

**FINANCIAL ASSISTANCE  
NOTICE OF FUNDING OPPORTUNITY**



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

***SEEDING CRITICAL ADVANCES FOR LEADING ENERGY  
TECHNOLOGIES WITH UNTAPPED POTENTIAL  
(SCALEUP) READY***

**Announcement Type: Initial Announcement  
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## **BASIC INFORMATION**

<b>KEY DATES:</b>	
Notice of Funding Opportunity (NOFO) Issue Date:	October 2, 2024
Full Application Due Date:	Not applicable. This NOFO will remain open until closed or replaced by a modified NOFO (which is anticipated to occur on an annual basis, subject to the availability of appropriated funds). Applications will be accepted any time while this NOFO remains open.
NOFO Close Date:	Open continuously until otherwise amended.
Expected Date for Finalist Notification:	Approximately 80 days after submission of the Full Application.
Expected Date for Final Selection Notifications:	Approximately 80 days after Finalist Notification.

<b>BASIC INFORMATION:</b>	
Total Amount to Be Awarded	Approximately \$50 million per fiscal year, subject to the availability of appropriated funds.
Anticipated Number and Value of Awards	ARPA-E may issue one, multiple, or no awards under this NOFO. The Federal share of awards may vary between \$5 million and \$20 million.
Anticipated Period of Performance	Approximately 36 months.
Agency Contact Information	<p>Applicants are encouraged to meet with an ARPA-E Technology-to-Market (T2M) Advisor to discuss their proposed SCALEUP Ready project and potential responsiveness in an Optional Pre-Submission Discussion. Interested Applicants should reach out to <a href="mailto:ARPA-E-SCALEUP@hq.doe.gov">ARPA-E-SCALEUP@hq.doe.gov</a>.</p> <ul style="list-style-type: none"> <li>• Questions and answers (Q&amp;As) about ARPA-E and this specific NOFO: <a href="http://arpa-e.energy.gov/faq">http://arpa-e.energy.gov/faq</a>.</li> <li>• Send other questions about the NOFO to: <a href="mailto:ARPA-E-CO@hq.doe.gov">ARPA-E-CO@hq.doe.gov</a>.</li> <li>• Send questions about use of ARPA-E eXCHANGE to: <a href="mailto:ExchangeHelp@hq.doe.gov">ExchangeHelp@hq.doe.gov</a>.</li> </ul> <p>Upon the issuance of a NOFO, other than the Optional Pre-Submission Discussion, only the Grants Officer via <a href="mailto:ARPA-E-CO@hq.doe.gov">ARPA-E-CO@hq.doe.gov</a> may communicate with Applicants. This “quiet period” remains in effect until ARPA-E’s public announcement of project selections. Emails sent to other email addresses will be disregarded.</p>

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## **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 Notice of Funding Opportunity (NOFO) under its authorizing statute codified at 42 U.S.C. § 16538. The NOFO and any cooperative agreements or grants made under this NOFO 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 will provide support at the highest funding level only for submissions with significant

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technology risk, aggressive timetables, and careful management and mitigation of the associated risks.

**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 (R&D).** 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.”<sup>1</sup> 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”)<sup>1</sup> 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>).

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 can propose a project with the end deliverable being an extremely creative, but partial solution.

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<sup>1</sup> OMB Circular A-11 ([https://www.whitehouse.gov/wp-content/uploads/2018/06/a11\\_web\\_toc.pdf](https://www.whitehouse.gov/wp-content/uploads/2018/06/a11_web_toc.pdf)), Section 84, pg. 3.

## **B. PROGRAM OVERVIEW**

The Seeding Critical Advances for Leading Energy technologies with Untapped Potential (SCALEUP) Ready program provides a vital mechanism for the support of innovative energy R&D that complements ARPA-E's primary focus on early-stage transformational energy technologies that require proof of concept.

Technologies that achieve substantial technical advancement under ARPA-E support may still face significant technical and commercial challenges upon completion of an award's funding period, and thus are at risk of being stranded in their development path once ARPA-E funding ends. Experience across ARPA-E's diverse energy portfolios, and input from a wide range of investors and industry stakeholders, indicate that pre-commercial scaling projects are critical to establish practical performance and cost parameters. These pre-commercial scaling projects aim to 1) translate the performance achieved at bench scale to commercially scalable versions of the technology, 2) integrate the technology with broader systems, 3) provide extended performance data, and 4) validate the manufacturability and reliability of new energy technologies. Successful scaling projects should enable industry stakeholders to justify the substantial commitments of financial resources, personnel, manufacturing facilities, and materials necessary to subsequently deploy the technologies at a commercial scale.

