FINANCIAL ASSISTANCE
FUNDING OPPORTUNITY ANNOUNCEMENT

ADVANCED RESEARCH PROJECTS AGENCY – ENERGY (ARPA-E)
U.S. DEPARTMENT OF ENERGY

Vision OPEN 2024

Announcement Type: Initial Announcement
Funding Opportunity No. DE-FOA-0003387
CFDA Number 81.135

Funding Opportunity Announcement (FOA) Issue Date:	May 22, 2024
First Deadline for Questions to ARPA-E-CO@hq.doe.gov:	5 PM ET, July 8, 2024
Submission Deadline for Concept Papers:	9:30 AM ET, July 16, 2024
Second Deadline for Questions to ARPA-E-CO@hq.doe.gov:	5 PM ET, TBD
Submission Deadline for Full Applications:	9:30 AM ET, TBD
Submission Deadline for Replies to Reviewer Comments:	5 PM ET, TBD
Expected Date for Selection Notifications:	April 2025
Total Amount to Be Awarded	Approximately $150 million, subject to the availability of appropriated funds.
Anticipated Awards	ARPA-E may issue one, multiple, or no awards under this FOA. The Federal share of awards may vary between $250,000 and $10 million.

- For eligibility criteria, see Section III.A of the FOA.
- For cost share requirements under this FOA, see Section III.B of the FOA.
- To apply to this FOA, Applicants must register with and submit application materials through ARPA-E eXCHANGE (https://arpa-e-foa.energy.gov/Registration.aspx). For detailed guidance on using ARPA-E eXCHANGE, see Section IV.H.1 of the FOA.
- Applicants are responsible for meeting each submission deadline. Applicants are strongly encouraged to submit their applications at least 48 hours in advance of the submission deadline.
- For detailed guidance on compliance and responsiveness criteria, see Sections III.C.1 through III.C.4 of the FOA.

Questions about this FOA? Check the Frequently Asked Questions available at http://arpa-e.energy.gov/faq. For questions that have not already been answered, email ARPA-E-CO@hq.doe.gov (with FOA name and number in subject line); see FOA Sec. VII.A. Problems with ARPA-E eXCHANGE? Email ExchangeHelp@hq.doe.gov (with FOA name and number in subject line).

TABLE OF CONTENTS

REQUIRED DOCUMENTS CHECKLIST

For an overview of the application process, see Section IV.A of the FOA.

For guidance regarding requisite application forms, see Section IV.B of the FOA.

For guidance regarding the content and form of Concept Papers, Full Applications, and Replies to Reviewer Comments, see Sections IV.C, IV.D, and IV.E of the FOA.

SUBMISSION	COMPONENTS	OPTIONAL/ MANDATORY	FOA SECTION	DEADLINE
Concept Paper	• Each Applicant must submit a Concept Paper in Adobe PDF format by the stated deadline. The Concept Paper must not exceed 4 pages in length including graphics, figures, and/or tables, and must include the following: ○ Concept Summary ○ Innovation and Impact ○ Proposed Work ○ Team Organization and Capabilities	Mandatory	IV.C	9:30 AM ET, July 16, 2024
Full Application	[TO BE INSERTED BY FOA MODIFICATION IN NOVEMBER 2024]	Mandatory	IV.D	9:30 AM ET, TBD
Reply to Reviewer Comments	[TO BE INSERTED BY FOA MODIFICATION IN NOVEMBER 2024]	Optional	IV.E	5 PM ET, TBD

I. FUNDING OPPORTUNITY DESCRIPTION

A. AGENCY OVERVIEW

The Advanced Research Projects Agency – Energy (ARPA-E), an organization within the Department of Energy (DOE), is chartered by Congress in the America COMPETES Act of 2007 (P.L. 110-69), as amended by the America COMPETES Reauthorization Act of 2010 (P.L. 111-358), as further amended by the Energy Act of 2020 (P.L. 116-260):

> "(A) to enhance the economic and energy security of the United States through the development of energy technologies that—
> (i) reduce imports of energy from foreign sources;
> (ii) reduce energy-related emissions, including greenhouse gases;
> (iii) improve the energy efficiency of all economic sectors;
> (iv) provide transformative solutions to improve the management, clean-up, and disposal of radioactive waste and spent nuclear fuel; and
> (v) improve the resilience, reliability, and security of infrastructure to produce, deliver, and store energy; and
> (B) to ensure that the United States maintains a technological lead in developing and deploying advanced energy technologies."

ARPA-E issues this Funding Opportunity Announcement (FOA) under its authorizing statute codified at 42 U.S.C. § 16538. The FOA and any cooperative agreements or grants made under this FOA are subject to 2 C.F.R. Part 200 as supplemented by 2 C.F.R. Part 910.

ARPA-E funds research on, and the development of, transformative science and technology solutions to address the energy and environmental missions of the Department. The agency focuses on technologies that can be meaningfully advanced with a modest investment over a defined period of time in order to catalyze the translation from scientific discovery to early-stage technology. For the latest news and information about ARPA-E, its programs and the research projects currently supported, see: http://arpa-e.energy.gov/.

ARPA-E funds transformational research. Existing energy technologies generally progress on established "learning curves" where refinements to a technology and the economies of scale that accrue as manufacturing and distribution develop drive improvements to the cost/performance metric in a gradual fashion. This continual improvement of a technology is important to its increased commercial deployment and is appropriately the focus of the private sector or the applied technology offices within DOE. In contrast, ARPA-E supports transformative research that has the potential to create fundamentally new learning curves. ARPA-E technology projects typically start with cost/performance estimates well above the level of an incumbent technology. Given the high risk inherent in these projects, many will fail to progress, but some may succeed in generating a new learning curve with a projected cost/performance metric that is significantly better than that of the incumbent technology.

ARPA-E funds technology with the potential to be disruptive in the marketplace. The mere creation of a new learning curve does not ensure market penetration. Rather, the ultimate value of a technology is determined by the marketplace, and impactful technologies ultimately become disruptive – that is, they are widely adopted and displace existing technologies from the marketplace or create entirely new markets. ARPA-E understands that definitive proof of market disruption takes time, particularly for energy technologies. Therefore, ARPA-E funds the development of technologies that, if technically successful, have clear disruptive potential, e.g., by demonstrating capability for manufacturing at competitive cost and deployment at scale.

ARPA-E funds applied research and development. The Office of Management and Budget defines "applied research" as an "original investigation undertaken in order to acquire new knowledge…directed primarily towards a specific practical aim or objective" and defines "experimental development" as "creative and systematic work, drawing on knowledge gained from research and practical experience, which is directed at producing new products or processes or improving existing products or processes."[1] Applicants interested in receiving financial assistance for basic research (defined by the Office of Management and Budget as "experimental or theoretical work undertaken primarily to acquire new knowledge of the underlying foundations of phenomena and observable facts")[2] should contact the DOE's Office of Science (http://science.energy.gov/). Office of Science national scientific user facilities (http://science.energy.gov/user-facilities/) are open to all researchers, including ARPA-E Applicants and awardees. These facilities provide advanced tools of modern science including accelerators, colliders, supercomputers, light sources and neutron sources, as well as facilities for studying the nanoworld, the environment, and the atmosphere. Projects focused on early-stage R&D for the improvement of technology along defined roadmaps may be more appropriate for support through the DOE applied energy offices including: the Office of Energy Efficiency and Renewable Energy (http://www.eere.energy.gov/), the Office of Fossil Energy and Carbon Management (https://www.energy.gov/fecm/office-fossil-energy-and-carbon-management), the Office of Nuclear Energy (http://www.energy.gov/ne/office-nuclear-energy), and the Office of Electricity (https://www.energy.gov/oe/office-electricity).

[1] OMB Circular A-11 (https://www.whitehouse.gov/wp-content/uploads/2018/06/a11_web_toc.pdf), Section 84, pg. 3.
[2] OMB Circular A-11 (https://www.whitehouse.gov/wp-content/uploads/2018/06/a11_web_toc.pdf), Section 84, pg. 3.

B. PROGRAM OVERVIEW

The energy transition towards net-zero by 2050[3] demands an unprecedented level of innovation that must be completed in the span of a generation. Global primary energy usage has increased continuously for the past century. This increase is expected to continue with improved standards of living and the rapid expansion of new technologies with high levels of energy-intensive computation, such as artificial intelligence.[4]

Present grid capacity is constrained and cannot accommodate these increasing primary energy needs to reliably deliver power on demand.[5] Meanwhile, all paths through the energy transition require concurrent efforts to decouple the production of essential carbon-based materials from harmful greenhouse gas (GHG) emissions.

Since the Agency's inception, the ARPA-E OPEN program has served as an opportunity to advance transformative energy breakthroughs in critical areas that fall outside the scope of its technology-focused programs. Vision OPEN challenges the research community to develop groundbreaking technologies to enable a future energy landscape that is dramatically different.

The Vision includes three goals that are critical to achieve a sustainable energy and carbon transition with:

1) GHG-free[6] abundant primary energy;
2) An intermodal energy superhighway that transports diversified forms of primary energy; and
3) A carbon transition that sustainably meets demand for polymers and other materials.

An illustration capturing this reimagined world is shown in Figure 1.

These goals will enable a novel and robust global energy system that responsibly meets the needs and aspirations of future generations. Achieving these three goals by 2050 will necessitate development and deployment of disruptive and ambitious technologies at an unparalleled speed and scale.

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[3] *The Long-Term Strategy of the United States: Pathways to Net-Zero Greenhouse Gas Emissions by 2050*. United States Department of State and the United States Executive Office of the President, November 2021. https://www.whitehouse.gov/wp-content/uploads/2021/10/US-Long-Term-Strategy.pdf.

[4] Figure 3. *International Energy Outlook 2023*. United States Energy Information Administration, October 2023. https://www.eia.gov/outlooks/ieo/pdf/IEO2023_Narrative.pdf

[5] *National Transmission Needs Study.* United States Department of Energy, October 2023. https://www.energy.gov/sites/default/files/2023-12/National%20Transmission%20Needs%20Study%20-%20Final_2023.12.1.pdf.

[6] For the purposes of the Vision OPEN 2024 FOA, GHG-free is defined as "primary energy sources with extremely limited, direct scope 1 GHG emissions." Scope 1 emissions are direct GHG emissions that occur from sources that are controlled or owned by an organization ("Scope 1 and Scope 2 Inventory Guidance." EPA.gov. Accessed May 2024. https://www.epa.gov/climateleadership/scope-1-and-scope-2-inventory-guidance.)

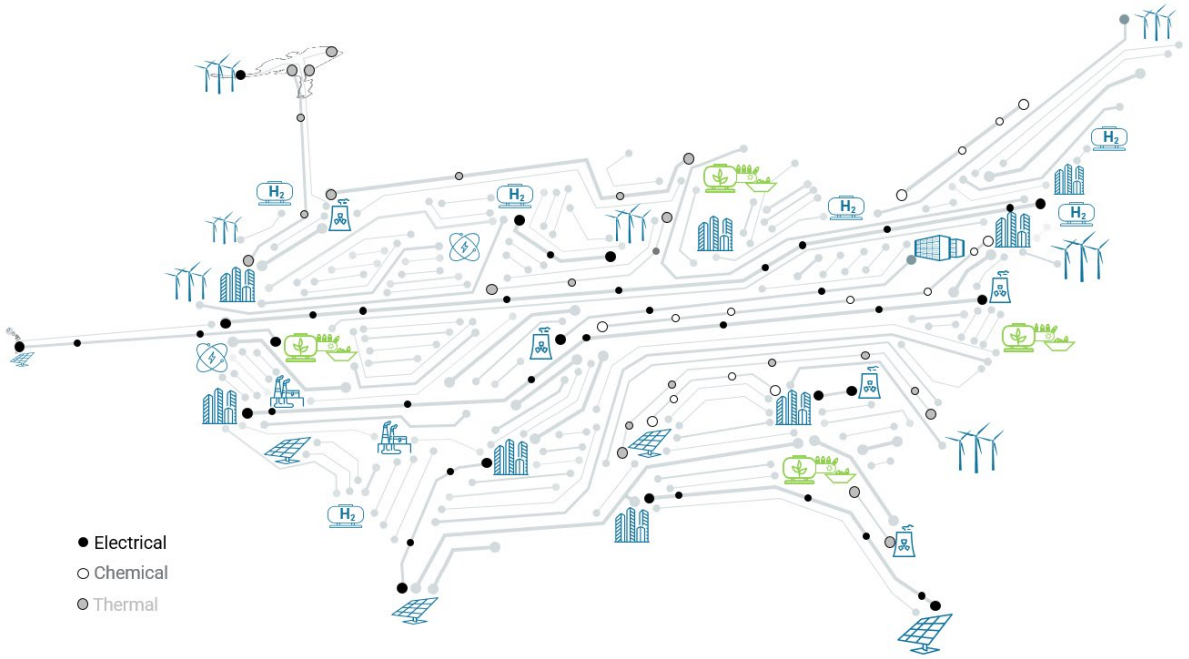

Figure 1. Illustration of Vision OPEN 2024 vision and goals in the U.S.

GHG-Free Abundant Primary Energy

The global energy network is in the process of transitioning from a primarily fossil carbon foundation towards a novel set of diversified forms of primary energy. This transition is contingent on scaling GHG-free primary energy supplies by approximately 10 times to reach an annual baseline of 300,000 terawatt hours (TWh).[4,7] Achieving a sufficient output demands a strategy to accelerate the deployment of mature GHG-free primary energy technologies while simultaneously advancing research and development of transformative nascent technologies.

Innovation must be supported and leveraged across multiple research areas, including fundamental design, manufacturing, installation, and deployment of energy technologies. The future GHG-free energy composition will be shaped by the competitive economics of primary energy technologies that emerge to meet reliable and affordable global energy needs.

Intermodal Energy Superhighway

Future generations will need to access a global grid that distributes approximately 13 terawatts (TW) of uninterrupted power from new, diverse, and abundant energy sources, without regard to where those sources are located.[8] To address this challenge, an intermodal energy superhighway is needed to transfer energy through several modalities – not just electrical

[7] "Global Direct Primary Energy Consumption." Our World in Data. Accessed May 2024. https://ourworldindata.org/grapher/global-primary-energy.
[8] *World Energy Outlook 2022*. International Energy Agency, October 2022. https://www.iea.org/reports/world-energy-outlook-2022.

power. These advanced technologies will streamline interconnection, address intermittency, and supply energy at a massive scale. This integrated energy network will leverage existing or displace present infrastructure to facilitate seamless deployment. A wide range of primary energy will be transferred through various networks (e.g., electrical, chemical, and thermal) designed to support its efficient, reliable, and inexpensive distribution.

The envisioned intermodal energy superhighway will include new pipeline and associated transfer media as well as upgrades to existing transfer infrastructure. Major technological challenges must be addressed to attain the right specifications, including bi-directional, resilient, and efficient energy flow to and from the point of use. To complement these specifications, energy delivery must be optimized to manage dynamic loads, intermittent sources, and systems via advanced or disruptive designs.

