and transportation, to increase representation and access in project's construction and operations jobs.

[61] "Underrepresented" refers to populations sharing a particular characteristic, as well as geographic communities, that are shown to have been systematically denied a full opportunity to participate in aspects of economic, social, and civic life, as exemplified by communities that have been denied fair, just, and impartial treatment, which may include Black, Latino, and Indigenous and Native American persons, Asian Americans and Pacific Islanders and other persons of color; members of religious minorities; lesbian, gay, bisexual, transgender, and queer (LGBTQ+) persons; persons with disabilities; persons who live in rural areas; persons otherwise adversely affected by persistent poverty or inequality; women; and veterans

[62] Minority-Serving Institution is defined in 7 CFR § 3430.302.

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

A. Identification of applicable disadvantaged communities to which the anticipated project benefits will flow, by making clear whether Federally Recognized Tribes or Tribal entities will benefit or if benefits will flow to disadvantaged communities as identified by the Climate and Economic Justice Screening Tool (https://screeningtool.geoplatform.gov/).

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

   Benefits include (but are not limited to) measurable direct or indirect investments or positive project outcomes that achieve or contribute to the following in disadvantaged communities: (1) a decrease in energy burden; (2) a decrease in environmental exposure and burdens; (3) an increase in access to low-cost capital; (4) an increase in quality job creation, the clean energy job pipeline, and job training for individuals; (5) increases in clean energy enterprise creation and contracting; (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. Applicants should also discuss how the project will maximize all the benefits listed in number 4 above.

C. A description of the mechanism and timing of anticipated benefits are expected to flow to disadvantaged communities. For example, whether the benefits will be provided directly within the disadvantaged communities identified in the Justice40 Initiative section or in another way; whether the benefits will flow during project development and/or after project completion; and how the applicant will track benefits delivered.

D. A discussion of anticipated negative environmental, social or economic impacts as described in B. above on local and disadvantaged communities including communities geographically near the project or directly affected by project construction or operations, as well as known impacts upstream (in the supply chain, e.g., raw material extraction) or downstream (e.g., waste disposal). Applicants should discuss any anticipated negative or positive environmental impacts associated with the project, and how they will mitigate any negative impacts, including cumulative negative impact. Within the context of negative or positive impacts created by the project, applicants should use the Climate and

Economic Justice Screening Tool (CEJST) to quantitatively discuss existing environmental impacts in the project area. See https://screeningtool.geoplatform.gov/.

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

xx. Current and Pending Support

Current and pending support is intended to allow the identification of potential duplication, overcommitment, potential conflicts of interest or commitment, and all other sources of support. As part of the application, the principal investigator or lead project manager 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 applications, provide the total amount of requested funding;
- The award period (start date through end date); and
- The person-months of effort per year being dedicated to the award or activity.

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

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

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

> I, [Full Name and Title], certify to the best of my knowledge and belief that the information contained in this Current and Pending Support Disclosure Statement is true, complete, and accurate. I understand that any false, fictitious, or fraudulent information, misrepresentations, half-truths, or omissions of any material fact, may subject me to criminal, civil or administrative penalties for fraud, false statements, false claims or otherwise. (18 U.S.C. §§ 1001 and 287, and 31 U.S.C. §§ 3729-3733 and 3801-3812). I further understand and agree that (1) the statements and representations made herein are material to DOE's funding decision, and (2) I have a responsibility to update the disclosures during the project period of performance of the award should circumstances change which impact the responses provided above.

The information may be provided in the approved common disclosure format available at Common Form for Current and Pending (Other) Support (nsf.gov). Regardless of the format used, the individual must 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 naming convention for the title "CPS.pdf" and click on "Add Optional Other Attachment" to attach.

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 RDandD 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 RDandD 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 RDandD efforts, including resources provided directly to the individual or through the organization, and regardless of whether or not they have monetary value (e.g., even if the support

received is only in-kind, such as office/laboratory space, equipment, supplies, or employees). This includes resource and/or financial support from all foreign and domestic entities, including but not limited to, gifts provided with terms or conditions, financial support for laboratory personnel, and participation of student and visiting researchers supported by other sources of funding.

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

Senior/key personnel – An individual who contributes in a substantive, meaningful way to the scientific development or execution of a research, development and demonstration (RDandD) project proposed to be carried out with DOE award.[63]

xxi. Locations of Work

The applicant must provide a list of locations where project work will be performed by the prime recipient or subrecipient(s) including the following information for each location:

- Location Type
- Location Type Category
- Is this a Principal Place of Performance?
- Prime or Subrecipient Location?
- If Subrecipient, Subrecipient/Community Name

[63] 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.

- Facility Name (if applicable)
- Is location in a foreign country?
- Street Address, City, State, 5-Digit Zip Code - +4
- Briefly describe the primary activity at this location or with this population. For example, management headquarters; construction, operations, production; raw materials extraction, etc.
- Latitude/Longitude
- Does the location of work qualify as a disadvantaged community according to the according to the Climate and Economic Justice Screening Tool (CEJST)?
- Does the location or community that will receive benefits qualify as a disadvantaged community according to the Climate and Economic Justice Screening Tool (CEJST)?
- Will a Federally Recognized Tribe or Tribal entity receive benefits?
- Is the location of work sited on Tribal land or does it intersect with Tribal subsurface rights?
- If a geographically defined disadvantaged community, add the census tract number or describe the distributed (dispersed) disadvantaged community served (e.g., migrant workers)
- % of work performed at this location

For an Applicant's convenience, a Locations of Work Template is included as an attachment to this announcement. Applicants are strongly encouraged to use the template. If the template is not used, the submission must include all of the elements described above, and as outlined in the template.

Save the Location of Work in a single Microsoft Excel file using the following naming convention for the title "LOW.xls or xlsx" and click on "Add Optional Other Attachment" to attach.

xxii. Transparency of Foreign Connections

Applicants must provide the following information as it relates to the proposed recipient and subrecipient(s). Include a separate disclosure for the applicant and each proposed subrecipient. U.S. National Laboratories, domestic government entities, and institutions of higher education are only required to respond to items 1, 2 and 9, and if applying as to serve as the prime recipient, must provide complete responses for project team members that are not U.S. National Laboratories, domestic government entities, or institutions of higher education.

1. Entity name, website address, and physical address;
2. The identity of all owners, principal investigators, project managers, and Senior/Key Personnel who are a party to any *Foreign Government-Sponsored Talent Recruitment Program* of a foreign country of risk (i.e., China, Iran, North Korea, and Russia);

3. The existence of any joint venture or subsidiary that is based in, funded by, or has a foreign affiliation with any foreign country of risk, including the People's Republic of China;
4. Any current or pending contractual or financial obligation or other agreement specific to a business arrangement, or joint venture-like arrangement with an enterprise owned by a foreign state or any foreign entity;
5. Percentage, if any, that the proposed recipient or subrecipient has foreign ownership or control;
6. Percentage, if any, that the proposed recipient or subrecipient is wholly or partially owned, directly or indirectly, by an entity in a foreign country of risk;
7. Percentage, if any, of venture capital or institutional investment by an entity that has a general partner or individual holding a leadership role in such entity who has a foreign affiliation with any foreign country of risk;
8. Any technology licensing or intellectual property sales to a foreign country of risk, during the 5-year period preceding submission of the application;
9. Any foreign equipment that will be used on the project:
    a. Equipment originally made or manufactured in a foreign country of risk (including relabeled or rebranded equipment).
    b. Coded equipment where the source code is written in a foreign country of risk.
    c. Equipment from a foreign country of risk that will be connected to the internet or other remote communication system.
    d. Any companies from a foreign country of risk that will have physical or remote access to any part of the equipment used on the project after delivery.
10. Any foreign business entity, offshore entity, or entity outside the United States related to the proposed recipient or subrecipient;
11. Complete list of all directors (and board observers), including their full name, citizenship and shareholder affiliation, date of appointment, duration of term, as well as a description of observer rights as applicable;
12. Complete capitalization table for your entity, including all equity interests (including LLC and partnership interests, as well as derivative securities). Include both the number of shares issued to each equity holder, as well as the percentage of that series and all equity on a fully diluted basis.
13. Identify the principal place of incorporation (or organization) for each equity holder. If the equity holder is a natural person, identify the citizenship(s). If the recipient or subrecipient is a publicly traded company, provide the above information for shareholders with an interest greater than 5%;
14. A summary table identifying all rounds of financing, the purchase dates, the investors for each round, and all the associated governance and

information rights obtained by investors during each round of financing; and

15. An organization chart to illustrate the relationship between your entity and the immediate parent, ultimate parent, and any intermediate parent, as well as any subsidiary or affiliates. Identify where each entity is incorporated.

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

Save the Transparency of Foreign Connections information in a single PDF file using the following convention for the title: "ControlNumber_LeadOrganization_TFC" and click on "Add Optional Other Attachment" to attach.

xxiii. Potentially Duplicative Funding Notice

If the applicant or project team member has other active awards of federal funds, the applicant must determine whether the activities of those awards potentially overlap with the activities set forth in its application to this FOA. If there is a potential overlap, the applicant must notify DOE in writing of the potential overlap and state how it will ensure any project funds (i.e., recipient cost share and federal funds) will not be used for identical cost items under multiple awards. Likewise, for projects that receive funding under this FOA, if a recipient or project team member receives any other award of federal funds for activities that potentially overlap with the activities funded under the DOE award, the recipient must promptly notify DOE in writing of the potential overlap and state whether project funds from any of those other federal awards have been, are being, or are to be used (in whole or in part) for one or more of the identical cost items under the DOE award. If there are identical cost items, the recipient must promptly notify the DOE Contracting Officer in writing of the potential duplication and eliminate any inappropriate duplication of funding.

Save the Potentially Duplicative Funding Notice in a single PDF file using the following naming convention for the title "PDFN.pdf" and click on "Add Optional Other Attachment" to attach.

xxiv. Impacted Indian Tribes Documentation (if applicable)

For any application that potentially impacts Indian Tribes or is on Tribal land[64], including when the potentially impacted Indian Tribe is the applicant, applicants are required to submit additional documentation at the time of application, and possibly during negotiation and prior to award. For any project that potentially impacts Indian Tribes, applicants are required to submit documentation

[64] Tribal land is as defined in 25 U.S.C. §§ 3501(2), (3), (4)(A) and (13)

demonstrating that an authorized representative[65] of each potentially impacted Indian Tribe is, at a minimum, aware of the nature of the application and its potential impacts to the relevant Indian Tribes. The notified authorized representative must be holding their position while the award is open for applications, and documentation must demonstrate affirmative awareness of the application (e.g. a delivery record from certified mail, a reply by the authorized representative).

For any project intended to be sited on Tribal land(s) or intersecting with Tribal subsurface rights, applicants are required to submit documentation demonstrating support from the relevant Indian Tribes at the time of application. Documentation of support submitted at the time of application will be considered to also demonstrate awareness of an Indian Tribe (specified above). Documentation may include either:

- A letter of support from Tribal leadership. The letter must be signed by an authorized representative of the Indian Tribe. The signer(s) must be holding their position while the award is open for applications or negotiations.

- A Tribal Council Resolution, Board resolution (including the Board of Directors of an Alaska Native Corporation (ANC)), or similar act passed by the legislative body of the Tribal government or Board of Directors of an ANC, expressing support for the project.

Applicants are encouraged to reference or include any applicable community benefits agreements in the Tribal support documentation, and to integrate any Tribal support documentation in the community benefits plan as appropriate. For projects not intended to be sited on Tribal land(s) or intersecting with Tribal subsurface rights, but that may have other potential impacts on Tribal resources or reserved rights, letters of support or resolutions of support are strongly encouraged and, depending on the nature of the impact, may be required if selected for negotiation of an agreement. Applicants are encouraged to reach out to Indian Tribes as early as possible in the application process to give Indian Tribes ample time to evaluate and respond.

The following resources may be useful to help determine if a project may impact an Indian Tribe(s) resources or reserved rights and the appropriate contacts. These resources are not exhaustive, and many Indian Tribes have resources or reserved rights which extend beyond their Tribal lands, or are covered within

[65] An authorized representative must be an elected official or designated leader according to the traditions, constitution, or charter of the Indian Tribe, or someone with relevant delegated authority within the Tribal government. Examples include: Chief, Chairman, Chairwoman, Governor, Nation Representative, President, Chief Executive Officer, Chief Financial Officer, Speaker of the Council, Speaker of the Congress, Tribal administrator

treaties, statutes, or case-law. Applicants are encouraged to do additional research:

- Map of Indian Lands: https://bia-geospatial-internal.geoplatform.gov/indianlands/
- Tribal Treaties Database: https://treaties.okstate.edu/
- Directory of federally recognized Tribes and Tribal leaders: https://www.bia.gov/service/tribal-leaders-directory
- Best Practices for Identifying and Protecting Tribal Treaty Rights, Reserved Rights, and other similar rights in federal regulatory actions: https://www.bia.gov/sites/default/files/dup/inline-files/best_practices_guide.pdf

To help determine if an Indian Tribe's resources or reserved rights may be impacted by the project, applicants must address the following elements. If the applicant is an Indian Tribe, these elements should be addressed to ascertain impacts to Indian Tribes other than the applicant. Applicants do not need to reveal specific details about sacred sites such as specific location or specific ceremonies:

- Identify any elements of the project that will occur on or near Indian land, Tribal historic sites, or sacred sites and describe its potential impacts to Indian Tribes. Identify the potentially impacted Indian Tribe(s);
- Identify any Tribal mineral rights, subsurface, or water rights at or near the proposed project location. Explain any relevant studies already performed, such as groundwater studies? Identify which Indian Tribe(s) might be impacted. Explain any instances of uncertainty and any potential for subsurface resource migration which has been considered;
- Identify any [other] proposed actions which may impact an Indian Tribe(s) resources or reserved rights. Tribal resources and reserved rights include, and are not limited to, an Indian Reservation or Land (as defined in 25 U.S.C. § 3501) [or intersecting Tribal sub-surface rights], historic homelands from which they were removed, cultural sites, sacred sites, water rights, mineral and other subsurface rights, fishing rights, and hunting rights. Identify the Tribe(s) potentially impacted and any sources of uncertainty or confidentiality.
- Explain any actions taken by the applicant to mitigate or address any potential impacts identified above, including engaging with the potentially impacted Indian Tribe(s), in the application.