SCALEUP Ready seeks to scale the most promising technologies previously funded by ARPA-E. The possibility of ARPA-E-funded technologies becoming stranded along their development pathways leaves substantial intellectual property developed with American taxpayer dollars vulnerable to adoption by foreign competitors, who capture it for continued development and economic benefit overseas. This harms national competitiveness, as U.S. industries often fall behind on the development, scaling, and manufacturing of technologies necessary to compete in rapidly evolving global energy markets. Thus, projects selected for SCALEUP Ready will meet ARPA-E's statutory goals by "accelerating transformational technological advances in areas that industry by itself is not likely to undertake because of technical and financial uncertainty."<sup>2</sup>

## **C. PROGRAM OBJECTIVES**

The objective of SCALEUP Ready is to support the scaling of high-risk and potentially disruptive new technologies across the full spectrum of energy applications. This program focuses only on scaling and pre-pilot projects of promising technologies that ARPA-E has previously funded. A SCALEUP Ready award would substantially build upon innovations achieved under the original ARPA-E award.

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<sup>2</sup> 42 U.S.C. §16538(c)(2)(a-c)



Eligible projects will be based upon inventions:

1. That were conceived or first actually reduced to practice during the performance of work under the original ARPA-E award (“subject inventions”) with the intent to advance the innovative results to practical application, and
2. For which a patent has been obtained or a domestic patent application (which may be a provisional application) has been filed by the time the SCALEUP Ready Full Application is submitted.

SCALEUP Ready Applicants are not required to have participated within the original ARPA-E award. For example, an Applicant may hold an exclusive license or have purchased the relevant intellectual property rights to such subject invention(s), and thereby become eligible under SCALEUP Ready. Refer to Section II.A for additional information on eligibility for this funding opportunity.

Due to the breadth of technologies solicited under SCALEUP Ready, technical and project targets are not specified. Therefore, ARPA-E requires each Applicant to address how its proposed SCALEUP Ready project will sufficiently advance the technology to enable a viable path to market and ultimately lead to successful commercialization and anticipated impacts. The anticipated impacts must meet one or more of the agency’s statutory goals cited in Section I.A and include substantial U.S. manufacturing of resulting technologies. ARPA-E funding under SCALEUP Ready focuses on projects for which the proof-of-concept R&D challenges were largely addressed in a successful original ARPA-E award, and for which the logical next step is a path to real-world adoption.

For SCALEUP Ready, Applicants must show how the proposed technology will scale and ultimately thrive in the open market. This includes building a Project Team with the skillset and capabilities necessary for scaling high-risk energy technologies during and beyond the completion of the SCALEUP Ready project. Standalone Applicants are not eligible. Applicants should communicate the anticipated development path for bringing the technology to scale and achieving market adoption, emphasizing where the proposed SCALEUP Ready project fits in that path and how successful completion will unlock the additional resources necessary to take the next step.

SCALEUP Ready seeks Applicants with an existing early-stage developmental prototype that validates functionality in a controlled environment. Finalists selected for SCALEUP Ready funding will illustrate a path to market and be well positioned for investment from the private sector (e.g., financial or strategic venture capital, philanthropic awards, corporate development funding). To support this expectation, Awardees will not be required to provide a cost share payment for the initial portion of the award (approximately the first year of the award), as described in Section II.F.1 of the NOFO.

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## D. TECHNICAL CATEGORIES OF INTEREST

Applicants will address one or more of ARPA-E’s statutory goals, through the type of high-risk, transformational research described in Section I.A of the NOFO. Concepts may span multiple disciplinary boundaries. To organize the submissions to SCALEUP Ready for the purposes of merit review, ARPA-E requires that each Full Application identify a Technical Subcategory or Subcategories for the proposed technology from the list provided below (Table 1). Applicants may select a single Technical Subcategory or multiple Technical Subcategories for their proposed technology, as appropriate. The Applicant may select multiple Technical Subcategories from the same Technical Category or from different Technical Categories.

The list of Technical Subcategories is intended to encompass the majority of energy-related technologies. If the proposed technology does not fall within any of the Technical Subcategories below, the Applicant should select from Category 7, “Other Energy Technologies,” Subcategory L, “Other Energy Technologies Not Listed Above.”

