

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

**Fiscal Year 2022 Vehicle Technologies Office Program Wide  
Funding Opportunity Announcement**

**Funding Opportunity Announcement (FOA) Number: DE-FOA-0002611**

**FOA Type: Initial**

**Assistance Listing Number: 81.086**

FOA Issue Date:	July 21, 2022
Amendment 000001	August 12, 2022
Amendment 000002	September 7, 2022
Submission Deadline for Concept Papers:	August 25, 2022 5:00pm ET September 1, 2022 5:00pm ET
Anticipated Date of Concept Paper Notification:	October 4, 2022 - November 3, 2022 October 7, 2022
Submission Deadline for Full Applications:	November 10, 2022 - December 14, 2022 5:00pm ET November 9, 2022 5:00pm ET
Expected Date for EERE Selection Notifications:	March - April 2023 February - March 2023
Expected Timeframe for Award Negotiations:	March - April - June 2023 February - May 2023

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

Questions about this FOA? Email [DE-FOA-0002611@netl.doe.gov](mailto:DE-FOA-0002611@netl.doe.gov).

Problems with EERE Exchange? Email [EERE-ExchangeSupport@hq.doe.gov](mailto: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 Amendment 000001 are highlighted in yellow.

All changes to the Funding Opportunity Announcement as a result of Amendment 000002 are highlighted in green.

Amendment No.	Date	Description of Amendment
000001	08/12/2022	The purpose of this amendment is the following: Updated deadlines on coverpage; Correction on “Specific/Special Deliverables” for all AOIs; AOI 1 – Clarification that neodymium is not a heavy rare earth metal; AOI 1 – Cost share consolidated to 20%; AOI 2 – Error in general requirements corrected to 600kW
000002	09/07/2022	The purpose of this amendment is to update the deadlines on the coverpage.

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## 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 Universal Entity Identifier (UEI) number, register with the System for Award Management (SAM), register with Grants.gov, 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 an UEI from the SAM to uniquely identify the entity.** The UEI is available in the SAM entity registration record. NOTE: Subawardees/subrecipients at all tiers must also obtain an UEI from the SAM and provide the UEI to the Prime Recipient before the subaward can be issued.

**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.fsd.gov/gsafsd\\_sp?id=gsafsd\\_kb\\_articles&sys\\_id=650d493e1bab7c105465eaccac4bcbcb](https://www.fsd.gov/gsafsd_sp?id=gsafsd_kb_articles&sys_id=650d493e1bab7c105465eaccac4bcbcb).

(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://www.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_Ready_Set_Go.pdf).

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Problems with EERE Exchange? Email [EERE-ExchangeSupport@hq.doe.gov](mailto:EERE-ExchangeSupport@hq.doe.gov) Include FOA name and number in subject line.

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### **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](mailto:EERE-ExchangeSupport@hq.doe.gov).

Questions related to the content of the FOA must be submitted to: [DE-FOA-0002611@netl.doe.gov](mailto:DE-FOA-0002611@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? Email [DE-FOA-0002611@netl.doe.gov](mailto:DE-FOA-0002611@netl.doe.gov).*

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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, “Fiscal Year 2022 Vehicle Technologies Office Program Wide 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. § Electric Drive System Innovations
- § 17011-17013)

#### 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”<sup>1</sup> 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 needs<sup>2</sup> 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 transportation<sup>3</sup>, making it the most expensive spending category after housing. This can be up to 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.

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

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

<sup>3</sup> Transportation Energy Data Book Edition 37, ORNL, Table 10.1.

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.

## **ii. Technology Space and Strategic Goals**

This funding opportunity announcement (FOA) seeks research projects to address priorities in the following areas: the cost-effective deployment of EV charging for those without easy home charging; innovative solutions to improve mobility options for underserved communities; community engagement to accelerate clean transportation options in underserved communities; batteries and electrification; materials technologies; energy-efficient commercial off-road vehicle technologies; medium/heavy duty vehicle corridor charging 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 equity<sup>4</sup> for all, including people of color 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

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<sup>4</sup> 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+) persons; persons with disabilities; persons who live in rural areas; and persons otherwise adversely affected by persistent poverty or inequality.

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.<sup>5</sup>

As part of this whole of government approach, this FOA seeks to encourage the participation of underserved communities<sup>6</sup> and underrepresented groups. Applicants are highly encouraged to include individuals from groups historically underrepresented<sup>7,8</sup> in STEM on their project teams. 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

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

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

<sup>6</sup> 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.

<sup>7</sup> 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>

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

(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.

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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 at least one SMART (Specific, Measurable, Assignable, Realistic and Time-Related) milestone per budget period supported by metrics to measure the success of the proposed actions. This plan will be evaluated as part of the technical review process, and incorporated into the award if selected.

Further, Minority Serving Institutions<sup>9</sup>, Minority Business Enterprises, Minority Owned Businesses, Woman Owned Businesses, Veteran Owned Businesses, or entities located in an 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.).

### **Identifying Disadvantaged Communities (DACs)**

Justice40 directs that 40% of benefits realized from covered programs accrue to “disadvantaged communities” (DACs). OMB Interim Guidance defines a *community* as either: (1) a group of individuals living in geographic proximity (such as census tract), or (2) a geographically dispersed set of individuals (such as migrant workers or Native Americans), where either type of group experiences common conditions.

Nationwide, 13,581 census tracts were identified as disadvantaged (18.6% of 73,056 total U.S. census tracts). Additionally, federally recognized tribal lands and U.S. territories, in their entirety, are categorized as DACs in accordance with OMB’s Interim Guidance “common conditions” definition of community.

The U.S. Department of Energy’s (DOE) convenient online DACs mapping tool can be accessed at: <https://energyjustice.egs.anl.gov/>. Geospatial data files and an excel spreadsheet of the underlying DACs data are available at [www.energy.gov/justice40](http://www.energy.gov/justice40).

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<sup>9</sup> 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>.

For this FOA, DOE will also recognize DACs identified by the joint U.S. Department of Transportation (DOT) and DOE interim guidance DAC definition for the National Electric Vehicle Infrastructure (NEVI) program

(<https://www.anl.gov/es/electric-vehicle-charging-equity-considerations>). The joint DOT and DOE interim guidance DAC definition is based on the Justice40 Interim Guidance<sup>10</sup> and uses publicly available data sets that capture vulnerable populations, health, transportation access and burden, energy burden, fossil dependence, resilience, and environmental and climate hazards. The joint DOT and DOE interim guidance DAC definition for the NEVI program includes three components:

1. Combined census tracts from DOT's working DAC definition and DOE's working DAC definition;
2. Tribal Lands; and
3. U.S. Territories.

#### **iv. Teaming Partner List**

DOE is compiling a Teaming Partner List to facilitate the formation of new project teams for AOs 6, 7a, 7b, 8, 9, 10, 11 and 12 for this potential FOA. The Teaming Partner List allows organizations who may wish to participate on an application to express their interest to other applicants and to explore potential partnerships.

Updates to the Teaming Partner List will be available in the EERE Exchange website after the FOA is published. The Teaming Partner List will be regularly updated to reflect new teaming partners who have provided their organization's teaming partner information.

**SUBMISSION INSTRUCTIONS:** Any organization that would like to be included on this list should submit the following information: Organization Name, Contact Name, Contact Address, Contact Email, Contact Phone, Organization Type, Area of Technical Expertise, Brief Description of Capabilities, and Area of Interest. Interested parties should email the information to [DE-FOA-0002611@netl.doe.gov](mailto:DE-FOA-0002611@netl.doe.gov) with the subject line "Teaming Partner Information."

*DISCLAIMER: By submitting a request to be included on the Teaming Partner List, the requesting organization consents to the publication of the above-referenced information. By enabling and publishing the Teaming Partner List, DOE is not endorsing, sponsoring, or otherwise evaluating the qualifications of the individuals and organizations that are self-identifying themselves for placement*

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<sup>10</sup> Interim Implementation Guidance for the Justice40 Initiative <https://www.whitehouse.gov/wp-content/uploads/2021/07/M-21-28.pdf>

*on this Teaming Partner List. DOE will not pay for the provision of any information, nor will it compensate any applicants or requesting organizations for the development of such information.*

**B. Topic Areas**

<b><u>Topic Area</u></b>	<b><u>Title</u></b>
<b>Battery and Electrification</b>	
1	Electric Drive System Innovations
2	Non-Road Electric Vehicle Charging Concepts
<b>Materials Technology</b>	
3	Powertrain Materials for Battery Electric Vehicles (BEVs)
4	Multi-Functional Material and Structures Research and Development
<b>Decarbonization of Off-Road, Rail and Marine Technologies</b>	
5a	Natural Gas Engine Demonstration for Non-Road, Including Off-Road, Rail and Marine Applications
5b	Low-GHG Concepts for Off-Road Vehicles and Equipment
5c	Advanced Opposed Piston 2-Stroke (OP2S) Hydrogen Combustion Architecture for Heavy-Duty Transportation, Including On-Road and Non-Road (Off-Road, Rail and Marine) Applications
5d	Demonstration of Dimethyl Ether Medium-Duty Engine for Non-Road Applications
<b>Energy Efficient Mobility Systems</b>	
6	Clean Energy Mobility Solutions for Underserved Communities
<b>Technology Integration</b>	
7a	No Home Charging: Multi-Family Housing Innovative Demonstrations, Technical Assistance and Best Practices
7b	No Home Charging: Electric Vehicle Charging for Overnight Parking
8	Community Engagement, Outreach, Technical Assistance, and Training in Underserved Communities
9	Community-Driven Electric Vehicle Charging Deployment in Underserved Communities
10	Innovative Medium- and Heavy-Duty EV Charging and Hydrogen Regional Fueling Corridor Infrastructure Plans
11	Addressing Critical Training Needs for Transportation Decarbonization
12	Demonstration and Deployment – Open Topic
<b>Analysis</b>	
13	Transportation Energy Analysis

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## **AOI 1: Electric Drive System Innovations**

### **Introduction**

Electric traction drive systems are a key component in all electrified vehicle platforms ranging from hybrid to full battery electric vehicles and fuel cell electric vehicles. This includes light-duty vehicles, medium-duty vehicles, and heavy-duty vehicles. Potential future EV designs will require smaller size electric drives at lower costs, with improved performance and durability. These systems will need to incorporate integrated power modules with wide bandgap devices to enable high-efficiency, high power density traction inverters. The majority of production Electric Traction Drive Systems (ETDS) use permanent magnet (PM) motors which contain NdFeB magnets. These magnets account for 20 to 30 percent of the total electric motor costs in today's production systems. This is in large part due to the high prices of heavy rare-earth elements (neodymium and dysprosium) which are needed to prevent demagnetization at high temperatures. Alternatives that reduce or eliminate the impact of these critical materials can have a substantial positive impact on electric vehicle deployment.

### **Objective**

The objective of the area of interest is to research, develop, and validate a high-power, low cost, heavy rare-earth mineral free motor and wide bandgap inverter traction drive system capable of the following:

<b>Technical Requirements <sup>(1)</sup></b>			
<b>Target Units</b>	<b>Electric Traction Drive Systems</b>	<b>High Voltage Power Electronics</b>	<b>Electric Motor</b>
<b>Cost (\$/kW)</b>	≤6	≤2.7	≤3.3
<b>Power Density (kW/L)</b>	≥33	≥100	≥50
<b>Note 1:</b> Targets identified within USDRIVE "Electrical and Electronics Technical Team Roadmap, located at: <a href="https://www.energy.gov/sites/default/files/2017/11/f39/EETT%20Roadmap%2010-27-17.pdf">https://www.energy.gov/sites/default/files/2017/11/f39/EETT%20Roadmap%2010-27-17.pdf</a>			

Please refer to the Gaps and Barriers identified by industry within the USDRIVE "Electrical and Electronics Technical Team Roadmap, located at:

<https://www.energy.gov/sites/default/files/2017/11/f39/EETT%20Roadmap%2010-27-17.pdf>

### **Potential areas of innovation include, but are not limited to:**

- Technologies that implement emerging materials and devices
- Multi-physics integration of power electronics
- Non-rare-earth electric motors
- Component integration
- Wide Band Gap (WBG) semiconductors
- High energy density capacitors

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- Thermal management innovations (high-temperature capability and/or heat management)
- Technologies that enable recycling of critical materials and use of recycled materials
- Technologies that minimize, or eliminate, the use of all rare-earth materials

### **General Requirements**

Applications **must**:

1. Identify a current baseline electric traction drive system design for comparison purposes.
2. Identify, describe, and justify intended vehicle class(es) for application of the system.
3. Identify and describe the flexibility and scalability of the electric traction drive system design to different power levels and/or applications.
4. Describe the rationale for application technical targets if other than the given vehicle classes, or if the Class 8 system will be two separate drive systems (e.g. e-axles) as opposed to center drive.
5. Describe how the proposed R&D will lead to specific improvements in comparison to the baseline system and address the technical targets, with particular emphasis and details on cost reduction, increased power density, and improved performance and durability.
6. Describe the plan for validating the system technical targets through final system testing and characterization.
7. Describe how the proposed technology addresses typical and/or application-specific vehicle conditions and limitations such as cooling, voltages, temperatures, and speeds.
8. Include a plan to participate in the Annual Merit Review held in Washington DC.  
Participate in the Annual Merit Review held in Washington DC.
9. Include a plan to participate in DOE/Industry Partnership meeting as requested.
10. Include a plan to provide input to the VTO Annual Report.

### **Specific Requirements**

None.

### **Teaming Arrangements**

Applicant teams are encouraged to include active participation by Electric Traction Drive System manufacturers, vehicle original equipment manufacturers (OEM), universities, and national laboratories.

### **Special Deliverables**

In addition to the deliverables required in the Federal Assistance Reporting Requirements Checklist, the following deliverables are required:

1. Test plan to validate final drive system performance to technical targets.
2. Listing of estimated manufacturing equipment and equipment cost required to produce the final drive system design.
3. Modular or indentured bill of materials for the final machine design.

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**Applications that include the following are highly discouraged:**

- Applications that duplicate ongoing or previous efforts, see VTO EDT 2020 Annual Report for ongoing research.
- Applications that focus solely on development of an electric traction motor or an electric traction inverter.

**For reference:**

**US DRIVE Partnership EETT Roadmap**

<https://www.energy.gov/sites/default/files/2017/11/f39/EETT%20Roadmap%2010-27-17.pdf>

**VTO EDT 2020 Annual Report**

[https://www1.eere.energy.gov/vehiclesandfuels/downloads/VTO\\_2020\\_APR\\_ELECTRIFICATION\\_COMPILED\\_REPORT\\_July%2014%20compliant\\_.pdf](https://www1.eere.energy.gov/vehiclesandfuels/downloads/VTO_2020_APR_ELECTRIFICATION_COMPILED_REPORT_July%2014%20compliant_.pdf)

## **AOI 2: Non-Road Electric Vehicle Charging Concepts**

### **Introduction**

The electrification of non-road vehicles, including agricultural, construction, rail, marine, and aviation applications, will require unique charging solutions due to the diversity of applications and environments. The high-power charging standards existing and under development for conductive and inductive charging of on-road vehicles provides one an opportunity to reduce the cost for off-road vehicle charging systems. In some cases, the challenge for non-road vehicles will be getting charging to remote work sites (e.g. farms or constructions sites) or managing the unique work environments for these vehicles. The development of novel charging concepts and cost reduction measures for off-road vehicle charging systems will enable greater market penetration of the technology.

### **Objective**

The objective of this AOI is to research, develop and validate innovative charging concepts for electrified off-road vehicles, including agricultural, construction, rail, marine, and/or aviation. This can include both systems capable of higher power, fast charging (at least 1 vehicle at 350 kW and a minimum concurrent charging capability of at least 600 kW when charging multiple vehicles) or lower power solutions that deploy innovative concepts to cost-effectively and practically integrate charging into the daily operation of this non-road vehicles. Projects can utilize equipment using applicable on-road transportation charging standards or standards under development with the goal of reducing cost and enabling broader adoption of electrification in the off-road market. The projects will include development of applicable technology followed by a laboratory or field demonstration.

### **Potential areas of innovation include, but are not limited to:**

1. Integration of Distributed Energy Resources (DER) to enable full charging capability when connected to weak or low capacity grid sources.
2. Sensing, measurement, and control technologies to prevent distribution (electric grid) feeder voltage and frequency violations.
3. Novel safety and fault isolation technologies for DC systems/architectures.
4. Grid intertie technologies to enable charging system portability/relocation.
5. Novel concepts for adapting on-road charging technology to off-road vehicle charging needs and environmental conditions.
6. Charging stations for short-term operation at temporary charging sites.
7. Charging system development to address cable cooling, cord handling, and other challenges associated with high charge rates.
8. Novel concepts to enable secondary capability or dual-use for the system when not charging.