Applicants are required to document any efforts taken to identify any potential impacts to Indian Tribes, Indian lands, Alaska Native regional and village land, traditional homelands, Tribal rights, or Tribal historic sites, or sacred sites. This includes any correspondence with Indian Tribes. These documents should be

available on request to DOE. An applicant's failure to submit documentation of an Indian Tribe's awareness, or a letter of support, when required as described above, may constitute grounds for determining an application ineligible, non-responsive to the FOA/OT solicitation, not subject to further review and/or not otherwise subject to selection or award.

Any application that may potentially impact Indian Tribe(s) may be shared with the potentially impacted Indian Tribe(s). Applicants should include a Notice of Restriction on Disclosure and Use of Data identifying any business sensitive, trade secrets, proprietary, or otherwise confidential information. Such information shall be used or disclosed only for evaluation of the application or to determine whether the proposed project affects an Indian Tribe(s). If an applicant determines an Indian Tribe(s) will be impacted, the applicant must provide information on the project location, potential impacts and how the applicant will engage with Indian Tribe(s), during the period of performance of the agreement, and, if necessary, after the end of the agreement. Approval by DOE must be obtained before any activities take place that could impact Tribal resources or reserved rights, including but not limited to lands, cultural sites, sacred sites, water rights, mineral rights, fishing rights, and hunting rights. DOE will determine if formal government-to-government consultation is needed, and DOE will conduct that consultation accordingly, in addition to any engagement by applicant.

Save any applicable Impacted Indian Tribes Documentation in a single PDF file using the following naming convention for the title "ImpactedTribes.pdf" and click on "Add Optional Other Attachment" to attach.

D. Post Selection Information Requests

If selected for award negotiations, DOE reserves the right to require selected applicants provide additional or clarifying information regarding the application submissions, the project, the project team, the award requirements, and any other matters related to anticipated award. The following is a list of examples of information that may be required:

- Personnel proposed to work on the project and collaborating organizations (See Section VI.B.xx. Participants and Collaborating Organizations);
- Current and Pending Support (See Sections IV.C.xx. and VI.B.xxi. Current and Pending Support);
- Community Benefits Outcomes and Objectives
- Indirect cost information;
- Other budget information;

- Letters of Commitment from third parties contributing to cost share, if applicable;
- Name and phone number of the Designated Responsible Employee for complying with national policies prohibiting discrimination (See 10 CFR 1040.5);
- Information for the DOE Office of Civil Rights to process assurance reviews under 10 CFR 1040;
- Representation of Limited Rights Data and Restricted Software, if applicable;
- Information related to Davis-Bacon Act Requirements;
- Information related to any proposed Workforce and Community Agreement, as defined above in "Community Benefits Plan: Job Quality and Equity," that applicants may have made with the relevant community;
- Any proposed or required Project Labor Agreements;
- Construction Workforce Continuity Plan;
- Operations Workforce Continuity Plan; and
- Clarifications regarding the Environmental Plan.

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

Each applicant 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 the 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 (unless the applicant has an exception approved by the federal awarding agency under 2 CFR 25.110). DOE may not make a federal award to an applicant until the applicant has complied with all applicable UEI and SAM requirements. If an applicant has not fully complied with the requirements by the time DOE is ready to make a federal award, the DOE will determine that the applicant is not qualified to receive a federal award and use that determination as a basis for making a federal award to another applicant.

NOTE: Due to the high demand of UEI requests and SAM registrations, entity legal business name and address validations are taking longer than expected to process. Entities should start the UEI and SAM registration process as soon as possible. If entities have technical difficulties with the UEI validation or SAM registration process they should use 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.

F. Submission Dates and Times

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

G. Intergovernmental Review

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

H. Funding Restrictions

i. Allowable Costs

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

ii. Pre-Award Costs

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

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

Pre-award expenditures are made at the selectee's risk. 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. **Environmental Requirements Related to Pre-Award Costs**
   DOE's decision whether and how to distribute federal funds under this FOA is subject to various environmental laws and regulations (e.g., NHPA, Endangered Species Act). 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 environmental 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 its 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 overrides 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 an environmental review, the prime recipient is doing so at risk of not receiving federal funding and such costs may not be recognized as allowable cost share.

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

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

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

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

iv. Construction

Recipients are required to obtain written authorization from the Contracting Officer before incurring any major construction costs. Recipients are encouraged to display DOE Investing in America signage during and after construction. Guidance can be found at: (https://www.energy.gov/design). Proposed signage costs that meet these specifications are an allowable cost and should be included in the proposed project budget.

v. Foreign Travel

Foreign travel costs are not allowable under this FOA.

vi. Equipment and Supplies

To the greatest extent practicable, all equipment and products purchased with funds made available under this FOA should be American-made. This requirement does not apply to used or leased equipment.

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

vii. Buy America Requirements for Infrastructure Projects

Pursuant to the Build America Buy America Act, subtitle IX of BIL (Buy America or BABA), and in accordance with 2 CFR Part 184, no funds for federal financial assistance which is subject to BABA requirements may be used for a project unless:

- All iron and steel used in the infrastructure work are produced in the United States;
- All manufactured products used in the project 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 defined in Section 70914 of the BIL, and

whether the infrastructure in question is publicly owned or serves a public function.

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

BABA requirements apply to DOE prime recipients that are "non-Federal entities." In accordance with OMB Memorandum M-24-02 and 2 CFR 200.1, the term "non-Federal entity" includes states, local governments, territories, Indian Tribes, Institutes of Higher Education or non-profit organizations. DOE does not apply BABA requirements to for-profit entities.

A Program Policy Factor that the Selection Official may consider in determining which Full Applications to select for award negotiations by for-profit entities may be applied pursuant to Section V.C.i., Program Policy Factors. The relevant Program Policy Factor considers the degree to which the proposed project will employ procurement of U.S. iron, steel, manufactured products, and construction materials.

Subawards should conform to the terms of the prime award from which they flow; in other words, for-profit prime recipients are not required to flow down these Buy America requirements to subrecipients, even if those subrecipients are non-Federal entities as defined above. Conversely, prime recipients which are non-Federal entities must flow the Buy America requirements down to all subrecipients, even if those subrecipients are for-profit entities.

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

Applicants are strongly encouraged to consult Appendix C and 2 CFR Part 184 for more information.

viii. Davis-Bacon Act Requirements

Pursuant to Clean Air Act Sections 314 (42 USC 7614) and 136, 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, 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 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 subrecipient or contract awards;

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

(3) Being responsible for compliance by any subrecipient or contractor with the Davis-Bacon labor standards;

(4) Receiving and reviewing certified weekly payrolls submitted by all subrecipients or contractors for accuracy and to identify potential compliance issues;

(5) Maintaining original certified weekly payrolls for three years after the completion of the project and making those payrolls available to 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 subrecipients or contractors and as requested or directed by DOE;

(7) Cooperating with any authorized representative of DOL in its 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 Grants/Contracting Officer of all labor standards issues, including all complaints regarding incorrect payment of prevailing wages and/or fringe benefits, received from 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 award, subrecipient award, contract or subcontract; and

(10) Preparing and submitting to the Grants/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.

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

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

Recipients of funding under this FOA must ensure the timely submission of weekly certified payrolls as part of its compliance with the Davis-Bacon Act.

DOE has contracted with LCPtracker, a third-party DBA electronic payroll compliance software application. A waiver for the use of LCPtracker may be granted to a particular recipient if they are unable or limited in their ability to use or access the system. LCPtracker allows for certified payroll reports and workforce data to be uploaded electronically, 24 hours a day, 7 days per week and currently partners with several commercially available payroll systems. If a

recipient uses a different payroll system, LCPtracker provides a free, spreadsheet template they can use to map out their payroll file, which would allow them to upload their employee and payroll data into the system. LCPtracker validation system checks payrolls for federal Davis-Bacon prevailing wage requirements by flagging mathematical errors or omission discrepancies for the recipient to review on a report. Examples include base hourly rate, total hourly rate, overtime, doubletime, apprentice approval, and fringe benefit contributions. Additionally, LCPtracker utilizes industry standard eSignature technology, thus allowing recipients to electronically sign payroll reports versus using a wet signature. Individual program offices will coordinate with recipients on access and training.

ix. Lobbying

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

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

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

x. Risk Assessment

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

1. Financial stability;
2. Quality of management systems and ability to meet the management standards prescribed in 2 CFR 200 as and adopted and supplemented 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 invests in critical infrastructure and funds critical and emerging technology areas, DOE also considers possible threats to United States research, technology, and economic security from undue foreign government influence when evaluating risk. If high risks are identified and cannot be sufficiently mitigated, DOE may elect to not fund the applicant. As part of the research, technology, and economic security risk review, DOE may contact the applicant and/or proposed project team members for additional information to inform the review. This risk review is conducted separately from the technical merit review.

xi. Invoice Review and Approval

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

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

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

a. Prohibition

Persons participating in a *Foreign Government-Sponsored Talent Recruitment Program of a Foreign Country of Risk* are prohibited from participating in projects selected for federal funding under this FOA. Should an award result

from this FOA, the recipient must exercise ongoing due diligence to reasonably ensure that no individuals participating on the DOE-funded project are participating in a *Foreign Government-Sponsored Talent Recruitment Program of a Foreign Country of Risk*. Consequences for violations of this prohibition will be determined according to applicable law, regulations, and policy. Further, the recipient must notify DOE within five (5) business days upon learning that an individual on the project team is or is believed to be participating in a foreign government talent recruitment program of a foreign country of risk. DOE may modify and add requirements related to this prohibition to the extent required by law.

b. Definitions

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

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

xiii. Affirmative Action and Pay Transparency Requirements

All applicants must comply with all applicable federal labor and employment laws, including but not limited to Title VII of the Civil Rights Act of 1964, the Fair Labor Standards Act, the Occupational Safety and Health Act, and the National Labor Relations Act, which protects employees' right to bargain collectively and

engage in concerted activities for the purpose of workers' mutual aid or protection.

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

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

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

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

DOL's Office of Federal Contractor Compliance Programs (OFCCP) uses a neutral process to schedule compliance evaluations. Consult OFCCP's Technical Assistance Guide[66] to gain an understanding of the requirements and possible actions the recipients, subrecipients, contractors, and subcontractors must take. Additional guidance may also be found in the National Policy Assurances, produced by DOE.

xiv. Foreign Collaboration Considerations

a. Consideration of new collaborations with foreign entities, organizations, and governments. The recipient will be required to provide DOE with advanced written notification of any potential collaboration with foreign entities, organizations, or governments in connection with its DOE-funded award scope. The recipient will then be required to await further guidance from DOE prior to contacting the proposed foreign entity, organization, or government regarding the potential collaboration or negotiating the terms of any potential agreement.

b. Existing collaborations with foreign entities, organizations, and governments. The recipient will be required to provide DOE with a written list of all existing

[66] 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

foreign collaborations in which it has entered in connection with its DOE-funded award scope.

c. Description of collaborations that should be reported. In general, a collaboration will involve some provision of a thing of value to, or from, the recipient. A thing of value includes but may not be limited to all resources made available to, or from, the recipient in support of and/or related to the DOE award, regardless of whether or not they have monetary value. Things of value also may include in-kind contributions (such as office/laboratory space, data, equipment, supplies, employees, students). In-kind contributions not intended for direct use on the DOE award but resulting in provision of a thing of value from or to the DOE award must also be reported. Collaborations do not include routine workshops, conferences, use of the recipient's services and facilities by foreign investigators resulting from its standard published process for evaluating requests for access, or the routine use of foreign facilities by awardee staff in accordance with the recipient's standard policies and procedures.

V. Application Review Information

A. Technical Review Criteria

i. Full Applications

Applications will be evaluated against the technical review criteria shown below.

AREA OF INTEREST 1

Merit Review Criterion 1: Technological Merit (40%)

- Thoroughness of the description of the types of methane emissions sources the applicant intends to mitigate, the mitigation solutions the applicant intends to utilize, and the relevance of those emissions sources and mitigation solutions to the objectives of the AOI.
- Adequacy and feasibility of the Applicant's Design and Implementation Plan, including the proposed process to (1) identify, prioritize, and select methane emissions sources for mitigation; (2) purchase, distribute, and install/implement commercially available methane emissions mitigation technologies; (3) quantify methane emissions reductions achieved through the program; (4) provide workforce training and development opportunities; and (5) optimize available funds to maximize the volume of methane emissions mitigated.
- Thoroughness of the explanation of the impacts of the proposed project, including: the estimated methane emissions expected to be eliminated or reduced, the total number of emissions sources expected to be mitigated, and the estimated total production of oil and natural gas affected by the mitigation efforts.

Merit Review Criterion 2: Technical and Management Approach (15%)

- Feasibility, appropriateness, rationale, and completeness of the proposed Statement of Project Objectives, such that there is a logical progression of work aligning with the objectives of the AOI and includes Task descriptions adequately describing the activities to be completed and how they would be accomplished.
- The adequacy and completeness of the Project Management Plan (PMP) in establishing baselines (technical scope, budget, schedule) and in managing project performance relative to those baselines; defining the actions that will be taken when these baselines must be revised; identification of project risks and strategies for mitigation, and the reasonableness of the project schedule to integrate all tasks/subtasks and achieve key project objectives as reflected by well-defined, quantifiable, and verifiable critical path milestones and key project

decision points including defined targets for what constitutes successful achievement.