**Table 1.** Technical Subcategories.

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

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

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

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CATEGORY	TECHNICAL SUBCATEGORY	DESCRIPTION
	<b>Subcategory K:</b> <b>Water Conservation In Power Generation</b>	Technologies that will enable significant water savings in the generation of power, such as water recovery/recirculation systems or dry cooling of power plants.
	<b>Subcategory L:</b> <b>Generation with Liquid and/or Gaseous Fuels – Other</b>	Generation technologies that do not fit into one of the categories above.
<b>CATEGORY 5:</b> <b>POWER GENERATION:</b> <b>RENEWABLE</b>	<b>Subcategory A:</b> <b>Wind – Energy Capture</b>	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.
	<b>Subcategory B:</b> <b>Wind – Energy Conversion</b>	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.
	<b>Subcategory C:</b> <b>Geothermal Energy</b>	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.
	<b>Subcategory D:</b> <b>Hydro Energy</b>	Technologies for capturing and/or converting hydrokinetic energy such as ocean, osmotic, tidal, etc., technologies for hydro resource identification and modeling.
	<b>Subcategory E:</b> <b>Solar – Photovoltaics (PV) / Concentrator Photovoltaics (CPV)</b>	Technologies for solar PV/CPV systems including materials, cell configurations, optical solar concentrators, Balance-of-System (BOS), and other technologies for solar cells that convert light into electricity or fuel. Technologies for cheaper installation or solar PV resource identification and modeling.
	<b>Subcategory F:</b> <b>Solar – Non-PV</b>	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.
	<b>Subcategory G:</b> <b>Power Electronics – Renewable Generation</b>	Technologies that include advances in semiconductor materials, substrates, circuit topologies, magnetic materials, inductors, dielectric materials, capacitors, transistors, device packaging, etc. that are applied to renewable power generation.
	<b>Subcategory H:</b> <b>Renewable Power – Other</b>	Renewable energy technologies that do not fit one of the above categories.
	<b>Subcategory A:</b>	

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CATEGORY	TECHNICAL SUBCATEGORY	DESCRIPTION
<b>CATEGORY 6: BIOENERGY</b>	<b>Biomass Production</b>	Technologies that improve biomass characteristics, such as yield and sustainability, and decrease cost of production and/or water use.
	<b>Subcategory B:</b> <b>Biofuel Production – Biological Methods</b>	Technologies that utilize a biological agent in one or more principal step(s) of feedstock conversion to fuels.
	<b>Subcategory C:</b> <b>Biofuel Production – Nonbiological Methods</b>	Technologies that do not utilize any biological agent in the conversion of organic feedstock to fuels, such as thermochemical and hybrid approaches or biomimetics.
	<b>Subcategory D:</b> <b>Bioenergy Supply Chain</b>	Technologies critical to supply chain development, such as feedstock collection and handling.
	<b>Subcategory E:</b> <b>Bioenergy – Other</b>	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.
<b>CATEGORY 7: OTHER ENERGY TECHNOLOGIES</b>	<b>Subcategory A:</b> <b>Water Production/Reuse</b>	Technologies that enable cost-effective and energy-efficient ways of providing fresh water.
	<b>Subcategory B:</b> <b>Thermal Energy Storage</b>	Thermal energy storage technologies that can apply to multiple applications.
	<b>Subcategory C:</b> <b>Advanced Manufacturing</b>	Technologies that enable energy-efficient manufacturing capabilities or methods or that use advanced manufacturing to enable new energy technologies.
	<b>Subcategory D:</b> <b>Appliance And Consumer Electronics Efficiency (End Use)</b>	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.
	<b>Subcategory E:</b> <b>Data Centers And Computation</b>	Technologies to improve the energy efficiency of large-scale computers, data centers, and computational infrastructure.
	<b>Subcategory F:</b> <b>Industrial Efficiency – Materials</b>	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.
	<b>Subcategory G:</b> <b>Industrial Efficiency – Other</b>	Technologies that improve the energy efficiency of industrial processes which are not covered by other subcategories.
	<b>Subcategory H:</b> <b>Heat Recovery</b>	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.
	<b>Subcategory I:</b> <b>High Temperature Materials</b>	Materials designed specifically to withstand extremely high temperatures in order to enable new energy generation technologies.

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CATEGORY	TECHNICAL SUBCATEGORY	DESCRIPTION
	<b>Subcategory J:</b>	Technologies that enable the development of new semiconductor materials or the use of semiconductor materials in innovative applications.
	<b>Semiconductors</b>	
	<b>Subcategory K:</b>	Technologies for portable power applications such as piezoelectrics, portable fuel cells, batteries, etc.
	<b>Portable Power</b>	
	<b>Subcategory L:</b>	
	<b>Other Energy Technologies Not Listed Above</b>	

## E. SCALING CATEGORIES

In addition to the Technical Category and Subcategory list in Table 1, Applicants will be required to identify a Scaling Category based on their technology and current scaling status (Table 2). This Scaling Category will support ARPA-E’s reviewer application matching process to enable stronger matching of applications with reviewer qualifications.

The list of Scaling Categories is intended to encompass the majority of the scaling domain areas. If the proposed scaling category does not fall within any of the categories specified, the Applicant should select “Other Scaling”. The Applicant must select a single scaling category from the list below.

