

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

Low Greenhouse Gas (GHG) Vehicle Technologies
Research, Development, Demonstration and Deployment

Funding Opportunity Announcement (FOA) Number: DE-FOA-0002475

FOA Type: Amendment 000002

CFDA Number: 81.086

FOA Issue Date:	04/15/2021
Submission Deadline for Concept Papers:	05/13/2021 5:00pm ET
Anticipated Date of Concept Paper Notification	06/07/2021
Submission Deadline for Full Applications:	07/12/2021 5:00pm ET
Expected Date for EERE Selection Notifications:	October 2021
Expected Timeframe for Award Negotiations:	October 2021 - December 2021

- Applicants must submit a Concept Paper by 5:00pm ET on the due date listed above to be eligible to submit a full application.
- To apply to this FOA, applicants must register with and submit application materials through EERE Exchange at <https://eere-Exchange.energy.gov>, EERE's online application portal.
- Applicants must designate primary and backup points-of-contact in the EERE Exchange with whom EERE will communicate to conduct award negotiations. If an application is selected for award negotiations, it is not a commitment to issue an award. It is imperative that the applicant/selectee be responsive during award negotiations and meet negotiation deadlines. Failure to do so may result in cancelation of further award negotiations and rescission of the selection.
- Applicants must review Section III. A. for specific eligibility requirements.

Questions about this FOA? Submit your questions to DE-FOA-0002475@netl.doe.gov.
Problems with EERE Exchange? Email EERE - EERE-ExchangeSupport@hq.doe.gov. Include FOA name and number in subject line.

AMENDMENTS

All changes to the Funding Opportunity Announcement as a result of this amendment are highlighted in yellow.

Amendment No.	Date	Description of Amendment
000001	04/29/2021	The purpose of this amendment is to a) provide minor clarifications to Topic Area 1 and 3; b) revise Section I.C. Applications Specifically Not of Interest for Topic Area 2; c) update Section III.B. Cost Sharing, to provide additional cost share guidance; d) revise Section IV.D, Content and Form of the Full Application, to add a required Location of Work component; and e) revise the technical review criteria for Topic Area 3 (Section V.A.).
000002	06/28/2021	The purpose of this amendment is to incorporate "Appendix G -- 2021 DOE EERE Funding Opportunity Announcement (FOA) Applicant Diversity Equity and Inclusion (DEI) Supplement." Please see pages 116 and 117.

NOTE: REGISTRATION/SUBMISSION REQUIREMENTS

Registration Requirements

There are several one-time actions you must complete in order to submit an application in response to this FOA (e.g., obtain a Dun and Bradstreet Data Universal Numbering System (DUNS) number, register with the System for Award Management (SAM), and register with EERE EXCHANGE.gov). Applicants who are not registered with SAM and Grants.gov, should start the process as soon as possible.

Applicants must register through the EERE EXCHANGE.

EERE EXCHANGE website: <https://eere-exchange.energy.gov/>

Applicants must obtain a DUNS number.

DUNS website: <http://fedgov.dnb.com/webform>

Applicants must register with the System for Award Management (SAM).

SAM website: <http://www.sam.gov/>

If you had an active registration in CCR, you should have an active registration in SAM. More information about SAM registration for applicants is found at:

[https://www.sam.gov/SAM/transcript/Quick Guide for Grants Registrations.pdf](https://www.sam.gov/SAM/transcript/Quick%20Guide%20for%20Grants%20Registrations.pdf)

(Please note: the SAM links will not work on any Internet Explorer (IE) Versions older than IE11. Use an upgraded version of IE or another supported browser type (e.g., Chrome or Firefox) to access these SAM links).

Applicants must register with Grants.gov.

Grants.gov website: <http://grants.gov/>

Applicants must register with Grants.gov in order to receive automatic updates, in the event that amendments to this FOA are posted. However, please note that applications will not be accepted through Grants.gov.

Applicants must register with FedConnect.

FedConnect website: <http://www.fedconnect.net/>

In the event that an application is selected for negotiation of award, applicants must be registered with FedConnect to receive the award. For more information regarding registration with FedConnect review the FedConnect Ready, Set, Go! Guide at:

[https://www.fedconnect.net/FedConnect/Marketing/Documents/FedConnect Ready Set Go.pdf](https://www.fedconnect.net/FedConnect/Marketing/Documents/FedConnect%20Ready%20Set%20Go.pdf).

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Problems with EERE Exchange? Email EERE - EERE-ExchangeSupport@hq.doe.gov. Include FOA name and number in subject line.

Submission Requirements

All application submissions are to be made via the EERE EXCHANGE at: <https://eere-exchange.energy.gov/>. To gain access to the EERE EXCHANGE system, the applicant must first register and create an account on the main EERE EXCHANGE site. This account will then allow the user to submit an application for open EERE FOAs that are currently in EERE Exchange. It is recommended that each organization or business unit, whether acting as a team or a single entity, utilize one account as the appropriate contact information for each submission.

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

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

Questions

Questions related to the use of the EERE EXCHANGE website or technical issues concerning the application submittal should be submitted to: EERE-ExchangeSupport@hq.doe.gov.

Questions related to the content of the FOA must be submitted to DE-FOA-0002475@netl.doe.gov and shall be submitted no later than three business days before the full applications are due. Questions submitted after that date may not allow the Government sufficient time to respond.

All questions and answers related to the content of this FOA will be posted at <https://eere-exchange.energy.gov/FAQ.aspx>. Applicants are encouraged to check the FAQ prior to submitting a question. DOE will try to respond to questions within 5 business days. Applicants are encouraged to review the posted questions and answers daily. **Please note that you must first select this FOA number in order to view the questions and answers specific to this FOA.**

*Questions about this FOA? Submit your questions to DE-FOA-0002475@netl.doe.gov.
Problems with EERE Exchange? Email EERE - EERE-ExchangeSupport@hq.doe.gov. Include FOA name and number in subject line.*

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I. Funding Opportunity Description

A. Background and Context

The Office of Energy Efficiency and Renewable Energy (EERE), on behalf of the Vehicle Technologies Office (VTO), is issuing a Funding Opportunity Announcement (FOA) entitled, “Low GHG Vehicle Technologies Research, Development, Demonstration and Deployment Funding Opportunity Announcement.” The activities supported by this FOA are authorized under the Energy Policy Act of 2005 (EPACT 2005) Public Law 109-58, TITLE IX - Energy Efficiency, Section 911. These provisions are found in the United States Code at 42 U.S.C. § 16191. Additional authorities include the following;

- Title VII, Subtitles B, C, D of EPACT 2005 (42 U.S.C. §§ 16061-16093)
- Sections 131-136 of EISA 2007 (42 U.S.C. §§ 17011-17013)
- Title VI, Subtitle A of EPACT 1992 (42 U.S.C. §§ 13281-13286) (Electric vehicle demonstration)
- Title VI, Section B of EPACT 1992 (42 U.S.C. §§ 13291-13296) (Electric vehicle infrastructure)

i. Background and Purpose

Building a clean energy economy and addressing the climate crisis is a top priority of the Biden Administration. This FOA will advance the Biden Administration’s goals to achieve carbon pollution-free electricity by 2035 and “deliver an equitable, clean energy future, and put the United States on a path to achieve net-zero emissions, economy-wide, by no later than 2050”¹ to the benefit of all Americans. The Department of Energy is committed to pushing the frontiers of science and engineering, catalyzing clean energy jobs through research, development, demonstration, and deployment (RDD&D), and ensuring environmental justice and inclusion of disadvantaged communities.

The RDD&D activities to be funded under this FOA will support the government-wide approach to the climate crisis by driving the innovation in the transportation sector that can lead to the deployment of clean energy technologies, which are critical for climate protection. The transportation sector accounts for approximately 30% of total U.S. energy needs² and is the largest source of greenhouse gas (GHG) emissions in the energy sector. The average U.S. household spends over 15% of its total family expenditures on transportation³, making it the most expensive spending category after housing. This can be up to

¹ Executive Order 14008, “Tackling the Climate Crisis at Home and Abroad,” January 27, 2021.

² Transportation Energy Data Book Edition 37, ORNL, Table 2.1 U.S. Consumption of Total Energy by End-Use Sector

³ Transportation Energy Data Book Edition 37, ORNL, Table 10.1.

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30% for lower income households. Transportation is also critical to the overall economy, from the movement of goods to providing access to jobs, education and healthcare.

Providing better and cleaner mobility options that are affordable for all Americans is the core objective of the Vehicle Technologies Office (VTO). Specifically, this FOA is seeking innovative solutions for on-road and off-road vehicles to develop and accelerate the charging infrastructure and drastically-reduced GHG emissions in support of Administration goals. In partnership with industry, VTO has established aggressive targets to focus research, demonstration and deployment on cost-reduction, efficiency, and emissions reduction that improve air quality and improved mobility.

The FOA seeks projects across the following areas: electric vehicle community partner demonstration projects; electric vehicle workplace charging projects; RDD&D of technologies to reduce the cost of EV chargers, advanced engines and fuels that reduce emissions, including natural gas, propane, and dimethyl ether; and, innovative solutions for medium/heavy duty on- and off-road vehicles including electrification and high-power charging. Detailed technical descriptions of the specific areas of interest (AOI) are provided in the sections that follow.

ii. Technology Space and Strategic Goals

This funding opportunity announcement (FOA) seeks research projects to address priorities in the following areas: vehicle electrification; technology integration including EV community partner projects and workplace charging; energy-efficient commercial off-road vehicle technologies; and advanced engine and fuel technologies to improve fuel economy and reduce GHG emissions. Detailed technical descriptions of the specific topics are provided in the sections that follow.

iii. Diversity, Equity and Inclusion

It is the policy of the Biden Administration that:

[T]he Federal Government should pursue a comprehensive approach to advancing equity⁴ for all, including people of color

⁴ The term “equity” means the consistent and systematic fair, just, and impartial treatment of all individuals, including individuals who belong to underserved communities that have been denied such treatment, such as 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+)

and others who have been historically underserved, marginalized, and adversely affected by persistent poverty and inequality. Affirmatively advancing equity, civil rights, racial justice, and equal opportunity is the responsibility of the whole of our Government. Because advancing equity requires a systematic approach to embedding fairness in decision-making processes, executive departments and agencies (agencies) must recognize and work to redress inequities in their policies and programs that serve as barriers to equal opportunity.

By advancing equity across the Federal Government, we can create opportunities for the improvement of communities that have been historically underserved, which benefits everyone.⁵

As part of this whole of government approach, this FOA seeks to encourage the participation of underserved communities⁶ and underrepresented groups. Applicants are highly encouraged to include individuals from groups historically underrepresented^{7,8} in STEM on their project teams. As part of the application,

persons; persons with disabilities; persons who live in rural areas; and persons otherwise adversely affected by persistent poverty or inequality.

⁵ Executive Order 13985, “Advancing Racial Equity and Support for Underserved Communities Through the Federal Government” (Jan. 20, 2021).

⁶ The term “underserved communities” refers to populations sharing a particular characteristic, as well as geographic communities, that have been systematically denied a full opportunity to participate in aspects of economic, social, and civic life, as exemplified by the list of in the definition of “equity.” E.O. 13985. For purposes of this FOA, as applicable to geographic communities, applicants can refer to economically distressed communities identified by the Internal Revenue Service as Qualified Opportunity Zones; communities identified as disadvantaged or underserved communities by their respective States; communities identified on the Index of Deep Disadvantage referenced at <https://news.umich.edu/new-index-ranks-americas-100-most-disadvantaged-communities/>, and communities that otherwise meet the definition of “underserved communities” stated above.

⁷ According to the National Science Foundation’s 2019 report titled, “Women, Minorities and Persons with Disabilities in Science and Engineering”, women, persons with disabilities, and underrepresented minority groups—blacks or African Americans, Hispanics or Latinos, and American Indians or Alaska Natives—are vastly underrepresented in the STEM (science, technology, engineering and math) fields that drive the energy sector. That is, their representation in STEM education and STEM employment is smaller than their representation in the U.S. population. <https://nces.nsf.gov/pubs/nsf19304/digest/about-this-report> For example, in the U.S., Hispanics, African Americans and American Indians or Alaska Natives make up 24 percent of the overall workforce, yet only account for 9 percent of the country’s science and engineering workforce. DOE seeks to inspire underrepresented Americans to pursue careers in energy and support their advancement into leadership positions.

<https://www.energy.gov/articles/introducing-minorities-energy-initiative>

⁸ See also. Note that Congress recognized in section 305 of the American Innovation and Competitiveness Act of 2017, Public Law 114-329:

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applicants are required to describe how diversity, equity, and inclusion objectives will be incorporated in the project. Specifically, applicants are required to submit a Diversity, Equity, and Inclusion Plan that describes the actions the applicant will take to foster a welcoming and inclusive environment, support people from underrepresented groups in STEM, advance equity, and encourage the inclusion of individuals from these groups in the project; and the extent the project activities will be located in or benefit underserved communities. (See Section IV.D.xvi). The plan should include SMART (Specific, Measurable, Assignable, Realistic and Time-Related) milestones supported by metrics to measure the success of the proposed actions. This plan will be evaluated as part of the technical review process.

Further, Minority Serving Institutions⁹, Minority Business Enterprises, Minority Owned Businesses, Woman Owned Businesses, Veteran Owned Businesses, or entities located in a underserved community that meet the eligibility requirements (See Section III) are encouraged to apply as the prime applicant or participate on an application as a proposed partner to the prime applicant. The Selection Official may consider the inclusion of these types of entities as part of the selection decision (See Section V.C.i.).

(1) [I]t is critical to our Nation's economic leadership and global competitiveness that the United States educate, train, and retain more scientists, engineers, and computer scientists; (2) there is currently a disconnect between the availability of and growing demand for STEM-skilled workers; (3) historically, underrepresented populations are the largest untapped STEM talent pools in the United States; and (4) given the shifting demographic landscape, the United States should encourage full participation of individuals from underrepresented populations in STEM fields.

⁹ Minority Serving Institutions (MSIs), including Historically Black Colleges and Universities/Other Minority Institutions) as educational entities recognized by the Office of Civil Rights (OCR), U.S. Department of Education, and identified on the OCR's Department of Education U.S. accredited postsecondary minorities' institution list. See <https://www2.ed.gov/about/offices/list/ocr/edlite-minorityinst.html>.

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B. Topic Areas

<u>Topic Area Number</u>	<u>Title</u>
Electrification	
1	Electric Vehicle Charging Community Partner Projects
2	Electric Vehicle Workplace Charging
3	Reducing the Cost of DC Fast Charging Equipment
Off-Road Technologies	
4a	Research to Transform the Efficiency of Off-Road Vehicles
4b	Electrified Construction Vehicle Research, Development, and Validation
Fuels Research	
5	Natural Gas Engine Enabling Technologies
6	Dimethyl Ether and Propane Engine Enabling Technologies
Advanced Combustion Engine R&D	
7	Integrated Hybrid System with Opposed Piston 2-Stroke
Technology Integration	
8	Natural Gas Vehicle Technology Proof of Concept

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Topic Area 1: Electric Vehicle Charging Community Partner Projects

Introduction

DOE's Technology Integration (TI) Program, including its Clean Cities activities, has encouraged robust local and regional partnerships to ease barriers and promote the use of new transportation technologies for over 27 years. The program has provided substantial air quality and fuel efficiency improvements through introducing alternative fuel vehicle technology to many communities. These efforts have laid the groundwork for the rapid growth that is occurring in clean vehicle technology, especially focused around electric vehicles. To support this growth opportunity, new demonstration and deployment work is needed. Today, there are still barriers to light-, medium-, and heavy-duty plug-in electric vehicle (PEV) deployment, especially in underserved communities (e.g., low-income, rural, and demographics that currently have minimal access to PEVs). Lack of charging infrastructure, PEV cost parity with conventional vehicles, education, and workforce training impede widespread PEV adoption.