Merit Review Criterion 3: Technical and Management Capabilities (25%)

- The degree to which the Applicant clearly includes and describes an organizational structure for the project team that is in line with the AOI objectives and explains the: roles and responsibilities of team members, integration of team members to achieve project objectives, approach to communication among participants and with DOE, the process for making decisions on technical direction, procedures for resolving conflict, and questions regarding intellectual property.
- The adequacy and relevance of the Applicant's and participating organization's corporate experience (not the individual personnel's experience) in managing projects of similar nature and complexity to that specifically proposed in the application, within budget and on schedule.
- Credentials, capabilities, experience, and availability of key personnel from the applicant and partnering organizations to carry out their specifically identified role within the proposed project.
- ***(AOI 1c)*** Adequacy of the Applicant's approach to coordinate and/or collaborate with Tribal government entities to complete the planned activities for the project

Merit Review Criterion 4: Comm. Benefits Plan: Job Quality and Equity (20%)
This criterion involves consideration of the following factors:

Community and Labor Engagement

- Extent to which the applicant demonstrates community and labor engagement to date resulting in support for the proposed project;
- Extent to which the applicant has a clear and appropriately robust plan to engage—ideally through a clear commitment to negotiate enforceable Workforce and Community Agreements—with labor unions, Indian Tribes, Tribal organizations, and community-based organizations supporting or work with disadvantaged communities and other affected stakeholders;
- Extent to which the applicant has considered accountability to affected workers and community stakeholders, including those most vulnerable to project activities, with a plan to publicly share SMART Community Benefits Plan commitments; and
- Extent to which the applicant demonstrates community and labor engagement will lead to the delivery of high-quality jobs for local and disadvantaged communities and underrepresented workers, minimal environmental impact, and allocation of project benefits to disadvantaged communities.

Investing in Quality Jobs

- Quality and manner in which the proposed project will create and/or retain high quality, good-paying jobs with employer-sponsored benefits for all classifications and phases of work;
- Extent to which the project provides employees with the ability to organize, bargain collectively, and participate, through labor organizations of their choosing, in decisions affecting them and contributing to the effective conduct of business and facilitates amicable settlements of any potential disputes between employees and employers, providing assurances of project efficiency, continuity, and multiple public benefits; and
- Extent to which applicant demonstrates they are a responsible employer, with ready access to a sufficient supply of appropriately skilled labor, and an effective plan to minimize the risk of labor disputes or disruptions.

Diversity, Equity, Inclusion, and Accessibility

- Extent to which the Community Benefits Plan includes specific and high-quality actions to meet DEIA goals, which may include DEIA recruitment procedures, supplier diversity plans, and other DEIA initiatives; and
- Quality of any partnerships and agreements with apprenticeship readiness programs, or community-based workforce training and support organizations serving workers facing systematic barriers to employment to facilitate participation in the project's construction and operations.

Justice40 Initiative

- Extent to which the Community Benefits Plan identifies: specific, measurable benefits for disadvantaged communities, how the benefits will flow to disadvantaged communities, and how negative environmental impacts affecting disadvantaged communities would be mitigated; and
- Extent to which the project would contribute to meeting the objective that 40% of the overall benefits of climate, clean energy, and other investments will flow to disadvantaged communities.

AREA OF INTEREST 2

Merit Review Criterion 1: Scientific and Technological Merit (40%)

- Thoroughness of the description of the proposed technology, the expected advantages over current state-of-the-art solutions, and the specific elements of the approach expected to be further validated in the field environment.
- Degree to which the proposed technology or methodology meets the stated objectives of the AOI in terms of the type of technology proposed,

the intended application of the technology, the performance metrics of the technology, the current TRL of the technology, and the projected TRL of the technology at the end of the project.

- Degree to which the Applicant proposes a feasible concept based on sound scientific and engineering principles and includes adequate field-testing elements to validate, demonstrate, and assess the proposed technology under the appropriate conditions outlined in the AOI.

Merit Review Criterion 2: Technical Approach and Understanding (15%)

- Feasibility, appropriateness, rationale, and completeness of the proposed Statement of Project Objectives, such that there is a logical progression of work aligning with the objectives of the AOI and includes Task descriptions adequately describing the activities to be completed and how they would be accomplished.
- The adequacy and completeness of the Project Management Plan (PMP) in establishing baselines (technical scope, budget, schedule) and in managing project performance relative to those baselines; defining the actions that will be taken when these baselines must be revised; identification of project risks and strategies for mitigation, and the reasonableness of the project schedule to integrate all tasks/subtasks and achieve key project objectives as reflected by well-defined, quantifiable, and verifiable critical path milestones and key project decision points including defined targets for what constitutes successful achievement.

Merit Review Criterion 3: Technical and Management Capabilities (25%)

- The degree to which the Applicant clearly includes and describes an organizational structure for the project team in line with the AOI objectives and explains the: roles and responsibilities of team members, integration of team members to achieve project objectives, approach to communication among participants and with DOE, the process for making decisions on technical direction, procedures for resolving conflict, and questions regarding intellectual property.
- The adequacy and relevance of the Applicant's and participating organization's corporate experience (not the individual personnel's experience) in commercializing relevant technologies and managing projects of similar nature and complexity to that specifically proposed in the application, within budget and on schedule.
- Credentials, capabilities, experience, and availability of key personnel from the applicant and partnering organizations to carry out their specifically identified role within the proposed project.
- Adequacy and availability of the proposed facilities, equipment, and field test site(s) to perform project tasks and meet the objectives of the AOI.

- Adequacy of the letters of commitment provided by a project team member who is a business intending to commercialize the proposed technology and an industry partner(s) who will provide access to relevant field site(s) for the validation/demonstration of the technology.

Merit Review Criterion 4: Comm. Benefits Plan: Job Quality and Equity (20%)
This criterion involves consideration of the following factors:

Community and Labor Engagement

- Extent to which the applicant demonstrates community and labor engagement to date resulting in support for the proposed project;
- Extent to which the applicant has a clear and appropriately robust plan to engage—ideally through a clear commitment to negotiate enforceable Workforce and Community Agreements—with labor unions, Indian Tribes, Tribal organizations, and community-based organizations supporting or work with disadvantaged communities and other affected stakeholders;
- Extent to which the applicant has considered accountability to affected workers and community stakeholders, including those most vulnerable to project activities, with a plan to publicly share SMART Community Benefits Plan commitments; and
- Extent to which the applicant demonstrates community and labor engagement will lead to the delivery of high-quality jobs for local and disadvantaged communities and underrepresented workers, minimal environmental impact, and allocation of project benefits to disadvantaged communities.

Investing in Quality Jobs

- Quality and manner in which the proposed project will create and/or retain high quality, good-paying jobs with employer-sponsored benefits for all classifications and phases of work;
- Extent to which the project provides employees with the ability to organize, bargain collectively, and participate, through labor organizations of their choosing, in decisions affecting them and contributing to the effective conduct of business and facilitates amicable settlements of any potential disputes between employees and employers, providing assurances of project efficiency, continuity, and multiple public benefits; and
- Extent to which applicant demonstrates they are a responsible employer, with ready access to a sufficient supply of appropriately skilled labor, and an effective plan to minimize the risk of labor disputes or disruptions.

Diversity, Equity, Inclusion, and Accessibility

- Extent to which the Community Benefits Plan includes specific and high-quality actions to meet DEIA goals, which may include DEIA recruitment procedures, supplier diversity plans, and other DEIA initiatives; and
- Quality of any partnerships and agreements with apprenticeship readiness programs, or community-based workforce training and support organizations serving workers facing systematic barriers to employment to facilitate participation in the project's construction and operations.

Justice40 Initiative

- Extent to which the Community Benefits Plan identifies: specific, measurable benefits for disadvantaged communities, how the benefits will flow to disadvantaged communities, and how negative environmental impacts affecting disadvantaged communities would be mitigated; and
- Extent to which the project would contribute to meeting the objective that 40% of the overall benefits of climate, clean energy, and other investments will flow to disadvantaged communities.

AREA OF INTEREST 3a

Merit Review Criterion 1: Technological Merit (40%)

- Thoroughness of the description of the targeted sources of emissions in the disadvantaged communities, and at oil and natural gas assets located near disadvantaged communities the applicant intends to monitor and their respective impact on methane and other GHG emissions in disadvantaged communities.
- Adequacy and feasibility of the Applicant's proposed approach to work with operators and disadvantaged communities to install/deploy methane emissions monitoring technologies. This includes the adequacy of the methane emissions monitoring solutions utilized within the prescribed effort and/or the proposed approach for the selection of methane emissions monitoring technologies for installation/deployment.
- Adequacy of the Applicant's proposed approach to communications and data reporting on methane emissions in disadvantaged communities and at oil and natural gas assets located near disadvantaged communities.
- Expected impacts of the proposed project, including: the estimated number of communities and point sources monitored in the proposed effort and total number of disadvantaged communities and oil and natural gas assets located near disadvantaged communities expected to be impacted by the project's efforts.

Merit Review Criterion 2: Technical and Management Approach (15%)

- Feasibility, appropriateness, rationale, and completeness of the proposed Statement of Project Objectives, such that there is a logical progression of work aligning with the objectives of the AOI and includes Task descriptions adequately describing the activities to be completed and how they would be accomplished.
- The adequacy and completeness of the Project Management Plan (PMP) in establishing baselines (technical scope, budget, schedule) and in managing project performance relative to those baselines; defining the actions that will be taken when these baselines must be revised; identification of project risks and strategies for mitigation, and the reasonableness of the project schedule to integrate all tasks/subtasks and achieve key project objectives as reflected by well-defined, quantifiable, and verifiable critical path milestones and key project decision points including defined targets for what constitutes successful achievement.

Merit Review Criterion 3: Technical and Management Capabilities (25%)

- The degree to which the Applicant clearly includes and describes an organizational structure for the project team in line with the AOI objectives and explains the: roles and responsibilities of team members, integration of team members to achieve the project objectives, approach to communication among participants and with DOE, the process for making decisions on technical direction, procedures for resolving conflict, and questions regarding intellectual property.
- The adequacy and relevance of the Applicant's and participating organization's corporate experience (not the individual personnel's experience) in managing projects of similar nature and complexity to that specifically proposed in the application, within budget and on schedule.
- Credentials, capabilities, experience, and availability of key personnel from the applicant and partnering organizations to carry out their specifically identified role within the proposed project.
- Adequacy of the proposed teaming arrangements to meet the objectives of the AOI as evidenced by letters of commitment provided by industry partners and disadvantaged communities.

Merit Review Criterion 4: Comm. Benefits Plan: Job Quality and Equity (20%)
This criterion involves consideration of the following factors:

Community and Labor Engagement

- Extent to which the applicant demonstrates community and labor engagement to date resulting in support for the proposed project;

- Extent to which the applicant has a clear and appropriately robust plan to engage—ideally through a clear commitment to negotiate enforceable Workforce and Community Agreements—with labor unions, Indian Tribes, Tribal organizations, and community-based organizations supporting or work with disadvantaged communities and other affected stakeholders;
- Extent to which the applicant has considered accountability to affected workers and community stakeholders, including those most vulnerable to project activities, with a plan to publicly share SMART Community Benefits Plan commitments; and
- Extent to which the applicant demonstrates community and labor engagement will lead to the delivery of high-quality jobs for local and disadvantaged communities and underrepresented workers, minimal environmental impact, and allocation of project benefits to disadvantaged communities.

Investing in Quality Jobs

- Quality and manner in which the proposed project will create and/or retain high quality, good-paying jobs with employer-sponsored benefits for all classifications and phases of work;
- Extent to which the project provides employees with the ability to organize, bargain collectively, and participate, through labor organizations of their choosing, in decisions affecting them and contributing to the effective conduct of business and facilitates amicable settlements of any potential disputes between employees and employers, providing assurances of project efficiency, continuity, and multiple public benefits; and
- Extent to which applicant demonstrates they are a responsible employer, with ready access to a sufficient supply of appropriately skilled labor, and an effective plan to minimize the risk of labor disputes or disruptions.

Diversity, Equity, Inclusion, and Accessibility

- Extent to which the Community Benefits Plan includes specific and high-quality actions to meet DEIA goals, which may include DEIA recruitment procedures, supplier diversity plans, and other DEIA initiatives; and
- Quality of any partnerships and agreements with apprenticeship readiness programs, or community-based workforce training and support organizations serving workers facing systematic barriers to employment to facilitate participation in the project's construction and operations.

Justice40 Initiative

- Extent to which the Community Benefits Plan identifies: specific, measurable benefits for disadvantaged communities, how the benefits

will flow to disadvantaged communities, and how negative environmental impacts affecting disadvantaged communities would be mitigated; and

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

AREA OF INTEREST 3b

Merit Review Criterion 1: Scientific and Technological Merit (40%)

- Degree to which the Applicant described current state-of-the-art technologies and/or processes for methane emissions monitoring, reconciliation, and assessment and the adequacy of the proposed approach to build on that foundation to achieve the objectives of the AOI.
- Degree to which the Application includes a clear discussion and assessment of existing LDAQ solutions and how the proposed project will characterize them and enable future improvements and validation of methane emissions data.
- Degree to which the Application includes a feasible approach to meet the objectives of the AOI including statistically relevant methane emissions data collection and validation from emissions sources identified by the applicant for data collection for use in improving emissions factors suitable for use by the EPA GHGRP and GHGI.
- Adequacy of the applicant's plan for broad collaboration, data dissemination, "best practices" development, and public outreach/stakeholder engagement opportunities with other projects along with DOE and NETL.
- Degree to which the Application includes plans for integrating the project's activities with other regional project teams in ways producing synergies and enable the collection of emissions data consistent and comparable across regions through the participation in program-based working groups, coordination with EPA and DOE, and the development of best practices documents to clarify overall lessons learned.