**Table 2.** Scaling Categories.

SCALING CATEGORY	DESCRIPTION
<b>Biological Systems Scaling</b>	Scaling of biological-based processes or technologies, such as agricultural- or aquaculture-based technologies, bacterial, fermentative processes, or any other technology when scaling the amount/production and/or maintenance of a biological component is the principal challenge.
<b>Chemical Process Scaling</b>	Scaling of chemical processes that do not involve the maintenance of biological systems, such as conversion of feedstocks into different products or mixtures, when scaling the reaction volume and/or quantity of desired products is the principal challenge.
<b>Electrical Devices/Component Scaling</b>	Scaling of electrical or electrochemical devices or component fabrication/assembly and/or manufacture, such as batteries, electronics, sensors, solid state devices, etc.
<b>Grid Technology Scaling</b>	Scaling of grid technologies related to infrastructure needed for transmission, distribution, and providing services on the electrical grid for reliable operation or monitoring.
<b>Materials Systems/Assemblies Scaling</b>	Scaling of the manufacturing or fabrication of materials or material systems/assemblies using a range of feedstocks or refined materials to prepare higher-value products such as coatings, absorbents, metal organic frameworks (MOFs), and fuel cells.

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<b>Mechanical/Thermal Systems Scaling</b>	Scaling of systems when mechanical and/or thermal components or systems are the primary scaling challenge, such as those related to engines and generators.
<b>Software Implementation Scaling</b>	Scaling of primarily software-based technologies across all application areas when software deployment, adoption, availability of training data, or integration with hardware components are the primary scaling challenges.
<b>Other Scaling Categories</b>	Scaling technology challenges not represented in the above.

## **F. PARTNERING REQUIREMENTS**

### **1. COMMERCIALIZATION PARTNERS**

Applicants must propose one or more third-party SCALEUP Ready Commercialization Partners in their Full Applications.

Commercialization Partners may include potential customers, end-users, suppliers, strategic investors, manufacturers, distributors, or other important stakeholders who will contribute to the commercialization of the subject technology. It is preferable for Applicants to have at least one Commercialization Partner that represents the viewpoint and needs of the target customer to help ensure market adoption for the technology after the completion of the SCALEUP Ready project. Commercialization Partners may be included as members of the Project Team or may be included as non-member third parties.

Commercialization Partners can make a contribution of cash, in-kind (e.g., use of a field validation site, intellectual property) or via other justifiable means that will be integral to the success of the project. Commercialization Partners are expected to actively participate in the project. Commercialization Partners will make contributions with the goal that the technology will be successfully proven and commercialized.

At least one Letter of Intent from one or more Commercialization Partners is required as part of the Full Application. Submission information regarding the Letter of Intent is provided in Section III.B.3 of the NOFO.

### **2. OPTIONAL FINANCIAL PARTNERS**

Applicants may propose Financial Partners for their proposed project. A Financial Partner is an investing organization willing to provide the Applicant with funding for the cost share contribution to the project. Financial Partners may include venture capitalists, accelerators/incubators, angel/impact investors, not-for-profit, philanthropic, or other organizations that take on investment risk with the goal that the technology will be successfully proven and commercialized. Financial Partners provide cost share contributions without actively participating in research activities in the project. As outlined in Section I.F, Commercialization Partners may optionally provide cost share contributions, but must also provide insight to the project or project market segment. Because of this, Financial Partners are

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not considered a part of the SCALEUP Ready Project Team and are considered non-member third parties.

Financial Partners are optional, and hence not a requirement of SCALEUP Ready. However, their inclusion by an Applicant and commitment to the proposed project will be considered as a factor in Full Application selections. Applicants should include Letter(s) of Intent from any committed Financial Partner(s) with the Full Application. Submission information regarding the Letter of Intent is provided in Section III.B.3 of the NOFO.

## **G. STATEMENT OF SUBSTANTIAL INVOLVEMENT**

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.”<sup>3</sup> Accordingly, 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 Grants 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<sup>4</sup> to provide mentoring and networking opportunities for Prime Recipients. ARPA-E may also organize and sponsor events to educate Prime Recipients about key

<sup>3</sup> U.S. Congress, Conference Report to accompany the 21<sup>st</sup> Century Competitiveness Act of 2007, H. Rpt. 110-289 at 171-172 (Aug. 1, 2007).

<sup>4</sup> The term “nonprofit organization” or “nonprofit” is defined in Section IX, Glossary.

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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.

## **H. 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 NOFO 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 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 Recipient may request a waiver of the \$30,000 cap.