Carbon as a Sustainable Building Block of the Future

One consequence of the long-standing dominance of fossil fuels is an abundant supply of ubiquitous fossil materials. While most carbon in petroleum and natural gas is used for combustion, 10-15% of this carbon is converted to diverse products ranging from plastics to asphalts.[9, 10] Plastic production alone contributes roughly 7% of global energy-related CO_2 emissions,[11] and its end-of-life disposal raises significant environmental concerns.[12]

A carbon transition that is complementary to the envisioned energy transition must involve reimagining sources and uses of carbon. Technological advances needed to position carbon as a sustainable building block of the future include engineering plants and algae into "living refineries" of atmospheric carbon; transforming fossil refineries into low-GHG materials factories; applying advanced carbon allotropes to energy technologies and sequestration; and scaling up new polymers that are recyclable by design. Together, these advances can enable new energy technologies and have the co-benefits of mitigating GHG emissions to the atmosphere and reducing waste.

The goals set forth by this Vision require disruptive and ambitious technologies. Additionally, the massive infrastructure needed can only be deployed by commercial market adoption. Therefore, the technologies developed should have plausible economic pathways to commercialization that leverage existing economic and financial frameworks.

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[9] "Oil and Petroleum Products Explained." United States Energy Information Administration, June 12, 2023. https://www.eia.gov/energyexplained/oil-and-petroleum-products/

[10] Levi, Peter G., and Jonathan M. Cullen. "Mapping Global Flows of Chemicals: From Fossil Fuel Feedstocks to Chemical Products." Environmental Science; Technology 52, no. 4 (February 8, 2018): 1725–34. https://doi.org/10.1021/acs.est.7b04573.

[11] Stegmann, Paul, Vassilis Daioglou, Marc Londo, Detlef P. van Vuuren, and Martin Junginger. "Plastic Futures and Their CO2 Emissions." Nature 612, no. 7939 (December 7, 2022): 272–76. https://doi.org/10.1038/s41586-022-05422-5.

[12] "Sustainable Management of Plastics." United States Environmental Protection Agency, April 22, 2024. https://www.epa.gov/plastics.

C. PROGRAM GOALS, TOPICS, AND SUBTOPICS

Each submission to Vision OPEN must only address one Subtopic. In addition, each submission must identify at least one Technical Category as described in Section I.D.

1. GOAL 1: GHG-FREE ABUNDANT PRIMARY ENERGY

This first goal seeks to provide a path to a complete transition of global primary energy supply to GHG-free forms by 2050, while increasing the primary energy supply. This will be realized through innovations that accelerate deployment of GHG-free primary energy and advance both new and nascent technologies.

Global primary energy use has continuously increased for the past century. The International Energy Agency's Net-Zero by 2050 roadmap calls for a decrease in total energy supply to reach a net-zero energy system.[13] However, energy use is expected to rise due to various factors, including improvements in standards of living and increasing energy demand from computing technologies.[14] Meeting future primary energy needs will require supply to increase globally, even with increases in utilization efficiency.[14]

Accordingly, technologies considered under this goal should not rely on, in particular:[15]

- Primary energy supply reductions ascribed to increases in utilization efficiency; and
- Carbon capture, utilization, and sequestration (CCUS).

Rapid deployment and scaling of GHG-free energy is needed to achieve this goal by 2050.[16] Innovative technological advancements will address the deployment rate and scale of GHG-free primary energy to provide the capacity necessary to realize this goal.

This goal addresses challenges to the economic displacement of traditional carbon sources by defining distinct technical topics. The sections below show the types of technologies that may be of interest. Examples are used for illustrative purposes and are not exhaustive.

Topic 1.A: Rapid Deployment

This topic seeks technologies that accelerate the deployment of mature GHG-free forms of primary energy. Approaches that apply to utility scale or distributed generation are welcome.

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[13] Figure 2.5. Net Zero by 2050 - A Roadmap for the Global Energy Sector. International Energy Agency, October 2021, 57. https://iea.blob.core.windows.net/assets/deebef5d-0c34-4539-9d0c-10b13d840027/NetZeroby2050-ARoadmapfortheGlobalEnergySector_CORR.pdf.

[14] *International Energy Outlook 2023*. United States Energy Information Administration, October 2023.

[15] Additional Submissions Specifically Not of Interest are defined in Section III.C.3.

[16] *Insights Briefing*. Energy Transitions Commission, January 2023. https://www.energy-transitions.org/publications/planning-and-permitting/.

Subtopic 1.A.1: Design and Manufacturing. Primary energy sources that are easier to design and faster to build in a cost-effective manner. Example technologies for Subtopic 1.A.1 include but are not limited to:

- Novel component designs such as modular, distributed configurations that can make parts easier to transport and assemble; and
- Novel manufacturing methods, such as additive manufacturing, that reduce the manufacturing time or allow the use of complex structures or materials.

Subtopic 1.A.2: Installation. Technologies that enable faster onsite construction and assembly of primary energy systems. Example technologies for Subtopic 1.A.2 include but are not limited to:

- Robotic and automated construction methods; and
- New multivariant systems and models.

Topic 1.B: Transformative Advances

This topic seeks innovations in nascent GHG-free forms of primary energy that improve learning curves and make rapid deployment possible. A focus on forms of firm, dense primary energy that can replace coal, oil, and natural gas in the energy mix is encouraged.

Subtopic 1.B.1: Breakthrough Progression. Discoveries in primary energy that change what is possible. Example technologies for Subtopic 1.B.1 include but are not limited to:

- Technologies to increase production, functionality, or resource characterization for enhanced geothermal systems;
- Transformational control systems for advanced power plants;
- Pivotal technologies to accelerate the realization of fusion energy, including novel fusion concepts; and
- Next-generation technologies to accelerate wind, wave, or other fluid-driven power generators.

Subtopic 1.B.2: New Sources. Fundamentally new forms of primary energy that have not been explored.

Lastly, any justifications used to define success criteria for a primary energy technology should illustrate relevance to the net-zero 2050 targets and a pathway to market-based cost competitiveness.

2. GOAL 2: INTERMODAL ENERGY SUPERHIGHWAY

To meet the nation's growing energy needs, ARPA-E envisions an intermodal energy superhighway that will reliably and efficiently distribute roughly 13 TW of power.[17] This goal requires transformational technologies that enable the large-scale expansion of transfer capabilities through the creation of novel energy transport systems and the optimization of existing technologies using intelligent systems.

The future energy grid should be capable of seamlessly distributing energy from both continuous and intermittent energy sources, independent of geographic siting. Presently, 1,350 gigawatts (GW) of power generation and 680 GW of storage projects are awaiting domestic transmission interconnections.[18] This is equivalent to approximately the entire present grid capacity for the United States. Additionally, while the levelized cost of electricity (LCOE) for newly installed wind and solar is lower than newly installed natural gas power plants, these energy resources are often not matched with demand due to non-ideal location and intermittent generation. As the energy network is decarbonized, there will be more opportunities to transport energy not just by electrons, but also in the form of molecules or phonons produced from renewable sources. To fully realize the benefits of low-cost abundant energy, an intermodal energy superhighway is envisioned as a nationwide network that resolves energy challenges associated with interconnection, intermittency, and access.

A transformational network infrastructure, without disruption and with universal connectivity, will be necessary to fully realize this goal. The new intermodal energy superhighway will need disruptive technology solutions.

This goal recognizes two main topics for transformative energy delivery technologies. The sections below show the types of technologies that may be of interest in each topic. Examples are used for illustrative purposes and are not exhaustive.

Topic 2.A: Novel and Efficient Energy Transport Systems

This topic seeks disruptive technologies that enable inexpensive, reliable, coast-to-coast energy distribution.

[17] *National Transmission Needs Study.* United States Department of Energy, October 2023. https://www.energy.gov/sites/default/files/2023-12/National%20Transmission%20Needs%20Study%20-%20Final_2023.12.1.pdf.

[18] Rand, Joseph, Rose Strauss, Will Gorman, Joachim Seel, Julie Mulvaney Kemp, Seongeun Jeong, Dana Robson, and Ryan H. Wiser. "Queued up: Characteristics of power plants seeking transmission interconnection as of the end of 2022." (2023). https://emp.lbl.gov/sites/default/files/queued_up_2022_04-06-2023.pdf

Subtopic 2.A.1: Electrical Power Movement. Novel technologies to transport electricity more efficiently. Example technologies for Subtopic 2.A.1 include but are not limited to:

- Transmission infrastructure such as transformers, cable designs, and superconductors; and
- Distribution infrastructure innovations (in either alternating or direct current modes) that enable resilient and efficient power flow to and from the point of generation and/or use.

Subtopic 2.A.2: Chemical Availability. Efficient chemical energy transport using novel technologies. Example technologies for Subtopic 2.A.2 include but are not limited to:

- New pipeline and energy carrier materials; and
- Methods or approaches for transporting renewable fuels such as hydrogen or ammonia.

Subtopic 2.A.3: Novel Use of Existing and New Infrastructure for Energy Transfer. Reimagined infrastructure to support the transfer of future energy sources. Example technologies for Subtopic 2.A.3 include but are not limited to:

- Repurposing pipelines, electrical services, and other existing infrastructure to move energy; and
- New technical approaches to overcome barriers for moving multiple forms of energy.

Subtopic 2.A.4: Energy Conversion. New energy conversion technologies to balance dynamic energy availability. Example technologies for Subtopic 2.A.4 include but are not limited to:

- Converting energy-related materials into new forms and facilitating easy transport to balance dynamic systems demands; and
- Electrical, chemical, or thermal bidirectional processes to convert materials into dispatchable energy at the point of generation and point of use.

Topic 2.B: Energy Delivery Optimization Through Intelligent Systems

This topic seeks disruptive advanced computing and artificial intelligence technologies that optimize use of intermittent energy sources while supplying loads and maintaining energy network stability.

Example technologies for Topic 2.B include but are not limited to models and associated hardware using advanced computing and artificial intelligence.

Subtopic 2.B.1: Intelligent Distribution. Computational methods that interface with hardware to optimize the distribution of intermittent supply to demand, utilizing both new and existing infrastructure.

Subtopic 2.B.2: Intelligent Utilization. Software and hardware that enable 'smart' energy use, optimized for flexible demand and supply.

3. GOAL 3: CARBON AS A SUSTAINABLE BUILDING BLOCK OF THE FUTURE

ARPA-E envisions a path to a transition from carbon as a source of unsustainable energy to a source of valuable materials. This will be realized through innovations that transform carbon inputs (new sources of GHG-free carbon feedstocks) and outputs (new uses of carbon to enable energy technology and sequester legacy emissions).

The carbon transition will transform the domestic energy future in three ways. First, it will unlock the transition to new GHG-free primary energy by making essential materials without utilizing fossil fuels. Second, it will provide new carbon materials that enable innovative energy technologies and increase energy efficiency. Finally, it will remove legacy GHG emissions from the atmosphere and sequester them in valuable products. The economics, engineering, and carbon flux of material production all currently rely upon fossil fuel production. Therefore, the energy transition will require an accompanying paradigm shift in sourcing and usage of materials.

The chemical and refining industries together account for approximately 10% of U.S. CO_2 emissions and energy usage,[19] so a transition to sustainable carbon materials without traditional carbon sources requires transforming two industries that are massive, interconnected, and complex. The plastics sector alone is responsible for approximately 4.5% of global GHG emissions while plastics demand is predicted to double by 2050 to roughly one metric gigaton (Gt) per year.[20] The envisioned carbon transition will satisfy the increasing demand for carbon products to facilitate the energy transition while simultaneously diverting carbon products from traditional waste streams, which will have the co-benefit of reducing adverse environmental and health effects associated with their disposal. This will require reimagining carbon feedstock inputs and material outputs in current refineries.
This goal is divided into four topics that will explore the potential of carbon as a sustainable building block of the future. The sections below show the types of technologies that may be of interest in each topic. Examples are used for illustrative purposes and are not exhaustive.

Topic 3.A: Living Refineries

Technologies in this topic will develop plants and algae as "living refineries" to produce carbon-based products directly rather than through microbial sugar conversion. The U.S. has the

[19] "DOE Industrial Decarbonization Roadmap." Energy.gov, 2022. https://www.energy.gov/industrial-technologies/doe-industrial-decarbonization-roadmap.
[20] Stegmann, Paul, Vassilis Daioglou, Marc Londo, Detlef P. van Vuuren, and Martin Junginger. "Plastic futures and their CO2 emissions." Nature 612, no. 7939 (2022): 272-276.

potential to produce 1 Gt of sustainable biomass per year,[21] so product accumulation of a few percent by weight can achieve the scale of commodity chemicals (roughly 30 million metric tons (MMt)). In all areas, preference will be given to work in photosynthetic organisms amenable to rapid, scalable deployment over work in model organisms.

Subtopic 3.A.1: Synthetic Products. Plants and algae modified to produce polymer and material intermediates. Example technologies for Subtopic 3.A.1 include but are not limited to:

- Breeding or genetic engineering to accumulate polymer and material intermediates *in planta*;
- Balancing trade-offs between product accumulation, biomass growth, and nutrient demand; and
- Engineering traits that facilitate intermediate extraction.

Subtopic 3.A.2: Native Polymers. Modification of polymers already produced by plants and algae into functional polymers. Example technologies for Subtopic 3.A.2 include but are not limited to:

- Strategies to upgrade natural polysaccharides and/or lignin to functional polymers using chemical and/or microbial polishing.

Topic 3.B: Refinery Transformation

Technologies in this topic will facilitate the transformation of refineries to a materials-first model, while lowering emissions and expanding the repertoire of material products. Approximately 40% of U.S. petrochemical GHG emissions can be abated via electrification of process heat and incorporation of green hydrogen, but the remainder will require novel processes and feedstocks.[22]

Subtopic 3.B.1: Electrochemical Process Integration. Integration of electrochemical processes into existing refineries or upstream infrastructure. Example technologies for Subtopic 3.B.1 include but are not limited to:

- Low-heat electrochemical processes to replace emissions-heavy thermal processes such as steam cracking; and
- Modular equipment that can be integrated into existing refinery infrastructure or upstream, for example, directly at the wellhead.

[21] U.S. Department of Energy. 2024. 2023 Billion-Ton Report: An Assessment of U.S. Renewable Carbon Resources. M. H. Langholtz (Lead). Oak Ridge, TN: Oak Ridge National Laboratory. ORNL/SPR-2024/3103. https://doi.org/10.23720/BT2023/2316165.

[22] "DOE Industrial Decarbonization Roadmap." Energy.gov, 2022. https://www.energy.gov/industrial-technologies/doe-industrial-decarbonization-roadmap.

Subtopic 3.B.2: Novel Feedstocks, Processes, and Products. New refinery-based methods for carbon upgrading and conversion into valuable products. Example technologies for Subtopic 3.B.2 include but are not limited to:

- Subsurface refining that selectively upgrades chosen hydrocarbons and leaves others below the ground;
- Conversion of fossil feedstocks directly into solid carbon products rather than fuels;
- Production of high-value carbon allotropes (graphite, carbon nanotubes, graphene); and
- Integration of biogenic and renewable feedstocks, including CO_2.