**General Requirements**

Applications ***must***:

1. Identify the charging solution, the real-world use case for that solution and how the development will lead to a demonstration of a combined charge rate greater than 600 kW or of a scale that is relevant to the use case proposed.
2. Identify the planned vehicle and/or equipment application, the typical usage of the charging system, and the potential impact of the technology to the market.
3. Identify the charging technology and the proposed on-road standard(s) or standard(s) under development to be used for the United States market.
4. Describe the proposed R&D to be performed and describe the advancements of the technology to overcome current challenges.
5. Describe the supporting distribution grid requirements (voltage, capacity, etc.) for the technology.
6. Describe the approach to comply with applicable safety and isolation standards.
7. Describe the proposed validation plan of the full-scale system.

**Specific Requirements**

None.

**Teaming Arrangements**

Applicant teams are encouraged to include a vehicle manufacturer or operator and a charging technology manufacturer.

**Special Deliverables**

None.

### **AOI 3: Powertrain Materials for Battery Electric Vehicles (BEVs)**

#### **Introduction**

The US transportation sector is beginning a major transition from vehicles relying primarily on internal combustion engines to a transportation fleet which is a combination of conventional, hybrid electric, and battery electric vehicles. This transition is expected to occur in all classes of vehicles at different rates of uptake depending on the operational requirements of the vehicle. Hybrid and battery electric vehicles are essential to the reduction of greenhouse gas emissions from the transportation sector. However, these vehicles rely on a number of electrical devices such as the traction motor, power electronics controller, DC/DC converter, onboard charger, wired and wireless charging components, and thermal management systems that are designed around the best materials available.

The advent of computer aided material design and new manufacturing methods such as additive manufacturing provide the opportunity to develop materials with properties tailored specifically for the components' technical requirements, such as enhanced electrical conductivity, management of magnetic fields, and thermal transport. By designing new materials, there is an opportunity to improve the component level efficiency and overall vehicle efficiency for future vehicle designs. Tomorrow's electric vehicles will need to be designed with the most efficient components and systems available to ensure that the maximum greenhouse gas emission reductions. To achieve this every component within the vehicle will need to be optimized to maximize its efficiency, while proving durability, minimizing weight, and this needs to be accomplished in a cost-effective manner. To meet these objectives new materials and designs should be developed together to maximize the targeted efficiency of the subcomponent.

#### **Objective**

The objective of this area of interest is to research, develop, and validate component and subcomponent materials for electrified vehicle components and subassemblies that have the capability to reduce system level volume/power density (kW/L), weight/specific power (kW/kg), power (kW), and/or cooling requirements when compared to the baseline system at a cost of ≤\$5/kg-saved.

#### **General Requirements**

Applications **must**:

1. Include a clear description of the current state of the art for the technology.
2. Identify target component and component baseline.
3. Discuss the existing component makeup including materials used in each area of the component.
4. Identify baseline component performance and material properties.
5. Describe material and design improvements to be implemented.
6. Identify the minimum number and description of experiments required to validate

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material properties and component level performance improvements.

7. Identify expected system level volume/power density (kW/L), weight/specific power (kW/kg), power (kW), and cooling requirements.
8. Identify expected total system weight savings relative to current baselines.
9. Include a plan for participation in the Annual Merit Review held in Washington DC.
10. Include a plan for participation in DOE/Industry Partnership meeting as requested.
11. Include plans to provide input to the VTO Annual Report.

### **Specific Requirements**

Target components are listed in the following table:

<b>Target Components</b>	
<b>Target Units</b>	<b>Type component</b>
<b>On-Vehicle Wired &amp; Wireless Charging</b>	Coils, cables, insulators, bus bars, conduits, magnetic interfaces, and thermal management
<b>Power Electronics Controller</b>	Cables, leads, bus bars, insulators, and thermal management
<b>High Current DC/DC Converter</b>	Coils, cables, insulators, conduits, magnetic interfaces, and thermal management
<b>Electrified Vehicle Traction Motors</b>	Laminates, bearings, housings, armature and windings, cables, magnetic interfaces, lubrication, thermal management, and support structures

### **Teaming Arrangements**

Applicant teams must include an automotive OEM, tier 1 supplier, or automotive electronics/traction drive component manufacturer to provide performance and manufacturing requirements for the proposed technology in the specified application. Applicant teams are also encouraged to include research partners from universities or National Laboratories to encourage different perspectives from the materials, power electronics or traction drive motor research communities.

### **Special Deliverables**

In addition to the deliverables required in the Federal Assistance Reporting Requirements Checklist, the following deliverables are required for awards made under this AOI:

1. Recipients will be required to provide a complete set of baseline data for the selected components including electrical/mechanical performance; materials data must include all relevant properties such as electrical resistivity, magnetic properties, and mass.
2. Recipients will be required to report the experimental performance, materials properties or sample characteristics relative to the baseline data.
3. Recipients will be required to report on potential commercialization pathways including

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cost models (does the technology achieve the cost goal of \$5/kg-saved) and manufacturing volume limitations.

**Applications that include the following are highly discouraged:**

- Applications that duplicate ongoing or previous efforts, see VTO EDT 2020 Annual Report for ongoing research.
- Applications that do not use current state-of-the-art baselines.
- Applications that focus solely on new component designs using existing materials.
- Applications that focus solely on new batteries or battery materials.

**For reference:**

[Materials Technical Team Roadmap \(energy.gov\)](#)

[EETT Roadmap 10-27-17.pdf \(energy.gov\)](#)

## **AOI 4: Multi-Functional Material and Structures Research and Development**

### **Introduction**

Vehicle lightweighting provides opportunities to increase electric vehicle (EV) driving range, reduce battery size and cost, and decrease carbon emissions. The EV battery management system is critical to the battery's safe operation, overall performance, and longevity. Current vehicle components are designed utilizing the traditional concept of one component structure for one function. Multi-functional materials and structures will allow design of components capable of undertaking multiple functions, increasing battery specific energy capacity, reducing the number of vehicle components and thus overall weight and total cost. The relative benefits are increased with autonomous vehicles (AV) which require additional sensors for safety, which in turn increases the vehicle weight. To address these issues, game-changing strategies of hybridization are needed which integrate dissimilar materials with more/different functionalities into a single structural component. As such, the next generation EV systems can have significantly increased performance at a reduced cost and carbon footprint.

### **Objective**

The objective of this area of interest is to research, develop, and validate a new class of multi-functional (composite) materials and structures.

### **Requirements**

1. Materials and structures will be engineered and manufactured with a synthesis of various types of lightweight materials, multi-functional sensors and devices with embedded sensor networks.
2. Diverse functionalities will be tailored to carry mechanical loads, reduce NVH, improve thermal management, use structural energy storage, and monitor health of the vehicle's components at a system level with reduced weight and complexity.

### **Applications are sought in the following sub-topics. Proposed technologies with a pathway to high-volume manufacturing are encouraged.**

#### **A - Multi-functional Materials Systems Applied to Automotive Applications**

The objective of this area of interest is to research, develop, and validate a new class of multi-functional (composite) materials and structures for use in vehicle component structures for lightweighting and increased performance of the next generation automobiles and provide weight savings and cost reductions compared to the baseline technology.

#### **Potential areas of innovation include, but are not limited to:**

- Autonomic systems - structures that can sense, diagnose, and respond for adjustment with minimum external intervention
- Adaptive systems – structures that allow alternation of shape functionality and mechanical properties on demand

- Self-sustaining systems - structural integration of power harvesting, energy storage, and transmission capabilities

### **B - Efficiency Improvement of the EV Battery Specific Energy Capacity Utilizing Multi-functional Materials and Structures**

The objective of this area of interest is to research, develop, and validate a new class of multi-functional (composite) materials and structures for use in the EV battery management system and its auxiliary structures to increase battery system specific energy capacity (Wh/kg) > 60% and provide weight savings and cost reductions compared to the baseline technology.

#### **Potential areas of innovation include, but are not limited to:**

- Innovative material options for enhanced thermal management performance
- Innovative material designs for enhanced structural performance
- Real-time battery management system monitoring, remaining life prediction (SOC/SOH), and useful life estimation

### **General Requirements**

Applications **must**:

1. Identify a vehicle component focusing on at least two specific functions that will be achieved with one multifunctional material.
2. Identify major technical barriers impeding the use of proposed multi-functional materials and provide innovative solutions.
3. Specify the significant impact on the current state-of-the-art that will be achieved by successfully accomplishing the proposed research and surmounting the technical challenges.
4. Indicate how, and to what degree, the use of the multi-functional materials and structures will reduce vehicle weight, cost, and/or carbon footprint.
5. Include a plan for participation in the Annual Merit Review held in Washington DC.
6. Include plans to provide input to the VTO Annual Report.

### **Teaming Arrangements**

Applicant teams are encouraged to include at least one automotive or heavy-duty original equipment manufacturer (OEM) or Tier 1 supplier (OEM is defined as a commercial manufacturer that sells at least 500 vehicles annually), at least one team member with manufacturing expertise and scale-up capability in materials development, and at least one material supplier with expertise in the production of structural materials.

### **Special Deliverables**

In addition to the deliverables required in the Federal Assistance Reporting Requirements Checklist, the following are deliverables for awards made under this area of interest:

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1. Cost model that shows a pathway for future commercialization of the developed technology in the selected specific components.
2. Documentation of the project's weight savings and cost impact compared to DOE provided baseline weight and cost for the selected components.

**Applications Specifically Not of Interest**

- Applications that propose sole development of cell chemistry R&D for a structural battery are discouraged.

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**AOI 5a: Natural Gas Engine Demonstration for Non-Road, Including Off-Road, Rail and Marine Applications****Introduction**

Production of renewable natural gas has grown tremendously over the last 5 years and, in some circumstances, can provide an opportunity to replace older diesel fueled vehicles with new, NG fueled vehicles that reduce harmful emissions like soot and NO<sub>x</sub>, leading to improved local air quality.<sup>11</sup> For fossil NG fueled vehicles, the lifecycle greenhouse gas (GHG) reduction compared to petroleum fuel vehicles is modest. This is in-part due to the lower efficiency of NG engines, which are typically stoichiometric spark-ignited, compared to compression-ignition diesel engines. Advances in the ability to capture methane for production of renewable natural gas (RNG) adds a robust renewable alternative to conventional fuels. RNG is biogas derived from waste streams such as landfills, wastewater treatment plants, municipal solid waste, and dairies that has been upgraded to a quality suitable for use, including use in natural gas vehicles (NGVs). Due to low-carbon fuel policies, RNG also has the potential to be sold at a lower cost than fossil NG or petroleum fuels.

New concepts such as blending renewable hydrogen (H<sub>2</sub>) into NG can decrease the fuel's carbon intensity while improving its combustion characteristics. Engines that can operate on a range of H<sub>2</sub>/NG mixtures offers flexibility and a bridge to greater GHG reductions as more clean hydrogen becomes available in the future.

High-horsepower off-road vehicles used for construction, industrial and agricultural applications, long-haul freight locomotives, and marine vessels are sectors where natural gas use has potential to displace use of petroleum. These sectors have high demands for durability, power density, and up-time requirements, which make them difficult to electrify and in need of unique solutions to lower their GHG emissions.

**Objective**

The objective of this topic area is to develop and demonstrate a commercially viable natural gas engine that can significantly reduce GHG emissions in the non-road sector, including off-road, rail, and/or marine. Applications should target technologies that substantially decrease the life-cycle GHG emissions compared to the baseline application, by either increasing the efficiency of engines compared to the baseline vehicle or enabling the use of lower-carbon natural gas by addressing major barriers to RNG or hydrogen blends up to 50 percent. Proposed technologies should target baseline applications where engine power is greater than 175 hp.

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<sup>11</sup> An Overview of Renewable Natural Gas from Biogas [An Overview of Renewable Natural Gas from Biogas \(epa.gov\)](https://www.epa.gov/biogas/an-overview-of-renewable-natural-gas-from-biogas)

**General Requirements**

Applications **must**:

1. Identify the baseline vehicle(s) and quantify the GHG benefits of the proposed technology in the same application(s) on a lifecycle basis with a widely used analytical tool (such as GREET<sup>12</sup>).
2. Identify the applicability of the proposed technology across the off-road, rail, and/or marine sector.
3. Identify vehicle emission standards applicable to the project period and how the technology will comply with or exceed them.
4. Include a detailed test plan, including duty cycle, to demonstrate the benefit of the developed technology, the plan should consist of two phases:
  - **Phase 1 – Technology Development:** (Not to exceed two budget periods) This phase should culminate in a Go/No-Go milestone that provides a proof-of-concept and validation of the new technology leading to GHG emission improvement
  - **Phase 2 – Demonstration:** (At least one budget period), this phase should include integration of the technology on the engine and demonstration of the GHG reduction benefits on a test-bed that can simulate the relevant duty-cycles (regulatory and/or real world), or on a vehicle.
5. Include a cost analysis of the proposed technologies that projects the change in the total cost of ownership.
6. Include an explanation of how durability and customer acceptance will be evaluated.
7. Include a plan for participation in the Annual Merit Review held in Washington DC.
8. Include plans to provide input to the VTO Annual Report.

**Specific Deliverables**

None required.

**Teaming Arrangements**

Applicant teams **must** include an Original Equipment Manufacturer (OEM) who serves the targeted market.

**Applications Discouraged**

None.

**Special Deliverables**

None.

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<sup>12</sup> [Argonne GREET Model \(anl.gov\)](http://anl.gov)

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## **AOI 5b: Low-GHG Concepts for Off-Road Vehicles and Equipment**

### **Introduction**

Off-road vehicles used for industry and agriculture consume more than 2 quadrillion BTUs of energy. They are a substantial source of greenhouse gases (GHG) and criteria emissions, including nitrogen oxides and fine particulate matter that contribute to poor air quality. Off-road vehicles have unique requirements for durability, power/torque density, daily run times, and operation in remote location. These requirements are typically met by using compression-ignition engines running on diesel fuel and fluid-power systems (hydraulics) for the work and/or drive circuits. Current fluid power systems utilize throttling for control, which leads to low efficiency. Deep reductions in the GHG emissions from these vehicles can be achieved by partial or full vehicle electrification or by using renewable fuels.

### **Objective**

The objective of the topic area is to develop and validate 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, agriculture, mining, forestry, etc. Concepts must demonstrate they can meet the unique requirements for off-road vehicles and gain customer acceptance.

### **Approaches may include, but are not limited to:**

- Technologies that enable full or partial vehicle electrification, while still meeting durability and uptime requirements;
- Technologies that represent a breakthrough in the efficiency of fluid power systems and are widely applicable across the off-road sector;
- Technologies which address specific barriers to utilizing a low-carbon fuel that is, or will be, widely available;
- Technologies which greatly increase the efficiency of compression ignition engines used in off-road vehicles;
- Technologies that automate vehicle operation and/or movements to maximize their efficiency.

### **General Requirements**

Applications **must:**

1. Include an estimate of the applicability of the proposed technology across the off-road sector.
2. Include an estimate of efficiency improvement and/or GHG reduction when compared to the baseline off-road sector vehicle.
3. Include an estimate of criteria emissions impacts.
4. Include a cost analysis of the proposed technologies that justifies any claimed reduction in the total cost of ownership.

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5. Include an explanation of how durability, manufacturability and customer acceptance will be evaluated.
6. Include a plan to validate the technology performance on a vehicle or in a lab-scale experiment that closely simulates how the technology will function in the vehicle application and publish these results.
7. Include a plan for participation in the Annual Merit Review held in Washington DC.
8. Include plans to provide input to the VTO Annual Report.

**Specific Deliverables**

None.

**Teaming Arrangements**

Applicant teams are encouraged to include a vehicle Original Equipment Manufacturer (OEM) and/or Tier 1 supplier.

**Applications Discouraged**

None.

**Special Deliverables**

None.

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**AOI 5c: Advanced Opposed Piston 2-Stroke (OP2S) Hydrogen Combustion Architecture for Heavy-Duty Transportation, Including On-Road and Non-Road (Off-Road, Rail and Marine) Applications****Introduction**

Opposed Piston 2-Stroke (OP2S) engines have the potential for higher efficiency than comparable conventional internal combustion (IC) engines. The two-stroke engines produce twice as many power-strokes per revolution as the more common four-stroke cycle, offering high power to weight ratio. Furthermore, opposed piston engine design eliminates cylinder head as well as traditional valves, cams, or camshafts, and therefore, they could offer reduced cost, weight, and complexity. Yet, these engines have not been able to achieve any significant commercial use due to other limitations, the advancement of alternative high efficiency powertrains and the unique form factor for these engines. This topic focuses on a potential new application for OP2S that may overcome some of these barriers.

Hydrogen combustion has become a growing area of interest in industry as it can readily use existing engine architecture but offer a near-zero emissions option. Hydrogen combustion also acts as a bridge to hydrogen fuel cell applications or an alternative in applications where fuel cells currently do not have the demonstrated durability needed.

This sub-topic will facilitate research and development of hydrogen combustion in advanced OP2S technology engines designed for use in commercial on-road or non-road applications. The solicited technology should offer substantial GHG reductions for the hard-to-electrify transportation segments.