### **4. CONSTRUCTION**

ARPA-E generally does not fund projects that involve major construction. Recipients are required to obtain written authorization from the Grants 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 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 this waiver must include a request in the Business Assurances & Disclosures Form. Such waivers are granted where ARPA-E determines there is a demonstrated need.

## **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 Recipients are required to notify the ARPA-E Grants 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 Grants Officer will provide consent to purchase or reject within 30 calendar days of receipt of the Recipient's notification.

## **8. LOBBYING**

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.

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.

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## 9. CONFERENCE SPENDING

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.

## 10. 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.

## **11. BUY AMERICA REQUIREMENT FOR PUBLIC INFRASTRUCTURE PROJECTS**

Projects funded through this NOFO 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 Recipient is a for-profit entity.

## **12. 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.

## **13. PARTICIPANTS, COLLABORATING ORGANIZATIONS, AND CURRENT AND PENDING SUPPORT**

If selected for award negotiations the selected applicant must submit, before the award is issued, an updated list of Covered Individuals<sup>5</sup> who are proposed to work on the project, both at the Recipient and subrecipient level, and a list of all participating<sup>6</sup> organizations. Further, the selectee must submit 1) current and pending support disclosures and resumes for any new Covered Individuals, and 2) updated disclosures if there have been any changes to the current and pending support submitted with the application.

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<sup>5</sup> See Section IX, Glossary, for the definition of Covered Individual.

<sup>6</sup> For a definition of “participation” please see footnote 11.

Throughout the life of the award, recipients have an ongoing responsibility to notify DOE of changes to the Covered Individuals and collaborating organizations, within 30 days of such change, and to submit 1) current and pending support disclosure statements and resumes for any Covered Individuals; and 2) updated disclosures if there are changes to the current and pending support previously submitted to ARPA-E. Recipients must certify on an annual basis that no such changes have occurred since their most recent certification.

Note that foreign participation is treated separately and may require a Foreign Entity Waiver, per Section II.C.2.

## II. ELIGIBILITY INFORMATION

### A. ELIGIBLE APPLICANTS

Only organizations seeking to scale subject inventions that meet the following criteria are eligible for funding under this program. Subject inventions:

1. Must have been conceived or first actually reduced to practice during an ARPA-E award;
2. Must have been reported in the iEdison system; and
3. Must be the subject of a filed U.S. patent application, which may be a provisional application, or an issued U.S. patent also reported in iEdison (excepting some software products described in Section II.B).

Organizations may also leverage software that was previously developed and reported (in technical reports or otherwise) under an ARPA-E award, will be used in manufacturing, is used as “firmware” in manufactured products, or is deployed on energy infrastructure or energy systems.

For both subject inventions and software, note that ARPA-E seeks Applications for projects that validate scalability, reliability, and domestic manufacturability, and Applicants are required to agree to the U.S. Competitiveness Provision requirements detailed in Section VII.B.3 as part of an award under this NOFO.

SCALEUP Ready Applicants are not required to have participated in the original ARPA-E award – for example, Applicants may have licensed or purchased rights in such subject inventions or software and thereby become eligible for SCALEUP Ready. This NOFO is open to the following Applicants that propose to scale subject inventions or software that have resulted from ARPA-E awards:

- i) Current and former ARPA-E awardees (except Institutions of Higher Education<sup>7</sup> and FFRDCs/DOE Labs) that own/control subject invention(s) or software arising from their ARPA-E award(s);
- ii) Entities that are owners or exclusive licensees<sup>8</sup> of subject invention(s) or software arising from any ARPA-E award(s); or
- iii) Consortia – specified below – that have title to or are exclusive licensees of subject invention(s) or software arising from an ARPA-E award.

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<sup>7</sup> See Section IX, Glossary, for the definition of “Institutions of Higher Education” or “educational institutions”

<sup>8</sup> A legally binding option agreement to exclusively license the qualifying subject invention or software, which becomes effective according to pre-negotiated terms between licensor and licensee upon the issuance of the SCALEUP award to the Applicant may also be sufficient. Prior to any award, ARPA-E may inspect any licenses and/or assignment or other transfer of rights documents to confirm the Applicant/licensee-assignee has the necessary rights to conduct research, and commercialize, the results of its proposed research project.

The eligible Applicants described in (i) or (ii) above may only propose as a member of a Project Team, and not as a Standalone Applicant. The Project Team may include for-profit entities, educational institutions, and nonprofits<sup>9</sup> that are incorporated in the United States, including U.S. territories, and FFRDCs/DOE Labs.