Topic 3.C: Carbon Allotrope Manufacture and Utilization

Technologies in this topic will enable new ways to manufacture carbon allotropes and new uses of these advanced materials. Materials like carbon fiber or carbon nanotubes have the potential to displace energy-intensive materials like steel and aluminum while sequestering atmospheric CO_2, but only if prices and emissions fall by orders of magnitude. In the shorter term, high-value applications in electronics and energy storage could accelerate the energy transition directly.

Subtopic 3.C.1: Novel Processes. Novel processes enabling manufacture of carbon allotropes. Example technologies for Subtopic 3.C.1 include but are not limited to:

- Technologies that would reduce costs and increase throughput of known carbon allotropes (e.g., carbon fiber, graphite, graphene, carbon nanotubes).

Subtopic 3.C.2: Novel Applications. Use of carbon allotropes to reduce GHG emissions. Example technologies for Subtopic 3.C.2 include but are not limited to:

- Applications of carbon allotropes, which reduce GHG emissions by enabling new energy technologies, reduce emissions by increasing energy efficiency, exploit the superior strength-to-weight ratio of carbon materials, and/or stably sequester carbon and have the potential to scale to more than 100 MMt.

Topic 3.D: Scalable Polymer Design and Deconstruction

To limit the energy demands of polymer production, this topic seeks technologies that enable scalable, recyclable polymers with predictable material properties, and scalable deconstruction of existing polymers. Envisioned polymer deconstruction and reconstruction must show a clear energy benefit relative to current production methods. Bringing a new polymer to market can take decades, so rapid deployment of "recyclable-by-design" polymers requires new tools to rapidly characterize and derisk the material properties of novel chemistries.

Subtopic 3.D.1: Synthesis, Characterization, and Prediction. Development of scalable, recyclable polymers with predictable properties. Example technologies for Subtopic 3.D.1 include but are not limited to:

- Techniques which allow rapid scaling from bench to material scale;
- Tools to reliably characterize material properties with smaller quantities of materials;
- Computational tools to predict material properties and guide microstructure design; and
- Robotic and machine learning tools to enable rapid screens of material properties and processing conditions.

Subtopic 3.D.2: Deconstruction of Post-Consumer Plastic Waste. New approaches that break down post-consumer plastic waste. Example technologies for Subtopic 3.D.2 include but are not limited to:

- Novel mechanical, chemical, electric, photocatalytic, and enzymatic processes that are designed from the beginning to be scalable and economical.

A condensed list of all Goals, Topics, and Subtopics described in this section is provided in Table 1 below. Each submission to Vision OPEN must only address one Subtopic.

Table 1: Program Goals, Topics, and Subtopics for Vision OPEN.

GOAL 1: GHG-FREE ABUNDANT PRIMARY ENERGY
Topic 1.A: Rapid Deployment
Subtopic 1.A.1: Design and Manufacturing
Subtopic 1.A.2: Installation
Topic 1.B: Transformative Advances
Subtopic 1.B.1: Breakthrough Progression
Subtopic 1.B.2: New Sources
GOAL 2: INTERMODAL ENERGY SUPERHIGHWAY
Topic 2.A: Novel and Efficient Energy Transport Systems
Subtopic 2.A.1: Electrical Power Movement
Subtopic 2.A.2: Chemical Availability
Subtopic 2.A.3: Novel Use of Existing Infrastructure for Energy Transfer
Subtopic 2.A.4: Energy Conversion
Topic 2.B: Electrical Delivery Optimization Through Intelligent Systems
Subtopic 2.B.1: Intelligent Distribution
Subtopic 2.B.2: Intelligent Utilization
GOAL 3: CARBON AS A SUSTAINABLE BUILDING BLOCK OF THE FUTURE
Topic 3.A: Living Refineries
Subtopic 3.A.1: Synthetic Products
Subtopic 3.A.2: Native Polymers
Topic 3.B: Refinery Transformation
Subtopic 3.B.1: Electrochemical Process Integration
Subtopic 3.B.2: Novel Feedstocks, Processes, and Products
Topic 3.C: Carbon Allotrope Manufacture and Utilization
Subtopic 3.C.1: Novel Processes
Subtopic 3.C.2: Novel Applications
Topic 3.D: Scalable Polymer Design and Deconstruction
Subtopic 3.D.1: Synthesis, Characterization, and Prediction
Subtopic 3.D.2: Deconstruction of Post-Consumer Plastic Waste

D. TECHNICAL CATEGORIES FOR REVIEW PURPOSES

Applicants to Vision OPEN must apply to a single Subtopic as described in Section I.C. To organize the submissions to this FOA for the purposes of merit review, ARPA-E requires that each Concept Paper and Full Application also identify a Technical Subcategory for the proposed technology from the list provided below (Table 2). Applicants must select a single primary Technical Subcategory and may select one or multiple secondary Technical Subcategories, as appropriate. The Technical Subcategories may be from the same Category or different Categories.

This list of Technical Categories is intended to encompass the majority of energy-related technologies regardless of applicability to this FOA. If the proposed technology does not fall

within any of the Technical Subcategories below, the Applicant should select Category 7, "Other Energy Technologies," Subcategory L, "Other Energy Technologies Not Listed Above."

This list of Technical Subcategories is used for multiple ARPA-E FOAs for the purposes of coordinating appropriate merit review expertise. The Technical Subcategory(ies) chosen may be modified by ARPA-E, if needed, during the review process. Applications will be evaluated on the content of the application, and Technical Subcategory assignments will not be a factor in deciding the merit of a proposed concept.

The presence or absence of a technology on this list does not imply that any specific technology is in or out of scope for this FOA. Please closely read the descriptions of the Program Goals, Topics, and Subtopics (Section I.C.) and the Submissions Specifically Not of Interest (Section III.C.3). ARPA-E will not respond to inquiries about Technical Subcategories.

Table 2: Technical Subcategories.

CATEGORY	SUBCATEGORY	DESCRIPTION
CATEGORY 1: GRID	**Subcategory A: Grid Transmission**	Technologies for the electricity transmission system (>69 kV) planning and operations, including both AC and DC systems.
	Subcategory B: Grid Distribution	Technologies for the electricity distribution system (≤69 kV) planning and operations including both AC and DC systems.
	Subcategory C: Modeling, Software, Algorithms, And Control For The Grid	Modeling, algorithms, or control methodologies that improve grid planning, operations, or markets.
	Subcategory D: Batteries – Grid Scale	Grid-scale battery technologies.
	Subcategory E: Grid Scale (Non-Battery) Storage	Non-battery technologies for grid-scale storage such as: pumped-hydro, compressed air, high angular velocity flywheels, etc.
	Subcategory F: Grid Reliability	Technologies that maintain the efficient function of the grid during unusual events, particularly in the context of increasing renewable energy sources and/or distributed generation.
	Subcategory G: Grid – Other	Grid technologies that do not fit into one of the above categories.
CATEGORY 2: TRANSPORTATION	**Subcategory A: Alternative Fuels (Non-Bio)**	Technologies that create fuels that are substitutes for gasoline/diesel, but are not bio-based.
	Subcategory B: Engines – Transportation	Improved engines/turbines for generation applications using liquid and/or gaseous fuels, for example increasing engine efficiency or reducing emitted GHGs.

CATEGORY	SUBCATEGORY	DESCRIPTION
	Subcategory C: **Electric Motors – Transportation**	Technologies for improved electric motors specifically for transportation applications.
	Subcategory D: **Fuel Cells - Transportation**	Technologies for improved fuel cells specifically for transportation applications.
	Subcategory E: **Advanced Vehicle Designs and Materials**	Advanced or alternative vehicle designs and/or key enabling technologies. Examples could include ultralightweight vehicles, advanced components, new vehicle designs and architectures, etc.
	Subcategory F: **Transportation Management**	Technologies for traffic management, transportation behavior, self-driving cars, and other advanced transportation management scenarios.
	Subcategory G: **Power Electronics – Transportation**	Technologies that include advances in semiconductor materials, substrates, circuit topologies, magnetic materials, inductors, dielectric materials, capacitors, transistors, device packaging, etc. or optimizations of electronic systems applied specifically to transportation applications.
	Subcategory H: **Non-Automotive Ground/Sea Transportation**	Technologies for advanced human-powered vehicles, marine vessels, trains, etc.
	Subcategory I: **Air Transportation**	Technologies for advanced airplanes.
	Subcategory J: **Batteries – Transportation**	Technologies for improved batteries for a wide range of vehicle applications, including hybrid electric vehicles (HEVs), plug-in hybrid electric vehicles (PHEVs), and battery electric vehicles (EVs).
	Subcategory K: **Non-Battery Storage For Transportation**	Technologies that apply thermal storage and non-battery electric storage, such as supercapacitors and others specifically for transportation application.
	Subcategory L: **Transportation – Other**	Transportation energy technologies that do not fit one of the above categories.
CATEGORY 3: BUILDING EFFICIENCY	**Subcategory A:** **Combined Heat and Power**	Technologies for new Combined Heat and Power (CHP) designs/scenarios.
	Subcategory B: **Building Heating and Cooling**	Technologies that improve the efficiency of building heating and cooling systems.
	Subcategory C: **Building Energy Demand Management**	Demand response and/or management technologies such as smart meters or other building energy conservation technologies such as automatic control systems.
	Subcategory D: **Lighting**	Energy efficient and environmentally-friendly advanced lighting technologies.

CATEGORY	SUBCATEGORY	DESCRIPTION
	Subcategory E: Building Envelope	Building designs leading to better energy efficiency, such as technologies that could be applied to windows, insulation, roofing, etc.
	Subcategory F: Building Efficiency – Other	Building energy efficiency technologies that do not fit into one of the categories above.
CATEGORY 4: POWER GENERATION AND ENERGY PRODUCTION: LIQUID AND GASEOUS FUELS/NUCLEAR	**Subcategory A:** Combined Processes – Generation with Liquid and/or Gaseous Fuels	Improved generation designs which use a combination of technologies (for example, fuel cells and turbines) with liquid and/or gaseous fuels.
	Subcategory B: Stationary Engines/Turbines For Generation with Liquid and/or Gaseous Fuels	Improved engines/turbines for generation applications using liquid and/or gaseous fuels.
	Subcategory C: Stationary Fuel Cells For Generation with Liquid and/or Gaseous Fuels	Improved fuel cells intended to be coupled with generation sources using liquid and/or gaseous fuels.
	Subcategory D: Nuclear Fission Power Generation and Materials	Technologies that enhance fission, or materials specifically for safe nuclear fission power generation.
	Subcategory E Nuclear Fusion Power Generation and Materials	Technologies that enhance fusion, or materials specifically for safe nuclear fusion power generation.
	Subcategory F: Carbon Capture	Technologies for carbon capture, use, and storage, excluding biological/agricultural carbon management.
	Subcategory G: Exploration And Extraction (Non-Geothermal) Of Conventional and Unconventional Liquid and/or Gaseous Resources	Technologies/tools for resource identification, classification, and modeling, as well as technologies to extract conventional and unconventional liquid and/or gaseous resources. This subcategory can include sensors and imaging technologies, predictive models and algorithms, drills, pumps, etc.
	Subcategory H: Planning And Operations For Generation with Liquid and/or Gaseous Fuels	Technologies that improve the planning and operation of power generation with liquid and/or gaseous fuels.
	Subcategory I: Infrastructure for Combustible Gas	Technologies for storage, transportation, handling, and/or monitoring of combustible gases. This could include tanks, pipelines, pumps, sensors, etc.
	Subcategory J: Chemical and Biological Conversions From Liquid and/or Gaseous Fuels	Technologies that improve chemical or biological conversions of liquid and/or gaseous resources to more desired forms, and other forms of energy transduction, including downstream production of commodity chemicals.

CATEGORY	SUBCATEGORY	DESCRIPTION
	Subcategory K: **Water Conservation In Power Generation**	Technologies that will enable significant water savings in the generation of power, such as water recovery/recirculation systems or dry cooling of power plants.
	Subcategory L: **Generation with Liquid and/or Gaseous Fuels – Other**	Generation technologies that do not fit into one of the categories above.
CATEGORY 5: POWER GENERATION: RENEWABLE	**Subcategory A:** **Wind – Energy Capture**	Technologies that lead to better capture of wind resources. This could include different configurations, blade designs, and materials. Also in this category could be tools for wind resource identification, classification, and modeling.
	Subcategory B: **Wind – Energy Conversion**	Technologies that lead to better conversion of wind power into useable energy, such as generators and magnetic materials, electronics, etc. specifically designed for wind energy.
	Subcategory C: **Geothermal Energy**	Geothermal heat technologies including pumps, proppants, induced seismicity, enhanced geothermal systems (EGS), drilling, resource identification (sensors, models, tracers), zonal isolation techniques, robust equipment, low temperature generation, etc.
	Subcategory D: **Hydro Energy**	Technologies for capturing and/or converting hydrokinetic energy such as ocean, osmotic, tidal, etc. Technologies for hydro resource identification and modeling.
	Subcategory E: **Solar – PV/CPV**	Technologies for solar PV/CPV systems including materials, cell configurations, optical solar concentrators, BOS, and other technologies for solar cells that convert light into electricity or fuel. Technologies to enable for cheaper installation or solar PV resource identification and modeling.
	Subcategory F: **Solar – Non-PV**	Technologies for non-PV conversion of solar energy including solar thermal conversion (materials, configurations, concentrators, and BOS), direct conversion of solar energy to fuels through thermal or catalytic routes, and other technologies that use or convert solar energy without PV conversion.
	Subcategory G: **Power Electronics – Renewable Generation**	Technologies that include advances in semiconductor materials, substrates, circuit topologies, magnetic materials, inductors, dielectric materials, capacitors, transistors, device packaging, etc. applied to renewable power generation.
	Subcategory H: **Renewable Power – Other**	Renewable energy technologies that do not fit one of the above categories.

CATEGORY	SUBCATEGORY	DESCRIPTION
CATEGORY 6: BIOENERGY	**Subcategory A: Biomass Production**	Technologies that improve biomass characteristics, such as yield and sustainability, and decrease cost of production and/or water use.
	Subcategory B: Biofuel Production – Biological Methods	Technologies that utilize a biological agent in one or more principal step(s) of feedstock conversion to fuels.
	Subcategory C: Biofuel Production – Nonbiological Methods	Technologies that do not utilize any biological agent in the conversion of organic feedstock to fuels, such as thermochemical and hybrid approaches or biomimetics.
	Subcategory D: Bioenergy Supply Chain	Technologies critical to supply chain development, such as feedstock collection and handling.
	Subcategory E: Bioenergy – Other	Technologies for bioenergy which do not fit in one of the above subcategories. Including but not limited to bioreactors, balance of plant, bioproducts, microbial fuel cells, sensors, and biological or agricultural carbon management.
CATEGORY 7: OTHER ENERGY TECHNOLOGIES	**Subcategory A: Water Production/Reuse**	Technologies that enable cost-effective and energy efficient ways of providing fresh water.
	Subcategory B: Thermal Energy Storage	Thermal energy storage technologies that can apply to multiple applications.
	Subcategory C: Advanced Manufacturing	Technologies that enable energy-efficient manufacturing capabilities or methods or that use advanced manufacturing to enable new energy technologies.
	Subcategory D: Appliance And Consumer Electronics Efficiency (End Use)	Technologies that improve the energy efficiency of appliances and consumer electronics, including but not limited to refrigerators, washers, dryers, televisions, stoves, personal computers, phones, etc.
	Subcategory E: Data Centers And Computation	Technologies to improve the energy efficiency of large-scale computers, data centers, and computational infrastructure.
	Subcategory F: Industrial Efficiency – Materials	Technologies that improve the energy efficiency of or reduce emissions from producing industrial materials, including but not limited to glass, paper, iron, steel, plastics, aluminum, cement, etc.
	Subcategory G: Industrial Efficiency – Other	Technologies that improve the energy efficiency of industrial processes which are not covered by other subcategories.
	Subcategory H: Heat Recovery	Technologies for heat recovery including but not limited to thermoelectrics, Stirling engines, heat exchangers, conversion of waste heat, bottoming cycles, heat capture methods, materials, devices, etc.