This topic area will invest in equitable access to clean and affordable transportation by expanding electrified transportation in underserved communities. These projects will contribute to a clean energy economy by targeting communities that have minimal access to PEVs, are disproportionately affected by transportation emissions, and experience elevated transportation expenses. Improving equitable access to the benefits of electrified transportation must take into consideration PEVs and charging infrastructure availability for mobility choices such as personal vehicle ownership, car sharing, ride sharing, school transport, and transit. Additionally, fleet operations such as the movement of freight, can have disproportionately high and adverse human health, environmental, climate-related and other cumulative impacts on historically marginalized and overburdened communities.

This topic will accelerate the adoption of commercially available PEVs and supporting infrastructure through community-based public-private partnerships prioritizing underserved communities. Projects will deploy PEV technologies and charging infrastructure in various applications and share resulting data, lessons learned, and best practices to a broader audience. The projects will improve adoption of light-, medium-, and heavy-duty PEVs and access to community charging infrastructure including Level 2 and DC fast charging (DCFC) through infrastructure development, PEV deployment, education, and outreach.

Objective

The objective of this topic area is to encourage strong local and/or regional partnerships to create an enduring local ecosystem to support increased

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consumer and business PEV use. Projects are encouraged to demonstrate various PEV applications by concentrating multiple sub-projects in a region or geographic area. Projects for consumers in underserved communities are a high priority. DOE is looking for projects that demonstrate efficient investment and use of charging infrastructure such as innovative charging technology for various settings (e.g., multi-family housing, car sharing, ride hailing, goods delivery). In the medium- and heavy-duty sectors, projects will demonstrate smart charging and business models that improve costs and efficiency for the acquisition and operation of new vehicle models for local governments, utilities, transit, schools, ports, and goods movement.

Project approach **must** include both:

1. PEVs and charging infrastructure in underserved communities (e.g., low-income, rural, and demographics that currently have minimal access to PEVs).
2. Multi-family housing **and/or** curbside charging providing PEV charging opportunities for residents without access to dedicated off-street parking.

Project approach may also include approaches including but not limited to:

1. Electrification of on-road and off-road vehicles at ports and airports and supporting infrastructure.
2. Electrification of public and/or private transit and paratransit buses and supporting infrastructure.
3. Multi-modal electrified transportation hubs.
4. Electrification of ride hailing vehicles, taxis, car sharing and/or rental vehicles.
5. Electric vehicle corridor development with DCFC.
6. Electrification of freight vehicles and infrastructure.
7. Charging co-located with retail, medical clinics, hospitals and/or other businesses or government entities (e.g., museums, DMVs) where PEV drivers may have extended dwell times.
8. Destination charging and electric transportation services to recreation facilities and other attractions that attract a large number of visitors (e.g., parks, forests, wildlife refuges, historical sites).
9. Outreach, education, and workforce training (e.g., driver, technician, first responder) efforts encouraging PEV adoption.

General Requirements

Applications **must** include:

1. A Project Overview which includes:
 - A description of the planned geography of the proposed project and an assessment of the current PEV market in that geographic area.

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2. A Technical Description which includes:
 - The project's methodology for strategic deployment of PEVs and charging stations, including commitments from vehicle owners and charging host partners, if available.
 - A description of the commercially-available light-, medium-, and/or heavy-duty PEV technologies to be demonstrated; including the number of vehicles.
 - An assessment of how the project will improve the underserved communities' access to PEVs.
 3. A Market Transformation Plan which details how the team will:
 - A discussion of how the project will impact broader PEV technology adoption and how the technologies may reduce costs for end users.
 - Broadly disseminate project approach and learnings throughout the project period (e.g., project website, webinar describing project approach, outreach through the Clean Cities coalition network).
 - Communicate best practices for how to replicate project successes in other communities (e.g., case studies to serve as templates, webinar describing recommendations for similar initiatives).
 - Continue related activities beyond project completion and gaining future commitments.
 4. A Workplan which includes:
 - A timeline for completion of charging station installations and deployment of PEVs.
 - A presentation of project progress and results at the Annual Merit Review held in Washington DC with timing as directed by DOE.
 5. A Data Management Plan which addresses:
 - The collection of data from project related infrastructure (e.g., equipment description, charging session data, cost/revenue, and maintenance).
 - The collection of data from project related vehicles (e.g., vehicle description, operation, cost, and maintenance).
 - Analyses to be performed on vehicle and charging infrastructure operations and costs during the length of the project.
 - The terms and conditions for data use, privacy and security provisions, public dissemination, and all limitations on public dissemination.
 - The methodology to provide all project-related, nonproprietary data to a designated DOE National Laboratory.

Specific Requirements

Vehicles:

1. PEVs include plug-in hybrid electric vehicles and all-electric vehicles.

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2. PEVs must be used 100% for the project scope.
 3. Vehicles must be new, original equipment manufacturer (OEM) factory-produced.
 4. All vehicles with applicable emissions standards established by the U.S. Environmental Protection Agency (EPA) and/or the California Air Resources Board must be certified under such standards.
 5. For vehicle leases, the monthly commercial vehicle lease price should be used to determine project costs.

Infrastructure:

1. Electric Vehicle Supply Equipment (EVSE) must be Level 2 or DCFC and must include only new charging systems that are located at new sites or added to existing charging sites.

Teaming Arrangements

1. Applicants are strongly encouraged to include active participation by at least one designated/active Clean Cities coalition with clearly documented roles, responsibilities, and budgets (coalition locations are available at <https://cleancities.energy.gov/coalitions/>).
2. Applicants are encouraged to include strategic partners such as utilities and other electricity suppliers; community-based groups or local/regional governments; charging station hosts; auto, truck and equipment dealerships; retailers; public or private fleets; and charging equipment installers, dealers, and manufacturers.

Other Considerations

1. To the greatest extent possible, projects should leverage ongoing, or propose new, smart mobility or smart cities initiatives.
2. All awarded projects must collect real-world data from demonstrations to enable DOE to evaluate how to scale those demonstrations to the next level. The extent and limitations on project-related, nonproprietary data is dependent upon each specific project scenario and purpose.

Applications Discouraged

See Section I.C. Applications Specifically Not of Interest.

Special Deliverables

1. Recipients **must** provide all project-related, nonproprietary data to a to-be-designated DOE national laboratory.
2. Recipients **must** provide a final analysis of vehicle and charging infrastructure operations and costs that span the entire project.

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3. Recipients **must** provide an outreach plan for broadly disseminating the project approach and learnings during the project period and at the conclusion of the project such that other communities can replicate project successes.

Topic Area 2: Electric Vehicle Workplace Charging**Introduction**

DOE's Technology Integration (TI) Program, including its Clean Cities activities, has encouraged robust local and regional partnerships to ease barriers and promote the use of new transportation technologies for over 27 years. The program has provided substantial air quality and fuel efficiency improvements through introducing alternative fuel vehicle technology to many communities. These efforts have laid the groundwork for the rapid growth that is occurring in clean vehicle technology, especially focused around electric vehicles. To support this growth opportunity, new demonstration and deployment work is needed. Plug-in electric vehicles (PEVs) made up about 2% of the total light-duty vehicle market in the U.S. in 2020.¹⁰ The light-duty vehicle PEV market needs to grow to achieve the goal of net-zero carbon emissions by 2050. While most current PEV drivers do more than 80% of their charging at home¹¹, many drivers do not have dedicated off-road parking that can be used for home charging. Lack of access to charging infrastructure is a major barrier to advancing PEV adoption, especially for underserved communities without home charging options. In 2018, 85.5% of workers drove a private vehicle to work.¹² Employers can increase the convenience and affordability of driving electric for their employees by offering at-work charging stations available for employees to charge personal-use PEVs (workplace charging). Workplace charging can also help attract and retain a cutting-edge workforce and demonstrate leadership in adopting advanced technologies. This topic area will invest in a national workplace charging program that encourages wide-scale investment in PEV charging infrastructure used for workplace charging.

Objective

The objective of this area of interest is to develop a nationwide workplace charging program that enables a large scale increase in workplace charging through employer education and outreach; technical and policy assistance for assessing the demand for, installing, and managing workplace charging; a nationwide employee recognition program for offering workplace charging; and resources to assist employees in advocating for workplace charging. DOE seeks a nationwide workplace charging program that spurs significant private-sector investment in offering Level 1, Level 2, and/or DC fast charging for employees to charge personal-use PEVs at their place of employment and implementing policies to engage employees and other stakeholders.

¹⁰ <https://www.anl.gov/es/light-duty-electric-drive-vehicles-monthly-sales-updates>

¹¹ <https://www.energy.gov/eere/electricvehicles/charging-home>

¹² https://tedb.ornl.gov/wp-content/uploads/2021/02/TEDB_Ed_39.pdf#page=250

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General Requirements

Applications **must** include:

1. A Technical Description which includes:
 - The project's methodology for enlisting employer commitments to install workplace charging and providing technical assistance for implementing workplace charging commitments.
2. A Market Transformation Plan which details how the team will:
 - Broadly disseminate the project approach and learnings throughout the project period (e.g., project website, webinar describing project approach, outreach through the Clean Cities coalition network).
 - Communicate best practices for how to replicate project successes in other communities (e.g., case studies to serve as templates, webinar describing recommendations for similar initiatives).
 - Continue related activities beyond project completion and gaining future commitments.
3. A Workplan which includes:
 - A presentation of project progress and results at the Annual Merit Review held in Washington DC with timing as directed by DOE.
4. A Data Management Plan which addresses:
 - The collection of data from willing workplace charging partners including EV charging stations data (e.g., equipment description, charging session data, cost/revenue, and maintenance) and participant feedback. The terms and conditions for data use, privacy and security provisions, public dissemination, and all limitations on public dissemination.
 - The methodology to provide all project-related, nonproprietary data to a designated DOE National Laboratory.

Projects are encouraged to utilize existing workplace charging best practices, lessons learned, tools, and templates such as those available on the Alternative Fuel Data Center.

Specific Requirements

None.

Teaming Arrangements

1. Applicants are strongly encouraged to include active participation by a consortium of multiple designated/active Clean Cities coalition with clearly documented roles, responsibilities, and budgets (coalition locations are available at <https://cleancities.energy.gov/coalitions/>).

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2. Applicants are encouraged to include strategic partners such as employers committed to installing workplace charging; utilities and other electricity suppliers; community-based groups or local/regional governments; and charging equipment installers, dealers, and manufacturers.

Other Considerations

None.

Applications Discouraged

See Section I.C. Applications Specifically Not of Interest.

Special Deliverables

1. Recipients **must** provide an outreach plan for broadly disseminating the project approach and learnings during the project period and at the conclusion of the project such that other communities can replicate project successes.

Topic Area 3: Reducing the Cost of DC Fast Charging Equipment

Introduction

Electric Vehicle (EV) adoption has begun, and large investments in EV charging infrastructure are planned to support even greater EV numbers on the horizon. Simultaneously, charging installations desire direct current (DC) fast charging equipment since it can provide greater EV utilization, extended useable range, and significantly reduced recharging times. Therefore, reducing the cost of DC fast charging equipment will enable both a larger number of chargers to be deployed for planned investments and reduced financial barriers for future charger installations. To reduce charger cost, this topic targets R&D in critical performance areas such as advanced power electronics, enhanced thermal management, and improved materials.

Objective

The objective of this topic area is to research, develop, and demonstrate innovative technologies and designs to significantly reduce the cost of Electric Vehicle Supply Equipment (EVSE) for DC Fast Charging that will be required in large numbers to support high volumes of EVs. Projects should aim for cost reduction through targeted R&D efforts that culminate with a site demonstration at charge rates of at least 150 kW.

Projects must identify an existing DC fast charge system as a baseline for comparison and propose innovations that could significantly reduce system cost, including grid connection transformers. Areas of cost reduction could include, but are not limited to the following:

- Power semiconductor commonality across power stages (including power modules, gate drives).
- Semiconductor packaging and modules.
- Thermal management for system and/or devices, power modules, interfaces, passives, conductors.
- Medium Voltage (MV) grid connection solid state transformer designs or magnetics/materials for transformers.
- Power factor correction.
- Improved materials, components, and/or devices that enable system cost savings including designs that can also reduce installation costs.

General Requirements

Applications **must**:

1. Identify at least one hardware-based approach for reducing DC electric vehicle supply equipment cost (either conductive or inductive) and describe how the proposed research

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- will reduce cost and lead to a functional demonstration providing a charge rate of at least 150 kW of DC power at both 400V and 800V.
2. Identify a baseline DC fast charge system for comparison and describe the cost reduction potential of the proposed research technology(ies).
 3. Describe how the proposed technical improvements can be scaled up from at least 150 kW charge rates to higher charge rate systems.
 4. Describe how the proposed R&D will lead to specific improvements in the state of the art of DC fast chargers, and how this cost reduction will encourage the widespread use of **grid-connected** electric vehicles in the United States.
 5. Describe a demonstration plan, including planned location and evaluation of technical advancements through analysis, testing, and/or characterization.
 6. Describe how the proposed technology(ies) addresses typical and/or application-specific equipment conditions, limitations, communications, and requirements such as temperature, voltage, current, and power.
 7. Include the following within the application U.S. Manufacturing Plan (USMP) at a minimum;
 - Description of potential locations, supporting suppliers and/or materials, and production equipment necessary for manufacturing of the proposed technology.
 - Project team manufacturing capabilities in the United States and describe how the proposed technologies could be integrated into existing or expanded manufacturing processes.
 8. Include and describe partnership(s) with state governments, local governments, metropolitan transportation authorities, air pollution control districts, private or nonprofit entities, and component and/or subcomponent suppliers integrated within the project team to support the overall system design and/or demonstration effort.
 9. Participation in the Annual Merit Review held in Washington DC.

Specific Requirements

None.

Teaming Arrangements

Teams must include and describe partnership(s) with state governments, local governments, metropolitan transportation authorities, air pollution control districts, private or nonprofit entities, and component and/or subcomponent suppliers integrated within the project team to support the overall system design and/or demonstration effort.

Special Deliverables

None.

Applications Discouraged

None.

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Topic Area 4a: Research to Transform the Efficiency of Off-Road Vehicles

Introduction

Off-road vehicles used for industry and agriculture consume more than 2 quadrillion BTUs of energy.¹³ They are a substantial source of greenhouse gas (GHG) and criteria emissions, including nitrogen oxides and fine particulate matter. Off-road vehicles are highly reliant on compression-ignition engines which use complex emission control devices to meet regulations. The power requirements of off-road vehicles often necessitate the use of fluid-power to the work and/or drive circuits. Improving the efficiency of commercial off-road vehicles can reduce GHG emissions, improve local air quality, and decrease operating costs.

Objective

The objective of the topic area is to research and develop technology concepts capable of significantly decreasing energy use, GHGs, harmful criteria emissions, and total cost of ownership across the entire off-road vehicle sector, including construction, mining, forestry, agriculture, etc. Concepts must demonstrate affordability, durability, and manufacturability to ensure customer acceptance and implementation.

The following technology approaches are highly encouraged:

- Technologies that represent a breakthrough in the efficiency of fluid power systems and are widely applicable across the off-road sector.
- Technologies that increase the efficiency of compression-ignition engines and/or reduce the cost, complexity, and energy penalty associated with emission control over a typical drive cycle for off-road vehicles.