ARPA-E welcomes the participation of educational institutions and FFRDCs/DOE Labs as Project Team Members and Consortia Members, but not as leads of Project Teams. This is in light of this NOFO's goal of rapidly advancing the commercialization of energy technologies resulting from ARPA-E funding. Commercialization of such inventions of educational institutions and FFRDCs/Labs should be accomplished through for-profit businesses. Such businesses should have the incentive, ability, and organizational competencies to attract financial support during the project, such as the 20%-33.3% cost share, as well as additional private capital, particularly after a successful SCALEUP Ready project. Educational institutions and FFRDCs/Labs are encouraged to participate as Project Team Members and Consortia Members in the proposals of businesses who license their – or others' - inventions arising from ARPA-E-funded research.

Consortia in (iii) above:

- Must include at least one U.S. for-profit business;
- May also include other for-profit entities, educational institutions, and nonprofits incorporated in the United States, including U.S. territories, and FFRDCs/DOE Labs; and
- 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. 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 internal rules to the Grants Officer ([ARPA-E-CO@hq.doe.gov](mailto:ARPA-E-CO@hq.doe.gov)).

If selected for award, unincorporated consortia must provide the Grants 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.

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<sup>9</sup> 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 or Subrecipient.



Foreign entities, whether for-profit or otherwise, are eligible to apply for funding 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 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. 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/>. Refer to the Business Assurances & Disclosures Form for guidance on the content and form of the request.

## **B. SUBJECT INVENTION AND PATENT/PATENT APPLICATION DISCLOSURE**

ARPA-E allows for multiple technologies with subject inventions that are the result of ARPA-E awards to be combined into one SCALEUP Ready application, as long as all are necessary for products resulting from a SCALEUP Ready award. **ARPA-E is requiring all such subject inventions, whether the applicant's, team members' or licensed from other ARPA-E awardees, be identified (see below) along with their award number(s) and be submitted per application in eXCHANGE.**

SCALEUP Ready Applicants must propose leveraging/further developing subject inventions that were created during an ARPA-E award, and to which a patent has been obtained or a domestic patent application (including a provisional application) has been filed. Some software products are exempt from this requirement - see "Software Report" below. To be eligible for a SCALEUP Ready award, the relevant subject invention(s) and patent(s) and/or patent application(s) must be reported to the Department of Energy:

- a. prior to submission of a SCALEUP Ready Full Application, and
- b. in accordance with the terms of the respective ARPA-E award(s).

**SCALEUP Ready Applications that do not specify an ARPA-E subject invention and patent or patent application (via corresponding iEdison number) will be determined to be noncompliant / nonresponsive and may not be merit reviewed or considered for award (see Section V.A.1 of the NOFO).**

### **1. IDENTIFYING SUBJECT INVENTIONS BY FINDING THEIR NUMBER**

SCALEUP Ready Applicants may find their subject invention number in the iEdison database found at: <https://iEdison.gov>. iEdison allows government funding recipients and contractors to report government-funded subject inventions, patents, and utilization data via the web to the Department of Energy for any previously funded award. A detailed guide for ARPA-E awardees on iEdison can be found on the ARPA-E website here: <https://arpa-e.energy.gov/technologies/project-guidance/post-award-guidance/subject-invention-reporting>.

*Questions about this NOFO? Check the Frequently Asked Questions available at <https://arpa-e.energy.gov/faqs>. For questions that have not already been answered, email [ARPA-E-CO@hq.doe.gov](mailto:ARPA-E-CO@hq.doe.gov) (with NOFO name and number in subject line). Problems with ARPA-E eXCHANGE? Email [ExchangeHelp@hq.doe.gov](mailto:ExchangeHelp@hq.doe.gov) (with NOFO name and number in subject line).*

If the SCALEUP Ready Applicant filed an invention report prior to ARPA-E using iEdison and the period of reporting ended prior to the rollout of iEdison in 2016, ARPA-E will accept a DOE S Number for inventions that meet these criteria. The Format for a DOE-S# is “S” + 6 digits (S-#####).

SCALEUP Ready Applicants may find they have several project record identifiers associated with their ARPA-E award. To provide clarity, listed below are the different types of record identifiers you may find.

#### **Eligible ARPA-E Award Number or DOE National Lab Work Authorization**

- Enter a single ARPA-E award number into eXCHANGE. Format is: DE-AR + 7 digits OR national lab work authorizations are 2 digits + / + CJ000 + “/” 2 digits + “/” + two digits
- Example of an award number is DE-AR0000159
- Example of DOE work authorization is 13/CJ000/10/01

#### **Eligible iEdison Invention Numbers**

- Enter a single subject invention number into eXCHANGE. Format is: 7, 8, or 9 digits + “-” + 2 digits + “-” + 4 digits
- Example of subject invention number: 9412501-10-0123

#### **Software Report**

Software products developed under an ARPA-E award must be reported in ePIC. Although the ePIC system is not presently set up to release a unique identifier of the software report, ARPA-E will validate the associated ARPA-E award. To complete the software report in ePIC, navigate to the “Project Reports” tab. For more detailed guidance please refer to the ePIC training guide here: <https://arpa-e.energy.gov/technologies/project-guidance/post-award-guidance/project-management-tool-epic>.