CATEGORY	SUBCATEGORY	DESCRIPTION
	Subcategory I: **High Temperature Materials**	Materials designed specifically to withstand extremely high temperatures in order to enable new energy generation technologies.
	Subcategory J: **Semiconductors**	Technologies that enable the development of new semiconductor materials or the use of semiconductor materials in innovative applications.
	Subcategory K: **Portable Power**	Technologies for portable power applications such as piezoelectrics, portable fuel cells, batteries, etc.
	Subcategory L: **Other Energy Technologies Not Listed Above**	Other energy technologies that do not fit one of the above categories.

II. AWARD INFORMATION

A. AWARD OVERVIEW

ARPA-E expects to make approximately $150 million available for new awards, subject to the availability of appropriated funds. ARPA-E anticipates making 30-50 awards under this FOA. ARPA-E may, at its discretion, issue one, multiple, or no awards.

Individual awards may vary between $250,000 and $10 million in Federal share.

The period of performance for funding agreements may not exceed 36 months. ARPA-E expects to issue funding agreements in July 2025, or as negotiated.

ARPA-E encourages submissions stemming from ideas that still require proof-of-concept R&D efforts as well as those for which some proof-of-concept demonstration already exists.

Submissions requiring proof-of-concept R&D can propose a project with the goal of delivering on the program metric at the conclusion of the period of performance. These submissions must contain an appropriate cost and project duration plan that is described in sufficient technical detail to allow reviewers to meaningfully evaluate the proposed project. If awarded, such projects should expect a rigorous go/no-go milestone early in the project associated with the proof-of-concept demonstration. Alternatively, submissions requiring proof-of-concept R&D can propose a project with the project end deliverable being an extremely creative, but partial solution. However, the Applicants are required to provide a convincing vision how these partial solutions can enable the realization of the program metrics with further development.

Applicants proposing projects for which some initial proof-of-concept demonstration already exists should submit concrete data that supports the probability of success of the proposed project.

ARPA-E will provide support at the highest funding level only for submissions with significant technology risk, aggressive timetables, and careful management and mitigation of the associated risks.

ARPA-E will accept only new submissions under this FOA. Applicants may not seek renewal or supplementation of their existing awards through this FOA.

ARPA-E plans to fully fund the negotiated budget at the time of award.

B. RENEWAL AWARDS

At ARPA-E's sole discretion, awards resulting from this FOA may be renewed by adding one or more budget periods, extending the period of performance of the initial award, or issuing a new

award. Renewal funding is contingent on: (1) availability of funds appropriated by Congress for the purpose of this program; (2) substantial progress towards meeting the objectives of the approved application; (3) submittal of required reports; (4) compliance with the terms and conditions of the award; (5) ARPA-E approval of a renewal application; and (6) other factors identified by the Agency at the time it solicits a renewal application.

C. ARPA-E FUNDING AGREEMENTS

Through cooperative agreements, other transactions, and similar agreements, ARPA-E provides financial and other support to projects that have the potential to realize ARPA-E's statutory mission. ARPA-E does not use such agreements to acquire property or services for the direct benefit or use of the U.S. Government.

Congress directed ARPA-E to "establish and monitor project milestones, initiate research projects quickly, and just as quickly terminate or restructure projects if such milestones are not achieved."[23] Accordingly, ARPA-E has substantial involvement in the direction of every Cooperative Agreement, as described in Section II.D below.

1. COOPERATIVE AGREEMENTS

ARPA-E generally uses Cooperative Agreements to provide financial and other support to Prime Recipients.[24]

Cooperative Agreements involve the provision of 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.

ARPA-E encourages Prime Recipients to review the Model Cooperative Agreement, which is available at https://arpa-e.energy.gov/technologies/project-guidance.

2. FUNDING AGREEMENTS WITH FFRDCS/DOE LABS, GOGOS, AND FEDERAL INSTRUMENTALITIES

Any Federally Funded Research and Development Centers (FFRDC) involved as a member of a Project Team must provide the information requested in the "FFRDC Lab Authorization" and "Field Work Proposal" section of the Business Assurances & Disclosures Form, which is submitted with the Applicant's Full Application.

[23] U.S. Congress, Conference Report to accompany the 21st Century Competitiveness Act of 2007, H. Rpt. 110-289 at 171-172 (Aug. 1, 2007).

[24] The Prime Recipient is the signatory to the funding agreement with ARPA-E.

When a FFRDC/DOE Lab (including the National Energy Technology Laboratory or NETL) is the *lead organization* for a Project Team, ARPA-E executes a funding agreement directly with the FFRDC/DOE Lab and a single, separate Cooperative Agreement with another entity on the Project Team. Notwithstanding the use of multiple agreements, the FFRDC/DOE Lab is the lead organization for the entire project, including all work performed by the FFRDC/DOE Lab and the rest of the Project Team.

When a FFRDC/DOE Lab is a *member* of a Project Team, ARPA-E executes a funding agreement directly with the FFRDC/DOE Lab and a single, separate Cooperative Agreement with the Prime Recipient, as the lead organization for the Project Team. Notwithstanding the use of multiple agreements, the Prime Recipient under the Cooperative Agreement is the lead organization for the entire project, including all work performed by the FFRDC/DOE Lab and the rest of the Project Team.

Funding agreements with DOE/NNSA FFRDCs take the form of Work Authorizations issued to DOE/NNSA FFRDCs through the DOE/NNSA Field Work Proposal system for work performed under Department of Energy Management & Operation Contracts. Funding agreements with non-DOE/NNSA FFRDCs, GOGOs (including NETL), and Federal instrumentalities (e.g., Tennessee Valley Authority) will be consistent with the sponsoring agreement between the U.S. Government and the Laboratory. Any funding agreement with an FFRDC or GOGO will have similar terms and conditions as ARPA-E's Model Cooperative Agreement (https://arpa-e.energy.gov/technologies/project-guidance/pre-award-guidance/funding-agreements).

Non-DOE GOGOs and Federal agencies may be proposed to provide support to the Project Team members on an applicant's project, through a Cooperative Research and Development Agreement (CRADA) or similar agreement.

3. OTHER TRANSACTIONS AUTHORITY

ARPA-E may use its "other transactions" authority under the America COMPETES Reauthorization Act of 2010 and DOE's other transactions authority as codified at 42 USC §7256(a) and (g) to enter into an other transaction agreement with Prime Recipients, on a case-by-case basis.

ARPA-E may negotiate an other transaction agreement when it determines that the use of a standard cooperative agreement, grant, or contract is not feasible or appropriate for a project.

The federal share of other transactions agreements should meet or exceed $3,000,000. In general, an other transaction agreement normally requires a minimum cost share of 50%. See Section III.B.2 of the FOA.

D. STATEMENT OF SUBSTANTIAL INVOLVEMENT

ARPA-E is substantially involved in the direction of projects from inception to completion. For the purposes of an ARPA-E project, substantial involvement means:

- Project Teams must adhere to ARPA-E's agency-specific and programmatic requirements.
- ARPA-E may intervene at any time in the conduct or performance of work under an award.
- ARPA-E does not limit its involvement to the administrative requirements of an award. Instead, ARPA-E has substantial involvement in the direction and redirection of the technical aspects of the project as a whole.
- ARPA-E may, at its sole discretion, modify or terminate projects that fail to achieve predetermined Go/No Go decision points or technical milestones and deliverables.
- During award negotiations, ARPA-E Program Directors and Prime Recipients mutually establish an aggressive schedule of quantitative milestones and deliverables that must be met every quarter. In addition, ARPA-E will negotiate and establish "Go/No-Go" milestones for each project. If the Prime Recipient fails to achieve any of the "Go/No-Go" milestones or technical milestones and deliverables as determined by the ARPA-E Contracting Officer, ARPA-E may – at its discretion - renegotiate the statement of project objectives or schedule of technical milestones and deliverables for the project. In the alternative, ARPA-E may suspend or terminate the award in accordance with 2 C.F.R. §§ 200.339 – 200.343.
- ARPA-E may provide guidance and/or assistance to the Prime Recipient to accelerate the commercialization of ARPA-E-funded technologies. Guidance and assistance provided by ARPA-E may include coordination with other Government agencies and nonprofits[25] to provide mentoring and networking opportunities for Prime Recipients. ARPA-E may also organize and sponsor events to educate Prime Recipients about key barriers to the commercialization of their ARPA-E-funded technologies. In addition, ARPA-E may establish collaborations with private and public entities to provide continued support for the development and commercialization of ARPA-E-funded technologies.

[25] The term "nonprofit organization" or "nonprofit" is defined in Section IX.

III. ELIGIBILITY INFORMATION

A. ELIGIBLE APPLICANTS

This FOA is open to U.S. universities, national laboratories, industry and individuals.

1. INDIVIDUALS

U.S. citizens or permanent residents may apply for funding in their individual capacity as a Standalone Applicant,[26] as the lead for a Project Team,[27] or as a member of a Project Team. However, ARPA-E will only award funding to an entity formed by the Applicant.

2. DOMESTIC ENTITIES

For-profit entities (which includes large businesses and small businesses), educational institutions[28], and nonprofits[29] that are incorporated in the United States, including U.S. territories, are eligible to apply for funding as a Standalone Applicant, as the lead organization for a Project Team, or as a member of a Project Team.

FFRDCs/DOE Labs are eligible to apply for funding as the lead organization for a Project Team or as a member of a Project Team that includes institutions of higher education, companies, research foundations, or trade and industry research collaborations, but not as a Standalone Applicant.

State, local, and tribal government entities are eligible to apply for funding as a member of a Project Team, but not as a Standalone Applicant or as the lead organization for a Project Team.

Federal agencies and instrumentalities (other than DOE) are eligible to apply for funding as a member of a Project Team, but not as a Standalone Applicant or as the lead organization for a Project Team.

3. FOREIGN ENTITIES

Foreign entities, whether for-profit or otherwise, are eligible to apply for funding as Standalone Applicants, as the lead organization for a Project Team, or as a member of a Project Team. Foreign entities must designate in the Full Application a subsidiary or affiliate incorporated (or

[26] A Standalone Applicant is an Applicant that applies for funding on its own, not as part of a Project Team.
[27] A Project Team consists of the Prime Recipient, Subrecipients, and others performing or otherwise supporting work under an ARPA-E funding agreement.
[28] Institutions of Higher Education (or educational institutions): Has the meaning set forth at 20 U.S.C. 1001.
[29] Nonprofit organizations described in section 501(c)(4) of the Internal Revenue Code of 1986 that engaged in lobbying activities after December 31, 1995 are not eligible to apply for funding as a Prime Recipient or Subrecipient.

otherwise formed or to be formed) under the laws of a State or territory of the United States to receive funding. The Full Application must state the nature of the corporate relationship between the foreign entity and domestic subsidiary or affiliate. All work under the ARPA-E award must be performed in the United States. The Applicant may request a waiver of this requirement in the Business Assurances & Disclosures Form, which is submitted with the Full Application and can be found at https://arpa-e-foa.energy.gov/ (see "View Template Application Documents"). Refer to the Business Assurances & Disclosures Form for guidance on the content and form of the request.

4. CONSORTIUM ENTITIES

Consortia, which may include domestic and foreign entities, must designate one member of the consortium as the consortium representative to the Project Team. The consortium representative must be incorporated in the United States. The eligibility of the consortium will be determined by reference to the eligibility of the consortium representative under Section III.A of the FOA. Each consortium must have an internal governance structure and a written set of internal rules. Upon request, the consortium entity must provide a written description of its internal governance structure and its internal rules to the Contracting Officer (ARPA-E-CO@hq.doe.gov).

Unincorporated consortia must provide the 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 collaboration agreement binds the individual consortium members together and shall include the consortium's:

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

B. COST SHARING[30]

Applicants are bound by the cost share proposed in their Full Applications.

1. BASE COST SHARE REQUIREMENT

ARPA-E generally uses Cooperative Agreements to provide financial and other support to Prime Recipients (see Section II.C.1 of the FOA). Under a Cooperative Agreement or Grant, the Prime

[30] Please refer to Section VI.B.3-4 of the FOA for guidance on cost share payments and reporting.

Recipient must provide at least 20% of the Total Project Cost[31] as cost share, except as provided in Sections III.B2 or III.B.3 below.[32]

2. INCREASED COST SHARE REQUIREMENT

Large businesses[33] are strongly encouraged to provide more than 20% of the Total Project Cost as cost share. ARPA-E may consider the amount of cost share proposed when selecting applications for award negotiations (see Section V.B.1 of the FOA).

Under an "other transaction" agreement, the Prime Recipient is normally expected to provide at least 50% of the Total Project Cost as cost share. ARPA-E may reduce this cost share requirement, as appropriate.

3. REDUCED COST SHARE REQUIREMENT

ARPA-E has reduced the base cost share requirement for the following types of projects:

- A domestic educational institution or domestic nonprofit applying as a Standalone Applicant is required to provide at least 5% of the Total Project Cost as cost share.

- Project Teams composed exclusively of domestic educational institutions, domestic nonprofits, and/or FFRDCs/DOE Labs/Federal agencies and instrumentalities (other than DOE) are required to provide at least 5% of the Total Project Cost as cost share. Small businesses – or consortia of small businesses – may provide 0% cost share from the outset of the project through the first 12 months of the project (hereinafter the "Cost Share Grace Period").[34] If the project is continued beyond the Cost Share Grace Period, then at least 10% of the Total Project Cost (including the costs incurred during the Cost Share Grace Period) will be required as cost share over the remaining period of performance.

- Project Teams where a small business is the lead organization and small businesses perform greater than or equal to 80% of the total work under the funding agreement (as measured by the Total Project Cost) are entitled to the same cost share reduction and Cost Share Grace Period as provided above to Standalone small businesses or consortia of small businesses.

[31] The Total Project Cost is the sum of the Prime Recipient share and the Federal Government share of total allowable costs. The Federal Government share generally includes costs incurred by GOGOs and FFRDCs.
[32] Energy Policy Act of 2005, Pub.L. 109-58, sec. 988(c)
[33] See Section IX.
[34] The term "small business" is defined in Section IX.