**Objective**

The objective of this area of interest is to develop and validate an advanced opposed piston two-stroke engine capable of hydrogen combustion and suitable for use in heavy-duty on- or off-road applications with performance validated on a chassis dynamometer.

**General Requirements**

Applications **must**:

1. Include a description of the proposed OP2S engine/powertrain hydrogen combustion architecture for on-road and/or non-road applications and how it could benefit the commercial off-road, rail, and marine industry.
2. Include an analysis of the benefits of the proposed hydrogen combustion strategy to be used in commercial on-road and/or non -road applications.
3. Include an analysis of the total cost of ownership of the proposed hydrogen combustion OP2S engine architecture and comparison with conventional on-and/or off-road applications and its path to commercialization.

**Specific Requirements**

None.

**Teaming Arrangements**

Applicant teams are encouraged to include an OEM or tier 1 supplier as lead. Teams are also encouraged to include research partners from universities and/or National Laboratories.

**Special Deliverables**

In addition to the deliverables required in the Federal Assistance Reporting Requirements Checklist, the following deliverables are required:

1. Participation in the Annual Merit Review, typically held in Washington DC
2. Provide input to the VTO Annual Report

**Applications Discouraged**

None.

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**AOI 5d: Demonstration of Dimethyl Ether Medium-Duty Engine for Non-Road Applications****Introduction**

Dimethyl ether (DME) is a gaseous fuel that condenses at relatively low pressure and has potential for use as a fuel in non-road vehicles and equipment. DME is suitable for use in compression-ignition (CI) engines, produces little or no soot, and can be produced from renewable sources.

**Objective**

The objective of this topic area is to develop and demonstrate a near-commercial, direct-injection, medium-duty engine prototype suitable for use in non-road vehicles or equipment. Demonstration is expected to be carried out via dynamometer testing since vehicle integration would be prohibitively expensive.

**General Requirements**

Applications **must**:

1. Identify a baseline, medium-duty engine using commercial emission control.
2. Identify vehicle emission standards applicable to the project period and how the technology will comply with or exceed them.
3. Include a detailed test plan, including duty cycle, to demonstrate the benefit of the developed technology, the plan should consist of two phases:
  - **Phase 1 – Technology Development:** (Not to exceed two budget periods) This phase should culminate in a Go/No-Go milestone that provides a proof-of-concept and validation of the new technology leading to GHG emission improvement
  - **Phase 2 – Demonstration:** (At least one budget period), this phase should include integration of the technology on the engine and demonstration of the GHG reduction benefits on a testbed that can simulate the relevant duty-cycles (regulatory and/or real world), or on a vehicle.
4. Identify barriers to improved engine efficiency using DME.
5. Identify technology approaches to overcome these barriers during the project period.
6. Identify the projected efficiency of the developed engine as well as the increase in efficiency when compared to the baseline engine.
7. Identify metrics and measures to be used to track project progress.
8. Identify the plan for testing and validating engine efficiency and emissions compliance when operating on DME.
9. Include a plan to demonstrate, via engine or chassis dynamometer testing, 200-hour engine durability (credible, accelerated durability testing protocol is also acceptable).
10. 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).
11. Identify metrics and measures to be used to track project progress.
12. Include a plan for participation in the Annual Merit Review held in Washington DC.

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**Teaming Requirements**

Inclusion of either an engine or vehicle OEM and/or a Tier I supplier on the applicant team is strongly encouraged.

**Applications Discouraged**

None.

**Special Deliverables**

None.

**Specific Requirements**

None.

## **AOI 6: Clean Energy Mobility Solutions for Underserved Communities**

### **Introduction**

The Energy Efficient Mobility Systems (EEMS) Program supports VTO's mission to improve transportation energy efficiency through low-cost, secure, and clean energy technologies. EEMS conducts research and development (R&D) at the vehicle-, traveler-, and system-levels, creating knowledge, insights, tools, and technology solutions that increase mobility energy productivity for individuals and businesses. This multi-level approach is critical to understanding the opportunities that exist for optimizing the overall transportation system. The EEMS Program uses this approach to develop tools and capabilities to evaluate the systems-level energy impacts of new mobility solutions and to create new technologies that provide economic benefits to all Americans through enhanced mobility.

EEMS is particularly focused on better understanding how disruptive transportation technologies, services and new mobility business models (such as connected and automated vehicles, car-sharing, first- and last-mile services, and ridesharing) can provide lower-cost and lower-energy mobility options for consumers.

While both government and the private sector have made significant progress in the development of new transportation technologies, many of these solutions have not fully incorporated the specific needs and challenges of traditionally underserved communities.

Additionally, the global COVID-19 pandemic has further disrupted and impacted mobility. Travel modes, transportation demand patterns, and commuting habits have all changed dramatically, and while some modes have bounced back to near pre-pandemic levels, other modes such as public transportation continue to struggle.

### **Objective**

This area of interest seeks to fund transportation research, development, and demonstration pilots for connected and automated mobility solutions that address the needs of underserved communities/regions and improve overall transportation system efficiency in terms of energy efficiency, time, cost, and accessibility to transportation resources.

### **Applications must describe pilot projects in three phases.**

- **Phase 1** should consist of community engagement, research, and design activities to fully understand the mobility needs of the underserved community being addressed, explore potential solutions that meet the community's needs, and research which technologies may provide the greatest benefit to the community.
- **Phase 2** of the project should involve development and implementation of the highest-impact mobility solution identified in Phase 1, including establishing performance metrics and determining methods for collecting and analyzing data to demonstrate the effectiveness of the proposed solution.

- **Phase 3** of the project is the pilot demonstration, data collection, and validation phase in which the mobility solution is operated in a real-world setting, demonstrating its benefit to the community and analyzing data to quantify its effectiveness.

### **General Requirements**

Applications **must**:

1. Describe the automation level of the vehicles used and are encouraged to use SAE J3016.
2. Describe the operational design domain for any connected or automated vehicle operations.
3. Describe the classes of vehicles proposed and the powertrain technology.
4. Describe community engagement activities including partnerships with organizations who represent underserved communities and result in community-driven strategic plans that define community goals and strategies for transportation decarbonization. (e.g., listening session, needs assessment, or strategic planning discussions).
5. Include organizations or persons from the communities being served on the proposed project teams.
6. Clearly identify the mobility needs of the underserved communities/regions targeted and the metrics of the proposed project, including baseline performance and end-of-project targets. Applicants are highly encouraged to consider metrics such as improvements to mobility energy productivity (MEP), vehicle miles travelled, productive hours travelled, freight load capacity, vehicle occupancy, vehicle energy efficiency (energy/mile driven), average trip speed, congestion, travel efficiency, network efficiency, consumer cost, and other similar and salient metrics.
7. Quantify the expected energy, mobility, and/or affordability benefits that would result from the deployment of the technology to be developed, supported by analysis, modeling, or simulation results as appropriate.
8. Describe how the project team will share the data on expected energy/mobility/affordability improvements with DOE and its National Laboratories.
9. Describe how data generated by the project will quantify the energy and mobility gains that result from the proposed technology, and how the project team will share this data with DOE and its National Laboratories.
10. Describe the project outreach plan to communicate results, including lessons learned, best practices, and case studies, to educate the broader transportation community.
11. Include a plan for participation in the Annual Merit Review held in Washington DC.
12. Include plans to provide input to the VTO Annual Report.

### **Specific Special Deliverables**

In addition to the deliverables required in the Federal Assistance Reporting Requirements Checklist, the following deliverables are required for awards made under this AOI:

1. Recipients will provide all testing and validation data produced in the project validation phase to the SMART Mobility National Lab Consortium

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(<https://www.energy.gov/eere/vehicles/energy-efficient-mobility-systems>) through the Livewire Data Platform (<https://livewire.energy.gov>) in a timely manner. Data that the project teams do not wish to be made public will be protected through a Non-Disclosure Agreement with the relevant laboratories in the Consortium.

2. Recipients must include a plan to participate in the VTO Annual Merit Review (AMR) in Washington, D.C.
3. Recipients must include a plan to provide report on annual project accomplishments for inclusion in the VTO Annual Accomplishments Report.

### **Teaming Arrangements**

- Applicant teams must include a connected and/or automated mobility technology provider.
- Applicants are encouraged to include active participation, with clearly documented roles, responsibilities, and/or active participation by locally-based stakeholders such as metropolitan planning organizations, departments of transportation, and others with an interest in overall transportation system efficiency. These organizations are to be part of the team to be able to implement the R&D solutions developed in the project.

### **Applications Discouraged**

- Applications that are primarily about procurement or straightforward implementation of existing technologies.
- Applications that do not clearly identify the mobility technology solution to be developed and implemented.
- Applications that do not clearly identify the underserved community to be served by the new mobility solution being developed.

### **Special Deliverables**

None.

### **For reference:**

[J3016C: Taxonomy and Definitions for Terms Related to Driving Automation Systems for On-Road Motor Vehicles - SAE International](#)

**AOI 7: EV Charging Solutions for Residents with No Home Charging**

Electric vehicles offer an opportunity for significant transportation decarbonization. Achieving a high level of decarbonization requires electric vehicle owners beyond just those with access to dedicated off-street parking for charging their electric vehicles while at home. EV drivers commonly rely on home EV charging since vehicles tend to be parked in residential locations for long durations overnight, enabling a low-cost charge using AC Level 1 or AC Level 2 charging stations. As the EV market expands, similar long-dwell low-cost EV charging solutions are needed for households without consistent access to home charging stations. This includes, but may not be limited to, renters, residents of multi-family housing (MFHs), and individuals in single-family homes without access to dedicated off-street parking.<sup>13</sup>

The objective of area of interest 7 is to develop a comprehensive program that develops innovative approaches and supports deployment of low-cost charging solutions for drivers that do not have access to dedicated residential charging options. Low-cost charging in long-dwell settings can form the backbone of daily electric vehicle charging and are often done overnight where vehicles are parked. This area of interest focuses on demonstrating innovative and cost-effective approaches for residents in multi-unit dwellings as well as urban residential areas that do not have dedicated parking and utilize public street parking. Projects should also work with outreach partners to document and broadly disseminate best practices and resources needed to replicate project success at scale.

**AOI 7a: No Home Charging: Multi-Family Housing (MFH) Innovative Demonstrations, Technical Assistance and Best Practices****Introduction**

Comprehensive analysis has recently quantified that over 25% of individuals will not have a place to charge their vehicle when they are at home.<sup>14</sup> Previous studies have shown that slower charging while drivers are at home can provide the most cost-effective solution and meet over 80% of consumer charging needs. Residents of MFH (apartment complexes, condominiums, etc.) are a critical target for expanding the potential market for electric vehicles, and MFH residents will be more likely to adopt EVs if charging solutions to fit their needs are available. An essential part of providing EV charging for MFH residents is bringing the building owners and managers, parking management, policy makers, and residents together to develop appropriate EV charging solutions. Replicable approaches to deploy charging for MFH that meet the needs of these stakeholders will be essential to widespread adoption of charging for this market. Solutions that address the needs of lower income and disadvantaged communities will be of particular importance to increase the penetration of EVs for these communities.

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<sup>13</sup> There's No Place Like Home: Residential Parking, Electrical Access, and Implications for the Future of Electric Vehicle Charging Infrastructure <https://www.nrel.gov/docs/fy22osti/81065.pdf>

<sup>14</sup> Ibid.

**Objective**

The objective of this area of interest is to work with owners and operators of multi-family housing developments, tenants of these buildings, local governments, and utilities to develop replicable programs that can provide cost-effective EV charging for residents, including comprehensive technical assistance to building owners and property managers to support successful deployments of multi-family housing EV charging. Projects should address technical, soft cost, and market barriers as well as human and operational factors to provide the basis for large-scale, replicable deployment of MFH charging. Projects should propose how to document and share the best practices from these programs with other property owners.

This area of interest is NOT focused on actual EV charger deployment since many other programs have larger scale deployment funding, but instead on created a replicable deployment model and the associated comprehensive technical assistance for owners and operators of MFH that will lead to an increase in MFH EV charging.

Projects that address the needs of lower income or disadvantaged communities are of particular interest.

**General Requirements**

Applications ***must*** include:

1. An overview of the number and type of multi-family housing developments to be addressed by the project, with specific properties and owners identified wherever possible, and the motivations behind these choices.
2. A description of the process to gather information on barriers and successful strategies, and to engage stakeholders.
3. A plan for working with owners and operators of multi-family housing to develop these replicable programs to deploy cost-effective charging for residents, including the type and scope of technical assistance to be provided.
4. A data collection and analysis plan to document the project's impact on facilitating the deployment of electric vehicle charging solutions.
5. An assessment of the existing tools and resources that the project team intends to use in its program development and how those tools will facilitate the success of the program.
6. Pathways to ensure replicability of the proposed multi-family housing solutions, including documenting and sharing best practices and lessons learned from these programs to facilitate broad adoption, potentially including the Clean Cities network as one possible avenue for information dissemination.
7. An outreach plan that includes multiple stakeholder engagements to share the outcomes and replicable models and raise awareness of the DOE funded research under this project.

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**SpecificSpecial Deliverables**

None.

**Teaming Arrangements**

VTO highly encourages project teams that include the following partners:

- One or more Clean Cities coalitions (<https://cleancities.energy.gov/coalitions/locations/>) with clearly documented roles, responsibilities, and budgets
- Local, regional, or national developers, building owners, property management organizations, and parking management organizations
- Electric vehicle charging providers
- Electric utilities
- Local governments (e.g. local codes/permitting officials)

**Applications Discouraged**

Applications that include the following are highly discouraged:

- Applications that include installations of electric vehicle charging infrastructure as part of the project budget.

## **AOI 7b: No Home Charging: Electric Vehicle Charging for Overnight Parking**

### **Introduction**

Comprehensive analysis has recently quantified that over 25% of individuals will not have a place to charge their vehicle when they are at home.<sup>15</sup> Previous studies have shown that slower charging, while drivers are at home can provide the most cost-effective solution and meet over 80% of consumer charging needs. Installing EV chargers in locations available for overnight parking is a potential solution for drivers who want to charge their EVs while at home but do not have residential charging options. Various pilot or demonstration projects deploying EV chargers in locations available for overnight parking (e.g., curbside parking, permit parking in the public right of way, chargers mounted to streetlight poles, residential parking garage) have encountered numerous barriers that make it challenging to implement this strategy at scale. There is a need for demonstrated successful strategies and replicable best practices related to meeting real-world consumer need (such as charger availability, payment, dedicated parking space, etc.), permitting processes, municipal stakeholder engagement, community engagement, EV charger ownership models and business cases, parking policies, equity considerations, signage, and site evaluation criteria.

### **Objective**

The objective of this area of interest is to develop, implement, and disseminate scalable strategies for EV chargers that provide cost-effective solutions for drivers who want to charge their EVs overnight while at home but do not have dedicated residential charging options. Projects should demonstrate the deployment of EV chargers accessible for overnight charging for EV drivers who do not have dedicated residential charging options using innovative approaches that overcome systemic barriers and ensure low cost. Projects should also work with outreach partners to document and broadly disseminate best practices and resources needed to replicate project success at scale, including how local governments can address parking, codes, payment, and accessibility issues, among other.

### **General Requirements**

Applications **must** include:

1. How the proposed project will utilize existing lessons learned and best practices from projects that installed EV chargers and the process to gather stakeholder feedback.
2. The barriers to installing EV chargers in locations available for overnight parking and how the project will strategically address those barriers.
3. How the project will broadly disseminate project approach and learnings throughout the project period to replicate project successes in other communities (e.g., project website,

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<sup>15</sup> There's No Place Like Home: Residential Parking, Electrical Access, and Implications for the Future of Electric Vehicle Charging Infrastructure <https://www.nrel.gov/docs/fy22osti/81065.pdf>

webinar describing project approach, outreach through the Clean Cities coalition network).

4. A description of the communities where EV chargers will be installed in locations available for overnight parking.
5. The quantity and type of EV chargers that will be installed in each community.
6. A description of team roles, responsibilities, and past experience with EV charger planning, permitting, siting, and installation.

### **SpecificSpecial 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.
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.

### **Teaming Arrangements**

VTO highly encourages project teams that include the following partners:

- One or more Clean Cities coalitions (<https://cleancities.energy.gov/coalitions/locations/>) with clearly documented roles, responsibilities, and budgets

VTO encourages project teams that include the following partners:

- Local/regional governments including code/permitting officials; community-based organizations; utilities and other electricity suppliers; charging equipment installers, dealers, and manufacturers; and charging station hosts.

### **Applications Discouraged**

Applications that include the following are highly discouraged:

- Applications that include the cost of electric vehicles.
- 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).

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## **AOI 8: Community Engagement, Outreach, Technical Assistance, and Training in Underserved Communities**

### **Objective**

The objective of this area of interest is to conduct community engagement, outreach, technical assistance, and training in underserved communities through partnerships with Clean Cities coalitions that advance EERE's priority to equitably decarbonize the transportation sector. Project teams should include representatives from underserved communities (which includes, but is not limited to federally identified disadvantaged communities) or community-based organizations that represent the interests of underserved communities. Projects will develop community-driven strategic plans that define community transportation mobility goals and strategies that use transportation decarbonization technologies to meet community needs and document best practices in developing plans and engaging with underserved communities to meet mobility needs.