For SCALEUP Ready Applicants that are proposing to utilize software inventions that are not associated with a subject invention reported in iEdison, when entering information in eXCHANGE, please enter the title of the software.

### **C. FOREIGN PARTICIPATION**

#### **1. FOREIGN NATIONAL PARTICIPATION FROM COUNTRIES OF CONCERN**

All applicants selected for an award under this NOFO and project participants (including subrecipients and contractors) who anticipate involving foreign nationals from Foreign Countries of Concern<sup>10</sup> in the performance of an award may be required to provide ARPA-E with specific information about each foreign national to satisfy requirements for foreign national participation. A “foreign national” is defined as any person who is not a United States

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<sup>10</sup> Please see footnote 10 for list of Foreign Countries of Concern.

Questions about this NOFO? Check the Frequently Asked Questions available at <https://arpa-e.energy.gov/faqs>. For questions that have not already been answered, email [ARPA-E-CO@hq.doe.gov](mailto:ARPA-E-CO@hq.doe.gov) (with NOFO name and number in subject line). Problems with ARPA-E eXCHANGE? Email [ExchangeHelp@hq.doe.gov](mailto:ExchangeHelp@hq.doe.gov) (with NOFO name and number in subject line).

citizen by birth or naturalization. The volume and type of information collected may depend on various factors associated with the award. ARPA-E approval is required before a foreign national can participate in the performance of any work under an award.

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

## **2. FOREIGN PARTICIPATION CONSIDERATIONS**

Foreign participation<sup>11</sup> in a project requires a Foreign Entity Waiver (see Waiver Request – Foreign Entity Participation in the Business Assurances & Disclosure Form). Awardees have an ongoing obligation to report new foreign participation in a project and may be required to obtain a waiver before new foreign participation can occur. A Foreign Work Waiver may also be required (see Section I.H.6 and the Business Assurances & Disclosures Form).

### **D. COMPLIANCE AND RESPONSIVENESS**

Submissions that are noncompliant or nonresponsive to the NOFO as described in Sections IV.E and V.A are not eligible.

### **E. LIMITATION ON NUMBER OF SUBMISSIONS**

Organizations may not use the same subject invention in more than one concurrent application to this NOFO. More than one application can be made when organizations have multiple subject inventions for different fields of use.

Applicants who apply to this NOFO and are not selected at the Full Application or Finalist stage are permitted to apply again to this NOFO with the same subject invention for the same or similar technical and commercial application after waiting 6 months from notification of non-selection. Applicants are expected to advance their technology, commercialization strategy, and team during that 6-month period to improve their application. Applicants who apply sooner than 6 months after previous notice of non-selection will be deemed noncompliant and will not be merit-reviewed.

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

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<sup>11</sup> "Participation" includes any activities performed under an ARPA-E award, including, but not limited to, all work described in the milestone schedule of an award (commonly referred to as "Attachment 3" or the "Statement of Project Objectives (SOPO)") and any services that include testing, including services performed by vendors or consultants. Participation also includes activities that involve the procurement of foreign equipment or supplies.

## **F. COST SHARING**<sup>12</sup>

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

### **1. COST SHARE DEFERRED FOR INITIAL PERIOD OF AWARD**

As specified in Section VII.B.1 of the NOFO, for the initial portion of the award – approximately the first year of the award – cost share payment will be deferred. The cost share requirements/reduction in this section will be required for Total Projects Costs after this initial portion of the award. See Section VII.B.1 of the NOFO for details.

### **2. BASE COST SHARE REQUIREMENT**

ARPA-E generally uses Cooperative Agreements to provide financial and other support to Prime Recipients (see Section VI.D.1 of the NOFO). For a Cooperative Agreement awarded under this NOFO, the Prime Recipient must provide at least 33.3% of the Total Project Cost<sup>13</sup> as cost share, except as provided in Section II.F.3 of the NOFO.<sup>14</sup>

Under an other transaction agreement, a higher level of cost share than 33.3% is required.

### **3. REDUCED COST SHARE REQUIREMENT**

Project teams may qualify for a reduced cost share of 20% if they qualify under one of the following specified applicant categories:

- Small businesses – or consortia of small businesses – will provide at least 20% of the Total Project Cost as cost share.
- Project Teams where a small business is the lead organization and small businesses perform greater than or equal to 80%, but less than 100%, of the total work under the funding agreement (as measured by the Total Project Cost) are entitled to the same cost share reduction provided to Standalone small businesses or consortia of small businesses.