General Requirements

Applications **must** include:

1. Estimation of the applicability of the proposed technology across the off-road sector.
2. Identification of common inefficiency sources across the off-road sector than can be addressed with the technology.
3. Estimation of efficiency improvement when compared to the baseline off-road sector vehicle.
4. Estimation of emissions and comparison to emission requirements.
5. A cost analysis of the proposed technologies that projects a reduction in the total cost of ownership.

¹³ Transportation Energy Data Book: Edition 39 – 2020, pp. 2-13

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6. Explanation of how cost, durability, manufacturability and customer acceptance will be evaluated.
 7. Participation in the Annual Merit Review held in Washington DC.

Specific Deliverables

Successful applicants must establish a plan to validate the technology performance in a lab-scale apparatus that closely simulates how the technology will function in the vehicle application and publish these results.

Teaming Arrangements

Proposed teams are encouraged to include an off-road vehicle Original Equipment Manufacturer (OEM) and/or Tier 1 supplier.

Applications Discouraged

None.

Special Deliverables

None.

Topic Area 4b: Electrified Construction Vehicle Research, Development, and Validation**Introduction**

Construction equipment makes up the largest share of the energy use and GHG emissions for commercial off-road vehicles. These vehicles often make repetitive movements, which offer the opportunity for energy recovery and storage. As they are often used in urban centers, criteria emissions can be a concern, and some international cities have proposed banning diesel engines. Electrification technologies offer unique benefits for improving the energy efficiency and reducing the emissions of commercial off-road construction equipment.

Objective

The objective of this topic area is to research and develop novel electrification technologies, such as electrified propulsion and work implements, designed for improving energy efficiency and dramatically reducing the GHG and criteria emissions of off-road construction equipment.

General Requirements

Applications **are strongly encouraged** to target approaches which can dramatically reduce the GHG emissions on a life-cycle basis over a wide range of typical duty cycles for the specified equipment.

Applications **must**:

1. Identify an existing construction equipment application as a comparative baseline and describe the benefits of the proposed electrification technology in this same application, including expected energy-efficiency life-cycle GHG improvement.
2. Describe how the proposed R&D will lead to specific improvements in the state of the art of powertrain electrification technologies.
3. Describe the plan for confirming technical achievements through analysis, testing, and characterization.
4. Describe how the proposed technology addresses typical and/or application-specific equipment conditions, limitations, and requirements such as cooling, voltages, speeds, and torques.
5. Include the following within the application U.S. Manufacturing Plan (USMP) at a minimum:
 - Description of potential locations, supporting suppliers and/or materials, and production equipment necessary for manufacturing of the proposed technology for construction equipment applications.

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- Project team manufacturing capabilities in the United States and describe how the proposed technologies could be integrated into existing or expanded manufacturing processes.
6. Participation in the Annual Merit Review held in Washington DC.

Teaming Arrangements

Applicant teams that include participation by equipment manufacturers or suppliers in the United States are highly encouraged.

Applications Discouraged

None.

Special Deliverables

Specific deliverables for this Topic Area include the following:

1. Test plan to confirm final electrification technology performance.
2. Listing of estimated manufacturing equipment and equipment cost required to produce the final electrification technology.

Topic Area 5: Natural Gas Engine Enabling Technologies

Introduction

Natural gas powered vehicles are used across a range of medium and heavy-duty applications and renewable natural gas has increased dramatically in volume in recent years. However, natural gas engines tend to operate at lower cycle efficiency than comparable diesel engines. Improved efficiency of natural gas engines could reduce GHG emissions (both from the vehicle and from upstream methane emissions) and improve the total cost of ownership for natural gas trucks, while also meeting lower levels of NOx emissions that are being proposed. Applications are sought for engine component technologies with the potential to reduce GHG and improve the efficiency of engines cost-effectively without increasing the cost of emission control systems for medium- and heavy-duty trucks.

Objective

The objective of this topic area is to research, develop, and validate natural gas engine component technologies that improve the efficiency of engines cost-effectively without increasing the cost of emission control systems for medium- and heavy-duty trucks.

Technology approaches are anticipated to include, but are not limited to:

- Advanced ignition systems – e.g., prechamber, plasma, etc.
- Improved injectors for direct injection engines.
- Systems enabling multi-mode SI/advanced compression ignition combustion
- Enabling low temperature NG combustion using novel technologies such as plasma assist and/or SACI (high dilution, advanced spark, end-gas controlled combustion)
- Reduced-cost, in-cylinder pressure sensors
- Real time methane number sensing and compensation systems
- Technologies enabling improved air-fuel mixing
- Dynamic cylinder deactivation
- Development of predictive simulation tools (data- & physics-driven) for NG direct injection, combustion, and emission modeling
- Application of thermal barrier coatings to improve efficiency
- Improvements to catalyst manufacturing which improve utilization of platinum group metals (PGMs) or technologies to reduce the need for PGMs in three-way catalysts
- Low temperature methane oxidation
- Lean-NOx emission control

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General RequirementsApplications **must**:

1. Identify a baseline stoichiometric, spark-ignition natural gas engine using commercial three-way catalyst aftertreatment.
2. Identify vehicle emission standards applicable to the project period.
3. Identify barriers to improved natural gas engine efficiency improvements.
4. Identify technology approaches to overcome these barriers during the project period.
5. Identify the projected efficiency of the developed natural gas engine as well as the increase in efficiency when compared to the baseline engine.
6. Identify metrics and measures to be used to track project progress.
7. Identify the plan for testing and validating both engine efficiency and emission compliance.
8. Include a credible cost-effectiveness analysis showing that the total cost of ownership for a vehicle employing the proposed enabling technology will be reduced, if the technology is applied at commercial scale (modeled).
9. Participate in the Annual Merit Review held in Washington, DC.

Specific Requirements

None.

Teaming Requirements

None.

Applications Discouraged

None.

Special Deliverables

None.

Topic Area 6: Dimethyl Ether and Propane Engine Enabling Technologies

Introduction

Dimethyl ether (DME) and propane are relatively low-pressure gaseous fuels with potential for use in light and medium-duty vehicles. Applications are sought for engine component technologies with the potential to improve the efficiency of direct injection engines using dimethyl ether, propane, or a blend of the two, cost-effectively and without increasing the cost of emission control systems for light and medium-duty vehicles.

Objective

The objective of this topic area is to research, develop, and validate engine component technologies that improve the efficiency of direct injection engines using dimethyl ether, propane, or a blend of the two, cost-effectively and without increasing the cost of emission control systems for light and medium-duty vehicles.

Technology approaches are anticipated to include, but are not limited to:

- Improved injectors for direct injection engines.
- Advanced ignition systems – e.g., prechamber, plasma, etc.
- Systems enabling multi-mode SI/advanced compression ignition combustion.
- Enabling low temperature combustion using novel technologies such as plasma assist and/or SACI (high dilution, advanced spark, end-gas controlled combustion).
- Reduced-cost, in-cylinder pressure sensors.
- Technologies enabling improved air-fuel mixing.
- Dynamic cylinder deactivation.
- Development of predictive simulation tools (data- & physics-driven) for direct injection, combustion, and emission modeling.
- Application of thermal barrier coatings to improve efficiency.

General Requirements

Applications **must**:

1. Identify a baseline stoichiometric, spark-ignition engine using commercial three-way catalyst aftertreatment.
2. Identify vehicle emission standards applicable to the project period.
3. Identify barriers to improved engine efficiency using the anticipated fuel or blend.
4. Identify technology approaches to overcome these barriers during the project period.

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5. Identify the projected efficiency of the developed engine as well as the increase in efficiency when compared to the baseline engine.
 6. Identify metrics and measures to be used to track project progress.
 7. Identify the plan for testing and validating engine efficiency and emissions compliance using the anticipated fuel or blend of fuels.
 8. Include a credible cost-effectiveness analysis showing that the total cost of ownership for a vehicle employing the proposed enabling technology will be reduced, if the technology is applied at commercial scale (modeled).
 9. Participate in the Annual Merit Review held in Washington, DC.

Specific Requirements

None.

Teaming Requirements

None.

Applications Discouraged

None.

Special Deliverables

None.

Topic Area 7: Integrated Hybrid System with Opposed Piston 2-Stroke

Introduction

Opposed Piston 2-Stroke (OP2S) engines have the potential of higher efficiency and power density than comparable conventional internal combustion engines. While OP2S engines have been undergoing development and are waiting for market penetration, hybrid technologies have become common in light-duty vehicles as well as making traction in some medium- and heavy-duty applications. Hybrids have demonstrated 10-20% fuel efficiency improvement over traditional internal combustion engines by running on both gasoline or diesel fuels and electricity generated by the vehicle. The biggest drawback to plug-in hybrid vehicles, in particular, is the cost of dual powertrains. Pairing a OP2S engine with a plug-in hybrid would take advantage of low cost, fewer parts and improve density of OP2S engines. In addition, a hybrid engine can be operated to reduce transients and peak loads which may be able to address some of the drawbacks of OP2S engines that have prevented market adoption thus far.

This topic area promotes industry led research and development on OP2S engines fueled by liquid fuels in the range of gasoline or diesel or substantially similar hydrocarbon fuels for light-, medium-, or heavy-duty applications and paired with a hybrid electric system. Deliverables include a full system of OP2S engine integrated with hybrid architecture, ready for operation on a chassis dynamometer, demonstrating significantly improved efficiency and reduced emissions over a state-of-the-art conventional engine technology in 2025-2030 timeframe. Proposing teams should also illustrate total cost of ownership of the proposed system with a path to commercialization.

Objective

The objective of this topic area is to demonstrate advanced OP2S technology engine for light-, medium-, or heavy-duty applications with hybridization that significantly improves energy efficiency and reduces emissions over conventional engines in 2025-2030 timeframe.

Applications that focus on medium- and heavy-duty trucks are encouraged due to the increased likelihood for adoption in those applications. Although not limited to plug-in hybrid approaches, the increased fuel efficiency and decreased greenhouse gas (GHG) and criteria emissions from a plug-in hybrid approach are encouraged.

General Requirements

Applications **must** include:

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1. A discussion of the engine technologies for light-, medium-, and heavy-duty applications and where OP2S engines can lead to significant improvement in energy efficiency of these transportation segments and how the pairing the proposed OP2S engine with electric hybridization can address existing challenges with OP2S engines and with hybrid technologies, especially in medium- and heavy-duty trucks.
2. A description of the OP2S engine/powertrain architecture for light-, medium-, or heavy-duty applications to be demonstrated under the proposed project.
3. An analysis of the benefits of the OP2S engines over conventional engines in light-, medium-, and heavy-duty applications in 2025-2030 timeframe.
4. A discussion of the path to commercialization for OP2S engine.
5. An analysis of the total cost of ownership of the proposed OP2S engine architecture and comparison with conventional applications.
6. A plan for continuing project activities beyond project completion to include achieving further reductions in energy and emissions for the proposed OP2S architecture including the suitability of using sustainable alternative fuels.
7. Participation in the Annual Merit Review held in Washington DC.

Specific Requirements

Light-duty engine/powertrain developed for this solicitation must exceed the EPA Tier3 Bin 30 and 2025-2030 GHG emission standards while the medium- and heavy-duty engine/powertrain must exceed the 2025-2027 EPA GHG and/or the California Air Resources Board Clean Truck criteria emissions standards for NOx and PM.

Teaming Arrangements

Applicant teams should include an OEM and/or Tier 1 supplier who has demonstrated expertise on 2-stroke engine research as well as expertise on vehicle hybridization.

Applications Discouraged

None.

Special Deliverables

None.

Topic Area 8: Natural Gas Vehicle Technology Proof of Concept**Introduction**

Natural gas vehicles can provide significant local air quality benefits through reduced criteria emissions, especially in populated areas that have extensive truck usage such as ports, industrial areas, large freight yards, etc. These areas are often near lower income and over-burdened communities. However, many fleets may not have the experience with natural gas vehicles necessary to fully realize the benefits for their fleets and regions. Proof-of-concept demonstrations in fleets with limited experience in deploying natural gas vehicles provide an efficient way to increase adoption by reducing the risk of initial adoption and building familiarity and comfort with these technologies. These proof-of-concept demonstrations can also provide the necessary information to catalyze broader adoption by other fleets in their communities through the sharing of data, best practices, and lessons learned. Through these proof-of-concept demonstrations, this topic seeks to encourage the further adoption and use of natural gas vehicles in areas where the air quality benefits are needed most and that have been most impacted by vehicle pollution.

Objective

The objective of this area of interest is to spur adoption of on-road natural gas vehicles (medium or heavy-duty) in a specific fleet or community where the low emissions from natural gas can provide unique and immediate health benefits. The technical approach must utilize a proof-of-concept demonstration of five or fewer vehicles per fleet, along with supporting infrastructure in local public or private fleet(s), and validate the demonstration's energy, environmental, economic and operational benefits with the purpose of reducing the burden from truck usage in these communities.

General Requirements

Applications **must** include:

1. A Project Overview which includes:
 - Identification of the specific fleet(s) which will utilize the vehicles.
 - A background description of the lack of experience in the fleet(s), community or region with natural gas vehicles and an explanation of how the project would overcome this barrier.
 - A background description of the local emissions landscape that deployment of natural gas vehicles could potentially address.
 - A project goal which sets a target for broader adoption in the proposed fleet(s), community or region, supported in the Market Transformation Plan by specific fleet commitments or an analysis showing how the project's technology validation will lead to broader adoption.

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2. A Technical Description which includes:
 - A description of the on-road natural gas light-, medium-, or heavy-duty vehicles to be demonstrated, including specific vehicle makes, models, and application/vocation (for commercial trucks) and the number of vehicles the project will include (not to exceed 5 per fleet).
 - An analysis supporting the estimated energy, environmental, economic, or other benefits of adopting these natural gas vehicles using tools such as DOE's AFLEET model.
 - The identification of a fueling strategy, such a fuel retailer providing or developing supporting fueling infrastructure and its location, or the methodology, approach, and timeline to select the fueling site(s) and obtain project commitments for its development.
 3. A Market Transformation Plan which details how the team will:
 - Gain future commitments for additional adoption of natural gas vehicles in the fleet, community, or region.
 - Communicate project results, including lessons learned, best practices, and/or case studies, to other fleets in the same region to promote replication.
 - Communicate project results through the Clean Cities coordinator network or other similar avenues to fleets or other communities nationally to promote replication.
 - Sustain project activities beyond project completion.
 4. A Workplan which includes a presentation of project progress and results at the Annual Merit Review held in Washington DC with timing as directed by DOE.
 5. A Data Management Plan which:
 - Addresses collection of data (including cost, operational issues, and performance elements), analysis, terms and conditions for data use, privacy and security provisions, public dissemination, and all limitations on public dissemination.
 - Provides all project-related, nonproprietary data to a designated DOE National Laboratory.

Specific Requirements

1. If vehicle purchases are planned, the application should state if the vehicles are intended to be kept in long term service after the expiration of the project's performance period, or if not, how disposition of equipment will be addressed in accordance with 2CFR200.313(e) (government or non-profit entities) or 2CFR910.360 (for-profit entities).
2. If vehicle leases are planned, the monthly commercial vehicle lease price should be used to determine project costs.