- Project Teams where domestic educational institutions, domestic nonprofits, small businesses, and/or FFRDCs perform greater than or equal to 80% of the total work under the funding agreement (as measured by the Total Project Cost) are required to provide at least 10% of the Total Project Cost as cost share. However, any entity (such as a large business) receiving patent rights under a class waiver, or other patent waiver, that is part of a Project Team receiving this reduction must continue to meet the statutory minimum cost share requirement (20%) for its portion of the Total Project Cost.

- Projects that do not meet any of the above criteria are subject to the base cost share requirements described in Sections III.B.1 and III.B.2 of the FOA.

4. LEGAL RESPONSIBILITY

Although the cost share requirement applies to the Project Team as a whole, the funding agreement makes the Prime Recipient legally responsible for paying or ensuring payment of the entire cost share. The Prime Recipient's cost share obligation is expressed in the funding agreement as a static amount in U.S. dollars (cost share amount) and as a percentage of the Total Project Cost (cost share percentage). If the funding agreement is terminated prior to the end of the period of performance, 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 obligations assumed by Project Team members in subawards or related agreements.

5. COST SHARE ALLOCATION

Each Project Team is free to determine how much each Project Team member will contribute towards the cost share requirement. 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.

6. COST SHARE TYPES AND ALLOWABILITY

Every cost share contribution must be allowable under the applicable Federal cost principles, as described in Section IV.G of the FOA.

Project Teams may provide cost share in the form of cash or in-kind contributions. Cash contributions may be provided by the Prime Recipient or Subrecipients. Allowable in-kind contributions include but are not limited to personnel costs, indirect costs, facilities and administrative costs, rental value of buildings or equipment, and the value of a service, other resource, or third-party in-kind contribution. Project Teams may use funding or property

received from state or local governments to meet the cost share requirement, so long as the funding or property 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:

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

In addition, Project Teams may not use independent research and development (IR&D) funds[35] to meet their cost share obligations under Cooperative Agreements. However, Project Teams may use IR&D funds to meet their cost share obligations under "other transaction" agreements.

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. 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 may wish to refer to 2 C.F.R. Parts 200 and 910, and 10 C.F.R Part 603[36] for additional guidance on cost sharing, specifically 2 C.F.R. §§ 200.306 and 910.130, and 10 C.F.R. §§ 603.525-555.

7. COST SHARE CONTRIBUTIONS BY FFRDCS AND GOGOS

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 a non-Federal source.

Because GOGOs/Federal Agencies are funded by the Federal Government, GOGOs/Federal Agencies may not provide cost share for the proposed project. However, the GOGO/Agency costs would be included in Total Project Costs for purposes of calculating the cost-sharing requirements of the applicant.

[35] As defined in Federal Acquisition Regulation Subsection 31.205-18.
[36] [36] In the case of Technology Investment Agreements under 42 USC §7256(g).

8. COST SHARE VERIFICATION

Upon selection for award negotiations, Applicants are required to provide information and documentation regarding their cost share contributions. Please refer to Section VI.B.3 of the FOA for guidance on the requisite cost share information and documentation.

C. OTHER

1. COMPLIANT CRITERIA

Concept Papers are deemed compliant if:

- The Applicant meets the eligibility requirements in Section III.A of the FOA;
- The Concept Paper complies with the content and form requirements in Section IV.C of the FOA; and
- The Applicant entered all required information, successfully uploaded all required documents, and clicked the "Submit" button in ARPA-E eXCHANGE by the deadline stated in the FOA.

Concept Papers found to be noncompliant may not be merit reviewed or considered for award. ARPA-E may not review or consider noncompliant Concept Papers, including Concept Papers submitted through other means, Concept Papers submitted after the applicable deadline, and incomplete Concept Papers. A Concept Paper is incomplete if it does not include required information. ARPA-E will not extend the submission deadline for Applicants that fail to submit required information and documents due to server/connection congestion.

Full Applications are deemed compliant if:

- The Applicant submitted a compliant and responsive Concept Paper;
- The Applicant meets the eligibility requirements in Section III.A of the FOA;
- The Full Application complies with the content and form requirements in Section IV.D of the FOA; and
- The Applicant entered all required information, successfully uploaded all required documents, and clicked the "Submit" button in ARPA-E eXCHANGE by the deadline stated in the FOA.

Full Applications found to be noncompliant may not be merit reviewed or considered for award. ARPA-E may not review or consider noncompliant Full Applications, including Full Applications submitted through other means, Full Applications submitted after the applicable deadline, and incomplete Full Applications. A Full Application is incomplete if it does not include required information and documents, such as Forms SF-424 and SF-424A. ARPA-E will not extend the submission deadline for Applicants that fail to submit required information and documents due to server/connection congestion.

Replies to Reviewer Comments are deemed compliant if:

- The Applicant successfully uploads its response to ARPA-E eXCHANGE by the deadline stated in the FOA; and
- The Replies to Reviewer Comments comply with the content and form requirements of Section IV.E of the FOA.

ARPA-E will not review or consider noncompliant Replies to Reviewer Comments, including Replies submitted through other means and Replies submitted after the applicable deadline. ARPA-E will not extend the submission deadline for Applicants that fail to submit required information due to server/connection congestion. ARPA-E will review and consider each compliant and responsive Full Application, even if no Reply is submitted or if the Reply is found to be noncompliant.

2. RESPONSIVENESS CRITERIA

ARPA-E performs a preliminary technical review of Concept Papers and Full Applications. The following types of submissions may be deemed nonresponsive and may not be reviewed or considered:

- Submissions that fall outside the technical parameters specified in this FOA.
- Submissions that have been submitted in response to currently issued ARPA-E FOAs.
- Submissions that are not scientifically distinct from applications submitted in response to currently issued ARPA-E FOAs.
- Submissions for basic research aimed solely at discovery and/or fundamental knowledge generation.
- Submissions for large-scale demonstration projects of existing technologies.
- Submissions for proposed technologies that represent incremental improvements to existing technologies.
- Submissions for proposed technologies that are not based on sound scientific principles (e.g., violates a law of thermodynamics).
- Submissions for proposed technologies that are not transformational, as described in Section I.A of the FOA.
- Submissions for proposed technologies that do not have the potential to become disruptive in nature, as described in Section I.A of the FOA. Technologies must be scalable such that they could be disruptive with sufficient technical progress.
- Submissions that are not distinct in scientific approach or objective from activities currently supported by or actively under consideration for funding by any other office within Department of Energy.
- Submissions that are not distinct in scientific approach or objective from activities currently supported by or actively under consideration for funding by other government agencies or the private sector.

- Submissions that do not propose a R&D plan that allows ARPA-E to evaluate the submission under the applicable merit review criteria provided in Section V.A of the FOA.
- Submissions that propose using funding for construction, alteration, maintenance, or repair of public infrastructure in the United States.

3. SUBMISSIONS SPECIFICALLY NOT OF INTEREST

Submissions that propose the following will be deemed nonresponsive and will not be merit reviewed or considered:

Goal 1: Abundant GHG-Free Primary Energy

- Primary energy generation that generates scope 1 GHG emissions (even when paired with CCUS)
- Efficiency improvements or energy use reduction
- Incremental advances to already mature forms of energy generation
- Secondary or tertiary energy
- Incremental engineering solutions

Goal 2: Intermodal Energy Superhighway

- Innovations that reduce the load on the grid through energy efficiency
- Incremental improvement of existing converter topologies
- 60 hertz AC-only solutions
- Proposals exclusively focused on new materials development
- Biofuels (alone)
- Carbon capture (alone)
- Electrolysis (alone)
- Combustion (alone)
- Projects exclusively focused on artificial intelligence algorithm development

Goal 3: Carbon as a Sustainable Building Block of the Future

- Projects primarily aiming to capture and concentrate CO_2 (atmospheric or point source)
- Reduction of captured CO_2 to C1 chemicals
- Conversion of bio-feedstocks into sugars
- Microbial or chemical conversion of sugars and aromatic compounds to polymer/material intermediates or biofuels
- Production of biofuels from photosynthetic organisms
- Incremental improvements to current fossil refinery operations
- Incremental improvements to current carbon allotrope production
- Projects that primarily synthesize new polymers without addressing their scaled material properties
- Incremental improvements to current methods for polymer recycling

4. LIMITATION ON NUMBER OF SUBMISSIONS

ARPA-E is not limiting the number of submissions from Applicants. Applicants may submit more than one application to this FOA, provided that each application is scientifically distinct.

IV. APPLICATION AND SUBMISSION INFORMATION

A. APPLICATION PROCESS OVERVIEW

1. REGISTRATION IN ARPA-E eXCHANGE

The first step in applying to this FOA is registration in ARPA-E eXCHANGE, ARPA-E's online application portal. For detailed guidance on using ARPA-E eXCHANGE, please refer to Section IV.H.1 of the FOA and the "ARPA-E eXCHANGE User Guide" (https://arpa-e-foa.energy.gov/Manuals.aspx).

2. CONCEPT PAPERS

Applicants must submit a Concept Paper by the deadline stated in the FOA. Section IV.C of the FOA provides instructions on submitting a Concept Paper.

ARPA-E performs a preliminary review of Concept Papers to determine whether they are compliant and responsive, as described in Section III.C of the FOA. Concept Papers found to be noncompliant or nonresponsive may not be merit reviewed or considered for award. ARPA-E makes an independent assessment of each compliant and responsive Concept Paper based on the criteria and program policy factors in Sections V.A.1 and V.B.1 of the FOA.

ARPA-E will encourage a subset of Applicants to submit Full Applications. Other Applicants will be discouraged from submitting a Full Application in order to save them the time and expense of preparing an application submission that is unlikely to be selected for award negotiations. By discouraging the submission of a Full Application, ARPA-E 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. Unsuccessful Applicants should continue to submit innovative ideas and concepts to future FOAs.

3. FULL APPLICATIONS

Applicants must submit a Full Application by the deadline stated in the FOA. Applicants will have approximately 45 days from receipt of the Encourage/Discourage notification to prepare and submit a Full Application. Section IV.D of the FOA provides instructions on submitting a Full Application.

ARPA-E performs a preliminary review of Full Applications to determine whether they are compliant and responsive, as described in Section III.C of the FOA. Full Applications found to be noncompliant or nonresponsive may not be merit reviewed or considered for award. ARPA-E makes an independent assessment of each compliant and responsive Full Application based on the criteria and program policy factors in Sections V.A.2 and V.B.1 of the FOA.

4. Reply to Reviewer Comments

Once ARPA-E has completed its review of Full Applications, reviewer comments on compliant and responsive Full Applications are made available to Applicants via ARPA-E eXCHANGE. Applicants may submit an optional Reply to Reviewer Comments, which must be submitted by the deadline stated in the FOA. Section IV.E of the FOA provides instructions on submitting a Reply to Reviewer Comments.

ARPA-E performs a preliminary review of Replies to determine whether they are compliant, as described in Section III.C.1 of the FOA. ARPA-E will review and consider compliant Replies only. ARPA-E will review and consider each compliant and responsive Full Application, even if no Reply is submitted or if the Reply is found to be non-compliant.

5. Pre-Selection Clarifications and "Down-Select" Process

Once ARPA-E completes its review of Full Applications and Replies to Reviewer Comments, it may, at the Contracting Officer's discretion, conduct a pre-selection clarification process and/or perform a "down-select" of Full Applications. Through the pre-selection clarification process or down-select process, ARPA-E may obtain additional information from select Applicants through pre-selection meetings, webinars, videoconferences, conference calls, written correspondence, or site visits that can be used to make a final selection determination. ARPA-E will not reimburse Applicants for travel and other expenses relating to pre-selection meetings or site visits, nor will these costs be eligible for reimbursement as pre-award costs.

ARPA-E may select applications for award negotiations and make awards without pre-selection meetings and site visits. Participation in a pre-selection meeting or site visit with ARPA-E does not signify that Applicants have been selected for award negotiations.

6. Selection for Award Negotiations

ARPA-E carefully considers all of the information obtained through the application process and makes an independent assessment of each compliant and responsive Full Application based on the criteria and program policy factors in Sections V.A.2 and V.B.1 and the risk analysis in Section VI.B.10 of the FOA. The Selection Official may select all or part of a Full Application for award negotiations. The Selection Official may also postpone a final selection determination on one or more Full Applications until a later date, subject to availability of funds and other factors. ARPA-E will enter into award negotiations only with selected Applicants.

Applicants are promptly notified of ARPA-E's selection determination. ARPA-E may stagger its selection determinations. As a result, some Applicants may receive their notification letter in advance of other Applicants. Please refer to Section VI.A of the FOA for guidance on award notifications.

B. APPLICATION FORMS

Required forms for Full Applications are available on ARPA-E eXCHANGE (https://arpa-e-foa.energy.gov), including the SF-424 and Budget Justification Workbook/SF-424A. A sample Summary Slide is available on ARPA-E eXCHANGE. Applicants may use the templates available on ARPA-E eXCHANGE, including the template for the Concept Paper, the template for the Technical Volume of the Full Application, the template for the Summary Slide, the template for the Summary for Public Release, the template for the Reply to Reviewer Comments, and the template for the Business Assurances & Disclosures Form. A sample response to the Business Assurances & Disclosures Form is available on ARPA-E eXCHANGE.

C. CONTENT AND FORM OF CONCEPT PAPERS

The Concept Paper is mandatory (i.e., in order to submit a Full Application, a compliant and responsive Concept Paper must have been submitted) and must conform to the following formatting requirements:

- The Concept Paper must not exceed 4 pages in length including graphics, figures, and/or tables.
- The Concept Paper must be submitted in Adobe PDF format.
- The Concept Paper must be written in English.
- All pages must be formatted to fit on 8-1/2 by 11-inch paper with margins not less than one inch on every side. Single space all text and use Times New Roman typeface, a black font color, and a font size of 12 point or larger (except in figures and tables).
- The ARPA-E assigned Control Number, the Lead Organization Name, and the Principal Investigator's Last Name 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.
- The first paragraph must include the Lead Organization's Name and Location, Principal Investigator's Name, Subtopic Number and Name, Technical Subcategory, Proposed Funding Requested (Federal and Cost Share), and Project Duration.

Concept Papers found to be noncompliant or nonresponsive may not be merit reviewed or considered for award (see Section III.C of the FOA).

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

A fillable Concept Paper template is available on ARPA-E eXCHANGE at https://arpa-e-foa.energy.gov.

Concept Papers must conform to the content requirements described below. If Applicants exceed the maximum page length indicated above, ARPA-E will review only the authorized number of pages and disregard any additional pages.