### **General Requirements**

Applications **must** include:

1. Community engagement activities - including partnerships with organizations who represent underserved communities - that will result in community-driven strategic plans that define community goals and strategies for transportation decarbonization (e.g., listening sessions, needs assessments, or strategic planning discussions).
2. Outreach activities that raise awareness of plug-in electric vehicles (PEVs) and electric vehicle supply equipment (EVSE) to help spur local PEV adoption and EVSE installation in underserved communities (e.g., ride and drive events, vehicle displays, dealership outreach, site visits and educational tours, outreach to potential EVSE site hosts).
3. Technical assistance activities that provide consultation services to vehicle fleets, government agencies, community-based organizations and other stakeholders regarding the deployment of alternative fuel vehicles and infrastructure that contribute to DOE transportation decarbonization goals and benefit underserved communities (e.g., prioritizing EVSE locations for meeting underserved community needs, community PEV readiness activities, fleet coaching).
4. Workforce training activities that provide technical training and technical education for underserved communities regarding alternative fuel vehicles and infrastructure that contribute to DOE transportation decarbonization goals (e.g., technicians/mechanics, first-responders, code, permitting and safety authorities having jurisdiction, public safety officials, government agencies, fleets/fleet managers).

Applications may include:

1. Educating state and/or local governments on how to improve the effectiveness of alternative fuel vehicle and infrastructure funding and incentive programs and increase the ability of these funding programs to benefit targeted underserved communities.

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### **Specific Requirements**

Applications ***must*** specify:

1. For each underserved community committed to participating in the proposed project, describe:
  - geographic area (e.g., city, county, neighborhood)
  - project partners representing the community
  - how this project will benefit the community, and
  - if the community is identified as disadvantaged by federal tools and definitions (identify the used federal definition, e.g., DOE, NEVI)
2. For each underserved community that is a prospective future project partner who has not yet committed to participating in the proposed project, describe:
  - geographic area (e.g., city, county, neighborhood),
  - prospective project partners representing the community and efforts to establish a partnership with these organizations,
  - how this project could benefit the community, and
  - if the community is identified as disadvantaged by federal tools and definitions (identify the used federal definition, e.g., DOE, NEVI)

**Applications *must* include planned performance metrics for each budget period (BP) including but not limited to the metrics in the tables below.**

#### **Community Engagement Metrics**

Metric	BP 1	BP 2	BP 3	Project Total
# of organizations with a funded role in the project who represent an underserved community				
Project dollars budgeted [\$] for organizations which represent an underserved community				
Anticipated # of community-driven strategic plans created (assuming one plan per community)				

#### **Outreach Metrics**

Metric	BP 1	BP 2	BP 3	Project Total
Anticipated # of outreach events				
Anticipated # of people reached through outreach events				

### Technical Assistance Metrics

Metric	BP 1	BP 2	BP 3	Project Total
Anticipated # fleets that receive technical assistance				
Anticipated # of non-fleet organizations that receive technical assistance				

### Workforce Training Metrics

Metric	BP 1	BP 2	BP 3	Project Total
Anticipated # of training events for people who work in or live-in underserved communities				
Project dollars budgeted [\$] for training events for people who work in or live-in underserved communities				

### Teaming Arrangements

1. Application teams **must** include active participation by at least one DOE 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 strongly encouraged to include active participation by multi-state regional partnerships made up of designated Clean Cities coalitions with clearly documented roles, responsibilities, and budgets (coalition locations are available at <https://cleancities.energy.gov/coalitions/>).
3. Applicants are encouraged to include strategic partners such as community-based groups or local/regional governments; utilities and other electricity suppliers; electric vehicle dealers and manufacturers; electric vehicle charging equipment installers, dealers, and manufacturers; and public or private fleets.
4. Application teams must not include DOE/NNSA FFRDCs. Projects selected for award may submit requests to DOE for DOE National Laboratory technical assistance throughout the project period of performance. DOE will approve DOE National Laboratory technical assistance that supplements the project team's activities depending upon the justification and available DOE funding.

### Special Deliverables

1. Community-Driven Strategic Plans that define community goals and strategies for transportation decarbonization.

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2. Supplemental quarterly reports providing data needed to calculate Justice 40 Initiative metrics (DOE will provide reporting template to project awardees.)

**Applications Discouraged**

None.

## **AOI 9: Community-Driven Electric Vehicle Charging Deployment in Underserved Communities**

### **Introduction**

Many communities disproportionately bear the burdens of our transportation energy system and do not equitably experience the benefits of access to clean, affordable, and reliable transportation. 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 nearly 30 years. With experience working in communities across the country planning and deploying electric vehicle (EV) chargers, also referred to as electric vehicle supply equipment (EVSE), DOE-designated Clean Cities coalitions are well-positioned to engage in projects that prioritize benefits in underserved communities (which includes, but is not limited to federally identified disadvantaged communities).

This topic advances the Biden Administration goal of installing 500,000 electric vehicle charging stations by 2030 and the Justice40 Initiative which seeks to ensure 40% of the overall benefits of federal investment in clean energy flow to disadvantaged communities. This topic also advances the EERE priority to decarbonize the transportation sector and EERE key emphasis area of energy and environmental justice.

### **Objective**

The objective of this area of interest is to work at the community level to understand and address the issues around the deployment of electric vehicle charging stations in underserved communities and inform current and future EV charging deployment. Project teams should:

- Engage underserved communities to discuss how investments in EV chargers can benefit the community,
- Determine which EV charger benefits align with community priorities,
- Identify potential EV charger sites that benefit the community,
- Finalize an EV charger deployment plan with community input,
- Install EV chargers in locations that benefit the community, and
- Evaluate whether the EV chargers provided anticipated benefits.
- Summarize best practices that maximize community benefits to ensure future EV infrastructure investments can leverage these learnings.

Project approach must include installation of some EV chargers to evaluate and measure benefits actually accrued to underserved communities. Projects teams may maximize the project impact by additionally deploying and evaluating EV chargers funded under other Federal programs such as the National Electric Vehicle Infrastructure formula program. However costs from other Federal programs cannot be used as cost share and should not be reflected in the project budget.

Examples of benefits from EV charger deployment that could flow to communities include:

- Increased access to affordable EVs, EV chargers, clean transportation, and the electric grid for communities through EV charger installation,
- Reduced transportation energy costs for communities by enabling transition from conventional vehicles to EVs through location of EV chargers,
- Reduced transportation emissions exposure for communities by enabling transition from conventional vehicles to EVs through location of EV chargers,
- Increased access to low-cost capital in communities contributing to equitable adoption of EVs and EV chargers,
- Increased enterprise creation and economic development opportunities in communities through location of EV chargers, including through work with disadvantaged business enterprises,
- Increased the clean energy job pipeline and job training for communities through location of and installation of EV chargers, including through work with minority-serving institutions,
- Increased energy resiliency in communities through electrical grid upgrades and diversification of energy sources for EV charger installation, and
- Increased energy democracy in communities through community engagement and ensuring community input is incorporated in EV charging planning and siting.

### **General Requirements**

Applications **must** include:

1. Development of a Community-Driven EV Charger Deployment Report in Budget Period 1 that describes the community engagement with underserved communities including:
  - determining community-driven priorities for how investments in EV chargers can benefit the community,
  - identifying potential EV charger sites that benefit the community, and
  - finalizing an EVSE deployment locations with community input.
2. Engagement with potential site hosts in priority EV charger locations and secure site host commitments for EV charger installation.
3. Installing EV chargers (Level 2 and/or DC fast charge) in locations that benefit underserved communities based on community engagement activities in Budget Period 1.
4. A plan for tracking and reporting metrics that measure the benefits that flow to underserved communities from the deployed EV chargers.
5. How the project will broadly disseminate project approach and learnings throughout the project period to replicate project successes in other communities (e.g., project website, webinar describing project approach, outreach through the Clean Cities coalition network, interaction with State Energy and Transportation Offices).

Applications may include:

1. Engaging underserved communities in community-driven EV charger planning activities and creating Community-Driven EV Charger Deployment Reports in Budget Period 2 and Budget Period 3.
2. Installing EV chargers (Level 2 and/or DC fast charge) in locations that benefit underserved communities based on community engagement activities in Budget Period 2 and Budget Period 3.
3. Conducting outreach activities for underserved communities to raise awareness of EVs (e.g., ride and drive events) and available EV chargers.
4. Providing EV charger planning technical assistance to governments agencies, utilities, and other stakeholders regarding deploying EV chargers that benefit underserved communities.

### **Specific Requirements**

Applications **must** specify:

1. For each underserved community committed to participating in the proposed project, describe:
  - geographic area (e.g., city, county, neighborhood)
  - project partners representing the community, and
  - if the community is identified as disadvantaged by federal tools and definitions (identify the used federal definition, e.g., DOE, NEVI)
2. For each underserved community that is a prospective future project partner who has not yet committed to participating in the proposed project, describe:
  - geographic area (e.g., city, county, neighborhood) and
  - how this project could benefit the community
  - if the community is identified as disadvantaged by federal tools and definitions (identify the used federal definition, e.g., DOE, NEVI)

**Applications *must* include planned performance metrics for each budget period (BP) including but not limited to the metrics in the tables below:**

### **Community Engagement Metrics**

Metric	BP 1	BP 2	BP 3	Project Total
# of organizations with a funded role in the project who represent an underserved community				
Project dollars budgeted [\$] for organizations which represent an underserved community				
Anticipated # of Community-Driven EVSE Deployment Reports created				

(assuming one report per community)				
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### EVSE Deployment Metrics

Metric	BP 1	BP 2	BP 3	Project Total
Anticipated # of Level 2 EV charger installations in locations that benefit underserved communities (unit: # of charge ports)				
Anticipated # of DC fast charge EV charger installations in locations that benefit underserved communities. (unit: # of charge ports)				

### Teaming Arrangements

1. Application teams **must** 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. Application teams are strongly encouraged to include active participation by community-based organizations or organizations that have experience engaging with underserved communities with clearly documented roles, responsibilities, and budgets.
3. Applicants are encouraged to include strategic partners such as local/regional governments; utilities and other electricity suppliers; and electric vehicle charging equipment installers, dealers, and manufacturers.
4. Application teams must not include DOE/NNSA FFRDCs.

### Special Deliverables

1. Recipients **must** provide all project-related, nonproprietary data including EVSE session-level data, EVSE equipment cost, EVSE installation costs, and charging prices to a to-be-designated DOE national laboratory.
2. 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.
3. Recipients **must** provide supplemental quarterly reporting data needed to calculate Justice 40 Initiative metrics (DOE will provide reporting template to project awardees.)

### Applications that include the following are highly discouraged:

None.

## **AOI 10: Innovative Medium- and Heavy-Duty EV Charging and Hydrogen Regional Fueling Corridor Infrastructure Plans**

### **Introduction**

Vehicle electrification, including both battery and hydrogen fuel cell vehicles, is a critical component of transportation decarbonization strategies for medium and heavy-duty vehicles. Deployment of electric vehicles at the scale necessary for deep decarbonization requires proactive planning to ensure clean fueling infrastructure is available at a wide scale and operated effectively and efficiently to maintain low costs and support cross-sectoral decarbonization goals. Planning for integrated and coordinated charging and refueling solutions at scale is particularly important for medium-duty and heavy-duty (MD/HD) freight movement, as these vehicles will need reliable access to charging and hydrogen refueling across single jurisdictions to ensure that fueling needs are met. However, the infrastructure will likely be deployed by private sector actors and the demands of these vehicles from that charging infrastructure can be considerable, requiring regional and multi-stakeholder coordination. These vehicles often travel along specific freight corridors that connect ports (inland and ocean), freight depots and industrial customers.

A clear planning process for charging and refueling along these corridors, at freight depots, and at port facilities will ensure the charging and refueling network meets the needs of all MHDV transportation users, mitigates impacts on the grid and ensure it is done in a way that meets EEJ goals. This planning will also provide greater confidence to developers and fleet owners by streamlining planning processes and accelerating deployment. Having these plans will make these corridors ready for rapid deployment of high-power charging through other large scale deployment programs, funded by the federal, state, or private sector.

### **Objective**

The objective of this area of interest is to develop regional plans for medium-duty and heavy-duty commercial electric vehicle charging infrastructure and hydrogen infrastructure for essential freight corridors, including the ports (inland and ocean) and large freight depot locations that these freight corridors connect. Developing these plans will enable key corridors to be ready for infrastructure deployment when public or private demonstrations and investments become available. These plans should be developed in collaboration with stakeholders such as utilities, utility regulators, transportation planning agencies, commercial fleet operators, truck depot owners and operators, trucking fueling providers, port operators and community-based organizations. These regional plans should quantify the projected future electrified freight traffic in the region; identify and quantify the advanced charging and fueling infrastructure technologies to be deployed; assess the current distribution grid hosting capacity and future needs, including positive and negative impacts of these charging technologies on the local and regional electric grid and mitigation strategies to address negative impacts (in conjunction with local utilities); identify hydrogen supply logistics (if hydrogen fueling is included); and identify other technologies or practices (such as managed charging and the use

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of distributed energy resources such as stationary storage) to meet the needs of a broad base of electric commercial vehicle users, while minimizing the impacts on the grid and maintaining low costs.

Applicants are encouraged to consider technologies and operational strategies to provide reliable charging and manage local grid loads from this infrastructure. Potential technologies could include, but are not limited to, MD/HD-specific high-power charging technology, integration of charging management into fleet freight planning, and dynamic pricing approaches. Charging needs at depots for these trucks is a primary focus but needs for charging along the corridor and fueling stations and at ports should also be included.

The proposed plans should address the needs and interests of the fleets, site hosts, and other freight stakeholders involved; the electric utilities serving the region; and the local community or communities. The regional plans should serve as a blueprint for future large-scale deployment of regional commercial electric vehicle charging and hydrogen refueling.

### **General Requirements**

Applications **must** include:

1. A project overview that identifies:
  - The region or corridor(s) to be covered by the plan, including the interstate highways, U.S. highways, and state roads addressed and the freight facilities to be served.
  - The broad scale of the corridor and the necessary charging/fueling to enable widespread commercial vehicle electrification and hydrogen vehicle deployment in that corridor or region (i.e., number of miles covered, number of freight facilities in the region, amount of freight traffic moving in or through the region, etc.).
  - The overall goal of the plan in terms of the level of freight electrification and hydrogen vehicle deployment enabled and the timeframe in which this will be achieved (e.g., number of vehicles supported, number of stations deployed, percent of miles on electricity or hydrogen, etc.).
2. A technical description which covers:
  - The approach to developing the regional plan, including the assessment tools to be employed in identifying infrastructure needs and the grid impacts/hydrogen supply impacts of those needs; the stakeholders to be involved in the development of the plan and their roles and interests in the plan; the methods to gather, process, and incorporate stakeholder inputs into the plan; and the timeframe during which the plan will be developed.
  - Examples illustrating the team's past expertise in working with truck fleets, utilities, and regional energy and transportation planning organizations and in developing large-scale infrastructure plans involving diverse stakeholder groups.

### **Specific Deliverables**

None.

### **Teaming Arrangements**

Applicants are strongly encouraged to propose a team which includes:

- Local, regional, or national freight carriers (fleets)
- Local or regional utilities
- Regional planning organizations and/or state DOT/Energy offices
- Site hosts for electric MD/HD truck infrastructure, such as truck stops or port operators
- Active participation by at least one Clean Cities coalition with clearly documented roles, responsibilities, and budgets
- Technology suppliers such as electric vehicle supply equipment manufacturers or charging network providers

Applicants are encouraged to propose a team which includes:

- Community-based organizations that focus on the needs and perspectives of underserved communities
- Experienced data collection partners (e.g., DOE FFRDCs, universities, or other academic/research organizations)

### **Applications Discouraged**

Applications that include the following are highly discouraged:

- Applications that fund vehicle or infrastructure deployment
- Applications that do not serve medium-duty and heavy-duty freight corridor or freight terminal facilities

### **Special Deliverables**

None.

## **AOI 11: Addressing Critical Training Needs for Transportation Decarbonization**

### **Introduction**

Communities will need to address the transition from to new, clean transportation jobs from traditional industries such as automotive powertrain production and conventional energy resources. New technologies for transportation decarbonization could provide these communities with new job opportunities if the right training is available to the local workforce. Workers need to expand their skills to be successful in the new decarbonized transportation sector, skills which can often be difficult to access in the communities facing these job transitions. Pathways are needed to bring new workers into electrician occupational training to support both electric vehicle infrastructure installation and maintenance as well as the associated electrical transmission and distribution upgrades associated with this electric vehicle infrastructure expansion. Opportunities also exist for electric vehicle maintenance and repair, particularly for medium-duty and heavy-duty trucks and buses.