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3. Original equipment manufacturer (OEM) factory-produced natural gas vehicles must be new, if purchased.
4. Natural gas vehicle conversions are allowable when performed by OEM-authorized/warranted qualified vehicle modifiers on new conventional vehicles.
5. All vehicles must be certified by the U.S. Environmental Protection Agency (EPA) and/or the California Air Resources Board and meet applicable Federal Motor Vehicle Safety Standards for on-road use.
6. Projects must include an emissions impact analysis that identifies the specific air quality benefits resulting from the project (compared to the dirtier vehicles they will be replacing) and also justifies how the project will help to address known local or regional air quality issues (e.g.; located within an EPA-designated non-attainment area, per the EPA Green Book definitions at <https://www.epa.gov/green-book>).

Teaming Arrangements

Applications are strongly encouraged to propose a team which includes:

1. Active participation by at least one Clean Cities coalition with clearly documented roles, responsibilities, and budgets (coalition locations are available at <https://cleancities.energy.gov/coalitions/>).
2. One or more public or private vehicle fleets for the demonstration.
3. Project Advisors who have prior field experience successfully implementing or operating NGV technologies and systems.

Applications are encouraged to propose a team which includes:

1. OEMs or other vehicle and/or infrastructure equipment providers.
2. Fuel suppliers, including those with renewable natural gas resources.
3. Experienced data collection partners (e.g., universities or other academic/research organizations).

Other Considerations

1. Applications are encouraged to include proof-of-concept demonstrations in underserved urban or rural regions (socially or economically disadvantaged) wherever feasible.
2. Applications are encouraged to consider fuel supply agreements that include renewable natural gas sourcing options.

Applications Discouraged

See Section I.C. Applications Specifically Not of Interest.

Special Deliverables

1. Recipients **must** make available all project-related, nonproprietary data to DOE and its national laboratories upon request.

Questions about this FOA? Submit your questions to DE-FOA-0002475@netl.doe.gov.

Problems with EERE Exchange? Email EERE - EERE-ExchangeSupport@hq.doe.gov. Include FOA name and number in subject line.

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):

All AOIs

- Applications that fall outside the technical parameters specified in Section I.A. and I.B. of the FOA.
- Applications for proposed technologies that are not based on sound scientific principles (e.g., violates the laws of thermodynamics).

AOI 1

- Applications that include low speed PEVs (e.g., golf carts, neighborhood electric vehicles), hybrid electric vehicles without plug-in capabilities, electric bikes, or electric scooters.
- Applications that include rebates or tax incentives.
- Applications that include the purchase of land.
- Applications for projects that use an EVSE that does not comply with applicable performance and safety certifications from an approved Nationally Recognized Testing Laboratory (NRTL).
- Applications for projects that use EVSE installations that do not comply with applicable installation codes and standards.
- Applications for projects that use EVSE installations and signage that do not comply with the Americans with Disabilities Act (ADA).

AOI 2

- Applications that include the costs of EV charging infrastructure, EVSE or the deployment of vehicles.
- Applications that include the cost of data from EV charging infrastructure or vehicles.

AOI 8

- Applications that request federal funding for a proof-of-concept validation including more than five vehicles per target fleet.
- Applications which propose additional natural gas vehicle demonstrations in a fleet currently running natural gas vehicles.
- Applications for projects that do not include sharing or disseminating project data.
- Applications that include rebates or incentives.
- Applications for projects that use vehicles converted using EPA's "Outside of Useful Life" criteria.

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D. Authorizing Statutes

The programmatic authorizing statutes are Public Law (P.L.) 102-486, Energy Policy Act (EPAct) of 1992, as amended by P.L. 109-58, EPAct 2005, Section 911, as amended (codified at 42 U.S.C. § 16191) and Sections 801 and 805, as amended (codified at 42 U.S.C. § 16154), and P.L. 110-140, Energy Independence and Security Act of 2007 (EISA 2007), Section 131, as amended (codified at 42 U.S.C. § 17011). Additional citations for these authorities include the following;

- Title VII, Subtitles B, C, D of EPACT 2005 (42 U.S.C. §§ 16061-16093)
- Sections 131-136 of EISA 2007 (42 U.S.C. §§ 17011-17013)
- Title VI, Subtitle A of EPACT 1992 (42 U.S.C. §§ 13281-13286)
- Title VI, Section B of EPACT 1992 (42 U.S.C. §§ 13291-13296)

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

II. Award Information

A. Award Overview

i. Estimated Funding

EERE expects to make a total of approximately \$62,750,000 of federal funding available for new awards under this FOA, subject to the availability of appropriated funds. EERE anticipates making approximately 17 to 35 awards under this FOA. EERE may issue one, multiple, or no awards. Individual awards may vary between \$500,000 and \$6,666,667.

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

Topic Area Number	Topic Area Title	Anticipated Number of Awards	Anticipated Minimum Award Size for Any One Individual Award (Fed Share)	Anticipated Maximum Award Size for Any One Individual Award (Fed Share)	Approximate Total Federal Funding Available for All Awards	Anticipated Period of Performance (months)
1	Electric Vehicle Charging Community Partner Projects	3-5	\$4,000,000	\$6,666,667	\$20,000,000	36-39
2	EV Workplace Charging	1	\$4,000,000	\$4,000,000	\$4,000,000	36
3	Reducing the Cost of DC Fast Charging Equipment	2-3	\$3,333,333	\$5,000,000	\$10,000,000	36-48
4a	Research to Transform the Efficiency of Off-Road Vehicles	2-3	\$1,500,000	\$2,500,000	\$5,000,000	39
4b	Electrified Construction Vehicle Research, Development, and Validation	1-2	\$2,500,000	\$5,000,000	\$5,000,000	39
5	Natural Gas Engine Enabling Technologies	1-3	\$1,250,000	\$6,250,000	\$6,250,000	39
6	Dimethyl Ether and Propane Engine Enabling Technologies	1-5	\$1,000,000	\$5,000,000	\$5,000,000	24-36

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7	Integrated Hybrid System with Opposed Piston 2-Stroke	1-2	\$2,500,000	\$5,000,000	\$5,000,000	24-36
8	Natural Gas Vehicle Technology Proof of Concept	2-5	\$500,000	\$1,250,000	\$2,500,000	36

EERE 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

EERE anticipates making awards that will run from 24 months up to 48 months in length, comprised of one or more budget periods. Project continuation will be contingent upon several elements, including satisfactory performance and Go/No-Go decision review. For a complete list, see Section VI.B.xiv. At the Go/No-Go decision points, EERE 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. As a result of this evaluation, EERE 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.

iii. New Applications Only

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

B. EERE Funding Agreements

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

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Problems with EERE Exchange? Email EERE - EERE-ExchangeSupport@hq.doe.gov. Include FOA name and number in subject line.

i. Funding Agreements with Federally Funded Research and Development Center (FFRDCs)

FFRDCs will be funded through the prime recipient as a member of the project team.

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. Restricted Eligibility

The National Energy Technology Laboratory is ineligible to participate as a prime applicant or as a team member/sub-recipient on any application because of its role in developing the requirements for this announcement.

This FOA will restrict foreign entities from applying as prime recipients unless they have a U.S. incorporated subsidiary or affiliate with a physical location for business operations in the United States. No waivers will be offered for this restriction.

ii. Individuals

U.S. citizens and lawful permanent residents are eligible to apply for funding as a prime recipient or subrecipient.

iii. Domestic Entities

For-profit entities, educational institutions, and nonprofits that are incorporated (or otherwise formed) under the laws of a particular state or territory of the United States and have a physical location for business operations in the United States are eligible to apply for funding as a prime recipient or subrecipient. Nonprofit organizations described in section 501(c)(4) of the Internal Revenue Code of 1986 that engaged in lobbying activities after December 31, 1995 are not eligible to apply for funding.

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

All Topic Areas: DOE/NNSA FFRDCs are eligible to apply for funding as a subrecipient, but are not eligible to apply as a prime recipient. FFRDC participation as a subrecipient is limited to an aggregate total of ≤25% of total project costs.

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

Federal agencies and instrumentalities (other than DOE) are eligible to apply for funding as a subrecipient, but are not eligible to apply as a prime recipient.

iv. Foreign Entities

Other than as provided in the “Individuals” or “Domestic Entities” sections above, all prime recipients receiving funding under this FOA must be incorporated (or otherwise formed) under the laws of a State or territory of the United States and have a physical location for business operations in the United States. If a foreign entity applies for funding as a prime recipient, it must designate in the Full Application a subsidiary or affiliate incorporated (or otherwise formed) under the laws of a State or territory of the United States to be the prime recipient. The Full Application must state the nature of the corporate relationship between the foreign entity and domestic subsidiary or affiliate.

A foreign entity may receive funding as a subrecipient.

v. Incorporated Consortia

Incorporated consortia, which may include domestic and/or foreign entities, are eligible to apply for funding as a prime recipient or subrecipient. For consortia incorporated (or otherwise formed) under the laws of a state or territory of the United States, please refer to “Domestic Entities” above. For consortia incorporated in foreign countries, please refer to the requirements in “Foreign Entities” above.

Each incorporated consortium must have an internal governance structure and a written set of internal rules. Upon request, the consortium must provide a written description of its internal governance structure and its internal rules to the EERE Contracting Officer.

vi. Unincorporated Consortia

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

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

- Management structure;
- Method of making payments to consortium members;
- Means of ensuring and overseeing members' efforts on the project;
- Provisions for members' cost sharing contributions; and
- Provisions for ownership and rights in intellectual property developed previously or under the agreement.

B. Cost Sharing

Topic Area Number	Topic Area Title	Minimum Cost Share Requirement
1	Electric Vehicle Charging Community Partner Projects	50%
2	EV Workplace Charging	20%
3	Reducing the Cost of DC Fast Charging Equipment	Phase 1 R&D - 20% Phase 2 Demonstration - 50%
4a	Research to Transform the Efficiency of Off-Road Vehicles	20%
4b	Electrified Construction Vehicle Research, Development, and Validation	20%
5	Natural Gas Engine Enabling Technologies	20%
6	Dimethyl Ether and Propane Engine Enabling Technologies	20%
7	Integrated Hybrid System with Opposed Piston 2-Stroke	20%
8	Natural Gas Vehicle Technology Proof of Concept	50%

See 2 CFR 200.306 and 2 CFR 910.130 for the applicable cost sharing requirements.

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

Questions about this FOA? Submit your questions to DE-FOA-0002475@netl.doe.gov.
Problems with EERE Exchange? Email EERE - EERE-ExchangeSupport@hq.doe.gov. Include FOA name and number in subject line.

i. Legal Responsibility

Although the cost share requirement applies to the project as a whole, including work performed by members of the project team other than the prime recipient, the prime recipient is legally responsible for paying the entire cost share. If the funding agreement is terminated prior to the end of the project period, the prime recipient is required to contribute at least the cost share percentage of total expenditures incurred through the date of termination.

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

ii. Cost Share Allocation

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

iii. Cost Share Types and Allowability

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

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

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

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

It is very common for deployment/demonstration projects to include third-party equipment where the use of the equipment benefits both the DOE project as well as the third party when they are operating under normal

business operations. As a result, when usage fees or usage rates in the form of in-kind contributions from a third party are proposed, DOE will review the benefit calculations and such project costs may be limited to a maximum of 45% of the usage rate. The intent of this restriction is to identify an appropriate percentage of the usage rates or usage fees that are allocable to the project. This applies only to vehicles or equipment that are donated to the project, provided as third-party cost share, and are still operating in some capacity under normal business operations. In rare cases, it is possible that the equipment will only benefit the project and exceptions may be considered.

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

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

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

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

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

Applicants are encouraged to refer to 2 CFR 200.306 as amended by 2 CFR 910.130 for additional cost sharing requirements.

iv. Cost Share Contributions by FFRDCs

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

v. Cost Share Verification

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

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

vi. Cost Share Payment

EERE 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).

In limited circumstances, and where it is in the government's interest, the EERE 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, however the minimum required cost share must be achieved on a budget period basis. 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

Concept papers and full applications must meet all compliance criteria listed below or they will be considered noncompliant. EERE will not review or consider noncompliant submissions, including concept papers and full applications that were: submitted through means other than the EERE Exchange; submitted after the applicable deadline; and/or submitted incomplete. EERE will not extend the submission deadline for applicants that fail to submit required information by the applicable deadline due to server/connection congestion.

i. Compliance Criteria

1. Concept Papers

Concept papers are deemed compliant if:

- The concept paper complies with the content and form requirements in Section IV.C. of the FOA; and
- The applicant successfully uploaded all required documents and clicked the “Submit” button in the EERE Exchange by the deadline stated in this FOA.

2. Full Applications

Full applications are deemed compliant if:

- The full application complies with the content and form requirements in Section IV.D. of the FOA; and
- The applicant successfully uploaded all required documents and clicked the “Submit” button in the EERE Exchange by the deadline stated in the FOA.

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/National Nuclear Security Agency (NNSA) Federally Funded Research and Development Centers (FFRDC) Listed as the applicant

A DOE/NNSA FFRDC is eligible to apply for funding under this FOA if its cognizant Contracting Officer provides written authorization and this authorization is submitted with the application.

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The following wording is acceptable for the authorization:

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

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

ii. Requirements for DOE/NNSA and non-DOE/NNSA Federally Funded Research and Development Centers 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:

1. 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.

2. 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.

3. Value/Funding

The value of, and funding for, the FFRDC/NL portion of the work will be included in the award to a successful applicant. DOE/NNSA will not fund a DOE/NNSA FFRDC/NL through the DOE field work authorization process and other FFRDC/NLs through an interagency agreement with the sponsoring

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agency. FFRDCs/NLs will be treated as subawards for applicants. Therefore, applicants should prepare the budgets utilizing rates appropriate for such an arrangement. For subawards to DOE FFRDCs, the recipient shall use the Department's strategic partnership projects program and the terms and conditions established for that program.

4. Cost Share

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.

5. 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 contractor.

F. Limitation on Number of Full Applications Eligible for Review

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

G. Questions Regarding Eligibility

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

IV. Application and Submission Information

A. Application Process

The application process will include two phases: a concept paper phase and a full application phase. **Only applicants who have submitted an eligible concept paper will be eligible to submit a full application.**

At each phase, EERE performs an initial eligibility review of the applicant submissions to determine whether they meet the eligibility requirements of Section III of the FOA. EERE will not review or consider submissions that do not meet the eligibility requirements of Section III. All submissions must conform to the following form and content requirements, including maximum page lengths (described below) and must be submitted via the EERE Exchange at <https://eere-exchange.energy.gov/>, unless specifically stated otherwise. **EERE will not review or consider submissions submitted through means other than the EERE Exchange, submissions submitted after the applicable deadline, or incomplete submissions.** EERE will not extend deadlines for applicants who fail to submit required information and documents due to server/connection congestion.

A **Control Number** will be issued when an applicant begins the EERE Exchange application process. This control number must be included with all application documents, as described below.

The Concept Paper and Full Application must conform to the following requirements:

- 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;
- The Control Number must be prominently displayed on the upper right corner of the header of every page. Page numbers must be included in the footer of every page; and

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- 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, EERE will review only the authorized number of pages and disregard any additional pages.

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

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

i. Additional Information on the EERE Exchange

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

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

B. Application Forms

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

Note: The maximum file size that can be uploaded to the EERE Exchange website is 10MB. Files in excess of 10MB cannot be uploaded, and hence cannot be submitted

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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

C. Content and Form of the Concept Paper

To be eligible to submit a Full Application, applicants must submit a Concept Paper by the specified due date and time. Applicants may not change the applying entity between the Concept Paper and Full Application stages of the process.

i. Concept Paper Content Requirements

EERE will not review or consider ineligible Concept Papers (see Section III of the FOA).