1. CONCEPT PAPER

a. CONCEPT SUMMARY

- Describe the proposed concept with minimal jargon and explain how it addresses the Program Objectives of the FOA.

b. INNOVATION AND IMPACT

- Clearly identify the problem to be solved with the proposed technology concept.
- Describe how the proposed effort represents an innovative and potentially transformational solution to the technical challenges posed by the FOA.
- Explain the concept's potential to be disruptive compared to existing or emerging technologies.
- Describe how the concept will have a positive impact on at least one of the ARPA-E statutory goals in Section I.A of the FOA.
- Provide quantitative metrics and project targets in a table that compares the proposed technology concept to current and emerging technologies relevant to the selected Subtopic in Section I.C of the FOA.

c. PROPOSED WORK

- Describe the final deliverable(s) for the project and the overall technical approach used to achieve project objectives.
- Discuss alternative approaches considered, if any, and why the proposed approach is most appropriate for the project objectives.
- Describe the background, theory, simulation, modeling, experimental data, or other sound engineering and scientific practices or principles that support the proposed approach. Provide specific examples of supporting data and/or appropriate citations to the scientific and technical literature.
- Describe why the proposed effort is a significant technical challenge and the key technical risks to the project. Does the approach require one or more entirely new technical developments to succeed? How will technical risk be mitigated?
- Identify techno-economic challenges to be overcome for the proposed technology to be commercially relevant.
- Estimated federal funds requested; total project cost including cost sharing.

d. TEAM ORGANIZATION AND CAPABILITIES

- Indicate the roles and responsibilities of the organizations and key personnel that comprise the Project Team.
- Provide the name, position, and institution of each key team member and describe in 1-2 sentences the skills and experience that he/she brings to the team.
- Identify key capabilities provided by the organizations comprising the Project Team and how those key capabilities will be used in the proposed effort.
- Identify (if applicable) previous collaborative efforts among team members relevant to the proposed effort.

D. CONTENT AND FORM OF FULL APPLICATIONS

[TO BE INSERTED BY FOA MODIFICATION IN NOVEMBER 2024]

E. CONTENT AND FORM OF REPLIES TO REVIEWER COMMENTS

[TO BE INSERTED BY FOA MODIFICATION IN NOVEMBER 2024]

F. INTERGOVERNMENTAL REVIEW

This program is not subject to Executive Order 12372 (Intergovernmental Review of Federal Programs).

G. FUNDING RESTRICTIONS

1. ALLOWABLE COSTS

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

2. PRE-AWARD COSTS

ARPA-E will not reimburse any pre-award costs incurred by Applicants before they are selected for award negotiations. Please refer to Section VI.A of the FOA for guidance on award notices.

Upon selection for award negotiations, Applicants may incur pre-award costs at their own risk, consistent with the requirements in 2 C.F.R. Part 200, as modified by 2 C.F.R. Part 910, and other Federal laws and regulations. All submitted budgets are subject to change and are typically reworked during award negotiations. ARPA-E is under no obligation to reimburse pre-

award costs if, for any reason, the Applicant does not receive an award or the award is made for a lesser amount than the Applicant expected, or if the costs incurred are not allowable, allocable, or reasonable.

3. PATENT COSTS

For Subject Inventions disclosed to DOE under an award, ARPA-E will reimburse the Prime Recipient – in addition to allowable costs associated with Subject Invention disclosures - up to $30,000 of expenditures for filing and prosecution of United States patent applications, including international applications (PCT application) submitted to the United States Patent and Trademark Office (USPTO).

The Prime Recipient may request a waiver of the $30,000 cap. Note that, patent costs are considered to be Technology Transfer & Outreach (TT&O) costs (see Section IV.G.8 of the FOA below) and should be requested as such.

4. CONSTRUCTION

ARPA-E generally does not fund projects that involve major construction. Recipients are required to obtain written authorization from the Contracting Officer before incurring any major construction costs.

5. FOREIGN TRAVEL

ARPA-E generally does not fund projects that involve foreign travel. Recipients are required to obtain written authorization from the ARPA-E Program Director before incurring any foreign travel costs and provide trip reports with their reimbursement requests.

6. PERFORMANCE OF WORK IN THE UNITED STATES

ARPA-E strongly encourages interdisciplinary and cross-sectoral collaboration spanning organizational boundaries. Such collaboration enables the achievement of scientific and technological outcomes that were previously viewed as extremely difficult, if not impossible.

ARPA-E requires all work under ARPA-E funding agreements to be performed in the United States. However, Applicants may request a waiver of this requirement where their project would materially benefit from, or otherwise requires, certain work to be performed overseas.

Applicants seeking a waiver of this requirement are required to include an explicit request in the Business Assurances & Disclosures Form, which is part of the Full Application submitted to ARPA-E. Such waivers are granted where there is a demonstrated need, as determined by ARPA-E.

7. PURCHASE OF NEW EQUIPMENT

All equipment purchased under ARPA-E funding agreements must be made or manufactured in the United States, to the maximum extent practicable. This requirement does not apply to used or leased equipment. The Prime Recipients are required to notify the ARPA-E Contracting Officer reasonably in advance of purchasing any equipment that is not made or manufactured in the United States with a total acquisition cost of $250,000 or more. Purchases of foreign equipment with a total acquisition cost of $1,000,000 or more require the approval of the Head of Contracting Activity (HCA). The ARPA-E Contracting Officer will provide consent to purchase or reject within 30 calendar days of receipt of the Recipient's notification.

8. TECHNOLOGY TRANSFER AND OUTREACH

ARPA-E is required to contribute a percentage of appropriated funds to Technology Transfer and Outreach (TT&O) activities. In order to meet this mandate, every Project Team must spend at least 5% of the Federal funding (i.e., the portion of the award that does not include the recipient's cost share) provided by ARPA-E on TT&O activities to promote and further the development and eventual deployment of ARPA-E-funded technologies. Project Teams must also seek a waiver from ARPA-E to spend less than the minimum 5% TT&O expenditure requirement.

All TT&O expenditures are subject to the applicable Federal cost principles (i.e., 2 C.F.R. 200 Subpart E and 48 C.F.R. Subpart 31). Examples of TT&O expenditures are as follows:

- Documented travel and registration for the ARPA-E Energy Innovation Summit and other energy-related conferences and events;
- Documented travel to meet with potential suppliers, partners, or customers;
- Documented work by salaried or contract personnel to develop technology-to-market models or plans;
- Documented costs of acquiring industry-accepted market research reports; and
- Approved patent costs.

ARPA-E will not reimburse recipients for TT&O costs considered to be unallowable in accordance with the applicable cost principles. Examples of unallowable TT&O expenditures include:

- Meals or entertainment;
- Gifts to potential suppliers, partners, or customers;
- TT&O activities that do not relate to the ARPA-E-funded technologies;
- Undocumented TT&O activities; and
- TT&O activities unrelated and/or unallocable to the subject award.

Applicants may seek a waiver of the TT&O requirement by including an explicit request in the Business Assurances & Disclosures Form. Please refer to the Business Assurances & Disclosures Form for guidance on the content and form of the waiver request. ARPA-E may waive or modify the TT&O requirement, as appropriate.

For information regarding incorporation of TT&O costs into budget documentation, see Section IV.D.3 of the FOA.

9. LOBBYING

Prime Recipients and Subrecipients may not use any Federal funds, directly or indirectly, to influence or attempt to influence, directly or indirectly, congressional action on any legislative 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.

Prime Recipients and Subrecipients are required to complete and submit SF-LLL, "Disclosure of Lobbying Activities" (https://www.gsa.gov/forms-library/disclosure-lobbying-activities) if any non-Federal funds have been paid or will be paid to any person for influencing or attempting to influence any of the following in connection with your 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.

10. CONFERENCE SPENDING

Prime Recipients and Subrecipients may not use any Federal funds to:

- Defray the cost to the United States Government of a conference held by any Executive branch department, agency, board, commission, or office which is not directly and programmatically related to the purpose for which their ARPA-E award is made and for which the cost to the United States Government is more than $20,000; or
- To circumvent 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 a conference.

11. INDEPENDENT RESEARCH AND DEVELOPMENT COSTS

ARPA-E does not fund Independent Research and Development (IR&D) as part of an indirect cost rate under its Grants and Cooperative Agreements. IR&D, as defined at FAR 31.205-18(a),

includes cost of effort that is not sponsored by an assistance agreement or required in performance of a contract, and that consists of projects falling within the four following areas: (i) basic research, (ii) applied research, (iii) development, and (iv) systems and other concept formulation studies.

ARPA-E's goals are to enhance the economic and energy security of the United States through the development of energy technologies and ensure that the United States maintains a technological lead in developing and deploying advanced energy technologies. ARPA-E accomplishes these goals by providing financial assistance for energy technology projects and has well recognized and established procedures for supporting research through competitive financial assistance awards based on merit review of proposed projects. Reimbursement for independent research and development costs through the indirect cost mechanism could circumvent this competitive process.

To ensure that all projects receive similar and equal consideration, eligible organizations may compete for direct funding of independent research projects they consider worthy of support by submitting proposals for those projects to ARPA-E. Since proposals for these projects may be submitted for direct funding, costs for independent research and development projects are not allowable as indirect costs under ARPA-E awards. IR&D costs, however, would still be included in the direct cost base that is used to calculate the indirect rate so as to ensure an appropriate allocation of indirect costs to the organization's direct cost centers.

12. PROHIBITION ON CERTAIN TELECOMMUNICATIONS AND VIDEO SURVEILLANCE SERVICES OR EQUIPMENT

Per 2 C.F.R. § 200.216, recipients and subrecipients are prohibited from obligating or expending project funds 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). Refer to 2 C.F.R. § 200.216 for possible additional prohibitions and limitations.

13. BUY AMERICA REQUIREMENT FOR PUBLIC INFRASTRUCTURE PROJECTS

Projects funded through this FOA that are for, or contain, construction, alteration, maintenance, or repair of public infrastructure in the United States undertaken by applicable recipient types, require that:

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

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

However, ARPA-E does not anticipate soliciting for or selecting projects that propose project tasks that are for, or contain, construction, alteration, maintenance, or repair of public infrastructure. If a project selected for award negotiations includes project tasks that may be subject to the Buy America Requirement, those project tasks will be removed from the project before any award is issued – i.e., no federal funding or Recipient cost share will be available for covered project tasks.

This "Buy America" requirement does not apply to an award where the Prime Recipient is a for-profit entity.

14. REQUIREMENT FOR FINANCIAL PERSONNEL

ARPA-E requires Small Business or Nonprofit applicants to identify a finance/budget professional (employee or contracted support) with an understanding of Federal contracting and/or financial assistance and cost accounting (including indirect costs, invoicing, and financial management systems) that will support the team in complying with all applicable requirements.

H. OTHER SUBMISSION REQUIREMENTS

1. USE OF ARPA-E eXCHANGE

To apply to this FOA, Applicants must register with ARPA-E eXCHANGE (https://arpa-e-foa.energy.gov/Registration.aspx). Concept Papers, Full Applications, and Replies to Reviewer Comments must be submitted through ARPA-E eXCHANGE (https://arpa-e-foa.energy.gov/login.aspx). ARPA-E will not review or consider applications submitted through other means (e.g., fax, hand delivery, email, postal mail). For detailed guidance on using ARPA-E eXCHANGE, please refer to the "ARPA-E eXCHANGE Applicant Guide" (https://arpa-e-foa.energy.gov/Manuals.aspx).

Upon creating an application submission in ARPA-E eXCHANGE, Applicants will be assigned a Control Number. If the Applicant creates more than one application submission, a different Control Number will be assigned for each application.

Once logged in to ARPA-E eXCHANGE (https://arpa-e-foa.energy.gov/login.aspx), Applicants may access their submissions by clicking the "My Submissions" link in the navigation on the left side of the page. Every application that the Applicant has submitted to ARPA-E and the corresponding Control Number is displayed on that page. If the Applicant submits more than one application to a particular FOA, a different Control Number is shown for each application.

Applicants are responsible for meeting each submission deadline in ARPA-E eXCHANGE. **Applicants are strongly encouraged to submit their 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. In addition, Applicants should allow at least 15 minutes to submit a Reply to Reviewer Comments. Once the application is submitted in ARPA-E eXCHANGE, Applicants may revise or update their application until the expiration of the applicable deadline.

Applicants should not wait until the last minute to begin the submission process. During the final hours before the submission deadline, Applicants may experience server/connection congestion that prevents them from completing the necessary steps in ARPA-E eXCHANGE to submit their applications. **ARPA-E will not extend the submission deadline for Applicants that fail to submit required information and documents due to server/connection congestion. ARPA-E may not review or consider incomplete applications and applications received after the deadline stated in the FOA.** Such applications may be deemed noncompliant (see Section III.C.1 of the FOA). The following errors could cause an application to be deemed "incomplete" and thus noncompliant:

- Failing to comply with the form and content requirements in Section IV of the FOA;
- Failing to enter required information in ARPA-E eXCHANGE;
- Failing to upload required document(s) to ARPA-E eXCHANGE;
- Failing to click the "Submit" button in ARPA-E eXCHANGE by the deadline stated in the FOA;
- Uploading the wrong document(s) or application(s) to ARPA-E eXCHANGE; and
- Uploading the same document twice but labeling it as different documents. (In the latter scenario, the Applicant failed to submit a required document.)

ARPA-E urges Applicants to carefully review their applications and to allow sufficient time for the submission of required information and documents.

V. APPLICATION REVIEW INFORMATION

A. CRITERIA

ARPA-E performs a preliminary review of Concept Papers and Full Applications to determine whether they are compliant and responsive (see Section III.C of the FOA). ARPA-E also performs a preliminary review of Replies to Reviewer Comments to determine whether they are compliant.

ARPA-E considers a mix of quantitative and qualitative criteria in determining whether to encourage the submission of a Full Application and whether to select a Full Application for award negotiations.

1. CRITERIA FOR CONCEPT PAPERS

(1) *Impact of the Proposed Technology* (50%) - This criterion involves consideration of the following:

- The potential for a transformational and disruptive (not incremental) advancement compared to existing or emerging technologies;
- The extent to which the proposed concept will have a significant impact on at least one of ARPA-E's statutory goals in Section I.A of the FOA;
- Identification of techno-economic challenges that must be overcome for the proposed technology to be commercially relevant; and
- Demonstration of awareness of competing commercial and emerging technologies and identifies how the proposed concept/technology provides significant improvement over existing solutions.

(2) *Overall Scientific and Technical Merit* (50%) - This criterion involves consideration of the following:

- The feasibility of the proposed work, as justified by appropriate background, theory, simulation, modeling, experimental data, or other sound scientific and engineering practices;
- Sufficiency of technical approach to accomplish the proposed R&D objectives, including why the proposed concept is more appropriate than alternative approaches and how technical risk will be mitigated;
- Clearly defined project outcomes and final deliverables; and
- The demonstrated capabilities of the individuals performing the project, the key capabilities of the organizations comprising the Project Team, the roles and responsibilities of each organization and (if applicable) previous collaborations among team members supporting the proposed project.

Submissions will not be evaluated against each other since they are not submitted in accordance with a common work statement.

2. CRITERIA FOR FULL APPLICATIONS

[TO BE INSERTED BY FOA MODIFICATION IN NOVEMBER 2024]

3. CRITERIA FOR REPLIES TO REVIEWER COMMENTS

[TO BE INSERTED BY FOA MODIFICATION IN NOVEMBER 2024]

B. REVIEW AND SELECTION PROCESS

1. PROGRAM POLICY FACTORS

In addition to the above criteria, ARPA-E may consider the following program policy factors in determining which Concept Papers to encourage to submit a Full Application and which Full Applications to select for award negotiations:

I. **ARPA-E Portfolio Balance**. Project balances ARPA-E portfolio in one or more of the following areas:
   a. Diversity of technical personnel in the proposed Project Team;
   b. Technological diversity;
   c. Organizational diversity;
   d. Geographic diversity;
   e. Technical or commercialization risk; or
   f. Stage of technology development.