Merit Review Criterion 2: Technical Approach and Understanding (15%)

- Feasibility, appropriateness, rationale, and completeness of the proposed Statement of Project Objectives, such that there is a logical progression of work aligning with the objectives of the AOI and includes Task descriptions adequately describing the activities to be completed and how they would be accomplished.
- The adequacy and completeness of the Project Management Plan (PMP) in establishing baselines (technical scope, budget, schedule) and in

managing project performance relative to those baselines; defining the actions that will be taken when these baselines must be revised; identification of project risks and strategies for mitigation, and the reasonableness of the project schedule to integrate all tasks/subtasks and achieve key project objectives as reflected by well-defined, quantifiable, and verifiable critical path milestones and key project decision points including defined targets for what constitutes successful achievement.

Merit Review Criterion 3: Technical and Management Capabilities (25%)

- The degree to which the Applicant clearly includes and describes an organizational structure for the project team that is in line with the AOI objectives and explains the: roles and responsibilities of team members, how the project team will be integrated to achieve the project objectives, the approach to communication among participants and with DOE, the process for making decisions on technical direction, procedures for resolving conflict, and questions regarding intellectual property.
- The adequacy and relevance of the Applicant's and participating organization's corporate experience (not the individual personnel's experience) in managing projects of similar nature and complexity to that specifically proposed in the application, within budget and on schedule.
- Credentials, capabilities, experience, and availability of key personnel from the applicant and partnering organizations to carry out their specifically identified role within the proposed project.
- Adequacy and availability of the proposed facilities, equipment, and field site(s) to perform project tasks and meet the objectives of the AOI.

Merit Review Criterion 4: Comm. Benefits Plan: Job Quality and Equity (20%)

This criterion involves consideration of the following factors:

Community and Labor Engagement

- Extent to which the applicant demonstrates community and labor engagement to date resulting in support for the proposed project;
- Extent to which the applicant has a clear and appropriately robust plan to engage—ideally through a clear commitment to negotiate enforceable Workforce and Community Agreements—with labor unions, Indian Tribes, Tribal organizations, and community-based organizations supporting or work with disadvantaged communities and other affected stakeholders;
- Extent to which the applicant has considered accountability to affected workers and community stakeholders, including those most vulnerable to project activities, with a plan to publicly share SMART Community Benefits Plan commitments; and

- Extent to which the applicant demonstrates community and labor engagement will lead to the delivery of high-quality jobs for local and disadvantaged communities and underrepresented workers, minimal environmental impact, and allocation of project benefits to disadvantaged communities.

Investing in Quality Jobs

- Quality and manner in which the proposed project will create and/or retain high quality, good-paying jobs with employer-sponsored benefits for all classifications and phases of work;
- Extent to which the project provides employees with the ability to organize, bargain collectively, and participate, through labor organizations of their choosing, in decisions affecting them and contributing to the effective conduct of business and facilitates amicable settlements of any potential disputes between employees and employers, providing assurances of project efficiency, continuity, and multiple public benefits; and
- Extent to which applicant demonstrates they are a responsible employer, with ready access to a sufficient supply of appropriately skilled labor, and an effective plan to minimize the risk of labor disputes or disruptions.

Diversity, Equity, Inclusion, and Accessibility

- Extent to which the Community Benefits Plan includes specific and high-quality actions to meet DEIA goals, which may include DEIA recruitment procedures, supplier diversity plans, and other DEIA initiatives; and
- Quality of any partnerships and agreements with apprenticeship readiness programs, or community-based workforce training and support organizations serving workers facing systematic barriers to employment to facilitate participation in the project's construction and operations.

Justice40 Initiative

- Extent to which the Community Benefits Plan identifies: specific, measurable benefits for disadvantaged communities, how the benefits will flow to disadvantaged communities, and how negative environmental impacts affecting disadvantaged communities would be mitigated; and
- Extent to which the project would contribute to meeting the objective that 40% of the overall benefits of climate, clean energy, and other investments will flow to disadvantaged communities.

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 October 1, 2020, which is available at: https://energy.gov/management/downloads/merit-review-guide-financial-assistance-and-unsolicited-proposals-current.

C. Other Selection Factors

i. Program Policy Factors

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

- The degree to which the proposed project exhibits technological diversity when compared to the existing DOE project portfolio and other projects selected from the subject FOA;
- The degree to which the proposed project, including proposed cost share, optimizes the use of available DOE funding to achieve programmatic objectives;
- The level of industry involvement and demonstrated ability to accelerate demonstration and commercialization and overcome key market barriers;
- The degree to which the proposed project will accelerate transformational technological advances in areas that industry by itself is not likely to undertake because of technical and financial uncertainty;
- The degree to which the proposed project, or group of projects, represent a desired geographic distribution (considering past awards and current applications);
- The degree to which the proposed project incorporates applicant or team members from Minority Serving Institutions (e.g., Historically Black Colleges and Universities (HBCUs)/Other Minority Serving Institutions); and partnerships with underrepresented businesses or Indian Tribes;
- The degree to which the proposed project, when compared to the existing DOE project portfolio and other projects to be selected from the subject FOA, contributes to the total portfolio meeting the goals reflected in the Community Benefits Plan criteria; and
- The degree to which the proposed project will employ procurement of U.S. iron, steel, manufactured products, and construction materials.
- The degree to which the proposed project contributes to the diversity of organizations and organization types and sizes selected from the subject FOA when compared to the existing DOE project portfolio.

- The degree to which the proposed project has broad public support from the communities most directly impacted by the project.
- The degree to which the project's solution or strategy will maximize deployment or replication.

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 and risk reviews, in determining which applications to select.

ii. Pre-Selection Interviews

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

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

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

Participation in Pre-Selection Interviews with DOE does not signify that applicants have been selected for award negotiations.

iii. Pre-Selection Clarification

DOE may determine that pre-selection clarifications are necessary from one or more applicants. Pre-selection clarifications are distinct from and less formal than pre-selection interviews. These pre-selection clarifications will solely be for

the purposes of clarifying the application. The pre-selection clarifications may occur before, during or after the merit review evaluation process. Information provided by an applicant that is not necessary to address the pre-selection clarification question will not be reviewed or considered. Typically, a pre-selection clarification will be carried out through either written responses to DOE's written clarification questions or video or conference calls with DOE representatives.

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

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

iv. Recipient Responsibility and Qualifications

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 responsibility and qualification information about the applicant that is in the entity information domain in SAM.gov (see 41 U.S.C. § 2313).

The applicant, at its option, may review information in the entity information domain in SAM.gov and comment on any information about itself that a federal awarding agency previously entered and is currently in the entity information domain in SAM.gov.

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

v. Selection

The Selection Official may consider the technical merit, the Federal Consensus Board's recommendations, program policy factors, risk reviews, 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 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 Grants.gov. The notification letter will state the basis upon which 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 Grants.gov. 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. Applicants Selected for Award Negotiations

DOE may stagger its selection determinations. As a result, some applicants may receive their notification letter in advance of other Applicants. Successful applicants will receive written notification that they have been selected for award negotiations. 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 nor is it a guarantee of federal government funding. Applicants do not receive an award unless and until award negotiations are complete and the Contracting Officer executes the funding agreement, accessible by the prime recipient in FedConnect.

The award negotiation process will take approximately 60 days. Applicants must designate a primary and a backup point-of-contact 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, which means, 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 required one-time actions applicants must take before applying to this FOA. Some of these may take several weeks, so it is vital applicants build in enough time to complete them. Failure to complete these actions could interfere with application or negotiation deadlines or the ability to receive an award if selected. These requirements are as follows:

1. **System for Award Management**
   Register in SAM (https://www.sam.gov). Please update your SAM registration annually.

2. **FedConnect**
   Register in FedConnect (https://www.fedconnect.net).

   For more information about FedConnect, review the FedConnect Ready, Set, Go! Guide at: https://www.fedconnect.net/FedConnect/Marketing/Documents/FedConnect_Ready_Set_Go.pdf.

3. **Grants.gov**
   Register in Grants.gov (https://www.grants.gov/) to receive automatic updates when Amendments to this FOA are posted and for Full Application submissions.

4. **Electronic Authorization of Applications and Award Documents**
   Submission of an application and supplemental information under this FOA through electronic systems used by the DOE, including Grants.gov

and FedConnect.net, constitutes the authorized representative's approval and electronic signature.

ii. Award Administrative Requirements

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

iii. Foreign National Participation (April 2023)

All applicants selected for award negotiations and recipients of an award under this FOA as well as project participants (including subrecipients and subcontractors) who anticipate involving foreign nationals in the performance of an award may be required to provide DOE with specific information about each foreign national to satisfy requirements for foreign national participation.

A "foreign national" is defined as any person without U.S. citizenship or nationality (may include a stateless person). The volume and type of information collected may depend on various factors associated with the award. DOE concurrence may be required before a foreign national can participate in the performance of any work under an award.

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

iv. Subaward and Executive Reporting

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

v. National Policy Requirements

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

vi. Environmental Review in Accordance with National Federal Authorities

This FOA is issued in accordance with statutory authority provided by:

Clean Air Act (CAA), Section 136, as amended by Inflation Reduction Act (IRA), Section 60113, codified at 42 U.S.C. 7436.

Because this action is taken under the Clean Air Act and "[n]o action taken under the Clean Air Act (42 U.S.C. 7401 et seq.) shall be deemed a major federal action significantly affecting the quality of the human environment within the meaning of the National Environmental Policy Act of 1969 (42 U.S.C. 4321 et seq.)," Federal agencies, such as DOE, are exempt from NEPA compliance in these types of actions, including NEPA Environmental Questionnaires and Categorical Exclusions. (15 U.S.C. § 793(c)(1)).

However, the Clean Air Act does not exempt compliance with other Federal authorities (including but not limited to the Endangered Species Act and the NHPA). Therefore, DOE's decision whether and how to distribute federal funds under this FOA is subject to the adequacy of the Applicant's "Environmental Plan" for addressing these non-exempt Federal authorities

vii. Flood Resilience

Executive Order 11988, Floodplain Management, requires agencies engage in a decision-making process to evaluate the potential effects of any action it may take in a floodplain and to avoid development in a floodplain to the extent possible. DOE procedures for implementing the Executive Order are in 10 CFR part 1022. Executive Order 13690, Establishing a Federal Flood Risk Management Standard and a Process for Further Soliciting and Considering Stakeholder Input (reinstated by EO 14030, Climate-Related Financial Risk), directs federal agencies 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% annual flood change (500-year floodplain).

Selectees will be required to indicate whether the proposed project location(s) is within a floodplain, how the floodplain was defined, and how the project's design has been modified to reduce the risk of flood loss and minimize the impact of floods on human safety, health, and welfare. Information to assist in the implementation of these requirements is available at:

- https://www.energy.gov/nepa/articles/eo-13690-establishing-federal-flood-risk-management-standard-and-process-further
- https://www.fema.gov/floodplain-management/intergovernmental/white-house-flood-resilience-interagency-working-group
- http://floodstandard.climate.gov

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 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, a corporation is any for-profit or nonprofit 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].

3. Nondisclosure and Confidentiality Agreements Representations

In submitting an application to this FOA the applicant represents that:

a. It **does not and will not** require its employees or contractors to sign internal nondisclosure or confidentiality agreements or statements prohibiting or otherwise restricting its employees or contactors from lawfully reporting waste, fraud, or abuse to a designated investigative or law enforcement representative of a federal department or agency authorized to receive such information.

b. It **does not and will not** use any federal funds to implement or enforce any nondisclosure and/or confidentiality policy, form, or agreement it uses unless it contains the following provisions:

''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.''

(1) 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.

(2) 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 U.S. government, may contain provisions appropriate to the 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 during such activity unless specifically authorized to do so by the U.S. 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 U.S. 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

Cooperative agreements will be awarded under this announcement. There will be substantial involvement between the DOE and the Recipient during performance of this Cooperative Agreement. DOE shares responsibility with the recipient for the management, control, direction, and performance of the project.

Recipient's Responsibilities.

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;
- Attending annual project review meetings and reporting project status;
- Participating in peer review evaluations of the project, or peer review evaluations of the program that their project supports;
- Submitting technical reports and publicly releasable documents that incorporate DOE comments; 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 annual 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 substantial involvement to ensure that project results address critical system and programmatic goals established by the DOE Office of Fossil Energy and Carbon Management, in coordination with DOE's Division of Methane Mitigation Technologies;
- Promoting and facilitating technology transfer activities, including disseminating program results through presentations and publications;
- Serving as scientific/technical liaison between awardees and other program or industry staff; and
- Reviewing and concurring with ongoing technical 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.

xi. Subject Invention Utilization Reporting

To ensure that prime recipients, subrecipients, and subcontractors 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 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 its 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.

xii. 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.

xiii. Energy Data eXchange (EDX) Requirements

The DOE is required to improve access to federally funded research results, proper archiving of digital data, and expanded discovery and reuse of research datasets per DOE and Executive Orders. The Energy Data eXchange (EDX) is a data laboratory developed and maintained by NETL to find, connect, curate, use, and re-use data to advance fossil energy and environmental research, development, and deployment.

Data products generated under the resulting award will be required to be submitted in the EDX at https://edx.netl.doe.gov/. Data products include but are not limited to software code, tools, applications, webpages, portfolios, images, videos, and datasets.

EDX uses federation and web services to elevate visibility for publicly approved assets in the system, including connections with DOE's Office of Scientific and Technical Information (OSTI) systems, Data.gov, and Re3Data. This ensures compliance with federal requirements, while raising visibility for researcher's published data products to promote discoverability and reuse.