Each Concept Paper must be limited to a single concept or technology. Unrelated concepts and technologies should not be consolidated into a single Concept Paper.

The Concept Paper must conform to the following content requirements:

Section	Page Limit	Description
Cover Page	1 page maximum	The cover page should include the project title, the specific FOA Topic area being addressed (if applicable), both the technical and business points of contact, names of all team member organizations, and any statements regarding confidentiality.
Technical Description and Impacts	3 pages maximum	Applicants are required to describe succinctly: <ul style="list-style-type: none"> • The proposed technology, including its basic operating principles and how it is unique and innovative; • The proposed technology's target level of performance (applicants should provide technical data or other support to show how the proposed target could be met); • The current state-of-the-art in the relevant field and application, including key shortcomings, limitations, and challenges; • How the proposed technology will overcome the shortcomings, limitations, and challenges in the relevant field and application; • The potential impact that the proposed project would have on the relevant field and application;

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		<ul style="list-style-type: none"> • The key technical risks/issues associated with the proposed technology development plan; • The impact that EERE funding would have on the proposed project; • Whether the Principal Investigator (PI) and Project Team have the skill and expertise needed to successfully execute the project plan; • Whether the applicant has prior experience which demonstrates an ability to perform tasks of similar risk and complexity; and • Whether the applicant has adequate access to equipment and facilities necessary to accomplish the effort. • Applicants may provide graphs, charts, or other data to supplement their Technology Description.
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EERE makes an independent assessment of each Concept Paper based on the criteria in Section V.A.i and V.A.ii of the FOA. EERE will encourage a subset of applicants to submit Full Applications. Other applicants will be discouraged from submitting a Full Application. An applicant who receives a “discouraged” notification may still submit a Full Application. EERE will review all eligible Full Applications. However, by discouraging the submission of a Full Application, EERE intends to convey its lack of programmatic interest in the proposed project in an effort to save the applicant the time and expense of preparing an application that is unlikely to be selected for award negotiations.

EERE may include general comments provided from reviewers on an applicant’s Concept Paper in the encourage/discourage notification.

While the content and form of the Concept Paper does not require proposing a cost share amount during this concept paper submission phase, the EERE Exchange system will require entering a proposed cost share as a step in the submission process. Any proposed cost share at the Concept Paper stage of the application process can be updated or amended at the time of full application submission.

D. Content and Form of the Full Application

Applicants must submit a Full Application by the specified due date and time to be considered for funding under this FOA. Applicants must complete the following application forms found on the EERE Exchange website at <https://eere-Exchange.energy.gov/>, in accordance with the instructions.

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Problems with EERE Exchange? Email EERE - EERE-ExchangeSupport@hq.doe.gov. Include FOA name and number in subject line.*

All Full Application documents must be marked with the Control Number issued to the applicant. Applicants will receive a control number upon clicking the “Create Concept Paper” button in the EERE Exchange, and should include that control number in the file name of their Full Application submission (i.e., *Control number_Applicant Name_Full Application*).

i. Full Application Content Requirements

EERE will not review or consider ineligible Full Applications (see Section III. of the FOA).

Each Full Application shall be limited to a single concept or technology. Unrelated concepts and technologies shall not be consolidated in a single Full Application. Full Applications must conform to the following requirements:

Component	File Format	Page Limit	File Name
Technical Volume	PDF	30	ControlNumber_LeadOrganization_TechnicalVolume
Resumes	PDF	1 per resume	ControlNumber_LeadOrganization_Resumes
Letters of Commitment	PDF	1	ControlNumber_LeadOrganization_LOCs
Statement of Project Objectives	MS Word	10	ControlNumber_LeadOrganization_SOPO
SF-424	PDF	N/A	ControlNumber_LeadOrganization_App424
Budget Justification Workbook	MS Excel	N/A	ControlNumber_LeadOrganization_Budget_Justification
Summary/Abstract for Public Release	PDF	1	ControlNumber_LeadOrganization_Summary
Summary Slide	MS PowerPoint	1	ControlNumber_LeadOrganization_Slide
Subrecipient Budget Justification	MS Excel	N/A	ControlNumber_LeadOrganization_Subrecipient_Budget_Justification
Authorization from cognizant Contracting Officer for FFRDC	PDF	N/A	ControlNumber_LeadOrganization_FFRDCAuth
SF-LLL Disclosure of Lobbying Activities	PDF	N/A	ControlNumber_LeadOrganization_SF-LLL
Foreign Entities and Foreign Work	PDF	N/A	ControlNumber_LeadOrganization_Waiver
Location(s) of work	MS Excel	N/A	ControlNumber_LeadOrganization_LOWs
U.S. Manufacturing Plan	PDF	N/A	ControlNumber_LeadOrganization_USMP
Data Management Plan	MS Word	N/A	ControlNumber_LeadOrganization_DMP

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

TechnicalVolume_Part_1

TechnicalVolume_Part_2

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

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

ii. **Technical Volume**

The Technical Volume must be submitted in PDF format. The Technical Volume must conform to the following content and form requirements, including maximum page lengths. If applicants exceed the maximum page lengths indicated below, EERE will review only the authorized number of pages and disregard any additional pages. This volume must address the Merit Review Criteria as discussed in Section V.A.ii. of the FOA. Save the Technical Volume in a single PDF file.

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

The Technical Volume to the Full Application may not be more than 30 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 evaluation criteria (see Section V.A.ii of the FOA) when preparing the Technical Volume.

The Technical Volume must conform to the following content requirements:

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SECTION/PAGE LIMIT	DESCRIPTION
Cover Page	The cover page should include the project title, the specific FOA Topic Area being addressed, both the technical and business points of contact, names of all team member organizations, and any statements regarding confidentiality.
Project Overview (Approximately 10% of the Technical Volume)	<p>The Project Overview should contain the following information:</p> <ul style="list-style-type: none"> • Background: The applicant should discuss the background of their organization, including the history, successes, and current research and development status (i.e., the technical baseline) relevant to the technical topic being addressed in the Full Application. • Project Goal: The applicant should explicitly identify the targeted improvements to the baseline technology and the critical success factors in achieving that goal. • DOE Impact: The applicant should discuss the impact that DOE funding would have on the proposed project. Applicants should specifically explain how DOE funding, relative to prior, current, or anticipated funding from other public and private sources, is necessary to achieve the project objectives.
Technical Description, Innovation, and Impact (Approximately 30% of the Technical Volume)	<p>The Technical Description should contain the following information:</p> <ul style="list-style-type: none"> • Relevance and Outcomes: The applicant should provide a detailed description of the technology, including the scientific and other principles and objectives that will be pursued during the project. This section should describe the relevance of the proposed project to the goals and objectives of the FOA, including the potential to meet specific DOE technical targets or other relevant performance targets. The applicant should clearly specify the expected outcomes of the project. • Feasibility: The applicant should demonstrate the technical feasibility of the proposed technology and capability of achieving the anticipated performance targets, including a description of previous work done and prior results. • Innovation and Impacts: The applicant should describe the current state-of-the-art in the applicable field, the specific innovation of the proposed technology, 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 and Market Transformation Plan	The Workplan should include a summary of the Project Objectives, Technical Scope, Work Breakdown Structure (WBS), Milestones, Go/No-Go

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(Approximately 40% of the Technical Volume)

Decision Points, and Project Schedule. A detailed SOPO is separately requested. The Workplan should contain the following information:

- **Project Objectives:** The applicant should provide a clear and concise (high-level) statement of the goals and objectives of the project as well as the expected outcomes.
- **Technical Scope Summary:** The applicant should provide a summary description of the overall work scope and approach to achieve the objective(s). The overall work scope is to be divided by performance periods that are separated by discrete, approximately annual decision points (see below for more information on Go/No-Go decision points). The applicant should describe the specific expected end result of each performance period.
- **WBS and Task Description Summary:** The Workplan should describe the work to be accomplished and how the applicant will achieve the milestones, will accomplish the final project goal(s), and will produce all deliverables. The Workplan is to be structured with a hierarchy of performance period (approximately annual), task and subtasks, which is typical of a standard WBS for any project. The Workplan shall contain a concise description of the specific activities to be conducted over the life of the project. The description shall be a full explanation and disclosure of the project being proposed (i.e., a statement such as “we will then complete a proprietary process” is unacceptable). It is the applicant’s responsibility to prepare an adequately detailed task plan to describe the proposed project and the plan for addressing the objectives of this FOA. The summary provided should be consistent with the SOPO. The SOPO will contain a more detailed description of the WBS and tasks.
- **Milestone Summary:** The applicant should provide a summary of appropriate milestones throughout the project to demonstrate success. A milestone may be either a progress measure (which can be activity based) or a SMART technical milestone. SMART milestones should be Specific, Measurable, Achievable, Relevant, and Timely, and must demonstrate a technical achievement rather than simply completing a task. Unless otherwise specified in the FOA, the minimum requirement is that each project must have at least one milestone per quarter for the duration of the project with at least one SMART technical milestone per year (depending on the project, more milestones may be necessary to comprehensively demonstrate progress). The applicant should also provide the means by which the milestone will be verified. The summary provided should be consistent with the Milestone Summary Table in the SOPO.
- **Go/No-Go Decision Points:** The applicant should provide a summary of project-wide Go/No-Go decision points at appropriate

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points in the Workplan. A Go/No-Go decision point is a risk management tool and a project management best practice to ensure that, for the current phase or period of performance, technical success is definitively achieved and potential for success in future phases or periods of performance is evaluated, prior to actually beginning the execution of future phases. At a minimum, each project must have at least one project-wide Go/No-Go decision point for each budget period (12 to 18-month period) of the project. See Section VI.B.xiv. The applicant should also provide the specific technical criteria to be used to evaluate the project at the Go/No-Go decision point. The summary provided should be consistent with the SOPO. Go/No-Go decision points are considered “SMART” and can fulfill the requirement for an annual SMART milestone.

- End of Project Goal: The applicant should provide a summary of the end of project goal(s). At a minimum, each project must have one SMART end of project goal. The summary provided should be consistent with the SOPO.
- Project Schedule (Gantt Chart or similar): The applicant should provide a schedule for the entire project, including task and subtask durations, milestones, and Go/No-Go decision points.
- Project Management: The applicant should discuss the team’s proposed management plan, including the following:
 - The overall approach to and organization for managing the work
 - The roles of each project team member
 - Any critical handoffs/interdependencies among project team members
 - The technical and management aspects of the management plan, including systems and practices, such as financial and project management practices
 - The approach to project risk management
 - A description of how project changes will be handled
 - If applicable, the approach to Quality Assurance/Control
 - How communications will be maintained among project team members
- Market Transformation Plan: The applicant should provide a market transformation plan, including the following:
 - Identification of target market, competitors, and distribution channels for proposed technology along with

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	<p>known or perceived barriers to market penetration, including a mitigation plan</p> <ul style="list-style-type: none"> ○ Identification of a product development and/or service plan, commercialization timeline, financing, product marketing, legal/regulatory considerations including intellectual property, infrastructure requirements, data dissemination, U.S. Manufacturing Plan, and product distribution
<p>Technical Qualifications and Resources (Approximately 20% of the Technical Volume)</p>	<p>The Technical Qualifications and Resources should contain the following information:</p> <ul style="list-style-type: none"> • Describe the project team’s unique qualifications and expertise, including those of key subrecipients. • Describe the project team’s existing equipment and facilities that will facilitate the successful completion of the proposed project; include a justification of any new equipment or facilities requested as part of the project. • This section should also include relevant, previous work efforts, demonstrated innovations, and how these enable the applicant to achieve the project objectives. • Describe the time commitment of the key team members to support the project. • Describe the technical services to be provided by DOE/NNSA FFRDCs, if applicable. • For multi-organizational or multi-investigator projects, describe succinctly: <ul style="list-style-type: none"> ○ The roles and the work to be performed by each PI and Key Participant. ○ Business agreements between the applicant and each PI and Key Participant. ○ How the various efforts will be integrated and managed; ○ Process for making decisions on scientific/technical direction; ○ Publication arrangements; ○ Intellectual Property issues; and ○ Communication plans.
<p>Diversity, Equity, Inclusion (Address in the Diversity, Equity, and Inclusion Plan)</p>	<p>The Diversity, Equity, and Inclusion Plan should contain the following information:</p>

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	<ol style="list-style-type: none"> 1. Equity Impacts: the impacts of the proposed project on underserved communities, including social and environmental impacts. 2. Benefits: The overall benefits of the proposed project, if funded, to underserved communities; and 3. How diversity, equity, and inclusion objectives will be incorporated in the project. <p>Section IV.D.xvi for more information on the contents of the Diversity, Equity, and Inclusion Plan.</p>
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iii. **Resumes**

Applicants are required to submit 1-page resumes for key participating team members. Multi-page resumes are not allowed. Save the resumes in a single PDF file using the following convention for the title “ControlNumber_LeadOrganization_Resumes”.

iv. **Letters of Commitment**

Submit letters of commitment from all subrecipient and third party cost share providers. If applicable, also include any letters of commitment from partners/end users (1-page maximum per letter). Save the letters of commitment in a single PDF file using the following convention for the title “ControlNumber_LeadOrganization_LOCs”.

v. **Statement of Project Objectives (SOPO)**

Applicants are required to complete a SOPO A SOPO template is available on EERE Exchange at <https://eere-exchange.energy.gov/>. The SOPO, including the Milestone Table, must not exceed 10 pages. The SOPO must not exceed the page limit 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 SOPO in a single MS Word file using the following convention for the title “ControlNumber_LeadOrganization_SOPO”.

vi. **SF-424: Application for Federal Assistance**

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

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vii. Budget Justification Workbook

Applicants are required to complete the Budget Justification Workbook. This form is available on EERE Exchange at <https://eere-Exchange.energy.gov/>.

Prime recipients must complete each tab of the Budget Justification Workbook for the project as a whole, including all work to be performed by the prime recipient and its subrecipients and contractors.

Applicants should include costs associated with required annual audits and incurred cost proposals in their proposed budget documents. The “Instructions and Summary” included with the Budget Justification Workbook will auto-populate as the applicant enters information into the Workbook.

Applicants must carefully read the “Instructions and Summary” tab provided within the Budget Justification Workbook. Save the Budget Justification Workbook in a single Microsoft Excel file using the following convention for the title “ControlNumber_LeadOrganization_Budget_Justification”.

viii. Summary/Abstract for Public Release

Applicants are required to submit a one-page summary/abstract of their project. The project summary/abstract must contain a summary of the proposed activity suitable for dissemination to the public. It should be a self-contained document that identifies the name of the applicant, the project director/principal investigator(s), the project title, the objectives of the project, a description of the project, including methods to be employed, the potential impact of the project (e.g., benefits, outcomes), and major participants (for collaborative projects). This document must not include any proprietary or sensitive business information as DOE may make it available to the public after selections are made. The project summary must not exceed 1 page when printed using standard 8.5 x 11 paper with 1” margins (top, bottom, left, and right) with font not smaller than 12 point. Save the Summary for Public Release in a single PDF file using the following convention for the title “ControlNumber_LeadOrganization_Summary”.

ix. Summary Slide

Applicants are required to provide a single MS PowerPoint slide summarizing the proposed project. This slide is used during the evaluation process.

The Summary Slide template requires the following information:

- A technology summary;

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

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

x. Subrecipient Budget Justification (if applicable)

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

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

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

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

Prime 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.