II. **Relevance to ARPA-E Mission Advancement.** Project contributes to one or more of ARPA-E's key statutory goals:
   a. Reduction of U.S. dependence on foreign energy sources;
   b. Stimulation of U.S. manufacturing and/or software development
   c. Reduction of energy-related emissions;
   d. Increase in U.S. energy efficiency;
   e. Enhancement of U.S. economic and energy security; or
   f. Promotion of U.S. advanced energy technologies competitiveness.

III. **Synergy of Public and Private Efforts**.
   a. Avoids duplication and overlap with other publicly or privately funded projects;
   b. Promotes increased coordination with nongovernmental entities for demonstration of technologies and research applications to facilitate technology transfer; or
   c. Increases unique research collaborations.

IV. **Low likelihood of other sources of funding.** High technical and/or financial uncertainty that results in the non-availability of other public, private or internal funding or resources to support the project.

V. **High-Leveraging of Federal Funds**. Project leverages Federal funds to optimize advancement of programmatic goals by proposing cost share above the required minimum or otherwise accessing scarce or unique resources.

VI. **High Project Impact Relative to Project Cost.**

VII. **Qualified Opportunity Zone (QOZ).** Whether the entity is located in an urban and economically distressed area including a Qualified Opportunity Zone (QOZ) or the proposed project will occur in a QOZ or otherwise advance the goals of QOZ. The goals include spurring economic development and job creation in distressed communities throughout the United States. For a list or map of QOZs go to: https://www.cdfifund.gov/opportunity-zones.

2. ARPA-E REVIEWERS

By submitting an application to ARPA-E, Applicants consent to ARPA-E's use of Federal employees, contractors, and experts from educational institutions, nonprofits, industry, and governmental and intergovernmental entities as reviewers. ARPA-E selects reviewers based on their knowledge and understanding of the relevant field and application, their experience and skills, and their ability to provide constructive feedback on applications.

ARPA-E requires all reviewers to complete a Conflict-of-Interest Certification and Nondisclosure Agreement through which they disclose their knowledge of any actual or apparent conflicts and agree to safeguard confidential information contained in Concept Papers, Full Applications, and Replies to Reviewer Comments. In addition, ARPA-E trains its reviewers in proper evaluation techniques and procedures.

Applicants are not permitted to nominate reviewers for their applications. Applicants may contact the Contracting Officer by email (ARPA-E-CO@hq.doe.gov) if they have knowledge of a potential conflict of interest or a reasonable belief that a potential conflict exists.

3. ARPA-E SUPPORT CONTRACTORS

ARPA-E utilizes contractors to assist with the evaluation of applications and project management. To avoid actual and apparent conflicts of interest, ARPA-E prohibits its support contractors from submitting or participating in the preparation of applications to ARPA-E.

By submitting an application to ARPA-E, Applicants represent that they are not performing support contractor services for ARPA-E in any capacity and did not obtain the assistance of

ARPA-E's support contractor to prepare the application. ARPA-E will not consider any applications that are submitted by or prepared with the assistance of its support contractors.

C. ANTICIPATED ANNOUNCEMENT AND AWARD DATES

[TO BE INSERTED BY FOA MODIFICATION IN NOVEMBER 2024]

VI. AWARD ADMINISTRATION INFORMATION

A. AWARD NOTICES

1. REJECTED SUBMISSIONS

Noncompliant and nonresponsive Concept Papers and Full Applications are rejected by the Contracting Officer and are not merit reviewed or considered for award. The Contracting Officer sends a notification letter by email to the technical and administrative points of contact designated by the Applicant in ARPA-E eXCHANGE. The notification letter states the basis upon which the Concept Paper or Full Application was rejected.

2. CONCEPT PAPER NOTIFICATIONS

ARPA-E promptly notifies Applicants of its determination to encourage or discourage the submission of a Full Application. ARPA-E sends a notification letter by email to the technical and administrative points of contact designated by the Applicant in ARPA-E eXCHANGE. ARPA-E may provide feedback in the notification letter in order to guide further development of the proposed technology.

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, ARPA-E 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 letter encouraging the submission of a Full Application does not authorize the Applicant to commence performance of the project. Please refer to Section IV.G of the FOA for guidance on pre-award costs.

3. FULL APPLICATION NOTIFICATIONS

[TO BE INSERTED BY FOA MODIFICATION IN NOVEMBER 2024]

B. ADMINISTRATIVE AND NATIONAL POLICY REQUIREMENTS

The following administrative and national policy requirements apply to Prime Recipients. The Prime Recipient is 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 a FFRDC contractor. Prime Recipients

are required to flow down these requirements to their Subrecipients through subawards or related agreements.

- If an award is made to a DOE/NNSA National Laboratory, all Disputes and Claims will be resolved in accordance with the terms and conditions of the DOE/NNSA National Laboratory's management and operating (M&O) contract, as applicable, in consultation between DOE and the prime awardee.
- If an award is made to another Federal agency or its FFRDC contractor, all Disputes and Claims will be resolved in accordance with the terms and conditions of the interagency agreement in consultation between DOE and the prime awardee.

1. UNIQUE ENTITY IDENTIFIER AND SAM, FSRS, AND FEDCONNECT REGISTRATIONS

Prime Recipients must register with the System for Award Management (SAM) at www.sam.gov/SAM prior to submitting an application, at which time the system will assign (if newly registered) a Unique Entity Identifier (UEI).

Prime Recipients must:

- Maintain an active SAM registration with current information, including information on a its immediate and highest-level owner and subsidiaries, as well as on all predecessors that have been awarded a Federal contract or financial assistance award within the last three years, if applicable, at all times during which it has an active Federal award or an application or plan under consideration by a Federal awarding agency;
- Remain registered in the SAM database after the initial registration;
- Update its information in the SAM database as soon as it changes;
- Review its information in the SAM database on an annual basis from the date of initial registration or subsequent updates to ensure it is current, accurate and complete; and
- Not make a subaward to any entity unless the entity has provided its UEI.

Subrecipients are not required to register in SAM but must obtain a UEI.
Prime Recipients and Subrecipients should commence this process as soon as possible in order to expedite the execution of a funding agreement. Registering with SAM and obtaining the UEI could take several weeks.
Prime Recipients are also required to register with the Federal Funding Accountability and Transparency Act Subaward Reporting System (FSRS) at https://www.fsrs.gov/.[37] Prime Recipients are required to report to FSRS the names and total compensation of each of the Prime Recipient's five most highly compensated executives and the names and total compensation of each Subrecipient's five most highly compensated executives. Please refer to

[37] The Federal Funding Accountability and Transparency Act, P.L. 109-282, 31 U.S.C. 6101 note.

https://www.fsrs.gov/ for guidance on reporting requirements. Prime Recipients are required to keep the FSRS data current throughout the duration of the project.

ARPA-E may not execute a funding agreement with the Prime Recipient until it has obtained a UEI and completed its SAM and FSRS registrations.

Finally, Prime Recipients are required to register with FedConnect in order to receive notification that their funding agreement has been executed by the Contracting Officer and to obtain a copy of the executed funding agreement. Please refer to https://www.fedconnect.net/FedConnect/ for registration instructions.

2. NATIONAL POLICY ASSURANCES

Project Teams, including Prime Recipients and Subrecipients, are required to comply with the National Policy Assurances attached to their funding agreement in accordance with 2 C.F.R. § 200.300. Refer to Attachment 6 of ARPA-E's Model Cooperative Agreement (https://arpa-e.energy.gov/technologies/project-guidance/pre-award-guidance/funding-agreements) for information on the National Policy Assurances.

3. PROOF OF COST SHARE COMMITMENT AND ALLOWABILITY

Upon selection for award negotiations, the Prime Recipient must confirm in writing that the proposed cost share contribution is allowable in accordance with applicable Federal cost principles.

The Prime Recipient is also required to provide cost share commitment letters from Subrecipients or third parties that are providing cost share, whether cash or in-kind. Each Subrecipient or third party that is contributing cost share must provide a letter on appropriate letterhead that is signed by an authorized corporate representative.

4. COST SHARE PAYMENTS[38]

All proposed cost share contributions must be reviewed in advance by the Contracting Officer and incorporated into the project budget before the expenditures are incurred.

The Prime Recipient is required to pay the "Cost Share" amount as a percentage of the total project costs in each invoice period for the duration of the period of performance. Small Businesses should refer to Section III.B.3 of the FOA.

[38] Please refer to Section III.B of the FOA for guidance on cost share requirements.

ARPA-E may deny reimbursement requests, in whole or in part, or modify or terminate funding agreements where Prime Recipients (or Project Teams) fail to comply with ARPA-E's cost share payment requirements.

5. ENVIRONMENTAL IMPACT QUESTIONNAIRE

By law, ARPA-E is required to evaluate the potential environmental impact of projects that it is considering for funding. In particular, ARPA-E must determine before funding a project whether the project qualifies for a categorical exclusion under 10 C.F.R. § 1021.410 or whether it requires further environmental review (i.e., an environmental assessment or an environmental impact statement).

To facilitate and expedite ARPA-E's environmental review, Prime Recipients are required to complete an Environmental Impact Questionnaire during award negotiations. This form is available at https://arpa-e.energy.gov/technologies/project-guidance/pre-award-guidance/required-forms-and-templates. Each Prime Recipient must wait to complete the Environmental Impact Questionnaire (EIQ) until after ARPA-E has notified them that Attachment 3 Statement of Program Objectives is in final form. The completed EIQ is then due back to ARPA-E within 14 calendar days.

6. TECHNOLOGY-TO-MARKET PLAN

During award negotiations, Prime Recipients are required to negotiate and submit an initial Technology-to-Market Plan to the ARPA-E Program Director and obtain the ARPA-E Program Director's approval prior to the execution of the award. Prime Recipients must show how any budgeted Technology Transfer and Outreach (TT&O) costs relate to furthering elements of the Technology-to-Market Plan. During the period of performance, Prime Recipients are required to provide regular updates on the initial Technology-to-Market plan and report on implementation of Technology-to-Market activities. Prime Recipients may be required to perform other actions to further the commercialization of their respective technologies.

ARPA-E may waive or modify this requirement, as appropriate.

7. INTELLECTUAL PROPERTY AND DATA MANAGEMENT PLANS

ARPA-E requires every Project Team to negotiate and establish an Intellectual Property Management Plan for the management and disposition of intellectual property arising from the project. The Prime Recipient must submit a completed and signed Intellectual Property Management plan to ARPA-E within six weeks of the effective date of the ARPA-E funding agreement. All Intellectual Property Management Plans are subject to the terms and conditions of the ARPA-E funding agreement and its intellectual property provisions, and applicable Federal laws, regulations, and policies, all of which take precedence over the terms of Intellectual Property Management Plans.

ARPA-E has developed a template for Intellectual Property Management Plans (https://arpa-e.energy.gov/technologies/project-guidance/post-award-guidance/project-management-reporting-requirements) to facilitate and expedite negotiations between Project Team members. ARPA-E does not mandate the use of this template. ARPA-E and DOE do not make any warranty (express or implied) or assume any liability or responsibility for the accuracy, completeness, or usefulness of the template. ARPA-E and DOE strongly encourage Project Teams to consult independent legal counsel before using the template.

Awardees are also required, post-award, to submit a Data Management Plan (DMP) that addresses how data generated in the course of the work performed under an ARPA-E award will be preserved and, as appropriate, shared publicly. The Prime Recipient must submit a completed and signed DMP - as part of the Team's Intellectual Property Management Plan - to ARPA-E within six weeks of the effective date of the ARPA-E funding agreement.

8. U.S. COMPETITIVENESS

A primary objective of DOE's multi-billion-dollar research, development and demonstration investments – including ARPA-E awards - is advancement of new energy technologies, 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 Contractor (Prime Recipient in ARPA-E awards) 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 Contractor 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 Contractor 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. Should the Contractor or other such entity receiving rights in the invention(s): (1) undergo a change in ownership amounting to a controlling interest, or (2) sell, assign, or otherwise transfer title or exclusive rights in the invention(s), then the assignment, license, or other transfer of rights in the subject invention(s) is/are suspended until approved in writing by DOE. The Contractor 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 Contractor will include this paragraph in all subawards/contracts, regardless of tier, for experimental, developmental or research work.
>
> A subject invention is any invention of the contractor conceived or first actually reduced to practice in the performance of work under an award. An invention is any invention or

discovery which is or may be patentable. The contractor includes any awardee, recipient, sub-awardee, or sub-recipient.

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.A, "Title to Subject Inventions", of this FOA for more information on the DEC and DOE Patent Waiver.

9. CORPORATE FELONY CONVICTIONS AND FEDERAL TAX LIABILITY

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

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

10. APPLICANT RISK ANALYSIS

If selected for award negotiations, ARPA-E may evaluate the risks posed by the Applicant using the criteria set forth at 2 CFR §200.206(b)(2). ARPA-E may require special award terms and conditions depending upon results of the risk analysis. As part of the research, technology, and economic security risk review, DOE may contact the applicant and/or proposed project team members for additional information to inform the review.

ARPA-E will not make an award if ARPA-E has determined that:

- The entity submitting the proposal or application:
  - has an owner or covered individual that is party to a malign foreign talent recruitment program;
  - has a business entity, parent company, or subsidiary located in the People's Republic of China or another foreign country of concern; or
  - has an owner or covered individual that has a foreign affiliation with a research institution located in the People's Republic of China or another foreign country of concern; and

- The relationships and commitments described above:
  - interfere with the capacity for activities supported by the Federal agency to be carried out;
  - create duplication with activities supported by the Federal agency;
  - present concerns about conflicts of interest;
  - were not appropriately disclosed to the Federal agency;
  - violate Federal law or terms and conditions of the Federal agency; or
  - pose a risk to national security.

11. RECIPIENT INTEGRITY AND PERFORMANCE MATTERS

Prior to making a Federal award, ARPA-E is required to review and consider any information about Applicants that is contained in the Office of Management and Budget's designated integrity and performance system accessible through SAM (currently the Federal Awardee Performance and Integrity Information System or FAPIIS) (41 U.S.C. § 2313 and 2 C.F.R. 200.206).

Applicants may review information in FAPIIS and comment on any information about itself that a Federal awarding agency previously entered into FAPIIS.

ARPA-E will consider any written comments provided by Applicants during award negotiations, in addition to the other information in FAPIIS, in making a judgment about an Applicant's integrity, business ethics, and record of performance under Federal awards when reviewing potential risk posed by Applicants as described in 2 C.F.R. §200.206.

12. NONDISCLOSURE AND CONFIDENTIALITY AGREEMENTS REPRESENTATIONS

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

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

(2) **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:

a. *"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."*

b. The limitation above shall not contravene requirements applicable to Standard Form 312, Form 4414, or any other form issued by a Federal department or agency governing the nondisclosure of classified information.

c. Notwithstanding the provision listed in paragraph (a), a nondisclosure 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 disclosure 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.