EDX supports a wide variety of file types and formats including: 1) data, 2) metadata, 3) software/tools, and 4) articles (provided that there is an accompanying Government use license). A partial list of file formats accepted by EDX is provided below, however, EDX is designed for flexibility and accepts all types of file formats.

- 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, SML, Xradio, ZIP, and others.
- Geographic Formats: APR, DBF, DEM, DLG, DRG, DXF, E00, ECW, GDB, GeoPDF, GeoTIFF, GML, GPX, GRID, IMG, KML, KMZ, MOB, MrSID, SHP, and others.

Information provided to EDX will be made publicly available, unless authorized under the resulting award. Additional information on EDX is available at https://edx.netl.doe.gov/about.

When data products are submitted to EDX, the data product will need to be registered with a digital object identifier (DOI) through OSTI to ensure more visibility in other search repositories (i.e., osti.gov, data.gov, Google Scholar, etc.). The OSTI DOI can be established through an application programming interface (API) by completing just a few additional fields.

The Recipient or subrecipient should coordinate with the Project Manager on an annual basis to assess if there is data that should be submitted to EDX and identify the proper file formats prior to submission. All final data products shall be submitted to EDX by the Recipient prior to the completion of the project.

xiv. Reporting

Reporting requirements are identified on the Federal Assistance Reporting Checklist and Instructions, DOE F 4600.2, which, if awarded, are provided as an Attachment to the Agreement.

Additional reporting requirements apply to IRA-funded projects. DOE may require specific data collection to track progress toward key departmental goals: ensuring justice and equity, investing in quality jobs, reducing greenhouse gas emissions, and advancing a pathway to private sector deployment. Examples of data that may be collected include:

- Jobs data, including:
    - Number and types of jobs provided, wages and benefits paid;
    - Workforce demographics, including local hires;
    - Efforts to minimize risks of labor disputes and disruptions;
    - Dollar value of contributions to worker training; number of new employee certificates and training credentials; ratio of apprentice- to journey-level workers employed;
    - Number of individuals trained, number of trainees placed in new full-time employment, number of trainings partnering with community-based organizations or labor unions
- Justice and Equity data, including:
    - Underrepresented businesses acting as vendors and subcontractors for bids on supplies, services, and equipment;
    - Value, number, and type of partnerships with MSIs;
    - Stakeholder engagement events, community engagement process;
    - Other relevant indicators from the Community Benefits Plan
- Number and type of energy efficient and clean energy equipment installed
- Funding leveraged, follow-on-funding, intellectual property generation and utilization

xv. Go/No-Go Review

Each project selected under this FOA will be subject to a periodic project evaluation referred to as a Go/No-Go Review. A Go/No-Go Review is a risk management tool and a project management best practice to ensure that, for the current phase or period of performance, technical success is definitively achieved and potential for success in future phases or periods of performance is evaluated, prior to beginning the execution of future phases.

At the Go/No-Go decision points, DOE will evaluate project performance, project schedule adherence, the extent milestone objectives are met, compliance with reporting requirements, and overall contribution to the program goals and objectives. Federal funding beyond the Go/No-Go decision point (continuation funding) is contingent upon (1) availability of federal funds appropriated by Congress for the purpose of this program; (2) the availability of future-year budget authority; (3) recipient's technical progress compared to the Milestone Summary Table stated in the Statement of Project Objectives attachment of the award; (4) recipient's submittal of required reports; (5) recipient's compliance with the terms and conditions of the award; (6) DOE's Go/No-Go decision; (7) the recipient's submission of a continuation application[67]; and (8) written approval of the continuation application by the Contracting Officer.

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

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

xvi. Conference Spending

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

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

i. A progress report on the project objectives, including significant findings, conclusions, or developments, and an estimate of any unobligated balances remaining at the end of the budget period. If the remaining unobligated balance is estimated to exceed 20 percent of the funds available for the budget period, explain why the excess funds have not been obligated and how they will be used in the next budget period.
ii. A detailed budget and supporting justification if there are changes to the negotiated budget, or a budget for the upcoming budget period was not approved at the time of award.
iii. A description of any planned changes from the SOPO and/or Milestone Summary Table.

board, commission, or office to the Inspector General (or senior ethics official for any entity without an Inspector General), of the date, location, and number of employees attending such conference.

xvii. Indemnity

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

The Recipient shall indemnify the Government and its officers, agents, or employees for any and all liability, including litigation expenses and attorney's fees, arising from suits, actions, or claims of any character for death, bodily injury, or loss of 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 not be covered by applicable allowable costs provisions.

xviii. 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.

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

States, local governments, and other public entities may not condition subawards in a manner that would discriminate against or otherwise disadvantage subrecipients based on their religious character.

xx. Participants and Collaborating Organizations

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

xxi. Current and Pending Support

If selected for award negotiations, within 30 days of the selection notice, the selectee must submit: 1) current and pending support disclosures and resumes for any new PIs or senior/key personnel, and 2) updated disclosures if there have been any changes to the current and pending support submitted with the application.

Throughout the life of the award, the Recipient has an ongoing responsibility to submit: 1) current and pending support disclosure statements and resumes for any new PI and senior/key personnel, and 2) updated disclosures if there are changes to the current and pending support previously submitted to DOE.

Also See Section IV.C.xx.

xxii. U.S. Manufacturing Commitments

A primary objective of DOE's multi-billion-dollar research, development, and demonstration investments is to cultivate new research and development ecosystems, manufacturing capabilities, and supply chains for and by United States industry and labor. Therefore, in exchange for receiving taxpayer dollars to support an applicant's project, the applicant/recipient and any subrecipient and contractor 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 applicant/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, subawardee, or subrecipient.

As noted in the U.S. Competitiveness Provision, if an entity cannot meet the requirements of the U.S. Competitiveness Provision, the entity may request a modification or waiver of the U.S. Competitiveness Provision. For example, the entity may propose modifying the language of the U.S. Competitiveness Provision in order to change the scope of the requirements or to provide more specifics on the application of the requirements for a particular technology. As another example, the entity may request that the U.S. Competitiveness Provision be waived in lieu of a net benefits statement or United States manufacturing plan. The statement or plan would contain specific and enforceable commitments that would be beneficial to the United States economy and competitiveness. Examples of such commitments could include manufacturing specific products in the United States, making a specific investment in a new or existing United States manufacturing facility, keeping certain activities based in the United States or supporting a certain number of jobs in the United States related to the technology. DOE may, in its sole discretion, determine that the proposed modification or waiver promotes commercialization and provides substantial United States economic benefits, and grant the request. If granted, DOE will modify the award terms and conditions for the requesting entity accordingly.

More information and guidance on the waiver and modification request process can be found in the DOE Financial Assistance Letter on this topic, available at: https://www.energy.gov/management/pf-2022-09-fal-2022-01-implementation-doe-determination-exceptional-circumstances-under. Additional information on DOE's Commitment to Domestic Manufacturing for DOE-funded RandD is available at: https://www.energy.gov/gc/us-manufacturing.

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

xxiii. Interim Conflict of Interest Policy for Financial Assistance

The DOE interim Conflict of Interest Policy for Financial Assistance (COI Policy)[68] is applicable to all non-Federal entities applying for, or that receive, DOE funding by means of a financial assistance award (e.g., a grant, cooperative agreement, or technology investment agreement) and, through the implementation of this policy by the entity, to each Investigator who is planning to participate in, or is participating in, the project funded wholly or in part under the DOE financial assistance award. The term "Investigator" means the PI and any other person, regardless of title or position, who is responsible for the purpose, design,

[68] DOE's interim COI Policy can be found at https://www.energy.gov/management/department-energy-interim-conflict-interest-policy-requirements-financial-assistance.

conduct, or reporting of a project funded by DOE or proposed for funding by DOE. Recipients must flow down the requirements of the interim COI Policy to any subrecipient non-federal entities. Further, for DOE funded projects, the recipient must include all financial conflicts of interest (FCOI) (i.e., managed and unmanaged/unmanageable) in its initial and ongoing FCOI reports.

It is understood that non-federal entities and individuals receiving DOE financial assistance awards will need sufficient time to come into full compliance with DOE's interim COI Policy. To provide some flexibility, DOE allows for a staggered implementation. Specifically, prior to award, applicants selected for award negotiations must: ensure all Investigators complete their significant financial disclosures; review the disclosures; determine whether a FCOI exists; develop and implement a management plan for FCOIs; and provide DOE with an initial FCOI report that includes all FCOIs (i.e., managed and unmanaged/ unmanageable). Recipients will have 180 days from the date of the award to come into full compliance with the other requirements set forth in DOE's interim COI Policy. Prior to award, the applicant must certify that it is, or will be within 180 days of the award, compliant with all requirements in the COI Policy.

xxiv. Fraud, Waste and Abuse

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

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

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

> The non-Federal entity or applicant for a Federal award must disclose, in a timely manner, in writing to the Federal awarding agency or pass-through entity all violations of Federal criminal law involving fraud, bribery, or gratuity violations potentially affecting the Federal award. Non-Federal entities that have received a Federal award including the term and condition outlined in appendix XII of 2 CFR Part 200 are required to report certain civil, criminal, or administrative proceedings to SAM. 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/recipients and subrecipients (if applicable) are encouraged to allocate sufficient costs in the project budget to cover the costs associated for personnel and data infrastructure needs to support performance management and program evaluation needs including but not limited to independent program and project audits to mitigate risks for fraud, waste, and abuse.

xxv. Human Subjects Research

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

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

xxvi. Construction Signage

After receiving a DOE award, recipients are encouraged to display DOE Investing in America signage during and after construction. Guidance can be found at: (https://www.energy.gov/design). Proposed signage costs that meet these specifications are an allowable cost and should be included in the proposed project budget.

xxvii. 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, 200.313, 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 200.310-200.316.

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 through the FedConnect portal. You must register with FedConnect to respond as an interested party to submit questions, and to view responses to questions. It is recommended that you register as soon after release of the FOA as possible to have the benefit of all responses. Applicants are encouraged to review previously issued Questions and Answers prior to the submission of questions.

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

All questions and answers related to this FOA will be posted on the FedConnect portal at: https://www.FedConnect.net. DOE will attempt to respond to a question within 3 business days, unless a similar question and answer has already been posted on the website.

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

VIII. Other Information

A. FOA Modifications

Amendments to this FOA will be posted on the Grants.gov system and the FedConnect portal. However, you will only receive an email when an amendment or a FOA is posted on these sites by registering with FedConnect as an interested party for this FOA. 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 business sensitive proprietary, or otherwise confidential information in their application unless such information is necessary to convey an understanding of the proposed project or to comply with a requirement in the FOA. Applicants are advised to not include any critically sensitive proprietary detail.

If an application includes trade secrets or business sensitive, proprietary, or otherwise confidential information, it is furnished to the Federal Government in confidence with the understanding that the information shall be used or disclosed only for evaluation of the application. Such information will be withheld from public disclosure to the extent permitted by law, including the Freedom of Information Act. Without assuming any liability for inadvertent disclosure, DOE will seek to limit disclosure of such information to its employees and to outside reviewers when necessary for merit review of the application or as otherwise authorized by law. This restriction does not limit the Government's right to use the information if it is obtained from another source.

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

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

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

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

E. Evaluation and Administration by Non-Federal Personnel

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

(COI) and non-disclosure acknowledgements (NDA) prior to reviewing an application. Non-federal personnel conducting administrative activities must sign an NDA.

F. Notice Regarding Eligible/Ineligible Activities

Eligible activities under this FOA include those which describe and promote the understanding of scientific and technical aspects of specific energy technologies, but not those which encourage or support political activities such as the collection and dissemination of information related to potential, planned or pending legislation.

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

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

H. Requirement for Full and Complete Disclosure

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

- The cancellation of award negotiations;
- The modification, suspension, and/or cancellation 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

DOE expects that the awards made as a result of this FOA will not involve research or development. However, in the event that an award is made that does involve research or development, 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); and
- 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. 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: Applicants not covered by a Class Patent Waiver or the Bayh-Dole Act 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 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 subawards, under this FOA shall include the U.S. Competitiveness Provision in accordance with Section VI.B.xxii. U.S. Manufacturing Commitments of this FOA. A copy of the DEC can be found at https://www.energy.gov/gc/determination-exceptional-circumstances-decs. Pursuant to 37 CFR 401.4, any nonprofit organization or small business firm

as defined by 35 U.S.C. § 201 affected by any DEC has the right to appeal it by providing written notice to DOE within 30 working days from the time it receives a copy of the determination.

- DOE may issue and publish further DECs on the website above 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, subrecipients, and subcontractors retain title to subject inventions, the United States government retains certain rights.

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 government subcontractors

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 United States manufacturing requirement has not been met.

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

decision. To date, DOE has never exercised its march-in rights to any subject inventions.

L. Rights in Technical Data

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

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

Government Rights in Technical Data Produced Under Awards: The United States government retains unlimited rights in technical data produced under government financial assistance awards, including the right to distribute to the public. One exception to the foregoing is that invention disclosures may be protected from public disclosure for a reasonable time in order to allow for filing a patent application.

M. Copyright

The prime recipient and subrecipients may assert copyright in copyrightable works, such as software, first produced under the award without DOE approval. When copyright is asserted, the government retains a paid-up nonexclusive, irrevocable worldwide license to reproduce, prepare derivative works, distribute copies to the public, and to perform publicly and display publicly the copyrighted work. This license extends to contractors and others doing work on behalf of the government.

N. Export Control

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

The recipient must immediately report to DOE any export control investigations, indictments, charges, convictions, and violations upon occurrence, at the recipient or subrecipient level, and for violations/convictions, provide the corrective action(s) to prevent future violations/convictions.