Prime recipients and subrecipients are required to complete and submit SF-LLL, "Disclosure of Lobbying Activities"

(<https://www.grants.gov/web/grants/forms/sf-424-individual-family.html>) to ensure that non-federal funds have not been paid and will not be paid to any person for influencing or attempting to influence any of the following in connection with the application:

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- 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”.

xiii. Waiver Requests: Foreign Work (if applicable)

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

As set forth in Section IV.J.iii., all work under EERE funding agreements must be performed in the United States. This requirement does not apply to the purchase of supplies and equipment, so a waiver is not required for foreign purchases of these items. However, the prime recipient should make every effort to purchase supplies and equipment within the United States. Appendix C lists the necessary information that must be included in a foreign work waiver request.

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

xiv. Location(s) of Work

The applicant must complete the supplied template by listing the City and State for each location where project work will be performed by the prime recipient or subrecipient(s).

xv. U.S. Manufacturing Commitments

Areas of Interest 3, 4a, 4b, 5, 6, and 7:

Pursuant to the DOE Determination of Exceptional Circumstances (DEC) dated September 9, 2013, each applicant is required to submit a U.S. Manufacturing Plan as part of its application. The U.S. Manufacturing Plan represents the applicant's measurable commitment to support U.S. manufacturing as a result of its award.

Each U.S. Manufacturing Plan must include a commitment 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 can show to the satisfaction of DOE that it is not commercially feasible to do so (referred to hereinafter as “the U.S. Competitiveness Provision”). The applicant further agrees to make the U.S. Competitiveness Provision binding on

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any sub-awardee and any assignee or licensee or any entity otherwise acquiring rights to any subject invention, including subsequent assignees or licensees. A subject invention is any invention conceived of or first actually reduced to practice under an award.

Due to the lower technology readiness levels of this FOA, DOE does not expect the U.S. Manufacturing Plans to be tied to a specific product or technology.

However, in lieu of the U.S. Competitiveness Provision, an applicant may propose a U.S. Manufacturing Plan with more specific commitments that would be beneficial to the U.S. economy and competitiveness. For example, an applicant may commit specific products to be manufactured in the U.S., commit to a specific investment in a new or existing U.S. manufacturing facility, keep certain activities based in the U.S. or support a certain number of jobs in the U.S. related to the technology. An applicant which is likely to license the technology to others, especially universities for which licensing may be the exclusive means of commercialization the technology, the U.S. Manufacturing Plan may indicate the applicant's plan and commitment to use a specific licensing strategy that would likely support U.S. manufacturing.

If DOE determines, at its sole discretion, that the more specific commitments would provide a sufficient benefit to the U.S. economy and industrial competitiveness, the specific commitments will be part of the terms and conditions of the award. For all other awards, the U.S. Competitiveness Provision shall be incorporated as part of the terms and conditions of the award as the U.S. Manufacturing Plan for that award.

The U.S. Competitiveness Provision is also a requirement for the Class Patent Waiver that applies to domestic large business under this FOA (see Section VIII.K. Title to Subject Inventions).

Save the U.S. Manufacturing Plan in a single PDF file using the following convention for the title "ControlNumber_LeadOrganization_USMP" .

Areas of Interest 1, 2, and 8:

A USMP is not required.

xvi. Data Management Plan (DMP)

Applicants are required to submit a DMP with their Full Application.

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subject line.*

An applicant may select one of the template Data Management Plans (DMP) listed below. Alternatively, instead of selecting one of the template DMPs below, an applicant may submit another DMP provided that the DMP, at a minimum, (1) describes how data sharing and preservation will enable validation of the results from the proposed work, how the results could be validated if data are not shared or preserved and (2) has a plan for making all research data displayed in publications resulting from the proposed work digitally accessible at the time of publications. DOE Public Access Plan dated July 24, 2014 provides additional guidance and information on DMPs.

Option 1 (when protected data is allowed): For the deliverables under the award, the recipient does not plan on making the underlying research data supporting the findings in the deliverables publicly-available for up to five (5) years after the data were first produced because such data will be considered protected under the award. The results from the DOE deliverables can be validated by DOE who will have access, upon request, to the research data. Other than providing deliverables as specified in the award, the recipient does not intend to publish the results from the project. However, in an instance where a publication includes results of the project, the underlying research data will be made available according to the policies of the publishing media. Where no such policy exists, the recipient must indicate on the publication a means for requesting and digitally obtaining the underlying research data. This includes the research data necessary to validate any results, conclusions, charts, figures, images in the publications.

Option 2: For any publication that includes results of the project, the underlying research data will be made available according to the policies of the publishing media. Where no such policy exists, the recipient must indicate on the publication a means for requesting and digitally obtaining the underlying research data. This includes the research data necessary to validate any results, conclusions, charts, figures, images in the publications.

Save the DMP in a single Microsoft Word file using the following convention for the title "ControlNumber_LeadOrganization_DMP".

xvii. Diversity, Equity and Inclusion Plan

As part of the application, applicants are required to describe how diversity, equity, and inclusion objectives will be incorporated in the project. Specifically,

applicants are required to submit a Diversity, Equity, and Inclusion Plan that describes the actions the applicant will take to foster a welcoming and inclusive environment, support people from groups underrepresented in STEM, advance equity, and encourage the inclusion of individuals from these groups in the project; and the extent the project activities will be located in or benefit underserved communities (also see Section I.A.iii). The plan should include SMART milestones supported by metrics to measure the success of the proposed actions.

The following is a non-exhaustive list of actions that can serve as examples of ways the proposed project could incorporate diversity, equity, and inclusion elements. These examples should not be considered either comprehensive or prescriptive. Applicants may include appropriate actions not covered by these examples.

- a. Include persons from groups underrepresented in STEM as PI, co-PI, and/or other senior personnel;
- b. Include persons from groups underrepresented in STEM as student researchers or post-doctoral researchers;
- c. Include faculty or students from Minority Serving Institutions as PI/co-PI, senior personnel, and/or student researchers, as applicable;
- d. Enhance or collaborate with existing diversity programs at your home organization and/or nearby organizations;
- e. Collaborate with students, researchers, and staff in Minority Serving Institutions;
- f. Disseminate results of research and development in Minority Serving Institutions or other appropriate institutions serving underserved communities;
- g. Implement evidence-based, diversity-focused education programs (such as implicit bias training for staff) in your organization;
- h. Identify Minority Business Enterprises, Minority Owned Businesses, Woman Owned Businesses and Veteran Owned Businesses to solicit as vendors and sub-contractors for bids on supplies, services and equipment.

Save the Diversity, Equity and Inclusion Plan in a single PDF file using the following convention for the title “ControlNumber_LeadOrganization_DEIP”.

E. Post Selection Information Requests

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

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- Indirect cost information;
- Other budget information;
- Commitment Letters from Third Parties Contributing to Cost Share, if applicable;
- Name and phone number of the Designated Responsible Employee for complying with national policies prohibiting discrimination (See 10 CFR 1040.5);
- Representation of Limited Rights Data and Restricted Software, if applicable; and
- Environmental Questionnaire.

F. Dun and Bradstreet Universal Numbering System (DUNS) Number and System for Award Management (SAM)

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

G. Submission Dates and Times

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

H. Funding Restrictions

i. Allowable Costs

All expenditures must be allowable, allocable, and reasonable in accordance with the applicable federal cost principles.

Refer to the following applicable federal cost principles for more information:

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

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ii. Pre-Award Costs

Selectees 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 Contracting Officer assigned to the award.

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

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

1. National Environmental Policy Act (NEPA) Requirements Related to Pre-Award Costs

EERE's decision whether and how to distribute federal funds under this FOA is subject to NEPA. Applicants should carefully consider and should seek legal counsel or other expert advice before taking any action related to the proposed project that would have an adverse effect on the environment or limit the choice of reasonable alternatives prior to EERE completing the NEPA review process.

EERE does not guarantee or assume any obligation to reimburse pre-award costs incurred prior to receiving written authorization from the Contracting Officer. If the applicant elects to undertake activities that DOE determines may have an adverse effect on the environment or limit the choice of reasonable alternatives prior to receiving such written authorization from the Contracting Officer, the applicant is doing so at risk of not receiving federal funding for their project and such costs may not be recognized as allowable cost share. Nothing contained in the pre-award cost reimbursement regulations or any pre-award costs approval letter from the Contracting Officer override these NEPA requirements 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

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authorized for federal funding by the Contracting Officer in advance of EERE completing a NEPA review, the prime recipient is doing so at risk of not receiving federal funding and such costs may not be recognized as allowable cost share.

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

1. Requirement

All work performed under EERE awards must be performed in the United States. This requirement does not apply to the purchase of supplies and equipment; however, the prime recipient should make every effort to purchase supplies and equipment within 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, EERE 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

There may be limited circumstances where it is in the interest of the project to perform a portion of the work outside the United States. To seek a foreign work waiver, the applicant must submit a written waiver request to EERE. Appendix C lists the necessary information that must be included in a request for a foreign work waiver.

The applicant must demonstrate to the satisfaction of EERE that a waiver would further the purposes of the FOA and is in the economic interests of the United States. EERE may require additional information before considering a waiver request. Save the waiver request(s) in a single PDF file. The applicant does not have the right to appeal EERE's decision concerning a waiver request.

iv. Construction

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

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v. Foreign Travel

If international travel is proposed for your project, please note that your organization must comply with the International Air Transportation Fair Competitive Practices Act of 1974 (49 USC 40118), commonly referred to as the “Fly America Act,” and implementing regulations at 41 CFR 301-10.131 through 301-10.143. The law and regulations require air transport of people or property to, from, between, or within a country other than the United States, the cost of which is supported under this award, to be performed by or under a cost-sharing arrangement with a U.S. flag carrier, if service is available. Foreign travel costs are allowable only with the written prior approval of the Contracting Officer assigned to the award.

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 will 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. Domestic Preference – Infrastructure Projects

As appropriate and to the extent consistent with law, Applicants shall ensure that, to the greatest extent practicable, iron and aluminum as well as steel, cement, and other manufactured products (items and construction materials composed in whole or in part of non-ferrous metals such as aluminum; plastics and polymer-based products such as polyvinyl chloride pipe; aggregates such as concrete; glass, including optical fiber; and lumber) used in the proposed project shall be produced in the United States. This requirement shall flow down to all sub-awards including all contracts, subcontracts and purchase orders for work performed under the proposed project.

viii. Lobbying

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

Recipients and subrecipients are required to complete and submit SF-LLL, “Disclosure of Lobbying Activities” (<https://www.grants.gov/web/grants/forms/sf-424-individual-family.html>) to

ensure that non-federal funds have not been paid and will not be paid to any person for influencing or attempting to influence any of the following in connection with the application:

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

ix. Risk Assessment

Prior to making a federal award, the DOE is required by 31 U.S.C. 3321 and 41 U.S.C. 2313 to review information available through any Office of Management and Budget (OMB)-designated repositories of government-wide eligibility qualification or financial integrity information, such as SAM Exclusions and “Do Not Pay.”

In addition, DOE evaluates the risk(s) posed by applicants before they receive federal awards. This evaluation may consider: results of the evaluation of the applicant's eligibility; the quality of the application; financial stability; quality of management systems and ability to meet the management standards prescribed in this part; history of performance; reports and findings from audits; and the applicant's ability to effectively implement statutory, regulatory, or other requirements imposed on non-federal entities.

In addition to this review, DOE must comply with the guidelines on government-wide suspension and debarment in 2 CFR 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.

x. 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;
- Invoices/receipts for all travel, equipment, supplies, contractual, and other costs;

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- 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.

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V. Application Review Information

A. Technical Review Criteria

i. **Concept Papers (For AOIs 3, 4a, 4b, 5, 6, 7)**

Concept Papers will be evaluated against the criteria shown below. All sub-criteria are of equal weight.

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

This criterion involves consideration of the following factors:

- Extent to which the concept paper describes the proposed technology, how the technology is unique and innovative, and how the technology will overcome barriers to advance the current state-of-the-art or baseline technology;
- Extent to which the concept paper identifies risks, technical barriers, challenges, and possible mitigation strategies, and demonstrates the impact that the proposed project would have on the relevant field and application;
- Extent to which the proposed project team has the qualifications, relevant experience, capabilities, equipment, and facilities to successfully complete the proposed project; and
- Extent to which the proposed project, if successfully accomplished, would meet the objectives as stated in the FOA.

ii. **Concept Papers (For AOIs 1, 2, 8)**

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

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

This criterion involves consideration of the following factors:

- The proposed project is responsive to the objectives as stated in the FOA/AOI;
- The proposed project is clearly described, unique, and innovative;
- The proposed approach/project will significantly accelerate the widespread use of the identified technologies or fuels;
- The probability that the proposed project will accomplish its objectives;
- The proposed partnerships are appropriate; and

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- The applicant has the qualifications, experience, capabilities and other resources necessary to complete the proposed project.

iii. Full Applications (For AOIs 3, 4a, 4b, 5, 6, 7)

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

Criterion 1: Technical Merit, Innovation, and Impact (Weight 45%)

This criterion involves consideration of the following factors:

- Extent to which the applicant demonstrates knowledge of the current state-of-the-art (SOA) or baseline technology and how the proposed project will move the state-of-the-art;
- Extent to which the proposed project will likely achieve prescribed goals, targets, or requirements as described in the topic area; and
- Extent to which the proposed project is technically sound, viable, and is supported by relevant data, calculations, technical assumptions, design rationale, alternatives, discussion of prior work, and references to literature.

Criterion 2: Project Plan (Weight 30%)

This criterion involves consideration of the following factors:

- Extent to which the approach comprehensively and logically addresses research, development, validation, technology integration, risks, and risk mitigation strategies as well as provides appropriate tasks and detailed task descriptions;
- Extent to which the project schedule includes all required tasks, reasonable task durations, logical predecessor and successor task ordering, and a defined critical path;
- Extent to which the baseline performance is defined, performance metrics quantify interim performance progress, appropriately scheduled SMART (specific, measurable, achievable, relevant, and time-based) milestones demonstrate project advancement based upon significant project outcomes, and appropriately scheduled SMART Go/No Go Decision Points represent decisions regarding project continuation; and
- Extent to which the U.S. Manufacturing Plan demonstrates knowledge of the target market(s), distribution channels, required licensing, and competitors as well as the risks and risk mitigation strategies associated with each.

Criterion 3: Project Team and Resources (Weight 15%)

This criterion involves consideration of the following factors:

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- Extent to which the qualifications, relevant experience, and time commitment of the individuals on the proposed project team are aligned and integrated for successful completion of the proposed project;
- Extent to which existing equipment and facilities, along with proposed acquisition of equipment, support successful completion of the proposed project; and
- Extent and appropriateness of resource commitment to the proposed project by project partners or other key participants validated by letters of commitment.

Criterion 4: Diversity, Equity, and Inclusion (Weight 10%)

This criterion involves consideration of the following factors:

- The quality and manner in which the measures incorporate diversity, equity and inclusion goals in the project; and
- Extent to which the project benefits underserved communities.

iv. Full Applications (For AOIs 1, 2, 8)

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

Criterion 1: Project Merit, Innovation, and Impact (Weight 35%)

This criterion involves consideration of the following factors:

- Extent to which the proposed approach has merit and is responsive to the topic area objectives;
- Extent to which the application objectively describes, using quantifiable metrics, the problem that is being addressed by this project, and defines a baseline upon which progress can be measured; and
- Extent to which the application demonstrates, using measurable parameters, supporting data, and analysis, that the project outcomes will significantly advance the baseline in the project's geographic area.