### **Objective**

The objective of this area of interest is to collaborate with communities across the United States who are impacted by the clean energy transition from an automotive/powertrain jobs or energy jobs perspective to equip this local workforce with skills necessary for participating in a new clean energy transportation workforce. Projects should work with community-based organizations, community colleges, labor groups, industry, or other local stakeholders to identify regional needs for training this workforce for transportation decarbonization jobs, develop or modify curricula to address skills gaps, and deliver the required training to the local workforce.

### **General Requirements**

1. A description of the community and its particular workforce/job market challenges related to a local transition in the automotive/powertrain or energy sectors.
2. A description of the plan for working with organizations in the local community to identify training needs and opportunities for a new clean energy transportation workforce.
3. The technologies and applications (light-duty, medium-duty, heavy-duty) to be covered by the training curriculum.
4. The broad technical topics to be covered by the training curriculum.
5. A plan for developing and delivering the necessary training identified by the community.
6. Team roles and responsibilities, including the activities to be undertaken by Clean Cities coalitions and educational institutions in the project.
7. A plan for replicability and continuation of the training curriculum upon the completion of the funded project, including stakeholder outreach.

### **Specific Deliverables**

None.

### **Teaming Arrangements**

VTO highly encourages project teams that include the following partners:

- One or more Clean Cities coalitions (<https://cleancities.energy.gov/coalitions/locations/>)
- Educational/training institutions with specific expertise in developing and delivering online and/or in-person training curricula.
- Community-based organizations with expertise in identifying and serving the needs and perspectives of underserved communities.
- Labor and/or industry groups impacted by the workforce transition areas.

VTO encourages project teams that include the following partners:

- Certification organizations in the transportation space

### **Applications Discouraged**

Applications that include the following are highly discouraged:

- Promotion of training for one specific brand, organization, proprietary certification, or product

### **Special Deliverables**

None.

## **AOI 12: Demonstration and Deployment – Open Topic**

### **Introduction**

The Technology Integration Program and its Clean Cities coalition partners have a broad portfolio of potential technology options with the opportunity to address pressing transportation efficiency and equity needs.

### **Objective**

The objective of this area of interest is to draw on this portfolio and explore novel solutions to transportation and related clean energy challenges through demonstration or deployment projects not otherwise addressed in this FOA. This area could include projects to address challenges unique to their geographic areas and solutions with potential for replication in other areas across the country, or other ways to accelerate clean transportation deployment.

Projects of interest include but are not limited to:

- projects with innovative approaches to decarbonize transportation
- projects that address mobility needs of local underserved regions or populations
- implement transportation fuels, vehicles, systems, and technologies that have positive impact on greenhouse gas emissions, such as those that implement renewable fuels and renewable energy sources (ex: solar/wind power) into transportation systems
- those which implement advanced technologies or alternative fuels in off-road, marine, rail, and other non-road applications. For example, ships and rail projects can have very high GGE reduction per vehicle by adopting alternative fuels, renewable blends and/or advanced technologies
- those which develop roadmaps for decarbonization in local Clean Cities regions
- projects that focus on transitioning high-impact heavy-duty fleets to new fuels and technologies that reduce petroleum consumption and greenhouse gas and criteria emissions
- projects which improve transportation affordability and reduce emissions by accelerating or enabling widespread access to affordable alternative and renewable fuels
- projects that holistically drive adoption of clean energy technologies across jurisdictions

### **General Requirements**

1. Identify the specific challenge to be addressed and the target audience for the technical solution to be implemented.
2. Identify specific technologies, approaches, or activities that align with the AOI objectives described above.
3. Define project team roles and responsibilities as well as funding for specific tasks that Clean Cities coalitions and partners will undertake.

4. Address replicability through a project structure that produces results and insights useful to others across the country; project teams must provide for public release a final technical report that documents project information, analyses, and insights.

**Specific Deliverables**

None.

**Teaming Arrangements**

The project team must include at least one active and DOE designated Clean Cities coalition with a significant role (at least 25% of project budget). Active Coalitions can be found at: <https://cleancities.energy.gov/coalitions/locations/>.

VTO highly encourages project teams and strategic partners such as the following:

- Clean Cities Coalitions
- Consortia comprised of multiple Clean Cities coalitions (<https://cleancities.energy.gov/coalitions/locations/>)
- Local/regional/state governments, metropolitan planning organizations
- Community-based organizations that focus on the needs and perspectives of underserved communities
- Transit agencies
- Transportation network providers
- Vehicle, fuel, energy, and infrastructure providers
- Utility companies;
- Fleets and other end-user groups

**Applications Discouraged**

Applications that include the following are highly discouraged:

- Promotion of a specific brand, product, or invention;
- Inclusion of novelty vehicles and recreational or sport vehicles;
- Subsidies for fuel cost;
- Rebates or tax incentives;
- Purchase of land.

**Special Deliverables**

None.

## **AOI 13: Transportation Energy Analysis**

### **Introduction**

VTO's Data, Modeling, and Analysis Program provides a cross-cutting, overarching, and convening role within VTO in its support for and application of energy, environmental, and economic models, data and tools. In general, these data and tools serve to estimate benefits and identify and evaluate gaps, opportunities, and challenges for VTO-supported advanced vehicle technologies. VTO's Analysis Program recognizes a lack of knowledge pertaining to vehicle market dynamics in disadvantaged communities, specifically in regard to adoption of electrified transportation (EVs), access to supporting infrastructure (i.e., EV supply equipment, or "EVSE") and the supply chain of these technologies. VTO's Analysis Program, in conjunction with its VTO partners, has begun to address this gap through developing analytical models and applied analyses to assess current environmental justice (EJ) outcomes and to help identify pathways to connect disadvantaged communities to EVs and supporting infrastructure (EVSE).

To further the understanding of effective, efficient pathways for helping disadvantaged communities access EVs and related infrastructure, the VTO Analysis Program is soliciting the development of new data, models, tools, applications, and insights.

Projects must primarily benefit underserved communities as defined in the FOA Section I.A.iii.

Benefits considered under the National Electric Vehicle Infrastructure (NEVI) program state guidance<sup>16</sup> can guide analytical efforts:

- Improve clean transportation access through the location of chargers;
- Decrease the transportation energy cost burden by enabling reliable access to affordable charging;
- Reduce environmental exposures to transportation emissions;
- Increase parity in clean energy technology access and adoption;
- Increase access to low-cost capital to increase equitable adoption of more costly, clean energy technologies like EVs and EV chargers;
- Increase the clean energy job pipeline, job training, and enterprise creation in disadvantaged communities;
- Increase energy resilience;
- Provide charging infrastructure for transit and shared-ride vehicles;
- Increase equitable access to the electric grid; and
- Minimize gentrification-induced displacement result from new EV charging infrastructure.

### **Objective**

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<sup>16</sup>[https://www.fhwa.dot.gov/environment/alternative\\_fuel\\_corridors/nominations/90d\\_nevi\\_formula\\_program\\_guidance.pdf](https://www.fhwa.dot.gov/environment/alternative_fuel_corridors/nominations/90d_nevi_formula_program_guidance.pdf)

The objective of this area of interest is to develop either new analytical models, tools and data sets or a novel approach to using existing model(s) in combination with real-world data (or representative synthetic data) in order to better understand vehicle technology market dynamics in disadvantaged communities. The models, data and tools must help identify effective, efficient approaches for connecting disadvantaged communities to electrified transportation and supporting infrastructure, along with the community benefits of transportation electrification, and enable quantification of EV and EJ outcomes of interest. Market dynamics of interest include disadvantaged community access to EVs, access to infrastructure, travel patterns, and alignment of travel patterns with EV ranges and charging opportunities.

Potential technical approaches of interest within this AOI include variations on and combinations of the following themes:

- Techno-economic and/or market dynamics modeling approaches representing disadvantaged community access to EVs and infrastructure and mobility
- More general vehicle technology market dynamics modeling with an explicit consideration of disadvantaged communities
- Disadvantaged community travel patterns and alignment with EV ranges and charging opportunities
- Analysis to highlight ways to accelerate EV adoption in DACs
- Analytical studies of effective, efficient approaches for connecting disadvantaged communities to EVs and supporting infrastructure
- National coverage data sets with community, household or individual-scale data
- Distributional impacts of electrified transportation and mitigation options
- Indirect benefits and non-energy benefits from electric vehicles that accrue to disadvantaged communities
- Prospective scenario analysis data and tools to inform local planning
- Any combination of the above
- Other timely, priority analytical modeling informing DOE's understanding of connecting disadvantaged communities to EVs and supporting infrastructure

### **General Requirements**

Applications ***must***:

1. Identify one or multiple disadvantaged communities that will be the focus of the project.
2. Identify user of the tool, data or analysis.
3. Identify metrics that will be used to demonstrate benefits to underserved communities.
4. Describe the existing real-world (or synthetic representative) datasets to be applied.
5. Describe how the proposed model, tool, and/or applied analysis can be generalized and applied to additional underserved communities beyond those explicitly studied as part of a project funded by this FOA.

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6. Describe how the existing or proposed model, tool, and/or applied analysis will enable quantification of EV and EJ outcomes of interest, such as increased EV market share, increased access to EVSE, lower household transportation costs, (e.g., through metrics like Argonne National Laboratory's transportation energy burden) and reductions in local air pollution and greenhouse gas emissions.

**SpecificSpecial Deliverables**

None.

**Teaming Arrangements**

None.

**Special Deliverables**

In addition to the deliverables required in the Federal Assistance Reporting Requirements Checklist, the following deliverables are required:

1. Participation in the Annual Merit Review held in Washington DC
2. Summary of accomplishments and project work report will be prepared for inclusion in the Vehicle Technologies Office annual programmatic progress report

**Applications Discouraged**

1. Applications that do not leverage real-world data or synthetic representative data.
2. Applications that focus solely or primarily on theoretical modeling without real-world application and insights.

## 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).

### Area of Interest 4:

- Applications that propose sole development of cell chemistry R&D for a structural battery are discouraged.

### Area of Interest 6:

- Applications that do not include a plan to provide all sharable data to a designated DOE National Laboratory.
- Applications that propose to perform only modeling and simulation of a transportation system solution without physical implementation and validation.
- Applications that propose a simple demonstration of existing technologies that do not contribute new data or understanding to the research community.

### Area of Interest 8:

- Applications that include deploying any vehicles, EVSE, or other infrastructure.
- Applications that include rebates or tax incentives.
- Applications that include the purchase of land.

### Area of Interest 9:

- Applications that promote a specific brand.
- Applications which include the purchase of vehicles as project costs.
- Applications that dedicate a substantial portion of project budget to modelling, analysis, or software development efforts.
- Applications that include rebates or tax incentives.
- Applications that include the purchase of land.

### Area of Interest 10:

- Applications that include technologies that are not in some phase of development.

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- Applications that include the purchase of land.
- Applications for projects that use an EVSE that does not comply or does not demonstrate future compliance with applicable performance and safety certifications from an approved Nationally Recognized Testing Laboratory (NRTL).
- Applications for projects with EVSE installations that do not comply with applicable installation codes and standards.
- Applications for projects with EVSE installations and signage that do not comply with the Americans with Disabilities Act (ADA).

## **D. Authorizing Statutes**

The programmatic authorizing statutes are Public Law (P.L.) 102-486, Energy Policy Act (EPA) of 1992, as amended by P.L. 109-58, EPA 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 EPA 2005 (42 U.S.C. §§ 16061-16093)
- Sections 131-136 of EISA 2007 (42 U.S.C. §§ 17011-17013)

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 \$95,700,000 of federal funding available for new awards under this FOA, subject to the availability of appropriated funds. EERE anticipates making approximately 40 to 82 awards under this FOA. EERE may issue one, multiple, or no awards. Individual awards may vary between \$300,000 and \$7,500,000.

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 Drive System Innovations	2-3	\$5,000,000	\$7,500,000	\$15,000,000	39
2	Non-Road Electric Vehicle Charging Concepts	2	\$2,000,000	\$2,000,000	\$4,000,000	24-39
3	Powertrain Materials for Battery Electric Vehicles (BEVs)	2-3	\$2,500,000	\$3,750,000	\$7,500,000	39
4	Multi-Functional Material and Structures Research and Development	2-3	\$2,500,000	\$3,750,000	\$7,500,000	39
5a	Natural Gas Engine Demonstration for Non-Road, Including Off-Road, Rail and Marine Applications	1-2	\$2,500,000	\$5,000,000	\$5,000,000	24-39
5b	Low-GHG Concepts for Off-Road Vehicles and Equipment	1-3	\$1,500,000	\$5,000,000	\$5,000,000	39
5c	Advanced Opposed Piston 2-Stroke (OP2S) Hydrogen Combustion	1-2	\$2,500,000	\$5,000,000	\$5,000,000	39

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	Architecture for Heavy-Duty Transportation, Including On-Road and Non-Road (Off-Road, Rail and Marine) Applications					
5d	Demonstration of Dimethyl Ether Medium-Duty Engine for Non-Road Applications	1	\$2,500,000	\$2,500,000	\$2,500,000	39
6	Clean Energy Mobility Solutions for Underserved Communities	2-3	\$3,330,000	\$5,000,000	\$10,000,000	39
7a	No Home Charging: Multi-Family Housing Innovative Demonstrations, Technical Assistance and Best Practices	1	\$2,000,000	\$2,000,000	\$2,000,000	24
7b	No Home Charging: Electric Vehicle Charging for Overnight Parking	2-4	\$1,500,000	\$3,000,000	\$6,000,000	24-39
8	Community Engagement, Outreach, Technical Assistance, and Training in Underserved Communities	5-20	\$500,000	\$2,000,000	\$10,000,000	24-39
9	Community-Driven Electric Vehicle Charging Deployment in Underserved Communities	3-10	\$500,000	\$1,670,000	\$5,000,000	39
10	Innovative Medium- and Heavy-Duty EV Charging and Hydrogen Regional Fueling Corridor Infrastructure Plans	2-5	\$500,000	\$1,250,000	\$2,500,000	18-24
11	Addressing Critical Training Needs for Transportation Decarbonization	2-4	\$630,000	\$1,250,000	\$2,500,000	24-39
12	Demonstration and Deployment – Open Topic	5-10	\$500,000	\$1,000,000	\$5,000,000	24-39

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13	Transportation Energy Analysis	3-4	\$300,000	\$400,000	\$1,200,000	27-39
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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 from 18 months up to 39 months in duration 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.xv. 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.

**i. Cooperative Agreements**

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

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

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

**ii. 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.

##### ii. Individuals

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

##### iii. Domestic Entities

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

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

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

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 for funding under this FOA. Nonprofits described in Section 501(c)5 of the IRS code are eligible to apply for funding.

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

Entities identified on a Department of Homeland Security (DHS), Binding Operational Directives (BOD) as an entity publicly banned from doing business with the United States government are not eligible. See <https://cyber.dhs.gov/directives/>.

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

Non-DOE/NNSA FFRDCs are eligible to apply for funding as a subrecipient, 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**

If a foreign entity applies for funding as a prime recipient, it must designate in the Full Application a subsidiary or affiliate that qualifies as a domestic entity to be the prime recipient. The Full Application must state the nature of the corporate relationship between the foreign entity and domestic subsidiary or affiliate.

Foreign entities may request a waiver of the requirement to designate a subsidiary or affiliate that qualifies as a domestic entity to be the prime recipient in the Full Application (i.e., a foreign entity may request that it remains the prime recipient on an award). To do so, the applicant must submit an explicit written waiver request in the Full Application. Likewise, if the applicant seeks to include a foreign entity as a subrecipient, the applicant must submit a separate explicit written waiver request in the Full Application for each proposed foreign subrecipient.

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

#### **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.

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**

AOI	Minimum Cost Share Required
1	20% - R&D Phase 50% - Demonstration Phase
2	20%
3	20%
4	20%
5a	20% - R&D Phase 50% - Demonstration Phase

5b	20%
5c	20%
5d	20% - R&D Phase 50% - Demonstration Phase
6	20%
7a	0%
7b	50%
8	0%
9	20%
10	0%
11	0%
12	50%
13	10%

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.

**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.

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### iii. **Cost Share Types and Allowability**

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

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

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

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

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

The 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. 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 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. Concept Papers*

Concept Papers are deemed compliant if:

- The Concept Paper 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 EERE Exchange by the deadline stated in this FOA.

### *ii. Full Applications*

Full Applications are deemed compliant if:

- The applicant submitted a compliant Concept Paper;
- The Full Application complies with the content and form requirements in Section IV.E. of the FOA; and
- The applicant successfully uploaded all required documents and clicked the “Submit” button in 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/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:

#### *i. Authorization for non-DOE/NNSA FFRDCs*

The federal agency sponsoring the FFRDC must authorize in writing the use of the FFRDC on the proposed project and this authorization must be

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submitted with the application. The use of a FFRDC must be consistent with its authority under its award.

*ii. Authorization for DOE/NNSA FFRDCs*

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

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

*iii. Value/Funding*

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

*iv. 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.