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; exercise an option to procure, or enter into a contract (or extend or renew a contract) to procure or obtain equipment, services, or systems that use *covered telecommunications equipment or services* as a substantial or essential component of any system, or as critical technology as part of any system. As described in 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. "PII" refers to information that can be used to distinguish or trace an individual's identity, such as their name, Social Security number, or biometric records, alone or combined with other personal or identifying information linked or linkable to a specific individual, such as date and place of birth or mother's maiden name. (See OMB Memorandum M-17-12 dated January 3, 2017.)

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, 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.

APPENDIX A – COST SHARE INFORMATION

Cost Sharing or Cost Matching

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

How Cost Sharing Is Calculated

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

- Formula: Federal share ($) divided by federal share (%) = Total Project Cost
  Example: $1,000,000 divided by 80% = $1,250,000
- Formula: Total Project Cost ($) minus federal share ($) = Non-federal share ($)
  Example: $1,250,000 minus $1,000,000 = $250,000
- Formula: Non-federal share ($) divided by Total Project Cost ($) = Non-federal share (%)
  Example: $250,000 divided by $1,250,000 = 20%

What Qualifies For Cost Sharing

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

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

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

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

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

General Cost Sharing Rules on a DOE Award

1. Cash Cost Share – encompasses all contributions to the project made by the recipient or subrecipient(s), for costs incurred and paid for during the project. This includes when an organization pays for personnel, supplies, equipment for their own company with organizational resources. If the cost of the item or service is reimbursed, it is cash cost share. All cost share items must be necessary to the performance of the project.
2. In-Kind Cost Share – encompasses all contributions to the project made by the recipient or subrecipient(s) that do not involve a payment or reimbursement and represent donated items or services. In-Kind cost share items include volunteer personnel hours, donated existing equipment, donated existing supplies. The cash value and calculations thereof for all In-Kind cost share items must be justified and explained in the Cost Share section of the project Budget Justification. All cost share items must be necessary to the performance of the project. If questions exist, consult your DOE contact before filling out the In-Kind cost share section of the Budget Justification.
3. Funds from other federal sources MAY NOT be counted as cost share. This prohibition includes FFRDC subrecipients. Non-federal sources include any source not originally derived from federal funds. Cost sharing commitment letters from subrecipients must be provided with the original application.
4. Fee or profit, including foregone fee or profit, are not allowable as project costs (including cost share) under any resulting award. The project may only incur those costs that are allowable and allocable to the project (including cost share) as determined in accordance with the applicable cost principles prescribed in FAR Part 31 for For-Profit entities and 2 CFR Part 200 Subpart E - Cost Principles for all other non-federal entities.

DOE Financial Assistance Rules 2 CFR Part 200 as adopted and supplemented by 2 CFR Part 910

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

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

(1) They are verifiable from the recipient's records.
(2) They are not included as contributions for any other federally-assisted project or program.
(3) They are necessary and reasonable for the proper and efficient accomplishment of project or program objectives.
(4) They are allowable under the cost principles applicable to the type of entity incurring the cost as follows:
- **a.** For-profit organizations. Allowability of costs incurred by for-profit organizations and those nonprofit organizations listed in Attachment C to OMB Circular A–122 is determined in accordance with the for-profit cost principles in 48 CFR Part 31 in the FAR, except that patent prosecution costs are not allowable unless specifically authorized in the award document. (v) Commercial Organizations. FAR Subpart 31.2—Contracts with Commercial Organizations; and
- **b.** Other types of organizations. For all other non-federal entities, allowability of costs is determined in accordance with 2 CFR Part 200 Subpart E.

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

(B) Valuing and documenting contributions

(1) Valuing recipient's property or services of recipient's employees. Values are established in accordance with the applicable cost principles, which mean that amounts chargeable to the project are determined on the basis of costs incurred. For real property or equipment used on the project, the cost principles authorize depreciation or use charges. The full value of the item may be applied when the item will be consumed in the performance of the award or fully depreciated by the end of the award. In cases where the full value of a donated capital asset is to be applied as cost sharing or matching, that full value must be the lesser or the following:
- **a.** The certified value of the remaining life of the property recorded in the recipient's accounting records at the time of donation; or
- **b.** The current fair market value. If there is sufficient justification, the Contracting Officer may approve the use of the current fair market value of the donated property, even if it exceeds the certified value at the time of donation to the project. The Contracting Officer may accept the use of any reasonable basis for determining the fair market value of the property.

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

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

(4) Valuing property donated by third parties.

- **a.** Donated supplies may include such items as office supplies or laboratory supplies. Value assessed to donated supplies included in the cost sharing or matching share must be reasonable and must not exceed the fair market value of the property at the time of the donation.
- **b.** Normally only depreciation or use charges for equipment and buildings may be applied. However, the fair rental charges for land and the full value of equipment or other capital assets may be allowed, when they will be consumed in the performance of the award or fully depreciated by the end of the award, provided that the Contracting Officer has approved the charges. When use charges are applied, values must be determined in accordance with the usual accounting policies of the recipient, with the following qualifications:
  - **i.** The value of donated space must not exceed the fair rental value of comparable space as established by an independent appraisal of comparable space and facilities in a privately-owned building in the same locality.
  - **ii.** The value of loaned equipment must not exceed its fair rental value.

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

- **a.** Volunteer services must be documented and, to the extent feasible, supported by the same methods used by the recipient for its own employees.
- **b.** The basis for determining the valuation for personal services and property must be documented.

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

1. Waiver for Foreign Entity Participation

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 United States national and economic security.[69] 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 United States industry and United States economic development;
b. The project team has appropriate measures in place to control sensitive information and protect against unauthorized transfer of scientific and technical information;
c. Adequate protocols exist between the United States subsidiary and its foreign parent organization to comply with export control laws and any obligations to protect proprietary information from the foreign parent organization;
d. The work is conducted within the United States and the entity acknowledges and demonstrates that it has the intent and ability to comply with the U.S. Competitiveness Provision (see Section VI.B.xxii.); and
e. The foreign entity will satisfy other conditions that may be deemed necessary by DOE to protect United States government interests.

Content for Waiver Request

A Foreign Entity waiver request must include the following:

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

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

d. A description of the project's anticipated contributions to the United States economy;
    - How the project will benefit the United States, including manufacturing, contributions to employment in the United States and growth in new markets and jobs in the United States;
    - How the project will promote manufacturing of products and/or services in the United States;
e. A description of how the foreign entity's participation is essential to the project;
f. A description of the likelihood of Intellectual Property (IP) being created from the work and the treatment of any such IP; and
g. Countries where the work will be performed (Note: if any work is proposed to be conducted outside the United States, the applicant must also complete a separate request foreign work waiver).

DOE may also require:

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

DOE may require additional information before considering the waiver request.

DOE's decision concerning a waiver request is not appealable.

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

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

Overall, a waiver request must demonstrate to the satisfaction of DOE that it would further the purposes of this FOA and is otherwise in the economic interests of the United States to perform work outside of the United States. A request for a foreign work waiver must include the following:

1. The rationale for performing the work outside the United States ("foreign work");
2. A description of the work proposed to be performed outside the United States;
3. An explanation as to how the foreign work is essential to the project;
4. A description of the anticipated benefits to be realized by the proposed foreign work and the anticipated contributions to the United States economy;
5. The associated benefits to be realized and the contribution to the project from the foreign work;
6. How the foreign work will benefit the United States, including manufacturing, contributions to employment in the United States and growth in new markets and jobs in the United States;
7. How the foreign work will promote manufacturing of products and/or services in the United States;
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.

DOE's decision concerning a waiver request is not appealable.

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

A. Definitions
For purposes of the Buy America Requirement, the following definitions apply:

Components See 2 CFR 184.3 Definitions

Construction Materials See 2 CFR 184.3 Definitions

"Buy America Preference," "Buy America Requirement," or "domestic content procurement preference" means the requirements set forth in section 70914 of the Build America, Buy America Act, which requires the head of each Federal agency to ensure that none of the funds subject to the requirements are made available for a Federal award for an infrastructure project may be obligated unless all of the iron, steel, manufactured products, and construction materials incorporated into the project are produced in the United States.

Infrastructure See 2 CFR 184.4(c) and (d).

Manufactured Products See 2 CFR 184.3 Definitions

Predominantly of iron or steel See 2 CFR 184.3 Definitions.

Infrastructure project See 2 CFR 184.3 Definitions

B. Buy America Requirement for Infrastructure Projects (Buy America Requirement)
None of the award funds (includes federal share and recipient cost share) may be used for a project for infrastructure unless:

(1) all iron and steel used in the project is produced in the United States—this means all manufacturing processes, from the initial melting stage through the application of coatings, occurred in the United States;

(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. See 2 CFR 184.5 for determining the cost of components for manufactured products; and

(3) all construction materials[70] are manufactured in the United States—this means that all manufacturing processes for the construction material occurred in the United States. See 2 CFR 184.6 for construction material standards.

The Buy America Requirement only applies to those articles, materials, and supplies that are consumed in, incorporated into, or affixed to the infrastructure in the 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 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 Requirement only applies to an article, material, or supply classified into one of the following categories* based on its status at the time it is brought to the work site for incorporation into an infrastructure project:

(i) Iron or steel products;
(ii) Manufactured products; or
(iii) Construction materials;

The Buy America Requirement only applies to the iron or steel products, manufactured products, and construction materials used for the construction, alteration, maintenance, or repair of public infrastructure in the United States when those items are consumed in, incorporated into, or permanently affixed to the infrastructure. An article, material, or supply incorporated into an infrastructure project should not be considered to fall into multiple categories, but rather must meet the Buy America Preference Requirement for only the single category in which it is classified.

The Buy America Requirement applies to public infrastructure projects in the United States. For purposes of this guidance, applicants should consider whether the infrastructure project will serve a public function. Infrastructure projects should generally be considered "public" if the infrastructure is: publicly owned, privately owned but operated on behalf of the public, or is a place of public accommodation. Review the implementation guidance in OMB Memorandum OMB Memorandum M-24-02 and consult with DOE if you are unsure if your project is subject to Buy America requirements.

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

All iron and steel, manufactured products, and construction materials used in the infrastructure project must be produced in the United States.

** Section 70917(c) Materials* are cement and cementitious materials; aggregates such as stone, sand, or gravel; or aggregate binding agents or additives as provided in section 70917(c) of BABA. Section 70917 (c) materials are excluded from Construction materials. Asphalt concrete pavement mixes are typically composed of asphalt cement (a binding agent) and aggregates such as stone, sand, and gravel. Accordingly, asphalt is also excluded from the definition of Construction materials.

Section 70917(c) materials, on their own, are not manufactured products. Further, Section 70917(c) materials should not be considered manufactured products when they are used at or combined proximate to the work site—such as is the case with wet concrete or hot mix asphalt brought to the work site for incorporation. However, certain Section 70917(c) materials (such as stone, sand, and gravel) may be used to produce a manufactured product, such as is precast concrete. Precast concrete is made of components, is processed into a specific shape or form, and is in such state when brought to the work site. Furthermore, wet concrete should not be considered a manufactured product if not dried or set prior to reaching the work site.

Further clarification is provided in 2 CFR Part 184 on the circumstances under which a determination is made that Section 70917(c) materials should be treated as components of a manufactured product. That determination is based on consideration of: (i) the revised definition of the "manufactured products" at 2 CFR 184.3; (ii) a new definition of "section 70917(c) materials" at 2 CFR 184.3; (iii) new instructions at 2 CFR 184.4(e) on how and when to categorize articles, materials, and supplies; and (iv) new instructions at 2 CFR 184.4(f) on how to apply the Buy America preference by category.

The recipient is responsible for flowing the Buy America Requirement down to all subawards, contracts, subcontracts, and purchase orders for work performed under the proposed infrastructure project, including to For-Profit Entities when the For-Profit Entity is a subrecipient or subawardee.

Recipients must certify or provide equivalent documentation for proof of compliance that a good faith effort was made to solicit bids for domestic products used in the infrastructure project under this award.

Recipients must also maintain certifications or equivalent documentation for proof of compliance that those articles, materials, and supplies that are consumed in, incorporated into, affixed to, or otherwise used in the infrastructure project, not covered by an approved waiver or an exemption provided in 2 CFR 184.8, are produced in the United States. The certification or proof of compliance must be provided by the suppliers or manufacturers of the iron, steel, manufactured products and construction materials and flow up from all subawardees, contractors and vendors to the recipient. Recipients must keep these certifications with the

award/project files and be able to produce them upon request from DOE, auditors or Office of Inspector General.

C. DOE Submission Requirements for Full Application

Within the first two pages of the workplan or project description, applicants must provide a short statement on whether the project will involve the construction, alteration, maintenance 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 the Buy America Requirement, which may impact the project's proposed budget and/or schedule.

D. Waivers

In limited circumstances, DOE may waive the application of the Buy America Requirement in an award where DOE determines that:

> (1) applying the Buy America requirements would be inconsistent with the public interest (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 (Non-Availability); 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 (Unreasonable Cost).

DOE will only process waiver requests after an award has been made but prior to any purchase of items the recipient is seeking to waive, and for which the requests have been submitted in accordance with the term and conditions of the award. Waiver requests must be reviewed by DOE and the Office of Management and Budget's Made in America Office and are subject to a public comment period of no less than 15 calendar days.

DOE or OMB may request additional information for consideration of the wavier. DOE may reject or grant waivers in whole or in part depending on its review, analysis, and/or feedback from OMB or the public. DOEs final determination regarding approval or rejection of the waiver request may not be appealed by a recipient.