13. INTERIM CONFLICT OF INTEREST POLICY FOR FINANCIAL ASSISTANCE

The DOE interim Conflict of Interest Policy for Financial Assistance (COI Policy) can be found at https://www.energy.gov/management/financial-assistance-letter-no-fal-2022-02. 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 or similar other transaction 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. DOE's interim COI Policy establishes standards that provide a reasonable expectation that the design, conduct, and reporting of projects funded wholly or in part under DOE financial assistance awards will be free from bias resulting from financial conflicts of interest or organizational conflicts of interest. The applicant is subject to the requirements of the interim COI Policy and within each application for financial assistance, the applicant must certify that it is, or will be by the time of receiving any financial assistance award, compliant with all requirements in the interim COI Policy. For applicants to any ARPA-E Funding Opportunity Announcement, this certification, disclosure of any managed or unmanaged conflicts of interest, and a copy of (or link to) the applicant's own conflict of interest policy must be included with the information provided in the Business Assurances & Disclosures Form. The applicant must also flow down the requirements of the interim COI Policy to any subrecipient non-Federal entities.

14. COMMERCIALIZATION PLAN AND SOFTWARE REPORTING

If your project is selected and it targets the development of software, you may be required to prepare a Commercialization Plan for the targeted software and agree to special provisions that require the reporting of the targeted software and its utilization. This special approach to projects that target software mirrors the requirements for reporting that attach to new inventions made in performance of an award.

15. FRAUD, WASTE, AND ABUSE

The mission of the DOE Office of Inspector General (OIG) is to strengthen the integrity, economy, and efficiency of the Department's programs and operations, including deterring and detecting fraud, waste, abuse, and mismanagement. The OIG accomplishes this mission primarily through investigations, audits, and inspections of DOE activities to include grants, cooperative agreements, loans, and contracts.
The OIG maintains a hotline for reporting allegations of fraud, waste, abuse, or mismanagement. To report such allegations, please visit https://www.energy.gov/ig/ig-hotline.

Prime Recipients and subrecipients must disclose, in a timely manner, in writing to the Federal awarding agency or pass-through entity all violations of Federal criminal law involving fraud, bribery, or gratuity violations potentially affecting the Federal award.

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

C. REPORTING

[TO BE INSERTED BY FOA MODIFICATION IN NOVEMBER 2024]

VII. AGENCY CONTACTS

A. COMMUNICATIONS WITH ARPA-E

Upon the issuance of a FOA, only the Contracting Officer may communicate with Applicants. ARPA-E personnel and our support contractors are prohibited from communicating (in writing or otherwise) with Applicants regarding the FOA. This "quiet period" remains in effect until ARPA-E's public announcement of its project selections.

During the "quiet period," Applicants are required to submit all questions regarding this FOA to ARPA-E-CO@hq.doe.gov. Questions and Answers (Q&As) about ARPA-E and the FOA are available at http://arpa-e.energy.gov/faq. For questions that have not already been answered, please send an email with the FOA name and number in the subject line to ARPA-E-CO@hq.doe.gov. Due to the volume of questions received, ARPA-E will only answer pertinent questions that have not yet been answered and posted at the above link.

- ARPA-E will post responses on a weekly basis to any questions that are received that have not already been addressed at the link above. ARPA-E may re-phrase questions or consolidate similar questions for administrative purposes.
- ARPA-E will cease to accept questions approximately 10 business days in advance of each submission deadline. Responses to questions received before the cutoff will be posted no later than three business days in advance of the submission deadline. ARPA-E may re-phrase questions or consolidate similar questions for administrative purposes.
- Responses are published in a document specific to this FOA under "CURRENT FUNDING OPPORTUNITIES – FAQS" on ARPA-E's website (http://arpa-e.energy.gov/faq).

Applicants may submit questions regarding ARPA-E eXCHANGE, ARPA-E's online application portal, to ExchangeHelp@hq.doe.gov. ARPA-E will promptly respond to emails that raise legitimate, technical issues with ARPA-E eXCHANGE. ARPA-E will refer any questions regarding the FOA to ARPA-E-CO@hq.doe.gov.

ARPA-E will not accept or respond to communications received by other means (e.g., fax, telephone, mail, hand delivery). Emails sent to other email addresses will be disregarded.

During the "quiet period," only the Contracting Officer may authorize communications between ARPA-E personnel and Applicants. The Contracting Officer may communicate with Applicants as necessary and appropriate. As described in Section IV.A of the FOA, the Contracting Officer may arrange pre-selection meetings and/or site visits during the "quiet period."

B. DEBRIEFINGS

ARPA-E does not offer or provide debriefings. ARPA-E provides Applicants with a notification encouraging or discouraging the submission of a Full Application based on ARPA-E's assessment of the Concept Paper. In addition, ARPA-E provides Applicants with reviewer comments on Full Applications before the submission deadline for Replies to Reviewer Comments.

VIII. OTHER INFORMATION

A. 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 subject inventions unless a waiver is granted (see below):
  - Class Patent Waiver for Domestic Large Businesses: DOE has issued a class patent waiver that applies to this FOA. Under this class patent 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 patent waiver, a domestic large business must agree to the U.S. Competitiveness Provision in accordance with Section VI.B.8. of this FOA.
  - Advance and Identified Waivers: For applicants that do not fall under the class patent waiver or the Bayh-Dole Act, those applicants may request a patent waiver that will cover subject inventions that may be made under the award, in advance of or within 30 days after the effective date of the award. Even if an advance waiver is not requested or the request is denied, the recipient will have a continuing right under the award to request a waiver for identified inventions, i.e., individual subject inventions that are disclosed to DOE within the time frames 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 made to a Bayh-Dole entity (domestic small businesses and nonprofit organizations) shall include the U.S. Competitiveness Provision in accordance with Section VI.B.8 of this FOA. A copy of the DEC may be found on the DoE website. Pursuant to 37 CFR § 401.4, any Bayh-Dole entity affected by this 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.

B. GOVERNMENT RIGHTS IN SUBJECT INVENTIONS

Where Prime Recipients and Subrecipients retain title to subject inventions, the U.S. Government retains certain rights.

1. 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.

2. 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. In addition, the Government may grant licenses for use of the subject invention when Prime Recipients, Subrecipients, or their assignees and exclusive licensees refuse to do so.

The U.S. Government may exercise its march-in rights 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 satisfactory manner;
- The owner has not met public use requirements specified by Federal statutes in a reasonably satisfactory manner; or
- The U.S. Manufacturing requirement has not been met.

C. 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.

- Background or "Limited Rights Data": The U.S. Government will not normally require delivery of 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.
- Generated Data: The U.S. Government normally retains very broad 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 ARPA-E awards may be protected from public disclosure for up to for up to ten years (or more, if approved by ARPA-E) in accordance with provisions that will be set forth 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.

D. PROTECTED PERSONALLY IDENTIFIABLE INFORMATION

Applicants may not include any Protected Personally Identifiable Information (Protected PII) in their submissions to ARPA-E. Protected PII is defined as data that, if compromised, could cause harm to an individual such as identity theft. Listed below are examples of Protected PII that Applicants must not include in their submissions.

- Social Security Numbers in any form;
- Place of Birth associated with an individual;
- Date of Birth associated with an individual;
- Mother's maiden name associated with an individual;
- Biometric record associated with an individual;
- Fingerprint;
- Iris scan;
- DNA;
- Medical history information associated with an individual;
- Medical conditions, including history of disease;
- Metric information, e.g., weight, height, blood pressure;
- Criminal history associated with an individual;
- Ratings;
- Disciplinary actions;
- Performance elements and standards (or work expectations) are PII when they are so intertwined with performance appraisals that their disclosure would reveal an individual's performance appraisal;
- Financial information associated with an individual;
- Credit card numbers;
- Bank account numbers; and
- Security clearance history or related information (not including actual clearances held).

E. FOAS AND FOA MODIFICATIONS

FOAs are posted on ARPA-E eXCHANGE (https://arpa-e-foa.energy.gov/), Grants.gov (http://www.grants.gov/), and FedConnect (https://www.fedconnect.net/FedConnect/). Any modifications to the FOA are also posted to these websites. You can receive an e-mail when a modification is posted by registering with FedConnect as an interested party for this FOA. It is recommended that you register as soon as possible after release of the FOA to ensure that you receive timely notice of any modifications or other announcements. More information is available at https://www.fedconnect.net.

F. OBLIGATION OF PUBLIC FUNDS

The Contracting Officer is the only individual who can make awards on behalf of ARPA-E or obligate ARPA-E to the expenditure of public funds. A commitment or obligation by any individual other than the Contracting Officer, either explicit or implied, is invalid.

ARPA-E awards may not be transferred, assigned, or assumed without the prior written consent of a Contracting Officer.

G. REQUIREMENT FOR FULL AND COMPLETE DISCLOSURE

Applicants are required to make a full and complete disclosure of the information requested in the Business Assurances & Disclosures Form. Disclosure of the requested information is mandatory. Any failure to make a full and complete disclosure of the requested information may result in:

- The rejection of a Concept Paper, Full Application, and/or Reply to Reviewer Comments;
- 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.

H. RETENTION OF SUBMISSIONS

ARPA-E expects to retain copies of all Concept Papers, Full Applications, Replies to Reviewer Comments, and other submissions. No submissions will be returned. By applying to ARPA-E for funding, Applicants consent to ARPA-E's retention of their submissions.

I. MARKING OF CONFIDENTIAL INFORMATION

ARPA-E will use data and other information contained in Concept Papers, Full Applications, and Replies to Reviewer Comments strictly for evaluation purposes.

Concept Papers, Full Applications, Replies to Reviewer Comments, and other submissions containing confidential, proprietary, or privileged information should 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 Concept Paper, Full Application, Reply to Reviewer Comments, or other submission must be marked as follows and identify the specific pages containing confidential, proprietary, or privileged information:

Notice of Restriction on Disclosure and Use of Data:

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

J. EXPORT CONTROL INFORMATION

Do not include information subject to export controls in any submissions, including Concept Papers, Full Applications, and Replies to Reviewer Comments – whether marked as subject to US export control laws/regulations or otherwise. Such information may not be accepted by ARPA-E and may result in a determination that the application is non-compliant, and therefore not eligible for selection. This prohibition includes any submission containing a general, non-determinative statement such as "The information on this page [or pages _ to__] may be subject to US export control laws/regulations", or similar. Under the terms of their award, awardees shall be responsible for compliance with all export control laws/regulations.

K. COMPLIANCE AUDIT REQUIREMENT

A prime recipient organized as a for-profit entity expending $750,000 or more of DOE funds in the entity's fiscal year (including funds expended as a Subrecipient) must have an annual compliance audit performed at the completion of its fiscal year. For additional information, refer to Subpart F of: (i) 2 C.F.R. Part 200, and (ii) 2 C.F.R. Part 910.

If an educational institution, non-profit organization, or state/local government is either a Prime Recipient or a Subrecipient and has expended $750,000 or more of Federal funds in the entity's fiscal year, the entity must have an annual compliance audit performed at the completion of its fiscal year. For additional information refer to Subpart F of 2 C.F.R. Part 200.

IX. GLOSSARY

Applicant: The entity that submits the application to ARPA-E. In the case of a Project Team, the Applicant is the lead organization listed on the application.

Application: The entire submission received by ARPA-E, including the Preliminary Application, Full Application, Reply to Reviewer Comments, and Small Business Grant Application (if applicable).

ARPA-E: is the Advanced Research Projects Agency – Energy, an agency of the U.S. Department of Energy.

Cost Sharing: Is the portion of project costs from non-Federal sources that are borne by the Prime Recipient (or non-Federal third parties on behalf of the Prime Recipient), rather than by the Federal Government.

Covered Individual: an individual who contributes in a substantive, meaningful way to the scientific development or execution of an R&D project proposed to be carried out with an award from ARPA-E. This includes, but is not limited to, the PI, Co-PI, Key Personnel, and technical staff (e.g., postdoctoral fellows/researchers and graduate students). ARPA-E may further designate covered individuals during award negotiations or the award period of performance.

Deliverable: A deliverable is the quantifiable goods or services that will be provided upon the successful completion of a project task or sub-task.

DOE: U.S. Department of Energy

DOE/NNSA: U.S. Department of Energy/National Nuclear Security Administration.

FFRDCs: Federally Funded Research and Development Centers

FOA: Funding Opportunity Announcement

Foreign Affiliation: a funded or unfunded academic, professional, or institutional appointment or position with a foreign government or government-owned entity, whether full-time, part-time, or voluntary (including adjunct, visiting, or honorary).

Foreign Countries of Concern: the People's Republic of China, the Democratic People's Republic of Korea, the Russian Federation, the Islamic Republic of Iran, Burma, Eritrea, Pakistan, Saudi Arabia, Tajikistan, and Turkmenistan.

For-Profit Organizations (or For-Profit Entities): Entities organized for-profit that are Large Businesses or Small Businesses as those terms are defined elsewhere in this Glossary.

GOCOs: U.S. Government Owned, Contractor Operated laboratories.

GOGOs: U.S. Government Owned, Government Operated laboratories.
Institutions of Higher Education (or *educational institutions*): Has the meaning set forth at 20 U.S.C. 1001.

Large Business: Large businesses are entities organized for-profit other than small businesses as defined elsewhere in this Glossary.

Malign Foreign Talent Recruitment Program: the meaning given such term in section 10638 of the Research and Development, Competition, and Innovation Act (division B of Public Law 117–167) or 42 USC 19237, as of October 20, 2022.

Milestone: A milestone is the tangible, observable measurement that will be provided upon the successful completion of a project task or sub-task.

Nonprofit Organizations (or *nonprofits*): Has the meaning set forth at 2 C.F.R. § 200.70.

Prime Recipient: The signatory to the funding agreement with ARPA-E.

PI: Principal Investigator.

Project Team: A Project Team consists of the Prime Recipient, Subrecipients, and others performing or otherwise supporting work under an ARPA-E funding agreement.

Small Business: Small businesses are domestically incorporated entities that meet the criteria established by the U.S. Small Business Administration's (SBA) "Table of Small Business Size Standards Matched to North American Industry Classification System Codes" (NAICS) (http://www.sba.gov/content/small-business-size-standards).

Standalone Applicant: An Applicant that applies for funding on its own, not as part of a Project Team.

Subject Invention: Any invention conceived or first actually reduced to practice under an ARPA-E funding agreement.

Subrecipient: An entity (not an individual) that receives a subaward from the Prime Recipient to carry out part of the ARPA-E award.

Task: A task is an operation or segment of the work plan that requires both effort and resources. Each task (or sub-task) is connected to the overall objective of the project, via the achievement of a milestone or a deliverable.

Total Project Cost: The sum of the Prime Recipient share and the Federal Government share of total allowable costs. The Federal Government share generally includes costs incurred by GOGOs, FFRDCs, and GOCOs.

TT&O: Technology Transfer and Outreach. (See Section IV.G.8 of the FOA for more information).