*v. Responsibility*

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

*vi. Limit on FFRDC Effort*

AOI	DOE FFRDC Participation Limit
1	25% of total project costs
2	25% of total project costs

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3	25% of total project costs
4	25% of total project costs
5a	25% of total project costs
5b	25% of total project costs
5c	25% of total project costs
5d	25% of total project costs
6	25% of total project costs
7a	0% of total project costs
7b	25% of total project costs
8	0% of total project costs
9	0% of total project costs
10	25% of total project costs
11	25% of total project costs
12	25% of total project costs
13	25% of total project costs

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

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

## **G. Questions Regarding Eligibility**

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 EERE Exchange at <https://eere-Exchange.energy.gov>, unless specifically stated otherwise. **EERE will not review or consider submissions submitted through means other than 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, Full Application, and Reply to Reviewer Comments 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
- 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 Concept Papers and Full Applications at least 48 hours in advance of the submission deadline.** Under normal conditions (i.e., at least 48 hours in advance of the submission deadline), applicants should allow at least 1 hour to submit a Concept Paper or Full Application. Once the Concept Paper or Full Application is submitted in EERE Exchange, applicants may revise or update that submission until the expiration of the applicable deadline. If changes are made to any of these documents, the applicant must resubmit the Concept Paper or 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 EERE Exchange**

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

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

**B. Application Forms**

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

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

**TechnicalVolume\_Part\_1**

**TechnicalVolume\_Part\_2**

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Problems with EERE Exchange? Email [EERE-ExchangeSupport@hq.doe.gov](mailto:EERE-ExchangeSupport@hq.doe.gov) Include FOA name and number in subject line.*

## 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.

### 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:

### AOIs 1-6

Section	Page Limit	Description
<b>Cover Page</b>	1 page maximum	The cover page should include the project title, the specific announcement Topic Area being addressed (if applicable), both the technical and business points of contact, names of all team member organizations, and any statements regarding confidentiality.
<b>Technology Description</b>	3 pages maximum	Applicants are required to describe succinctly: <ul style="list-style-type: none"> <li>• The proposed technology, including its basic operating principles and how it is unique and innovative;</li> <li>• 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);</li> <li>• The current state-of-the-art in the relevant field and application, including key shortcomings, limitations, and challenges;</li> <li>• How the proposed technology will overcome the shortcomings, limitations, and challenges in the relevant field and application;</li> <li>• The potential impact that the proposed project would have on the relevant field and application;</li> <li>• The key technical risks/issues associated with the proposed technology development plan; and</li> <li>• 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;</li> </ul>

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		<ul style="list-style-type: none"><li>• Whether the applicant has prior experience which demonstrates an ability to perform tasks of similar risk and complexity;</li><li>• Whether the applicant has worked together with its teaming partners on prior projects or programs;</li><li>• Whether the applicant has adequate access to equipment and facilities necessary to accomplish the effort and/or clearly explain how it intends to obtain access to the necessary equipment and facilities; and</li><li>• Applicants may provide graphs, charts, or other data to include in their Technology Description.</li></ul>
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## AOIs 7a-13

Section	Page Limit	Description
<b>Cover Page</b>	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.
<b>Technical Description and Impacts</b>	3 pages maximum	Applicants are required to describe succinctly: <ul style="list-style-type: none"><li>• The problem being addressed by the project and the relevance of this problem to the AOI;</li><li>• The project goal (i.e., what the project will accomplish) and what technologies will be used within the scope of that project;</li><li>• The project's approach to accomplishing the goal and its innovation;</li><li>• The stakeholders/communities that will benefit from the project;</li><li>• The potential impact that the proposed project would have on the problem being addressed;</li><li>• How EERE funding is necessary to achieve the project objectives;</li><li>• The project team's qualifications, experience, and capabilities to successfully execute the proposed project; and</li><li>• Applicants may provide graphs, charts, or other data within the 3-page limit.</li></ul>

EERE makes an independent assessment of each Concept Paper based on the criteria in Section V.A.i. 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 posted on EERE Exchange at the close of that phase.

## **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.

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

All Full Application documents must be marked with the Control Number issued to the applicant. Applicants will receive a control number upon clicking the “Create Concept Paper” button in 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	2 pages each	ControlNumber_LeadOrganization_Resumes
Letters of Commitment	PDF	1 page each	ControlNumber_LeadOrganization_LOCs
Statement of Project Objectives (use the supplied template)	MS Word	7	ControlNumber_LeadOrganization_SOPO
SF-424	PDF	n/a	ControlNumber_LeadOrganization_App424
Budget Justification Workbook (use the supplied template)	MS Excel	n/a	ControlNumber_LeadOrganization_Budget_Justification
Summary/Abstract for Public Release	PDF	1	ControlNumber_LeadOrganization_Summary
Summary Slide (use the supplied template)	MS Powerpoint	1	ControlNumber_LeadOrganization_Slide
Subrecipient Budget Justification (use the supplied template)	MS Excel	n/a	ControlNumber_LeadOrganization_Subrecipient_Budget_Justification
Authorization from cognizant Contracting Officer for FFRDC	PDF	n/a	ControlNumber_LeadOrganization_FFRDC
SF-LLL Disclosure of Lobbying Activities	PDF	n/a	ControlNumber_LeadOrganization_SF-LLL
Foreign Entity and Foreign Work Waivers	PDF	n/a	ControlNumber_LeadOrganization_Waiver
Diversity Equity and Inclusion Plan	PDF	10	ControlNumber_LeadOrganization_DEIP
Current and Pending Support	PDF	n/a	ControlNumber_LeadOrganization_CPS
Locations of Work (use the supplied template)	MS Excel	n/a	ControlNumber_LeadOrganization_LOW
Data Management Plan	MS Word	n/a	ControlNumber_LeadOrganization_DMP

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**TechnicalVolume\_Part\_1**

**TechnicalVolume\_Part\_2**

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

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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 using the following convention for the title “ControlNumber\_LeadOrganization\_TechnicalVolume”.

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

The Technical Volume to the Full Application may not be more 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 should clearly describe and expand upon information provided in the Concept Paper. The Technical Volume must conform to the following content requirements:

## AOIs 1-6

SECTION/PAGE LIMIT	DESCRIPTION
<b>Cover Page</b>	The cover page should include the project title, the specific FOA Topic Area being addressed (if applicable), both the technical and business points of contact, names of all team member organizations, names of the senior/key personnel and their organizations, and any statements regarding confidentiality.
<b>Project Overview</b> (Approximately 10% of the Technical Volume)	<p>The Project Overview should contain the following information:</p> <ul style="list-style-type: none"><li>• <b>Background:</b> 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.</li><li>• <b>Project Goal:</b> The applicant should explicitly identify the targeted improvements to the baseline technology and the critical success factors in achieving that goal.</li><li>• <b>DOE Impact:</b> 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.</li></ul>
<b>Technical Description, Innovation, and Impact</b> (Approximately 30% of the Technical Volume)	<p>The Technical Description should contain the following information:</p> <ul style="list-style-type: none"><li>• <b>Relevance and Outcomes:</b> 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.</li><li>• <b>Feasibility:</b> 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.</li><li>• <b>Innovation and Impacts:</b> 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.</li></ul>

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<b>Workplan and Market Transformation Plan</b> (Approximately 40% of the Technical Volume)	<p>The Workplan should include a summary of the Project Objectives, Technical Scope, Work Breakdown Structure (WBS), Milestones, Go/No-Go Decision Points, and Project Schedule. A detailed SOPO is separately requested. The Workplan should contain the following information:</p> <ul style="list-style-type: none"><li>• <b>Project Objectives:</b> 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.</li><li>• <b>Technical Scope Summary:</b> 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.</li><li>• <b>WBS and Task Description Summary:</b> 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.</li><li>• <b>Milestone Summary:</b> 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.</li></ul>
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	<ul style="list-style-type: none"><li>• <b>Go/No-Go Decision Points:</b> The applicant should provide a summary of project-wide Go/No-Go decision points at appropriate 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.</li><li>• <b>End of Project Goal:</b> 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.</li><li>• <b>Project Schedule (Gantt Chart or similar):</b> The applicant should provide a schedule for the entire project, including task and subtask durations, milestones, and Go/No-Go decision points.</li><li>• <b>Project Management:</b> The applicant should discuss the team’s proposed management plan, including the following:<ul style="list-style-type: none"><li>○ The overall approach to and organization for managing the work</li><li>○ The roles of each project team member</li><li>○ Any critical handoffs/interdependencies among project team members</li><li>○ The technical and management aspects of the management plan, including systems and practices, such as financial and project management practices</li><li>○ The approach to project risk management</li><li>○ A description of how project changes will be handled</li><li>○ If applicable, the approach to Quality Assurance/Control</li><li>○ How communications will be maintained among project team members</li></ul></li><li>• <b>Market Transformation Plan:</b> The applicant should provide a market transformation plan, including the following:<ul style="list-style-type: none"><li>○ Identification of target market, competitors, and distribution channels for proposed technology along with</li></ul></li></ul>
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	<p>known or perceived barriers to market penetration, including a mitigation plan</p> <ul style="list-style-type: none"><li>○ Identification of a product development and/or service plan, commercialization timeline, financing, product marketing, legal/regulatory considerations including intellectual property, infrastructure requirements, data dissemination, and product distribution.</li></ul>
<b>Technical Qualifications and Resources</b> (Approximately 20% of the Technical Volume)	<p>The Technical Qualifications and Resources should contain the following information:</p> <ul style="list-style-type: none"><li>• Describe the project team's unique qualifications and expertise, including those of key subrecipients.</li><li>• 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.</li><li>• This section should also include relevant, previous work efforts, demonstrated innovations, and how these enable the applicant to achieve the project objectives.</li><li>• Describe the time commitment of the key team members to support the project.</li><li>• Describe the technical services to be provided by DOE/NNSA FFRDCs, if applicable.</li><li>• For multi-organizational or multi-investigator projects, describe succinctly:<ul style="list-style-type: none"><li>○ The roles and the work to be performed by each PI and senior/key personnel;</li><li>○ Business agreements between the applicant and each PI and senior/key personnel;</li><li>○ How the various efforts will be integrated and managed;</li><li>○ Process for making decisions on scientific/technical direction;</li><li>○ Publication arrangements;</li><li>○ Intellectual Property issues; and</li><li>○ Communication plans</li></ul></li></ul>

## AOIs 7a-13

SECTION/PAGE LIMIT	DESCRIPTION
<b>Cover Page</b>	<p>The cover page should include:</p> <ul style="list-style-type: none"> <li>• Project title,</li> <li>• The specific FOA Topic Area of Interest (AOI) being addressed,</li> <li>• The technical point of contact,</li> <li>• The business points of contact,</li> <li>• The names and locations (city, state, zip code) of all team member organizations,</li> <li>• Any additional locations (city, state, zip code) of project work</li> <li>• Statements regarding confidentiality.</li> </ul>
<b>Project Overview</b> (Approximately 10% of the Technical Volume)	<p>The Project Overview section should contain a brief summary of the proposed project including the following information:</p> <p><b>Project Summary:</b></p> <ul style="list-style-type: none"> <li>• Explanation of the project's relevance to the AOI objectives</li> <li>• The project's end goal(s): Describe what the project will accomplish.</li> <li>• The project approach: Summarize the proposed project tasks to achieve the project's end goal(s).</li> <li>• Project outcomes: Describe specific short-term results from the project activities.</li> <li>• Project outputs: Describe specific deliverables or tools to be produced.</li> <li>• Project impacts: Describe expected long-term impacts resulting from the project activities.</li> </ul> <p><b>Project Team and Qualifications</b></p> <ul style="list-style-type: none"> <li>• Describe the team member organizations' experience with this type of work and any special qualifications of key individuals in relation to the proposed work.</li> </ul>

<p><b>Project Approach</b> (Approximately 30% of the Technical Volume)</p>	<p>The Project Approach and Impact section should contain the following information:</p> <p><b>Project Approach and Impact Description</b></p> <ul style="list-style-type: none"> <li>• Describe the problem being addressed, or the opportunity pursued by the project, using quantifiable metrics.</li> <li>• Describe the current state of the market sector applicable to the AOI (e.g., mobility accessibility, local knowledge and use of electric vehicles, availability of electric vehicle charging stations, market penetration, etc.). This should be specific to the geographic project area being proposed.</li> <li>• Using measurable/quantifiable elements, describe the expected change in the market sector as a result of the project activities. This should be specific to the geographic project area being proposed.</li> <li>• The project approach: Describe the proposed project approach including what tasks and activities will be undertaken to achieve the project's end goal(s).</li> <li>• Provide a detailed description of: <ul style="list-style-type: none"> <li>○ the technology or system to be demonstrated or deployed including quantity, type, location, specifications, etc. and/or</li> <li>○ the outreach and education programs and activities to be developed/conducted and/or</li> <li>○ the training to be developed/conducted.</li> </ul> </li> <li>• Describe how community stakeholders affected by the project are involved in the design and implementation of the project activities.</li> <li>• The project's end goal(s): Describe what the project will accomplish by the end of the project period.</li> <li>• Describe the project outcomes: the associated metrics and the approach to measuring their impact.</li> <li>• Project outputs: Describe specific deliverables or tools to be produced.</li> <li>• Describe how the proposed project is innovative and replicable in other communities.</li> </ul> <p><b>Justice 40 Considerations</b></p> <ul style="list-style-type: none"> <li>• Describe how the project may directly or indirectly benefit disadvantaged communities.</li> </ul>
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<b>Market Transformation Plan</b> (Approximately 5% of the Technical Volume)	<p>The Market Transformation Plan section should include the following information</p> <p><b>Market Transformation Plan</b></p> <p>Describe the projects approach to ensuring long-term, market transforming impacts resulting from the project activities.</p> <ul style="list-style-type: none"><li>• Describe the long-term impacts from the project activities on the problem being addressed, including the alleviation of any market barriers.</li><li>• Describe the approach for broadly disseminating project learnings, valuable insights, best practices and outcomes throughout the project period, in order to enable other communities to replicate project successes.</li><li>• Describe how project deployments, training programs, outreach and education programs would sustain themselves or expand after the completion the project period.</li></ul>
<b>Workplan</b> (Approximately 35% of the Technical Volume)	<p>The Workplan should contain the following information:</p> <ul style="list-style-type: none"><li>• <b>Project Summary by Budget Period:</b> Provide a summary description of the work scope by budget periods.<ul style="list-style-type: none"><li>○ Describe the specific expected outcome(s) of each budget period.</li></ul></li><li>• <b>Project Schedule</b> (Gantt Chart or similar): Provide a schedule for the entire project, including<ul style="list-style-type: none"><li>○ Task and subtask durations,</li><li>○ Milestones, and</li><li>○ Go/No-Go decision points</li></ul></li><li>• <b>Work Breakdown Structure (WBS):</b> Provide a WBS which:<ul style="list-style-type: none"><li>○ Is structured with a hierarchy of budget periods (approximately annual), task and subtasks</li><li>○ Contains a concise description of the specific activities to be conducted.</li><li>○ Describes how the team members will accomplish the work, achieve the milestones, and produce the deliverables in order to meet the final project goal(s).</li><li>○ For each work package in the WBS, clearly indicates the responsible party and the location of the work.</li></ul></li></ul>

	<ul style="list-style-type: none"><li>• <b>Milestone Summary:</b> 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.  Completion of a deliverable (a project output such as a technical report or tool) should be associated with an individual milestone.  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).  Include the following information<ul style="list-style-type: none"><li>○ Milestone Title</li><li>○ Milestone description</li><li>○ Associated task number</li><li>○ Timeframe for completion (e.g., project month or quarter)</li><li>○ How the milestone will be verified</li></ul></li><li>• <b>Go/No-Go Decision Points:</b> Provide a summary of project-wide Go/No-Go decision points at appropriate 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, project 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.<ul style="list-style-type: none"><li>○ Each project must have at least one project-wide Go/No-Go decision point for each budget period (ex: 12 to 15-month period) of the project. See Section VI.B.xiv.</li><li>○ Provide the specific criteria to be used to evaluate the project at the Go/No-Go decision point.</li><li>○ Go/No-Go decision points are considered “SMART” and can fulfill the requirement for an annual SMART milestone.</li></ul></li><li>• <b>End of Project Goal:</b> Provide a summary of the end of project goal(s). Each project must have at least one SMART end of project goal.</li><li>• <b>Project data:</b> Provide a description of:<ul style="list-style-type: none"><li>○ The data to be collected from project related infrastructure, vehicles, or processes; market impact metrics;</li><li>○ The Justice 40 Initiative metrics the project will collect;</li></ul></li></ul>
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	<ul style="list-style-type: none"><li>○ The types and quantities of analyses to be performed to determine the project impact on market transformation and on underserved communities.</li><li>● <b>Project Management and Controls:</b> Provide an overview of the team's approach to project management and controls, including the following:<ul style="list-style-type: none"><li>○ The overall approach to managing the work</li><li>○ Financial management practices and systems used to track project costs, invoicing, and payments.</li><li>○ Project management practices and systems used to provide oversight of task progress, scope, schedule, and budget management.</li><li>○ Process for managing project changes</li><li>○ The involvement (responsible, accountable, consulted, or informed) of each project team organization in relation to the tasks, milestones and deliverables.</li><li>○ Describe the internal communication process among project team members.</li><li>○ Identification of project risks, mitigation strategies and risk management responsibilities</li><li>○ Quality Assurance/Control process to ensure the quality of services and products (including deliverables) generated by the team.</li></ul></li></ul> <p>Note that a SOPO is required as a separate submission in the application (SOPO template is available in EERE Exchange). The tasks, milestones, and go/no-go decision points in the SOPO must be consistent with those proposed in the Workplan.</p>
<b>Project Team and Qualifications</b> (Approximately 20% of the Technical Volume)	<p>The Project Team and Qualifications section should contain the following information:</p> <ul style="list-style-type: none"><li>● Describe the unique qualifications, expertise, and experience of the key individuals in the project team in relation to project and AOI objectives.</li><li>● Describe succinctly the roles and the work to be performed by each Principal Investigator (PI) and key participant in relation to their qualifications, expertise, and experience.</li><li>● Describe the time commitment of the PI and key participants to support the project.</li><li>● Describe the alignment between the team organizations' missions/strategic goals with the objectives of the AOI and with the teaming arrangement encouraged or required by the AOI.</li></ul>