Criterion 2: Project Plan (Weight 35%)

This criterion involves consideration of the following factors:

- Extent to which the workplan includes required tasks; risk mitigation strategies; and the schedule includes reasonable task durations, logical task ordering, and a defined critical path;
- Appropriateness of the proposed technical and project metrics, including SMART (specific, measurable, achievable, relevant, and time-based) milestones and Go/No-Go decision points, and the extent to which they enable objective monitoring and control of technical and project progress, including decisions regarding project continuation;

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- Reasonableness of the proposed plan for collecting, utilizing, analyzing, and publicly sharing project data; and
- Extent to which the project is constructed to have ongoing impact, produce valuable insights and best practices, and communicate to other organizations recommendations for how to replicate project successes.

Criterion 3: Project Team and Resources (Weight 20%)

This criterion involves consideration of the following factors:

- Extent of team member qualifications, expertise, and experience, in relation to project and AOI objectives;
- Reasonableness of the allocation of project resources, including key personnel time commitment, to ensure the successful completion of the proposed work; and
- Extent and appropriateness of resource commitment to the proposed project by project partners or other key participants as validated by letters of commitment.

Criterion 4: Diversity, Equity, and Inclusion (Weight 10%)

This criterion involves consideration of the following factors:

- The quality and manner in which the measures incorporate diversity, equity and inclusion goals in the project; and
- Extent to which the project benefits underserved communities.

B. Standards for Application Evaluation

Applications that are determined to be eligible will be evaluated in accordance with this FOA, by the standards set forth in EERE's Notice of Objective Merit Review Procedure (76 Fed. Reg. 17846, March 31, 2011) and the guidance provided in the "DOE Merit Review Guide for Financial Assistance," effective April 14, 2017, 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:

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- Whether the proposed project exhibits technological diversity when compared to the existing DOE project portfolio and other projects selected from the subject FOA;
- Whether the proposed project collectively represents diversity of applicant organizations, organization types, and/or organization sizes;
- The level of industry involvement and demonstrated ability to accelerate commercialization and overcome key market barriers;
- Whether the proposed project is likely to lead to increased employment and manufacturing in the United States;
- Whether 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;
- Whether the proposed project, or group of projects, represent a desired geographic distribution (considering past awards and current applications);
- Whether the proposed project, including proposed cost share, optimizes the use of available EERE funding to achieve programmatic objectives; and
- Whether the proposed project incorporates diversity, equity, and inclusion elements, including but not limited to team members from Minority Serving Institutions (e.g. Historically Black Colleges and Universities (HBCUs)/Other Minority Institutions), Minority Business Enterprises, Minority Owned Businesses, Woman Owned Businesses, Veteran Owned Businesses, or members within underserved communities.

D. Evaluation and Selection Process

i. Overview

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

ii. Pre-Selection Clarification

EERE 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, and will be limited to information already provided in the application documentation. The pre-selection clarifications may occur before, during or after the merit review evaluation

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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 EERE's written clarification questions or video or conference calls with EERE representatives.

The information provided by applicants to EERE through pre-selection clarifications is incorporated in their applications and contributes to the merit review evaluation and EERE's selection decisions. If EERE 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.

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

iii. Recipient Integrity and Performance Matters

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

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

DOE will consider any written comments by the applicant, in addition to the other information in the designated integrity and performance system, in making a judgment about the applicant's integrity, business ethics, and record of performance under federal awards when completing the review of risk posed by applicants as described in 2 C.F.R. § 200.205.

iv. Selection

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

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E. Anticipated Notice of Selection and Award Negotiation Dates

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

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VI. Award Administration Information

A. Award Notices

i. Ineligible Submissions

Ineligible Concept Papers and Full Applications will not be further reviewed or considered for award. The Contracting Officer will send a notification letter by email to the technical and administrative points of contact designated by the applicant in the EERE Exchange. The notification letter will state the basis upon which the Concept Paper or the Full Application is ineligible and not considered for further review.

ii. Concept Papers

EERE will notify applicants of its determination to encourage or discourage the submission of a Full Application.

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

A notification encouraging the submission of a Full Application does not authorize the applicant to commence performance of the project. Please refer to Section IV.I.ii of the FOA for guidance on pre-award costs.

iii. Full Application Notifications

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

iv. Successful Applicants

Receipt of a notification letter selecting a Full Application for award negotiations does not authorize the applicant to commence performance of the project. If an

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application is selected for award negotiations, it is not a commitment by EERE to issue an award. Applicants do not receive an award until award negotiations are complete and the Contracting Officer executes the funding agreement, accessible by the prime recipient in FedConnect.

The award negotiation process will take approximately 60 days. Applicants must designate a primary and a backup point-of-contact in the EERE Exchange with whom EERE 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, EERE will cancel the award negotiations and rescind the Selection. EERE reserves the right to terminate award negotiations at any time for any reason.

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

v. Alternate Selection Determinations

In some instances, an applicant may receive a notification that its application was not selected for award and EERE designated the application to be an alternate. As an alternate, EERE 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. EERE may ultimately determine to select or not select the Full Application for award negotiations.

vi. Unsuccessful Applicants

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

B. Administrative and National Policy Requirements

i. Registration Requirements

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

1. EERE Exchange

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Register and create an account on EERE Exchange at <https://eere-Exchange.energy.gov>. This account will then allow the user to register for any open EERE FOAs that are currently in EERE Exchange. It is recommended that each organization or business unit, whether acting as a team or a single entity, use only one account as the contact point for each submission. Applicants should also designate backup points of contact so they may be easily contacted if deemed necessary. **This step is required to apply to this FOA.**

The EERE Exchange registration does not have a delay; however, **the remaining registration requirements below could take several weeks to process and are necessary for a potential applicant to receive an award under this FOA.**

2. DUNS Number

Obtain a DUNS number (including the plus 4 extension, if applicable) at <http://fedgov.dnb.com/webform>.

3. System for Award Management

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

4. FedConnect

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

5. Grants.gov

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

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

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ii. Pending and Current Sources of 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. If selected for award negotiations, the principal investigator and each senior/key person at the recipient 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 foreign government-sponsored talent recruitment programs must be identified in current and pending support. The information may be provided in the format approved by the National Science Foundation (NSF), which may be generated by the Science Experts Network Curriculum Vita (SciENCv), a cooperative venture maintained at <https://www.ncbi.nlm.nih.gov/sciencv/>, and is also available at <https://www.nsf.gov/bfa/dias/policy/nsfapprovedformats/cps.pdf>. The use of a format required by another agency is intended to reduce the administrative burden to researchers by promoting the use of common formats.

For every activity, list the following items:

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

iii. Award Administrative Requirements

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

iv. Foreign National Access Under DOE Order 142.3A, “Unclassified Foreign Visits and Assignments Program”

All applicants selected for an award under this FOA are required to provide information to the Department of Energy (DOE) in order to satisfy requirements for foreign nationals’ access to DOE sites, information, technologies, equipment, programs, or personnel. A “foreign national” is defined as any person who is not a U.S. citizen by birth or naturalization.

If a selected applicant anticipates involving foreign nationals in the performance of its Award, the selected applicant must provide specific information about each foreign national to DOE for review and consideration. The selected applicant must provide this information for any foreign national who will participate in the performance of the Award for the selected applicant or any subrecipient. The information must also be provided for any foreign national who will provide a service under a contract and who will be exposed to Official Use Only (OUO) or business sensitive information, or information or technology developed under the Award that may be included under any category of national or state security.

The Secretary of Energy or the Secretary’s assigned approval authority must approve foreign national participation before any foreign national may gain access to DOE sites, information, technologies, equipment, programs, or personnel or begin performance of any work under the Award.

v. 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.

vi. 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>.

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

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

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

viii. Applicant Representations and Certifications**1. Lobbying Restrictions**

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

2. Corporate Felony Conviction and Federal Tax Liability Representations

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

- a.** It is **not** a corporation that has been convicted of a felony criminal violation under any federal law within the preceding 24 months; and
- b.** It is **not** a corporation that has any unpaid federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability.

For purposes of these representations the following definitions apply:

A Corporation includes any entity that has filed articles of incorporation in any of the 50 states, the District of Columbia, or the various territories of the United States [but not foreign corporations]. It includes both for-profit and non-profit organizations.

3. Nondisclosure and Confidentiality Agreements Representations

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

- a. It **does not and will not** require its employees or contractors to sign internal nondisclosure or confidentiality agreements or statements prohibiting or otherwise restricting its employees or contractors from lawfully reporting waste, fraud, or abuse to a designated investigative or law enforcement representative of a federal department or agency authorized to receive such information.
- b. It **does not and will not** use any federal funds to implement or enforce any nondisclosure and/or confidentiality policy, form, or agreement it uses unless it contains the following provisions:
 - (1) *“These provisions are consistent with and do not supersede, conflict with, or otherwise alter the employee obligations, rights, or liabilities created by existing statute or Executive order relating to (1) classified information, (2) communications to Congress, (3) the reporting to an Inspector General of a violation of any law, rule, or regulation, or mismanagement, a gross waste of funds, an abuse of authority, or a substantial and specific danger to public health or safety, or (4) any other whistleblower protection. The definitions, requirements, obligations, rights, sanctions, and liabilities created by controlling Executive orders and statutory provisions are incorporated into this agreement and are controlling.”*
 - (2) The limitation above shall not contravene requirements applicable to Standard Form 312 Classified Information Nondisclosure Agreement (<https://fas.org/sgp/othergov/sf312.pdf>), Form 4414 Sensitive Compartmented Information Disclosure Agreement (<https://fas.org/sgp/othergov/intel/sf4414.pdf>), or any other form issued by a federal department or agency governing the nondisclosure of classified information.

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

ix. Statement of Federal Stewardship

EERE will exercise normal federal stewardship in overseeing the project activities performed under EERE 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

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

1. EERE shares responsibility with the recipient for the management, control, direction, and performance of the project.
2. EERE may intervene in the conduct or performance of work under this award for programmatic reasons. Intervention includes the interruption or modification of the conduct or performance of project activities.
3. EERE may redirect or discontinue funding the project based on the outcome of EERE's evaluation of the project at the Go/No-Go decision point(s).
4. EERE participates in major project decision-making processes.

xi. Subject Invention Utilization Reporting

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

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

xiv. 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. At the Go/No-Go decision points, EERE will evaluate project performance, project schedule adherence, meeting milestone objectives, compliance with reporting requirements, and overall contribution to the EERE program goals and objectives. Federal funding beyond the Go/No-Go decision point (continuation funding) is contingent upon (1) availability of federal funds appropriated by Congress for the purpose of this program; (2) the availability of future-year budget authority; (3) recipient's technical progress compared to the Milestone Summary Table stated in Attachment 1 of the award; (4) recipient's submittal of required reports; (5) recipient's compliance with the terms and conditions of the award; (6) EERE's Go/No-Go decision; (7) the recipient's submission of a continuation application; 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, EERE may take appropriate action, including but not limited to, redirecting, suspending or terminating the award.

xv. Conference Spending

The recipient shall not expend any funds on a conference not directly and programmatically related to the purpose for which the grant or cooperative agreement was awarded that would defray the cost to the United States government of a conference held by any Executive branch department, agency, board, commission, or office for which the cost to the United States government would otherwise exceed \$20,000, thereby circumventing the required notification by the head of any such Executive Branch department, agency, board, commission, or office to the Inspector General (or senior ethics official for any entity without an Inspector General), of the date, location, and number of employees attending such conference.

xvi. 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.

VII. Questions/Agency Contacts

Upon the issuance of a FOA, EERE 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 the content of this FOA must be submitted to: DE-FOA-0002475@netl.doe.gov. Questions must be submitted no later than 5 business days prior to the application due date and time. Please note, feedback on individual concepts will not be provided through Q&A.

All questions and answers related to this FOA will be posted on EERE Exchange at: <https://eere-exchange.energy.gov>. **Please note that you must first select this specific FOA Number in order to view the questions and answers specific to this FOA.** EERE will attempt to respond to a question within 5 business days, unless a similar question and answer has already been posted on the website. All questions submitted must clearly identify the Topic Area to insure a timely and accurate response. Failure to identify the AOI, or not being as specific as possible with a question, may result in additional time to address the question or require further correspondence for further clarification regarding the submitted questions.

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

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VIII. Other Information

A. FOA Modifications

Amendments to this FOA will be posted on the EERE Exchange website and the Grants.gov system. However, you will only receive an email when an amendment or a FOA is posted on these sites if you register for email notifications for this FOA in Grants.gov. EERE recommends that you register as soon after the release of the FOA as possible to ensure you receive timely notice of any amendments or other FOAs.

B. Government Right to Reject or Negotiate

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

C. Commitment of Public Funds

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

D. Treatment of Application Information

Applicants should not include trade secrets or commercial or financial information that is privileged or confidential in their application unless such information is necessary to convey an understanding of the proposed project or to comply with a requirement in the FOA. Applicants are advised to not include any critically sensitive proprietary detail.

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

Full Applications and other submissions containing confidential, proprietary, or privileged information must be marked as described below. Failure to comply with

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these marking requirements may result in the disclosure of the unmarked information under the Freedom of Information Act or otherwise. The U.S. Government is not liable for the disclosure or use of unmarked information, and may use or disclose such information for any purpose.

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

Notice of Restriction on Disclosure and Use of Data:

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

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

E. Evaluation and Administration by Non-Federal Personnel

In conducting the merit review evaluation, 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 EERE 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

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

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

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

H. Requirement for Full and Complete Disclosure

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

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

I. Retention of Submissions

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

J. Title to Subject Inventions

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

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

DOE has issued a class waiver that applies to this FOA. Under this class waiver,

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domestic large businesses may elect title to their subject inventions similar to the right provided to the domestic small businesses, educational institutions, and nonprofits by law. In order to avail itself of the class waiver, a domestic large business must agree that any products embodying or produced through the use of a subject invention first created or reduced to practice under this program will be substantially manufactured in the United States, unless DOE agrees that the commitments proposed in the U.S. Manufacturing Plan are sufficient.

- **Advance and Identified Waivers:** Applicants 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 EERE 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; and
- AOs 4a, 4b, 5, 6 and 7 are required to submit a U.S. Manufacturing Plan as part of their application. If selected, the U.S. Manufacturing Plan shall be incorporated into the award terms and conditions for domestic small businesses and nonprofit organizations. DOE has determined that exceptional circumstances exist that warrants the modification of the standard patent rights clause for small businesses and non-profit awardees under Bayh-Dole to the extent necessary to implement and enforce the U.S. Manufacturing Plan. Any Bayh-Dole entity (domestic small business or nonprofit organization) affected by this DEC has the right to appeal it.

K. Government Rights in Subject Inventions

Where prime recipients and subrecipients retain title to subject inventions, the U.S. 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 contractors doing work on behalf of the government.

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

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their assignees or exclusive licensees), to grant a license for use of the invention to a third party. In addition, the government may grant licenses for use of the subject invention when a prime recipient, subrecipient, or their assignees and exclusive licensees refuse to do so.

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

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

Any determination that march-in rights are warranted must follow a fact-finding process in which the recipient has certain rights to present evidence and witnesses, confront witnesses and appear with counsel and appeal any adverse decision. 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 U.S. government will not normally require delivery of confidential or trade secret-type technical data developed solely at private expense prior to issuance of an award, except as necessary to monitor technical progress and evaluate the potential of proposed technologies to reach specific technical and cost metrics.