Requests to waive the Buy America Requirement must include the following:

- Waiver type (Public Interest, Non-Availability, or Unreasonable Cost);
- Recipient name and Unique Entity Identifier (UEI);
- Award information (Federal Award Identification Number, Assistance Listing number);

- A brief description of the project, its location, and the specific infrastructure involved;
- Total estimated project cost, with estimated federal share and recipient cost share breakdowns;
- Total estimated infrastructure costs, with estimated federal share and recipient cost share breakdowns;
- List and description of iron or steel item(s), manufactured goods, and/or construction material(s) the recipient seeks to waive from the Buy America Requirement, including name, cost, quantity(ies), country(ies) of origin, and relevant Product Service Codes (PSC) and North American Industry Classification System (NAICS) codes for each;
- A detailed justification as to how the non-domestic item(s) is/are essential the project;
- A certification that the recipient made a good faith effort to solicit bids for domestic products supported by terms included in requests for proposals, contracts, and non-proprietary communications with potential suppliers;
- A justification statement—based on one of the applicable justifications outlined above—as to why the listed items cannot be procured domestically, including the due diligence performed (e.g., market research, industry outreach, cost analysis, cost-benefit analysis) by the recipient to attempt to avoid the need for a waiver. This justification may cite, if applicable, the absence of any Buy America-compliant bids received for domestic products in response to a solicitation;
- A description of the market research conducted that includes who conducted the market research, when it was conducted, sources that were used, and the methods used to conduct the research; and Anticipated impact to the project if no waiver is issued.

APPENDIX D – DEFINITION OF TECHNOLOGY READINESS LEVELS

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

APPENDIX E – LIST OF ACRONYMS

AOI	Area of Interest
BIL	Bipartisan Infrastructure Law
BOED	Barrels of oil equivalent per day
CAA	Clean Air Act
CBOO	Community Benefits Objectives and Outcomes
CBP	Community Benefits Plan
CBR	Community Benefits Reporting
CETs	Critical and Emerging Technologies
CEJST	Climate and Economic Justice Screening Tool
CO_2e	CO_2 equivalent
COI	Conflict of Interest
DEC	Determination of Exceptional Circumstances
DEIA	Diversity, Equity, Inclusion, and Accessibility
DOE	Department of Energy
DOI	Digital Object Identifier
DOL	Department of Labor
DRE	Destruction removal efficiency
EIA	Energy Information Administration
EPA	Environmental Protection Agency
FAR	Federal Acquisition Regulation
FCOI	Financial Conflicts of Interest
FECM	Office of Fossil Energy Carbon Management
FFATA	Federal Funding and Transparency Act of 2006
FOA	Funding Opportunity Announcement
FOIA	Freedom of Information Act
FFRDC	Federally Funded Research and Development Center
GAAP	Generally Accepted Accounting Principles
GHG	Greenhouse Gas
GHGI	Inventory of U.S. Greenhouse Gas Emissions and Sinks
GHGRP	Greenhouse Gas Reporting Program
GWP	Global Warming Potential
HBCUs	Historically Black Colleges and Universities
IPMP	Intellectual Property Management Plan
IRA	Inflation Reduction Act
IRB	Institutional Review Board
LDAQ	Leak Detection and Quantification
LDAR	Leak Detection and Repair
MandO	Management and Operating
MCW	Marginal Conventional Well
MFA	Multi-Factor Authentication
MMT	Million Metric Tons
MPIN	Marketing Partner ID Number

MSI	Minority-Serving institution
MYPP	Multi-Year Program Plan
NDA	Non-Disclosure Acknowledgement
NEPA	National Environmental Policy Act
NETL	National Energy Technology Laboratory
NGL	Natural Gas Liquids
NNSA	National Nuclear Security Administration
NSF	National Science Foundation
OFCCP	Office of Federal Contractor Compliance Program
OIG	Office of Inspector General
OMB	Office of Management and Budget
OSS	Open-Source Software
OSTI	Office of Scientific and Technical Information
OTA	Other Transactions Authority
PII	Personal Identifiable Information
PMP	Project Management Plan
RDandD	Research, Development, and Demonstration
SAM	System for Award Management
SCI	Societal Considerations and Impacts
SciENcv	Science Experts Network Curriculum Vita
SMART	Specific, Measurable, Achievable, Relevant, and Timely
SOPO	Statement of Project Objectives
SPOC	Single Point of Contact
STEM	Science, Technology, Engineering, and Mathematics
TAA	Technical Assistance Agreement
TEA	Techno-Economic Analysis
TIA	Technology Investment Agreement
TMP	Technology Maturation Plan
TRL	Technology Readiness Level
UCC	Uniform Commercial Code
UNFCCC	United Nations Framework Convention on Climate Change
UEI	Unique Entity Identifier
VOC	Volatile Organic Compounds
VRU	Vapor recovery unit
WBS	Work Breakdown Structure
WP	Work Proposal

APPENDIX F – 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. 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 narrative).

Task 1.0 - Project Management and Planning

Task 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, 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 quarterly progress reports with emphasis placed on the medium- and high-risk items."

Task 1.2 Workforce Readiness Plan (**REQUIRED FOR AOI 2a, 2b, 2c, 3a, AND 3b ONLY**; APPLICANT INSERT THE LANGUAGE PROVIDED BELOW IN QUOTES)

"As successful technology commercialization and deployment requires a ready workforce, recipients of an award under this FOA will be required to complete a Workforce Readiness Plan as part of the project. A suggested template for this Plan is contained in Appendix G (of the FOA). The Plan must include: (i) a description of the occupations and necessary skills, certificates, certifications, or other educational attainment involved in the occupations related to this technology/activity (ii) a description of the availability and accessibility of training programs related to the technology and occupations, and current and projected future demand (iii) any ongoing or planned collaborations with education and training providers (iv) a discussion on the need for the creation of new workforce training programs if necessary to meet demand or to introduce new workforce skills for emerging technologies."

Task 1.3 Technology Maturation Plan (**REQUIRED FOR AOI 2a, 2b, AND 2c ONLY**; APPLICANT INSERT THE LANGUAGE PROVIDED BELOW IN QUOTES. REFERENCE APPENDIX H FOR FORMAT.)

"The Recipient shall develop a Technology Maturation Plan (TMP) that describes the current technology readiness level (TRL) of the proposed technology/technologies, relates the proposed project work to maturation of the proposed technology, describes the expected TRL at the end of the project, and describes any known post-project RandD necessary to further mature the technology. The initial TMP is due 90 days after award and should be updated as needed throughout the project period of performance. A final TMP should be submitted within 90 days of project completion. The TMP should be completed in accordance with the format provided in Appendix H of the FOA."
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 2.0 - Community Benefits (REQUIRED; APPLICANT INSERT THE LANGUAGE PROVIDED BELOW IN QUOTES AND CONTINUE TO COMPLETE)

"The Recipient is required to complete the commitments and milestones listed in the Community Benefits Outcomes and Objectives (CBOO) document, which is incorporated as an Attachment to this award.

The CBOO contains four actionable sections: Community and Labor Engagement; Investing in Quality Jobs; Diversity, Equity, Inclusion, and Accessibility; and Justice40 Initiative. This task includes all activities necessary to fulfill the commitments and milestones in the four actionable sections of the CBOO. Key milestones associated with the CBOO are incorporated into the milestone log as part of the overall Project Management Plan. The quarterly progress reports and the final technical report shall include updates on the progress and challenges throughout the course of the award as well as a tracking of funding spent on this task.

In addition, the Recipient will undergo an Assistance and Validation (AandV) process after selection, at an interim review, and toward the end of the project. AandV is a cooperative effort between the Recipient and the DOE team administering the award. Each AandV effort will require the Recipient Team and the DOE the discuss the activities, performance metrics, baseline, and targets of the CBOO and assess progress. Discussion will include opportunities for improvement. At the conclusion of each AandV effort, a report will be prepared with findings and recommendations and a summary of the report will be made public."

Task 3.0 - (Title)
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 3.1 - (Title)
Subtask descriptions should include a concise description of the work to be conducted for each subtask.

Subtask 3.2 - (Title)

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 NETL Project Manager (identified in Block 15 of the Assistance Agreement as the Program Manager)**."**

Task / Subtask Number	Deliverable Title	Due Date
1.1	Project Management Plan **(ALL AOIs)**	Update due 30 days after award. Revisions to the PMP shall be submitted as requested by the NETL Project Manager.
1.1	EDX Data Submission **(ALL AOIs)**	All data generated under the project must be submitted to EDX on an annual basis and at the end of the period of performance.
1.2	Workforce Readiness Plan **(AOI 2a, 2b, 2c, 3a, and 3b ONLY)**	A Workforce Readiness Plan is due 90 days after award and updates to may be submitted as needed throughout the period of performance.
1.3	Technology Maturation Plan **(AOI 2a, 2b, and 2c ONLY)**	A Technology Maturation Plan (TMP) is due 90 days after award and should be updated as needed throughout the project period of performance. A final TMP is due within 90 days of project completion.
X.X	Design and Implementation Plan **(AOI 1a, 1b, and 1c ONLY)**	A revised Design and Implementation Plan is due 60 days after award and must be finalized and approved by DOE prior to implementation. Updates to the Design and Implementation Plan may be submitted as needed throughout the period of performance but must be approved prior to implementation.
X.X	Annual Operating and Funds Distribution Plan **(AOI 1a, 1b, and 1c ONLY)**	An Annual Operating and Funds Distribution Plan is due 90 days after award and must be finalized and approved by DOE prior to implementation. Annual Operating and Funds Distribution Plans for subsequent years of the project must be submitted 90 days prior to the start of each project year and must be finalized and approved by DOE prior to implementation the following year.
X.X	*Continue with project specific deliverables…*	
X.X		
X.X		

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 NETL is also identified. For examples: Delivery to NETL 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 NETL Project Manager at their facility located in Pittsburgh, PA, Morgantown, WV, Albany, OR, or via WebEx. The Recipient shall make a presentation to the NETL 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 G – WORKFORCE READINESS PLAN TEMPLATE

This is a suggested format. If it makes sense for the Recipient to present the information in a different format, it may do so provided all content is covered.

Recipient Name:
PI Name:
Award Number:
Project Title:
Technology:

What are the occupations and necessary skills, certificates, certifications, or other educational attainment involved in the occupations related to this technology/activity?
Examples include applicable skills, apprenticeships, certificates, certifications, academic training or other programs available through in-house training or in coordination with education institutions such as community colleges, technical schools, universities, unions or other professional associations.

What is the availability and accessibility of training programs and current and projected future demand for these occupations?
Describe any training required to prepare the workforce needed to commercialize/deploy the technology and if there is availability of training and educational programs to fill current or projected activity / commercialization need as well as any projected future demand for training.

Describe how training strategies are connected to employment or foster opportunities for on-the-job training.

Does this activity have any ongoing or planned collaborations with education and training providers?
Describe how the Recipient plans to access any necessary training for its workforce, through coordination with educational institutions such as community colleges, technical schools, and universities, company-led, in-house training, union training, etc. Please identify any institutions with which working relationships exist.

Is there a need for the creation of a new workforce training program for this specific technology being developed to meet demand or to teach new skills necessary for emerging technologies?
This may include the creation of new apprenticeship, certificate, certifications, or other related training programs with educational training providers, like community colleges or universities or others. Ex. New welding techniques, skills necessary for advanced materials, increased demand for IT and coding skills, etc.

What proactive steps are planned to secure the necessary workforce?

Describe partnerships with workforce organizations, including labor unions, higher education institutions, technical schools, public workforce agencies, workforce intermediaries, and/or other workforce training providers to recruit and staff projects. Describe strategies to recruit and retrain skilled oil and gas workers. This may reference commitments in the Community Benefits Plan to ensure job quality, workforce continuity, health and safety, and recruiting and hiring plans to benefit local residents and residents from disadvantaged communities.

APPENDIX H – TECHNOLOGY MATURATION PLAN INSTRUCTIONS AND TEMPLATE

A technology maturation plan (TMP) is a planning tool that summarizes the necessary research and development (RandD) steps to advance the maturation of a specified technology to a targeted technology readiness level (TRL) and defines the key performance metrics that will be used to determine if the targeted TRL has been successfully achieved. A TMP also documents the current TRL of the specified technology, defines the ultimate commercial application of the technology, and conceptualizes a future commercialization pathway in terms of additional RandD, resources and schedule. A TMP is a high-level summary document. It is not a collection of detailed test plans.

The National Energy Technology Laboratory (NETL) uses TMPs to enhance its stewardship of RandD project portfolios and improve the value of the technologies it develops. TMPs help NETL to:

- *ensure that research questions are resolved in the least expensive and least risky RandD setting (i.e., scale, degree of integration, environment, fidelity)*
- *focus technology development on the performance metrics that are most important for technical and economic success (at component and system levels)*
- *identify RandD gaps and critical components that are lagging in maturity*
- *ensure that RandD projects address what is required for integration into higher-level systems*
- *make informed decisions at critical stages of research (e.g., moving a technology from a laboratory project to a larger-scale pilot project)*
- *improve the balance of project portfolios in terms of technology types, pathways, TRLs, redundancy, etc., to mitigate risks and increase the likelihood of RandD success, and*
- *forecast the cost and duration of technology development through demonstration and commercialization.*

The below template should be used to complete a TMP. Instructions, shown in italics, should be deleted/replaced in the completed TMP. Section 3 is provided solely for reference but should be retained as-is in the completed TMP.

TECHNOLOGY MATURATION PLAN
for *{insert project title}*
{Date Prepared}

SUBMITTED UNDER FUNDING OPPORTUNITY ANNOUNCEMENT

DE-FOA-#######

SUBMITTED BY

{Organization Name}
{Organization Address}
{City, State, Zip Code}

PRINCIPAL INVESTIGATOR

{Name}
{Phone Number}
{E-mail}

SUBMITTED TO

U.S. Department of Energy
National Energy Technology Laboratory

1.0 INTRODUCTION

1.1 Purpose of the Project

Provide a brief summary of the project's objectives as related to maturation of the proposed technology.