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	<ul style="list-style-type: none"><li>• Describe the technical services to be provided by DOE/NNSA FFRDCs, if applicable.</li><li>• Describe how the project team's financial and resource commitments to the project will facilitate the successful achievement of the project's end goals.</li></ul>
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### iii. Resumes

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

1. Contact Information;
2. Education and training: Provide institution, major/area, degree, and year for undergraduate, graduate, and postdoctoral training;
3. Research and Professional Experience: Beginning with the current position, list professional/academic positions in chronological order with a brief description. List all current academic, professional, or institutional appointments, foreign or domestic, at the applicant institution or elsewhere, whether or not remuneration is received, and, whether full-time, part-time, or voluntary;
4. Awards and honors;
5. A list of up to 10 publications most closely related to the proposed project. For each publication, identify the names of all authors (in the same sequence in which they appear in the publication), the article title, book or journal title, volume number, page numbers, year of publication, and website address if available electronically. Patents, copyrights, and software systems developed may be provided in addition to or substituted for publications. An abbreviated style such as the Physical Review Letters (PRL) convention for citations (list only the first author) may be used for publications with more than 10 authors; and
6. Synergistic Activities: List up to five professional and scholarly activities related to the proposed effort.

Save the resumes in a single PDF file using the following convention for the title "ControlNumber\_LeadOrganization\_Resumes".

In future FOAs, EERE may require a biographical sketch for the PI and senior/key personnel. In the meantime, in lieu of a resume, it is acceptable to use the biographical sketch format approved by the National Science Foundation (NSF). The biographical sketch format may be generated by the Science Experts Network Curriculum Vita (SciENCv), a cooperative venture maintained at <https://www.ncbi.nlm.nih.gov/sciencv/>, and is also available at

<https://nsf.gov/bfa/dias/policy/nsfapprovedformats/biosketch.pdf>. The use of a format required by another agency is intended to reduce the administrative burden to researchers by promoting the use of common formats.

**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 (one-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 [X] pages when printed using standard 8.5 x 11 paper with 1" margins (top, bottom, left, and right) with font not smaller than 12 point (except in figures or tables, which may be 10 point font). Save the SOPO in a single Microsoft Word file using the following convention for the title "ControlNumber\_LeadOrganization\_SOPO".

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

Applicants are required to complete the SF-424 Application for Federal Assistance. This form is available on EERE Exchange at <https://eere-Exchange.energy.gov/>. Complete all required fields in accordance with the instructions on the form. The list of certifications and assurances in Field 21 can be found at <http://energy.gov/management/office-management/operational-management/financial-assistance/financial-assistance-forms>, under Certifications and Assurances. Note: The dates and dollar amounts on the SF-424 are for the complete project period and not just the first project year, first phase or other subset of the project period. Save the SF-424 in a single PDF file using the following convention for the title "ControlNumber\_LeadOrganization\_424".

**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

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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 slide summarizing the proposed project. This slide is used during the evaluation process.

The Summary Slide template requires the following information:

- A technology summary;
- A description of the technology’s impact;
- Proposed project goals;
- Any key graphics (illustrations, charts and/or tables);
- The project’s key idea/takeaway;
- Project title, prime recipient, Principal Investigator, and senior/key personnel 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” (**Error! Hyperlink reference not valid.**<https://www.grants.gov/web/grants/forms/sf-424-individual-family.html>) to ensure that non-federal funds have not been paid and will not be paid to any person for influencing or attempting to influence any of the following in connection with the application:

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

Save the SF-LLL in a single PDF file using the following convention for the title  
“ControlNumber\_LeadOrganization\_SF-LLL”.

**xiii. Waiver Requests: Foreign Entity and Foreign Work (if applicable)**

**i. Foreign Entity Participation:**

As set forth in Section III.A.iii., 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. To request a waiver of this

requirement, the applicant must submit an explicit waiver request in the Full Application. Appendix C lists the necessary information that must be included in a request to waive this requirement.

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

As set forth in Section IV.K.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. 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 at least one SMART milestone per Budget Period supported by metrics to measure the success of the proposed actions, and will be incorporated into the award if selected. The Diversity, Equity, and Inclusion 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.

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.

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- 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.

The Diversity, Equity, and Inclusion Plan must not exceed 10 pages. Save the Diversity, Equity and Inclusion Plan in a single PDF file using the following convention for the title "ControlNumber\_LeadOrganization\_DEIP".

**xv. Current and Pending Support**

Current and pending support is intended to allow the identification of potential duplication, overcommitment, potential conflicts of interest or commitment, and all other sources of support. As part of the application, the principal investigator and senior/key personnel at the applicant and subrecipient level must provide a list of all sponsored activities, awards, and appointments, whether paid or unpaid; provided as a gift with terms or conditions or provided as a gift without terms or conditions; full-time, part-time, or voluntary; faculty, visiting, adjunct, or honorary; cash or in-kind; foreign or domestic; governmental or private-sector; directly supporting the individual's research or indirectly supporting the individual by supporting students, research staff, space, equipment, or other research expenses. All foreign government-sponsored talent recruitment programs must be identified in current and pending support.

For every activity, list the following items:

- The sponsor of the activity or the source of funding;
- The award or other identifying number;

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

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.

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

I, [Full Name and Title], certify to the best of my knowledge and belief that the information contained in this Current and Pending Support Disclosure Statement is true, complete and accurate. I understand that any false, fictitious, or fraudulent information, misrepresentations, half-truths, or omissions of any material fact, may subject me to criminal, civil or administrative penalties for fraud, false statements, false claims or otherwise. (18 U.S.C. §§ 1001 and 287, and 31 U.S.C. 3729-3730 and 3801-3812). I further understand and agree that (1) the statements and representations made herein are material to DOE's funding decision, and (2) I have a responsibility to update the disclosures during the period of performance of the award should circumstances change which impact the responses provided above.

The information may be provided in the format approved by the National Science Foundation (NSF), which may be generated by the Science Experts Network Curriculum Vita (SciENCv), a cooperative venture maintained at <https://www.ncbi.nlm.nih.gov/sciencv/>, and is also available at <https://www.nsf.gov/bfa/dias/policy/nsfapprovedformats/cps.pdf>. The use of a

format required by another agency is intended to reduce the administrative burden to researchers by promoting the use of common formats. If the NSF format is used, the individual must still include a signature, date, and a certification statement using the language included in the paragraph above.

Save the Current and Pending Support in a single PDF file using the following convention for the title "ControlNumber\_LeadOrganization\_CPS".

**xvi. 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).

**xvii. Data Management Plan**

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

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 (for 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 MS Word file.

## **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):

- Personnel proposed to work on the project and collaborating organizations (See Section VI.B.xviii. Participants and Collaborating Organizations);
- Current and Pending Support (See Sections IV.E.xvii and VI.B.xix. Current and Pending Support);
- 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, Unique Entity Identifier (UEI) and System for Award Management (SAM)**

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

make a federal award, the DOE will determine that the applicant is not qualified to receive a federal award and use that determination as a basis for making a federal award to another applicant.

## **G. Submission Dates and Times**

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

## **H. Intergovernmental Review**

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

## **I. Funding Restrictions**

### **i. Allowable Costs**

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

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.

### **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 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

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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.

#### **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

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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

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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;
- 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.

## V. Application Review Information

### A. Technical Review Criteria

#### i. Concept Papers AOIs 1-6

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

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

This criterion involves consideration of the following factors:

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

#### ii. Concept Papers AOIs 7a-13

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

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

This criterion involves consideration of the following factors:

- The applicant clearly describes the problem being addressed by the project, the project goal, and what technologies will be used within the scope of the project;
- The applicant clearly describes how the project is unique and innovative;
- The applicant demonstrates adequate involvement from intended partnerships;
- The applicant has the qualifications, experience, capabilities and other resources necessary to complete the proposed project;
- The proposed project clearly meets the requirements of the FOA topic; and
- The proposed work, if successfully accomplished, would have a meaningful impact on the problem targeted by the FOA topic.

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**iii. Full Applications AOIs 1-6**

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

**Criterion 1: Technology Description, Performance Measures, and Impact (50%)**

This criterion involves consideration of the following factors:

**1a. [State-of-Art (SOA)/Baseline Justification]** Validity of the rationale and justification supporting selection of a representative state-of-the-art technology baseline when considering the most recent state of technology development, advancement, and evolution.

**1b. [State-of-Art (SOA)/Baseline Description]** Comprehensiveness of the state-of-the-art technology baseline description to include relevant technology characteristics, operating environment, and specifications/standards applicable to the technology's operational environment.

**1c. [State-of-Art (SOA)/Baseline AOI Performance Measures]** Accuracy of the quantitative state-of-the-art technology baseline performance measure calculation appropriately supported by results of analysis, modeling, simulation, and/or testing and alignment with parameters identified within the AOI objective.

**1d. [Proposed Innovation Description]** Comprehensiveness of the proposed innovation description to include relevant technology characteristics, operating environment, and specifications/standards applicable to the technology's operational environment.

**1e. [Proposed Innovation AOI Performance Measures]** Accuracy of the proposed innovation quantitative performance measure calculation appropriately supported by results of analysis, modeling, simulation, and/or testing and alignment with parameters identified within the AOI objective.

**1f. [Proposed Innovation Benefit Measures]** Reasonableness and accuracy of the quantitative performance measure comparison between the state-of-the-art technology baseline and the proposed innovation with respect to parameters identified within the AOI objective, and the extent that the proposed innovation is projected to meet or exceed performance of these quantitative measures.

**1g. [Barriers to Implementation of the Proposed Innovation]** Comprehensiveness, reasonableness, and accuracy of the proposed innovation barriers to achieving the AOI objective along with corresponding methods to address each barrier.

**1h. [Impact of the Proposed Innovation]** Reasonableness of the proposed innovation's projections of applicability across the market and the extent of the proposed innovation's quantifiable projected impact.

**1i. [Total Ownership Cost of the Proposed Innovation]** Comprehensiveness, accuracy, and reasonableness of the proposed assumptions used in calculating the proposed innovation's total ownership cost and the reasonableness of the projected impact on consumer purchase decisions.

**Criterion 2: Project and Market Transformation Plans (25%)**

This criterion involves consideration of the following factors:

**2a. [Workplan]** Extent that the work breakdown structure includes tasks and subtasks that do not cross budget periods, is comprehensive/specific/concise, and identifies the responsible party for each task completion.

**2b. [Statement of Project Objectives (SOPO)]** Extent that the SOPO complies with the template provided as an attachment to the FOA, includes special deliverables identified within the AOI, includes an anticipated outcome for each budget period in the scope section, and includes high level tasks/subtasks that align with the work breakdown structure BUT DOES NOT include exact detail from the work breakdown structure, tasks that cross budget periods, dates, timeframes, reference to months, or the responsible party for task completion.

**2c. [System Development and Validation Plan]** Comprehensiveness and effectiveness of the technology development and test plan to enable management of the proposed effort through implementation of appropriate SMART metrics, technical milestones, and Go/No-Go Decision Points to quantitatively measure, monitor, and ultimately validate the performance of the proposed innovation incrementally over the course of the proposed project through appropriate use of analysis, modeling, simulation, lab scale testing, component testing, and final system testing and characterization.

**2d. [Schedule]** Extent that the project schedule is comprehensive, includes all tasks and deliverables required for the project, integrates appropriate technical milestones and Go-No-Go decision points, identifies the project critical path, represents reasonable task durations, and identifies appropriate task dependencies.

**2e. [Technical Risks]** Extent of discussion and demonstrated understanding of the key technical risk areas involved in the proposed work and the quality of the mitigation strategies to address them.

**2f. [Market Transformation Plan]** Comprehensiveness and realism of the identified target market, competitors, and distribution channels for proposed innovation along with known or perceived barriers to market penetration, including mitigation plans.

**2g. [Market Transformation Plan]** Comprehensiveness of market transformation plan including but not limited to product development and/or service plan, commercialization timeline, financing, product marketing, legal/regulatory considerations including intellectual property, infrastructure requirements, Open-Source Software Distribution Plan, etc., and product distribution.

**2h. [Domestic Manufacturing Plan]** Reasonableness of the plan and extent of the commitment to either manufacture the end product in the United States or implement the resulting manufacturing process innovation within United States Manufacturing locations.

**2i. [Manufacturing Plan]** Comprehensiveness of the applicable manufacturing process steps, supporting suppliers and/or materials, and equipment appropriate for high volume manufacturing of the proposed technologies for vehicle applications at low cost and high volumes.

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### **Criterion 3: Team & Resources (15%)**

This criterion involves consideration of the following factors:

- 3a. [Project Team/Objectives]** Comprehensiveness of the proposed project team, partners, and collaborations and the assigned roles of each to support successful achievement of project objectives.
- 3b. [Project Team/Continued Development]** Comprehensiveness of the project partnerships, teams, and collaborations to facilitate and expedite further development and commercial deployment of the proposed innovation beyond the project period.
- 3c. [Project Team/Foreign Work]** Extent of foreign work, foreign work disclosure, degree of compliance with foreign work waiver submission instructions, and extent of the necessity and justification for work proposed outside of the United States.
- 3d. [Project Staff/Qualifications and Time Commitment]** Appropriateness of personnel qualifications, relevant expertise and experience, and time commitment of individuals to support successful achievement of project objectives.
- 3e. [Labor Categories/Time Commitment]** Appropriateness of the analysis and justification for the total labor hours planned and the types and quantities of labor categories allocated for each budget period.
- 3f. [Existing Facility/Equipment Availability]** Extent of current or existing team facilities and equipment to support successful achievement of project objectives compared to those proposed for acquisition using project funds.
- 3g. [Validated Project Partner Commitments]** Comprehensiveness, accuracy, and appropriateness of the project letters of commitment (letters of support do not serve as replacement) for all project partners as well as the appropriateness of the proportional project participation of each project partner as identified within a list that includes the proposed partner name, location, proposed Federal funding, proposed cost share contribution, total project participation amount, role in the project, sources and types of cost share, and percentage of project participation as measured against the total project value.

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

This criterion involves consideration of the following factors:

- 4a. [Diversity, Equity, and Inclusion Plan]** The extent, quality, and manner in which the Diversity, Equity, and Inclusion plan incorporates diversity, equity, and inclusion goals in the project.
- 4b. [Underserved Community]** Comprehensiveness in describing the underserved communities served by the project and rationale for determining the community is underserved.
- 4c. [Underserved Community Benefit]** Extent to which the project benefits underserved communities.

**iv. Full Applications AOIs 7a-12**

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

**Criterion 1: Project Approach and Impact (30%)**

This criterion involves consideration of the following factors:

- 1a.** Extent to which the proposed approach is relevant to the topic area objectives, demonstrates how DOE funding will impact the problem that is being addressed, and is innovative;
- 1b.** Extent to which the application objectively describes the current state of the market sector using quantifiable metrics and how the project outcomes will measurably advance the state of the market sector;
- 1c.** Extent to which the community which will be affected by the project is involved in the design and implementation of the project activities; and
- 1d.** Extent to which the project includes activities to produce and share valuable insights and best practices that will effectively enable others to replicate the project successes.

**Criterion 2: Project Plan (30%)**

This criterion involves consideration of the following factors:

- 2a.** Extent to which the workplan clearly defines the scope, tasks, milestones, and schedule of the project such that the parameters of the project are appropriately defined, the tasks are logically ordered, the task durations are reasonable, and that the overall plan will result in successful achievement of project outcomes and goals;
- 2b.** Reasonableness of the approach to managing the work, including the extent to which the involvement of project team organizations/individuals are defined in relation to specific work tasks, milestones and deliverables, and of the structure of the plan for communication among team members;
- 2c.** Reasonableness of the proposed plan for collecting, utilizing, analyzing, and publicly sharing project data; and
- 2d.** Reasonableness of the allocation of project resources, including project budget and key personnel time commitment, to ensure the successful completion of the proposed work.