Topic Areas 3, 4a, 4b, 5, 6, and 7: Government Rights in Technical Data

Produced Under Awards: The U.S. government normally retains unlimited rights in technical data produced under government financial assistance awards, including the right to distribute to the public. However, pursuant to special statutory authority, certain categories of data generated under EERE awards may be protected from public disclosure for up to five years after the data is generated (“Protected Data”). For awards permitting Protected Data, the protected data must be marked as set forth in the award’s intellectual property terms and conditions and a listing of unlimited rights data (i.e., non-protected data) must be inserted into the data clause in the award. In addition, invention disclosures may

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be protected from public disclosure for a reasonable time in order to allow for filing a patent application.

Topic Areas 1, 2, and 8: Government Rights in Technical Data Produced Under Awards: The U.S. 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 EERE 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. In addition, for those awards requiring distribution of software as Open-Source Software (OSS), the additional information in Appendix D must be addressed in the application.

N. Export Control

The U.S. government regulates the transfer of information, commodities, technology, and software considered to be strategically important to the U.S. to protect national security, foreign policy, and economic interests without imposing undue regulatory burdens on legitimate international trade. There is a network of federal agencies and regulations that govern exports that are collectively referred to as “Export Controls”. To ensure compliance with Export Controls, it is the prime recipient’s responsibility to determine when its project activities trigger Export Controls and to ensure compliance.

Export Controls may apply to individual projects, depending on the nature of the tasks. When Export Controls apply, the recipient must take the appropriate steps to obtain any required governmental licenses, monitor and control access to restricted information, and safeguard all controlled materials. Under no circumstances may foreign entities (organizations, companies or persons) receive access to export controlled information unless proper export procedures have been satisfied and such access is authorized pursuant to law or regulation.

Applicants are advised that some of the results of the research conducted under this FOA may be restricted for proprietary reasons and not published or shared broadly within the scientific community.

O. Personally Identifiable Information (PII)

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

<https://www.whitehouse.gov/sites/whitehouse.gov/files/omb/memoranda/2007/m07-16.pdf>

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

P. 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 C.F.R. § 910.501 and Subpart F.

If an educational institution, non-profit organization, or state/local government is a prime recipient or subrecipient and has expended \$750,000 or more of federal awards during the non-federal entity's fiscal year, then a Single or Program-Specific Audit is required. For additional information, please refer to 2 C.F.R. § 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. EERE will share in the cost of the audit at its applicable cost share ratio.

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

Recipients and subrecipients are prohibited from obligating or expending federal funds to procure or obtain; extend or renew a contract to procure or obtain; or enter into a contract (or extend or renew a contract) to procure or obtain equipment, services, or systems that use covered telecommunications equipment or services as a substantial or essential component of any system, or as critical technology as part of any system. As described in Public Law 115-232, section 889, covered telecommunications equipment is telecommunications equipment produced by Huawei Technologies Company or ZTE Corporation (or any subsidiary or affiliate of such entities).

- a. For the purpose of public safety, security of government facilities, physical security surveillance of critical infrastructure, and other national security purposes, video surveillance and telecommunications equipment produced by Hytera Communications Corporation, Hangzhou Hikvision Digital Technology Company, or Dahua Technology Company (or any subsidiary or affiliate of such entities).
- b. Telecommunications or video surveillance services provided by such entities or using such equipment.
- c. Telecommunications or video surveillance equipment or services produced or provided by an entity that the Secretary of Defense, in consultation with the Director of the National Intelligence or the Director of the Federal Bureau of Investigation, reasonably believes to be an entity owned or controlled by, or otherwise connected to, the government of a covered foreign country.

Certain prohibited equipment, systems, or services, including equipment, systems, or services produced or provided by entities identified in Public Law 115-232, section 889, are recorded in the System for Award Management exclusion list.

R. Foreign Government-Sponsored Talent Recruitment Program Prohibition

Recipients of DOE financial assistance awards and project participants are prohibited from participating in certain foreign-government sponsored talent recruitment programs. The purpose of this prohibition is to ensure the protection of U.S. competitive and national security interests and DOE program objectives; prevent potential conflicts of interest; and limit unauthorized transfers of scientific and technical information.

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Selected applicants and Recipients of financial assistance awards under this FOA may be required to submit disclosures and/or certifications to ensure compliance with the prohibition; individual certifications and/or disclosures may be required for the selected applicant, Recipient, and certain project participants (at the recipient, subrecipient, and contractor levels). Further, to exercise due diligence, Recipients of a financial assistance award under this FOA may be required to submit updated disclosures and/or certifications during the life of the award to ensure that neither they nor certain project participants (at the recipient, subrecipient, and contractor levels) are participating in certain foreign government-sponsored talent recruitment programs.

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

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

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. EERE almost always uses the term “cost sharing,” as it conveys the concept that non-federal share is calculated as a percentage of the Total Project Cost. An exception is the State Energy Program Regulation, 10 CFR 420.12, State Matching Contribution. Here “cost matching” for the non-federal share is calculated as a percentage of the federal funds only, rather than the Total Project Cost.

How Cost Sharing Is Calculated

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

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

What Qualifies for Cost Sharing

While it is not possible to explain what specifically qualifies for cost sharing in one or even a couple of sentences, in general, if a cost is allowable under the cost principles applicable to the organization incurring the cost and is eligible for reimbursement under an EERE 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, EERE 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, EERE generally does not allow pre-award costs prior to the signing of the Selection Statement by the EERE Selection Official.

General Cost Sharing Rules on a DOE Award

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

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

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

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

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

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

(B) Valuing and documenting contributions

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- (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

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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 – SAMPLE COST SHARE CALCULATION FOR BLENDED COST SHARE PERCENTAGE

The following example shows the math for calculating required cost share for a project with \$2,000,000 in federal funds with four tasks requiring different non-federal cost share percentages:

Task	Proposed Federal Share	Federal Share %	Recipient Share %
Task 1 (R&D)	\$1,000,000	80%	20%
Task 2 (R&D)	\$500,000	80%	20%
Task 3 (Demonstration)	\$400,000	50%	50%
Task 4 (Outreach)	\$100,000	100%	0%

Federal share (\$) divided by federal share (%) = Task Cost

Each task must be calculated individually as follows:

Task 1

\$1,000,000 divided by 80% = \$1,250,000 (Task 1 Cost)

Task 1 Cost minus federal share = non-federal share

\$1,250,000 - \$1,000,000 = \$250,000 (non-federal share)

Task 2

\$500,000 divided 80% = \$625,000 (Task 2 Cost)

Task 2 Cost minus federal share = non-federal share

\$625,000 - \$500,000 = \$125,000 (non-federal share)

Task 3

\$400,000 / 50% = \$800,000 (Task 3 Cost)

Task 3 Cost minus federal share = non-federal share

\$800,000 - \$400,000 = \$400,000 (non-federal share)

Task 4

Federal share = \$100,000

Non-federal cost share is not mandated for outreach = \$0 (non-federal share)

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The calculation may then be completed as follows:

Tasks	\$ Federal Share	% Federal Share	\$ Non-Federal Share	% Non-Federal Share	Total Project Cost
Task 1	\$1,000,000	80%	\$250,000	20%	\$1,250,000
Task 2	\$500,000	80%	\$125,000	20%	\$625,000
Task 3	\$400,000	50%	\$400,000	50%	\$800,000
Task 4	\$100,000	100%	\$0	0%	\$100,000
Totals	\$2,000,000		\$775,000		\$2,775,000

Blended Cost Share %

Non-federal share (\$775,000) divided by Total Project Cost (\$2,775,000) = 27.9% (non-federal)

Federal share (\$2,000,000) divided by Total Project Cost (\$2,775,000) = 72.1% (federal)

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APPENDIX C – WAIVER REQUESTS AND APPROVAL PROCESSES

PERFORMANCE OF WORK IN THE UNITED STATES (FOREIGN WORK WAIVER)

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

As set forth in Section IV.J.iii., all work under EERE funding agreements must be performed in the United States. This requirement does not apply to the purchase of supplies and equipment, so a waiver is not required for foreign purchases of these items. However, the prime recipient should make every effort to purchase supplies and equipment within the United States. There may be limited circumstances where it is in the interest of the project to perform a portion of the work outside 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 EERE 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 to waive the *Performance of Work in the United States* requirement must include the following:

- The rationale for performing the work outside the U.S. (“foreign work”);
- A description of the work proposed to be performed outside the U.S.;
- An explanation as to how the foreign work is essential to the project;
- A description of the anticipated benefits to be realized by the proposed foreign work and the anticipated contributions to the US economy;
- The associated benefits to be realized and the contribution to the project from the foreign work;
- How the foreign work will benefit U.S. research, development and manufacturing, including contributions to employment in the U.S. and growth in new markets and jobs in the U.S.;
- How the foreign work will promote domestic American manufacturing of products and/or services;
- A description of the likelihood of Intellectual Property (IP) being created from the foreign work and the treatment of any such IP;
- The total estimated cost (DOE and recipient cost share) of the proposed foreign work;
- The countries in which the foreign work is proposed to be performed; and

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- The name of the entity that would perform the foreign work.

EERE may require additional information before considering the waiver request.

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

APPENDIX D – GLOSSARY

Applicant – The lead organization submitting an application under the FOA.

Continuation application – 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 to EERE its continuation application, which includes the following information:

- i. A report on the Recipient’s progress towards meeting the objectives of the project, including any 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 negotiated Statement of Project Objectives and/or Milestone Summary Table.

Cooperative Research and Development Agreement (CRADA) – a contractual agreement between a national laboratory contractor and a private company or university to work together on research and development. For more information, see <https://www.energy.gov/gc/downloads/doe-cooperative-research-and-development-agreements>.

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

Go/No-Go Decision Points – A decision point at the end of a budget period that defines the overall objectives, milestones and deliverables to be achieved by the recipient in that budget period. As of a result of EERE’s review, EERE may take one of the following actions: 1) authorize federal funding for the next budget period; 2) recommend redirection of work; 3) discontinue providing federal funding beyond the current budget period; or 4) place a hold on federal funding pending further supporting data.

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Project – The entire scope of the cooperative agreement which is contained in the recipient’s Statement of Project Objectives.

Recipient or “Prime Recipient” – A non-federal entity that receives a federal award directly from a federal awarding agency to carry out an activity under a federal program. The term recipient does not include subrecipients.

Subrecipient – A non-federal entity that receives a subaward from a pass-through entity to carry out part of a federal program; but does not include an individual that is a beneficiary of such program. A subrecipient may also be a recipient of other federal awards directly from a federal awarding agency. Also, a DOE/NNSA and non-DOE/NNSA FFRDC may be proposed as a subrecipient on another entity’s application. See section III.E.ii.

APPENDIX E – 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

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APPENDIX F – LIST OF ACRONYMS

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

COI	Conflict of Interest
DEC	Determination of Exceptional Circumstances
DMP	Data Management Plan
DOE	Department of Energy
DOI	Digital Object Identifier
EERE	Energy Efficiency and Renewable Energy
FAR	Federal Acquisition Regulation
FFATA	Federal Funding and Transparency Act of 2006
FOA	Funding Opportunity Announcement
FOIA	Freedom of Information Act
FFRDC	Federally Funded Research and Development Center
GAAP	Generally Accepted Accounting Principles
IPMP	Intellectual Property Management Plan
M&O	Management and Operating
MPIN	Marketing Partner ID Number
MYPP	Multi-Year Program Plan
NDA	Non-Disclosure Acknowledgement
NEPA	National Environmental Policy Act
NNSA	National Nuclear Security Agency
OMB	Office of Management and Budget
OSTI	Office of Scientific and Technical Information
PII	Personal Identifiable Information
R&D	Research and Development
RFI	Request for Information
RFP	Request for Proposal
SAM	System for Award Management
SOPO	Statement of Project Objectives
SPOC	Single Point of Contact
TIA	Technology Investment Agreement
TRL	Technology Readiness Level
UCC	Uniform Commercial Code
WBS	Work Breakdown Structure
WP	Work Proposal

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APPENDIX G -- 2021 DOE EERE FUNDING OPPORTUNITY ANNOUNCEMENT (FOA) APPLICANT DIVERSITY EQUITY AND INCLUSION (DEI) SUPPLEMENT

This is a supplemental document providing U.S. Department of Energy (DOE) Office of Energy Efficiency and Renewable Energy (EERE) FOA applicants a high-level overview of DEI priorities and requirements. Review the full FOA and Frequently Asked Questions webpage on EERE Exchange for complete information.

Section 1. Key Term Definitions

Diversity includes a broad spectrum of characteristics including, but not limited to, race, color, ethnicity, national origin, age, religion, culture, language, disability, sexual orientation, gender identity, socioeconomic status, family structure, geographic differences, diversity of thought, technical expertise, and life experiences.

Equity is the consistent and systematic fair, just, and impartial treatment of all individuals, including individuals who belong to underserved communities that have been denied such treatment, such as 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 and other underserved areas; and persons otherwise adversely affected by persistent poverty or inequality. *Source: EO 13985*

Inclusion is a process that cultivates a work environment that encourages collaboration, flexibility, and fairness; and leverages diversity throughout the organization so that all individuals are enabled to participate and contribute to their full potential.

Underserved Communities refer to populations sharing a particular characteristic, as well as geographic communities, that have been systematically denied a full opportunity to participate in aspects of economic, social, and civic life, as exemplified by the list in the definition of “equity.” *Source: EO 13985*

For purposes of this FOA, as applicable to geographic communities, applicants can refer to

- economically distressed communities identified by the Internal Revenue Service as Qualified Opportunity Zones;
- communities identified as disadvantaged or underserved communities by their respective States;
- communities identified on the Index of Deep Disadvantage referenced at <https://news.umich.edu/new-index-ranks-americas-100-most-disadvantaged-communities/>, and
- communities that otherwise meet the definition of “underserved communities” stated above.

Underrepresented groups in STEM (science, technology, engineering and math) fields that drive the energy sector include women, persons with disabilities, and underrepresented minority groups—blacks or African Americans, Hispanics or Latinos, and American Indians or Alaska Natives. *Source:*

<https://nces.nsf.gov/pubs/nsf19304/digest/about-this-report>

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Section 2. DEI Plan and Technical Review Criteria

Applicants are required to submit a DEI Plan that describes the actions the applicant will take to foster a welcoming and inclusive environment, support people from underrepresented groups in STEM, advance equity, and encourage the inclusion of individuals from these groups in the project; and the extent the project activities will be located in or benefit underserved communities.

The DEI Plan should contain the following information:

- **Equity Impacts:** the impacts of the proposed project on underserved communities, including social and environmental impacts.
- **Benefits:** The overall benefits of the proposed project, if funded, to underserved communities; and
- How diversity, equity, and inclusion objectives will be incorporated in the project.

When developing the DEI Plan, consider:

- **Participation:** For underserved communities being impacted and/or receiving benefits from the project, are they involved in planning and implementing the project? How well are underrepresented groups supported in terms of mentorship, training, and other opportunities?
- **Benefit:** Are direct/tangible benefits being conferred to underserved communities? Will the benefits increase quality of life (e.g. health, wealth)? Are they indirect benefits? Are the benefits being adequately measured? How are these benefits being distributed? Are they being communicated?
- **Impact:** What are the social and environmental impacts on underserved communities? Are these impacts being adequately monitored and evaluated? What steps are taken to mitigate risks/harms and optimize benefits?

Applications will be evaluated against merit review criteria including a 10% weight for DEI.

Criterion 4: Diversity, Equity, and Inclusion (Weight 10%)

This criterion involves consideration of the following factors:

- The quality and manner in which the measures incorporate diversity, equity and inclusion goals in the project; and
- Extent to which the project benefits underserved communities