1.2 Technology Readiness Assessment System

Technology maturation is quantified by a performing a technology readiness assessment (TRA) on the specified technology system.

- *Identify the specified "TRA System" and describe all the critical components and/or subsystems that comprise it. See "TRA System" definition under Section 3.1.*
- *State whether the current project will test: (1) the total, integrated TRA System, or (2) one or more critical subsystems or components of the TRA System. If the latter, identify which critical subsystems and/or components will be tested.*

1.3 Commercial Application

Provide a one-paragraph description of the targeted commercial application(s) of the TRA System.

2.0 MATURATION OF THE TRA SYSTEM

2.1 Beginning Technology Readiness Level (TRL) of the TRA System

Briefly summarize the prior research that matured the technology to its current state.

Using the Technology Readiness Levels (TRL) descriptions in Sections 3.2 and 3.3, specify the current (i.e., pre-project) TRL of the TRA System. To attain a certain TRL, all aspects of the associated TRL description must be met.

Justify the specified TRL by explaining how all the required TRL aspects have been achieved.

2.2 Proposed Research to Mature the TRA System

Identify the TRL that the project plans to attain.

- *Note that the targeted TRL could be the same as the beginning TRL if the project is aimed at making only incremental progress toward achieving the next TRL.*
- *If the project proposes to advance the TRL by more than one level, explain if that will be accomplished in stages (i.e., first one TRL, then the next) or by skipping a TRL. If the latter, explain how any increased technical, cost and schedule risks associated with skipping a TRL will be mitigated.*

Identify each of the key performance attributes that will be assessed during the research along with the corresponding, quantifiable performance requirements that must be achieved to attain the targeted TRL(s). Explain how the key performance attributes were selected and how the corresponding requirements were determined. Be as specific as practical on any supporting technical/economic assessments (see Section 3.4 for NETL's Systems Analysis Best Practices). As a general principle, all key performance requirements that may be appropriately tested at a particular TRL must be substantially met, thereby supporting the feasibility of commercial success/goal achievement, prior to proceeding to the subsequent TRL.

Briefly summarize the proposed research steps and how they will mature the TRA System to the targeted TRL(s).

2.3 Potential Post-Project Maturation and Commercialization of the TRA System

Assuming the project successfully attains the targeted TRL(s), describe what additional (post-project) work would be required to mature the TRA System to the next TRL. Identify the key performance requirements and goals/measures that would need to be achieved. If possible, provide rough estimates of the cost and duration of the research required to attain the next TRL.

Describe your organization's potential role in a commercialization strategy for the TRA system.

3.0 REFERENCE MATERIAL

3.1 Definition of TRA System

NETL's interpretation (Section 3.2) of the DOE TRL definitions (Section 3.3) is based on a view of technology maturation in which "components" are integrated into a "system" that is being assessed for its technology readiness. To clearly and consistently apply the DOE TRL definitions, one must first precisely identify what "system" is being assessed, defined herein as the "Technology Readiness Assessment (TRA) System." Since most technologies can be viewed as subsystems within larger systems, multiple choices are available for defining the TRA System. However, note that the choice of the "level" of the TRA System affects how TRLs are assessed:

- A TRL 3 is achieved for the specified TRA System when analytical performance predictions for each of the TRA System's critical[71] components have been validated in separate experiments (i.e., without integration across components).
  Accordingly, the table in Section 3.2 shows the required scope of TRL 3 as "single component" and the required integration of TRL 3 as "none."

[71] A component or subsystem of a TRA System is considered critical if it is new, novel, and necessary for the TRA System to meet its anticipated operational performance requirements or poses major cost, schedule, or performance risk during design or demonstration. Note that a component that is fully mature and non-critical for an established application or operational environment may be considered critical if it is incorporated into a new application or operational environment.

- A TRL 4 or 5 is achieved for a given TRA System when the targeted performance requirements for each of its critical, multi-component subsystems (or the entire TRA system) have been validated in a laboratory environment (TRL 4) or relevant environment (TRL 5) with integration of some or all components.
- Achieving TRLs 6 to 9 requires testing of the entire, fully integrated, TRL system.

To further clarify, consider, for example, a fuel cell stack. Its critical components are multiple, identical fuel cells. In turn, the critical components of each fuel cell are an anode, cathode and electrolyte. If one wished to assess the technology readiness of the fuel cell stack, the TRA System would be defined as an integrated system of multiple fuel cell subsystems, and a TRL 6 could only be achieved by successfully testing an entire stack of integrated fuel cells. However, if one instead wished to assess the technology readiness of only the fuel cell, the TRA System would be defined as an integrated system of cathode, anode and electrolyte components, and a TRL 6 could be achieved by successfully testing just a single, integrated fuel cell. In both cases, achievement of TRL 6 could be claimed, but only in the context of the properly specified TRA System.

APPENDIX I – PROJECT MANAGEMENT PLAN TEMPLATE

REMINDER: APPLICANTS SHOULD DOUBLE SPACE THE PROJECT MANAGEMENT PLAN IN ACCORDANCE WITH THE FORM AND CONTENT REQUIREMENTS IN SECTION IV, "APPLICATION AND SUBMISSION INFORMATION AND REMOVE THIS BLOCK PRIOR TO SUBMISSION.

The Applicant's Project Management Plan (PMP) is an approved document that defines how the Applicant will execute, monitor, and control the project to accomplish the objectives. The specific contents, level of detail, and inclusion of subsidiary planning documents are tailored according to the needs of the project. Consequently, every PMP will be different based on the risk, visibility, and/or complexity of the project and the Recipient's established processes, procedures, and systems.

Title Page:

PROJECT MANAGEMENT PLAN

{Insert Project Title}

{Date Prepared}

SUBMITTED BY
{Organization Name}
{Organization Address}
{City, State, Zip Code}

PRINCIPAL INVESTIGATOR
{Name}
{Phone Number}
{E-mail}

SUBMITTED TO
U.S. Department of Energy
National Energy Technology Laboratory

This plan should be formatted to include the following sections with each section to include the information as described below:

A. Executive Summary:

Provide a description of the project that includes the objective, project goals, and expected results. For purposes of the application, this information is included in the Project Narrative and

should be simply copied to this document for completeness, so that the Project Management Plan is a stand-alone document.

B. Project Organization and Structure:

Provide the following information in this section:

- Organizational Chart(s): Include a complete project organizational chart and sub-organization charts (if applicable), accompanied by a discussion of how the organizational structure will facilitate the performance of the Tasks and achievement of the objectives described in the SOPO within the time frame specified in the application.
- Roles and Responsibilities of Participants: Provide a discussion of key project team members, and the capacity in which each team member will assist in achieving the overall objective(s) of the proposed project. For multi-organizational or multi-investigator projects, describe the roles to be performed by each participant/investigator within the context of the Task/subtask structure contained in the SOPO. Include descriptions of any business agreements or intellectual property issues between the applicant and other members of the project team, and how these agreements will be integrated and managed.
- Decision-making and Communication Strategy: Provide a discussion of how communication and decision-making will occur within the context of the organizational structure, with particular emphasis on scientific/technical direction and mechanisms for controlling project scope, cost, and schedule. Include a discussion of how the project team will communicate with DOE and external stakeholders during the performance of the project.
- Management Capabilities: Provide information relevant to the capabilities and experience of the PI and key project team members in managing technical projects of similar nature and complexity. If applicable, include examples that demonstrate the ability to successfully meet research objectives within scope, budget and schedule.

C. Risk Management Plan:

Provide a summary description of the proposed approach to identify, analyze, and respond to perceived risks associated with the proposed project. Project risk events are uncertain future events that, if realized, impact the success of the project. Risk is inherent to all projects regardless of complexity, cost, or visibility. An effective Risk Management Plan will identify perceived risks and explain mitigation strategies for each risk. At a minimum, the Risk Management Plan shall include the initial identification of significant financial, cost/schedule, technical/scope, management, planning and oversight, ESandH, external factors, and management issues that have the potential to impede project progress and strategies to minimize impacts from those issues.

The following table format is provided but is not required:

Perceived Risks and Mitigation Strategies

Perceived Risk	Risk Rating			Mitigation/Response Strategy
	Probability (Low, Med, High)	Impact	Overall	
Financial Risks:				
Cost/Schedule Risks:				
Technical/Scope Risks:				
Management, Planning, and Oversight Risks:				
ESandH Risks:				
External Factor Risks:				

D. Milestone Log:

Provide milestones for each budget period of the project. Each milestone should be linked to a specific Task or Subtask and include a title, planned completion date, and a description of the method/process/measure used to verify completion. Milestones should be quantitative and show progress toward budget period and/or project goals. Conversely, periodic, mandatory progress reports are not considered to be Milestones.

Milestones are presumed to lie on the critical path of the project, i.e., unless all milestones are achieved, the Objectives as defined in the SOPO cannot be met completely. Applicants must provide at least two milestones per year throughout the course of the project.

Milestone Format

Task/ Subtask	Milestone Title and Description	Planned Completion Date	Verification method

[Note: During project performance, the Recipient will report the Milestone Status as part of the required quarterly progress report as prescribed under the Federal Assistance Reporting Checklist. The Milestone Status will present actual performance in comparison with Planned Milestones, and include:

(1) the actual status and progress of the project,

(2) specific progress made toward achieving the project's milestones, and,

(3) any proposed changes in the project's schedule required to complete milestones.]

E. Costing Profile:

Provide a table (the Spend Plan) that projects the expenditures of government funds by fiscal year for each project team member.

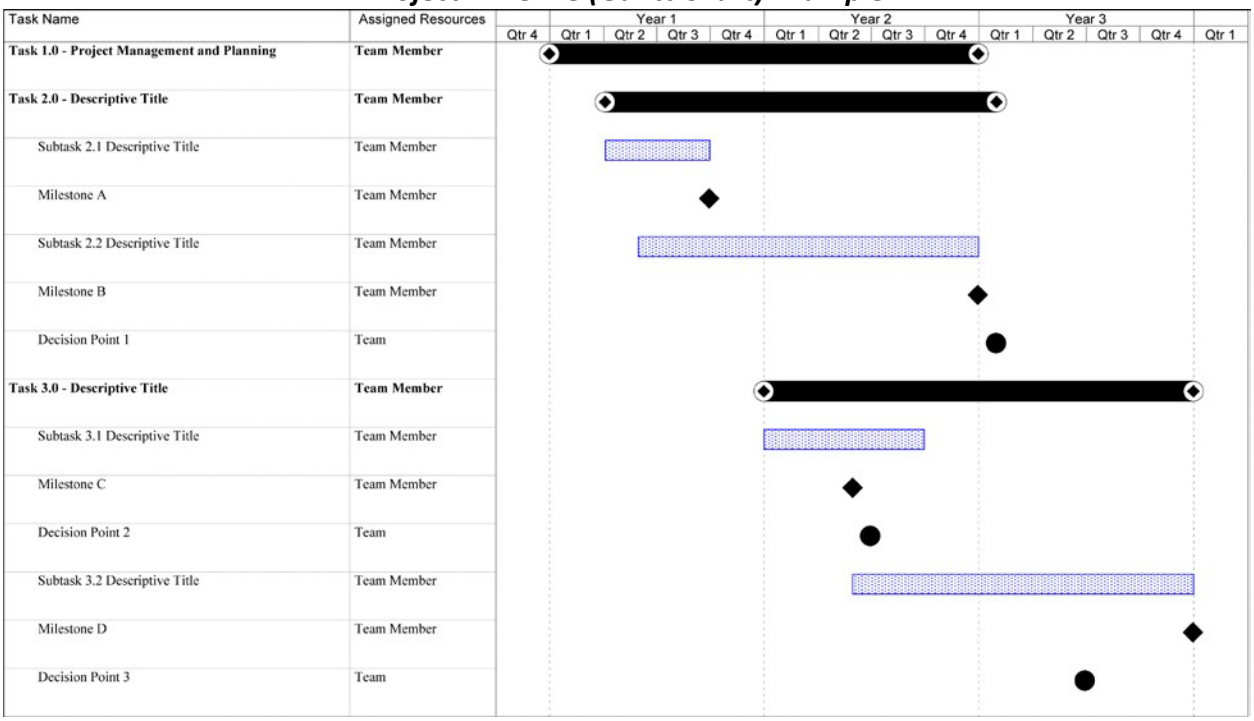
Spend Plan by Fiscal Year Format

	FY 20XX		FY 20XX		FY 20XX		FY 20XX		Total	
	DOE Funds	Cost Share	DOE Funds	Cost Share	DOE Funds	Cost Share	DOE Funds	Cost Share	DOE Funds	Cost Share
Applicant										
Subrecipient A, if proposed										
Subrecipient B, if proposed										
FFRDC/NL, if proposed										
Total ($)										
Total Cost Share %										

F. Project Timeline:

Provide a timeline of the project (similar to a Gantt chart) broken down by each task and subtask, as described in the Statement of Project Objectives. The timeline should include for each task, a start date, and end date. The timeline should show interdependencies between tasks and include the milestones that are identified in the Milestone Log (Section C).

Project Timeline (Gantt Chart) Example



G. Success Criteria:

Success criteria are used by the DOE to determine if specific goals and objectives were met at the end of budget period(s), go/no-go decision points, and/or project completion. The success criteria should be objective and stated in terms of specific, measurable, and repeatable data. Usually, the success criteria pertain to desirable outcomes, results, and observations from the project.

[Note: As the first task in the Statement of Project Objectives, successful applicants will revise the version of the Project Management Plan that is submitted with their applications by including details from the negotiation process. This Project Management Plan will be updated by the Recipient as the project progresses, and the Recipient must use this plan to report scope, schedule, and budget variances.]