**Criterion 3: Project Team and Qualifications (25%)**

This criterion involves consideration of the following factors:

- 3a.** Extent of key personnel qualifications, expertise, and experience, in relation to project and AOI objectives;
- 3b.** Extent of the alignment between the team organizations' missions/strategic goals with the objectives of the AOI and with the teaming arrangement proposed by the AOI; and

**3c.** Appropriateness of the resource commitments proposed by project partners or other key participants as validated by letters of commitment.

**Criterion 4: Diversity, Equity, and Inclusion (15%)**

This criterion involves consideration of the following factors:

- 4a. [Diversity, Equity, and Inclusion Plan]** The quality and manner in which the measures incorporate diversity, equity, and inclusion goals in the project;
- 4b. [Underserved Community]** Comprehensiveness in describing the underserved communities served by the project and rationale for determining the community is underserved; and
- 4c. [Underserved Community Benefit]** Extent to which the project benefits underserved communities.

**v. Full Applications AOI 13**

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 (30%)**

This criterion involves consideration of the following factors, all of which are equal weight:

- 1a.** Extent to which the proposed methods for collecting, transmitting, storing, validating and analyzing data are clearly described, feasible, and aligned with the area of interest objectives;
- 1b.** Reasonableness of the approach to sharing models, tools, and analytical applications/insights and the extent to which summary reports and operational data sets will be made publicly available; and
- 1c.** Comprehensiveness of the proposed models, tools, and analytical applications/insights and its consistency with the requirements of the AOI.

**Criterion 2: Project Plan (30%)**

This criterion involves consideration of the following factors, all of which are equal weight:

- 2a.** Extent to which the project plan and schedule include all required tasks, reasonable task durations, logical predecessor and successor task ordering, and a defined critical path;
- 2b.** Extent to which the baseline performance is defined, performance metrics quantify interim performance progress, appropriately scheduled SMART milestones demonstrate project advancement based upon significant project outcomes, and appropriately scheduled SMART Go/No Go Decision Points represent decisions regarding project continuation;
- 2c.** Extent to which the project plan effectively addresses the management of Personally Identifiable Information (PII);

**2d.** 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; and

**2e.** Extent to which the project schedule includes all required tasks, reasonable task durations, logical predecessor and successor task ordering, and a defined critical path.

### **Criterion 3: Project Team and Resources (25%)**

This criterion involves consideration of the following factors, all of which are equal weight:

**3a.** Extent of team member qualifications, relevant expertise, resource commitment, and time commitment to address all aspects of the proposed work with a high probability of success;

**3b.** Reasonableness of the allocation of project resources to ensure the successful completion of the proposed work; and

**3c.** 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 (15%)**

This criterion involves consideration of the following factors, all of which are equal weight:

**4a.** The quality and manner in which the measures incorporate diversity, equity, and inclusion goals in the project; and

**4b.** 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 September 2020, which is available at: <https://energy.gov/management/downloads/merit-review-guide-financial-assistance-and-unsolicited-proposals-current>.

## **C. Other Selection Factors**

### **i. Program Policy Factors**

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

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

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- The degree to which the proposed project, including proposed cost share, optimizes the use of available EERE funding to achieve programmatic objectives;
- The level of industry involvement and demonstrated ability to accelerate commercialization and overcome key market barriers;
- The degree to which the proposed project is likely to lead to increased employment and manufacturing in the United States;
- The degree to which the proposed project will accelerate transformational technological advances in areas that industry by itself is not likely to undertake because of technical and financial uncertainty;
- The degree to which the proposed project, or group of projects, represent a desired geographic distribution (considering past awards and current applications);
- The degree to which the proposed project incorporates 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.

**Diversity (other than technological)**

- The degree to which the proposed project collectively represents diverse types and sizes of applicant organizations.

**Optimize Funding**

- The degree to which the proposed project avoids duplication/overlap with other publicly or privately funded work.

**Complementary Efforts**

- The degree to which the proposed project supports complementary efforts or projects, which, when taken together, will best achieve the research goals and objectives.

**Market Impact**

- The degree to which the proposed project enables new and expanding market segments.

**EE/Deployment**

- The degree to which the project's solution or strategy will maximize deployment or replication.

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#### **Tech Transfer**

- The degree to which the project promotes increased coordination with nongovernmental entities for demonstration of technologies and research applications to facilitate technology transfer.

## **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 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 CFR 200.206.

**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.

**E. Anticipated Notice of Selection and Award Negotiation Dates**

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

## **VI. Award Administration Information**

### **A. Award Notices**

#### **i. Ineligible Submissions**

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

#### **ii. Concept Paper Notifications**

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 EERE Exchange.

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.K.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 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 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 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.K.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**

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

**2. System for Award Management**

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

**3. FedConnect**

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

**4. Grants.gov**

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

**5. Electronic Authorization of Applications and Award Documents**

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

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**ii. Award Administrative Requirements**

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

**iii. Foreign National Access**

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

**iv. Subaward and Executive Reporting**

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

**v. National Policy Requirements**

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

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

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.

## **vii. 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

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prohibiting or otherwise restricting its employees or contactors from lawfully reporting waste, fraud, or abuse to a designated investigative or law enforcement representative of a federal department or agency authorized to receive such information.

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

**(1)** *“These provisions are consistent with and do not supersede, conflict with, or otherwise alter the employee obligations, rights, or liabilities created by existing statute or Executive order relating to (1) classified information, (2) communications to Congress, (3) the reporting to an Inspector General of a violation of any law, rule, or regulation, or mismanagement, a gross waste of funds, an abuse of authority, or a substantial and specific danger to public health or safety, or (4) any other whistleblower protection. The definitions, requirements, obligations, rights, sanctions, and liabilities created by controlling Executive orders and statutory provisions are incorporated into this agreement and are controlling.”*

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

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

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**viii. 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.

**ix. 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.

**x. 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.

**xi. 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>.

**xii. Reporting**

Reporting requirements are identified on the Federal Assistance Reporting Checklist, attached to the award agreement.

**xiii. 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.

**xiv. 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.

**xv. 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.

**xvi. 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.

**xvii. Participants and Collaborating Organizations**

If selected for award negotiations, the selected applicant must submit a list of personnel who are proposed to work on the project, both at the recipient and subrecipient level and a list of collaborating organizations within 30 days after the applicant is notified of the selection. Recipients will have an ongoing

responsibility to notify DOE of changes to the personnel and collaborating organizations, and submit updated information during the life of the award.

**xviii. Current and Pending Support**

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

**xix. U.S. Manufacturing Commitments**

A primary objective of DOE's multi-billion dollar research, development and demonstration investments is to cultivate new research and development ecosystems, manufacturing capabilities, and supply chains for and by U.S. industry and labor. Therefore, in exchange for receiving taxpayer dollars to support an applicant's project, the applicant must agree to the following U.S. Competitiveness Provision as part of an award under this FOA.

**U.S. Competitiveness**

The Recipient agrees that any products embodying any subject invention or produced through the use of any subject invention will be manufactured substantially in the United States unless the Recipient can show to the satisfaction of DOE that it is not commercially feasible. In the event DOE agrees to foreign manufacture, there will be a requirement that the Government's support of the technology be recognized in some appropriate manner, e.g., alternative binding commitments to provide an overall net benefit to the U.S. economy. The Recipient agrees that it will not license, assign or otherwise transfer any subject invention to any entity, at any tier, unless that entity agrees to these same requirements. In the event that the Recipient or other such entity receiving rights in the Subject Invention undergoes a change in ownership amounting to a controlling interest, the Recipient or other such entity receiving rights shall ensure continual compliance with the requirements of this paragraph and shall inform DOE in writing, of the change in ownership within 6 months of the change. The Recipient and any successor assignee

will convey to DOE, upon written request from DOE, title to any subject invention, upon a breach of this paragraph. The Recipient will include this paragraph in all subawards/contracts, regardless of tier, for experimental, developmental or research work.

A subject invention is any invention conceived or first actually reduced in performance of work under an award. An invention is any invention or discovery which is or may be patentable.

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

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

**xx. Data Management Plan (DMP) (if applicable)**

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

## 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-0002611@netl.doe.gov](mailto:DE-FOA-0002611@netl.doe.gov). Questions must be submitted not later than 3 business days prior to the application due date and time. Please note, feedback on individual concepts 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 3 business days, unless a similar question and answer has already been posted on the website.

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

## **VIII. Other Information**

### **A. FOA Modifications**

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

### **B. Government Right to Reject or Negotiate**

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

- **Advance and Identified Waivers:** For an applicant not covered by a Class Patent Waiver or the Bayh-Dole Act, the applicant may request a patent waiver that will cover subject inventions that may be invented under the award, in advance of or within 30 days after the effective date of the award. Even if an advance waiver is not requested or the request is denied, the recipient will have a continuing right under the award to request a waiver for identified inventions, i.e., individual subject inventions that are disclosed to 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.
- **DEC:** On June 07, 2021, DOE approved a DETERMINATION OF EXCEPTIONAL CIRCUMSTANCES (DEC) UNDER THE BAYH-DOLE ACT TO FURTHER PROMOTE DOMESTIC MANUFACTURE OF DOE SCIENCE AND ENERGY TECHNOLOGIES. In accordance with this DEC, all awards, including sub-awards, under this FOA shall include the U.S. Competitiveness Provision in accordance with Section VI.B.xx. U.S. Manufacturing Commitments of this FOA. A copy of the DEC can be found at <https://www.energy.gov/gc/determination-exceptional-circumstances-decs>. Pursuant to 37 CFR § 401.4, any nonprofit organization or small business firm as defined by 35 U.S.C. 201 affected by any DEC has the right to appeal it by providing written notice to DOE within 30 working days from the time it receives a copy of the determination.

## **K. Government Rights in Subject Inventions**

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

### **i. Government Use License**

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

### **ii. March-In Rights**

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

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

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

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

### **AOIs 1-6**

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

### **AOIs 7a-13**

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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.

## **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-17-12 dated January 3, 2017)

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

## **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 CFR 910.501 and Subpart F.

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

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

## **Q. Interim Conflict of Interest Policy for Financial Assistance (February 2022)**

The DOE interim Conflict of Interest Policy for Financial Assistance (COI Policy) can be found at: [PF 2022-17 FAL 2022-02 Department of Energy Interim Conflict of Interest Policy Requirements for Financial Assistance](#).

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

Federal entities. Further, for EERE funded projects, the recipient must include all financial conflicts of interest (FCOI) (i.e., managed and unmanaged/ unmanageable) in their initial and ongoing FCOI reports.

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

## **R. Foreign National Participation (SEPTEMBER 2021)**

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

## **S. Prohibition on Certain Telecommunications and Video Surveillance Services or Equipment**

As set forth in 2 CFR 200.116, recipients and subrecipients are prohibited from obligating or expending project funds (federal funds and recipient cost share) to:

- (1) Procure or obtain;
- (2) Extend or renew a contract to procure or obtain; or
- (3) Enter into a contract (or extend or renew a contract) to procure or obtain equipment, services, or systems that uses covered telecommunications equipment or services as a substantial or essential component of any system, or as critical technology as part of any system. As described in 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).

(i) 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).

(ii) Telecommunications or video surveillance services provided by such entities or using such equipment.

(iii) 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.

See Public Law 115-232, Section 889 for additional information.

## 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:

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

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

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

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

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

**(B) Valuing and documenting contributions**

- (1)** Valuing recipient's property or services of recipient's employees. Values are established in accordance with the applicable cost principles, which mean that amounts chargeable to the project are determined on the basis of costs incurred.

For real property or equipment used on the project, the cost principles authorize depreciation or use charges. The full value of the item may be applied when the item will be consumed in the performance of the award or fully depreciated by the end of the award. In cases where the full value of a donated capital asset is to be applied as cost sharing or matching, that full value must be the lesser or the following:

- a. The certified value of the remaining life of the property recorded in the recipient's accounting records at the time of donation; or
  - b. The current fair market value. If there is sufficient justification, the Contracting Officer may approve the use of the current fair market value of the donated property, even if it exceeds the certified value at the time of donation to the project. The Contracting Officer may accept the use of any reasonable basis for determining the fair market value of the property.
- (2) Valuing services of others' employees. If an employer other than the recipient furnishes the services of an employee, those services are valued at the employee's regular rate of pay, provided these services are for the same skill level for which the employee is normally paid.
- (3) Valuing volunteer services. Volunteer services furnished by professional and technical personnel, consultants, and other skilled and unskilled labor may be counted as cost sharing or matching if the service is an integral and necessary part of an approved project or program. Rates for volunteer services must be consistent with those paid for similar work in the recipient's organization. In those markets in which the required skills are not found in the recipient organization, rates must be consistent with those paid for similar work in the labor market in which the recipient competes for the kind of services involved. In either case, paid fringe benefits that are reasonable, allowable, and allocable may be included in the valuation.
- (4) Valuing property donated by third parties.
  - a. Donated supplies may include such items as office supplies or laboratory supplies. Value assessed to donated supplies included in the cost sharing or matching share must be reasonable and must not exceed the fair market value of the property at the time of the donation.
  - b. Normally only depreciation or use charges for equipment and buildings may be applied. However, the fair rental charges for land and the full value of equipment or other capital assets may be allowed, when they will be consumed in the performance of the award or fully depreciated by the end of the award, provided that the Contracting Officer has approved the charges. When use charges are

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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)

## **APPENDIX C – WAIVER REQUESTS AND APPROVAL PROCESS**

### **A. Waiver for Foreign Entity Participation as the Prime Recipient and Subrecipients**

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

#### **Waiver Criteria**

EERE invests in R&D as part of the DOE's broad portfolio approach to addressing our Nation's energy and environmental challenges. EERE seeks to address gaps in domestic supply chains for critical materials by validating and/or demonstrating improvements to current industrial extraction, separation and processing technologies and developing next-generation technologies to shift the paradigm of the industry. To ensure that purpose is not frustrated by foreign involvement, foreign entities seeking to participate in a project funded under this FOA must demonstrate to the satisfaction EERE that:

- Its participation is in the best interest of the U.S. industry and U.S. economic development;
- The project team has appropriate measures in place to control sensitive information and protect against unauthorized transfer of scientific and technical information;
- Adequate protocols exist between the U.S. subsidiary and its foreign parent organization to comply with export control laws and any obligations to protect proprietary information from the foreign parent organization;
- The work is conducted within the U.S. and the entity acknowledges and demonstrates that it has the intent and ability to comply with the U.S. Manufacturing Plan; and
- The foreign entity will satisfy other conditions that may be deemed necessary by EERE to protect U.S. interests.

#### **Content for Waiver Request**

A Foreign Entity Participation waiver request must include the following:

- a. Information about the entity: name, point of contact, and proposed type of involvement with the Institute, and UEI number for the proposed foreign participant and any foreign parent organization;
- b. Country of incorporation, the extent of the ownership/level control by foreign entities, whether the entity is state owned or controlled, a summary of the ownership breakdown of the foreign entity and the percentage of

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ownership/control by foreign entities, foreign shareholders, foreign state or foreign individuals;

- c. The rationale for proposing a foreign entity participate (must address the waiver criteria stated above);
- d. A description of the project's anticipated contributions to the U.S. economy:
  - i. How the foreign entity's participation 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.;
  - ii. How the foreign entity's participation will promote domestic manufacturing of products and/or services;
- e. A description of why the foreign entity's participation is essential to the project;
- f. A description of the likelihood of Intellectual Property (IP) being created from the work and the treatment of any such IP; and
- g. Countries where the work will be performed (Note: if any work is proposed to be conducted outside the U.S., the applicant must also complete a separate request for a foreign work waiver).

EERE may also require:

- A risk assessment with respect to IP and data protection protocols that includes the export control risk based on the data protection protocols, the technology being developed and the foreign entity and country. These submissions could be prepared by the project lead, but the prime recipient must make a representation to DOE as to whether it believes the data protection protocols are adequate and make a representation of the risk assessment – high, medium or low risk of data leakage to a foreign entity.
- Additional language be added to any agreement or subagreement to protect IP, mitigate risk or other related purposes.

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.

## **B. 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. 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

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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 U.S. 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 measures in place to control sensitive information and protect against unauthorized transfer of scientific and technical information;
- The countries in which the foreign work is proposed to be performed; and
- 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.

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## 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.

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

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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

## APPENDIX F – LIST OF ACRONYMS

COI	Conflict of Interest
DEC	Determination of Exceptional Circumstances
DEI	Diversity, Equity, and Inclusion
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
MSI	Minority-Serving institution
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
STEM	Science, Technology, Engineering, and Mathematics
TIA	Technology Investment Agreement
TRL	Technology Readiness Level
UCC	Uniform Commercial Code
UEI	Unique Entity Identifier
WBS	Work Breakdown Structure
WP	Work Proposal