Projects that do not meet any of the above criteria are subject to the minimum cost share requirements described in Section II.F.2 of the NOFO.

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<sup>12</sup> Please refer to Section VII.B.1 of the NOFO for guidance on cost share payments and reporting.

<sup>13</sup> The term “Total Project Cost” is defined in NOFO Section IX, Glossary.

<sup>14</sup> Energy Policy Act of 2005, Pub.L. 109-58, Sec. 988(c).

#### **4. COST SHARE ABOVE THE MINIMUM**

Project Teams are encouraged to provide Cost Share above the minimum requirements in Section III.C.2 and III.C.3 because it reflects the financial commitment of the team to the proposed technology. Cost Share above the minimum may be evaluated favorably in accordance with Program Policy Factor V in Section V.B.1.

#### **5. LEGAL RESPONSIBILITY**

Although the cost share requirement applies to the Project Team as a whole, the funding agreement makes the Recipient legally responsible for paying or ensuring payment of the entire cost share. The 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 Recipient is required to contribute at least the cost share percentage of total expenditures incurred through the date of termination.

The 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.

#### **6. 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.

#### **7. COST SHARE TYPES AND ALLOWABILITY**

Every cost share contribution must be allowable under the applicable Federal cost principles, as described in Section I.H of the NOFO. Upon selection for award negotiations, the Recipient must confirm in writing that the proposed cost share contribution is allowable in accordance with applicable Federal cost principles.

Project Teams may provide cost share in the form of cash or in-kind contributions. Cash contributions may be provided by the 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 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<sup>15</sup> 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 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 Grants 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<sup>16</sup> for additional guidance on cost sharing, specifically 2 C.F.R. §§ 200.306 and 910.130, and 10 C.F.R. §§ 603.525-555.

## **8. 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.

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<sup>15</sup> As defined in Federal Acquisition Regulation Subsection 31.205-18.

<sup>16</sup> In the case of Technology Investment Agreements under 42 USC §7256(g).

## **9. 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 II.F of the NOFO for guidance on the requisite cost share information and documentation.

### **III. APPLICATION CONTENTS AND FORMAT**

#### **A. GENERAL APPLICATION CONTENT REQUIREMENTS**

##### **1. MARKING OF CONFIDENTIAL INFORMATION**

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

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 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.

##### **2. EXPORT CONTROL INFORMATION**

Do not include information subject to export controls in any submissions, including 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.

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## **B. FULL APPLICATIONS**

Full Applications must conform to the following formatting requirements:

- Each document must be submitted in the file format prescribed below and/or written in the document template at <https://arpa-e-foa.energy.gov>.
- The Full Application 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.

**Fillable Full Application template documents are available on ARPA-E eXCHANGE at <https://arpa-e-foa.energy.gov>.**

Full Applications found in any component to be noncompliant or nonresponsive may not be merit reviewed or considered for award (see Section II.D of the NOFO).

ARPA-E provides detailed guidance on the content and form of each component below.

### **1. FIRST COMPONENT: TECHNICAL VOLUME**

The Technical Volume is the centerpiece of the Full Application.

The Technical Volume must be submitted in Adobe PDF format. The Technical Volume must conform to the content and form requirements included within the template, including maximum page lengths. If Applicants exceed the maximum page lengths specified for each section, or add any additional sections not requested, ARPA-E may review only the authorized number of pages and disregard any additional pages or sections.

Applicants must provide sufficient citations and references to the primary research literature to justify the claims and approaches made in the Technical Volume. ARPA-E and reviewers may review primary research literature in order to evaluate applications. However, all relevant technical information should be included in the body of the Technical Volume.

### **2. SECOND COMPONENT: PROJECT PLAN WORKBOOK**

The Project Plan Workbook must be submitted in XLS format. A Project Plan Workbook template is available at <https://arpa-e-foa.energy.gov>. The Project Plan Workbook requires information on the following data fields and metrics: (1) original ARPA-E project performance goals, progress by project-end, status to date, and future targets (where applicable); (2) scaling

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metric progress to date and proposed targets for the project; (3) follow-on funding since the original ARPA-E award; (4) total product sales to date; (5) list of commercial/financial partners and contact information; (6) past financial performance and future financial projections for the company, with and without the proposed ARPA-E award; (7) summary of intellectual property relevant to the proposed project, including the primary subject invention from the original ARPA-E award and any supplemental subject inventions included in the proposed project. Applicants must complete all required fields in accordance with the instructions provided in the template and must document all assumptions and resources as appropriate within the Project Plan Workbook template.

### **3. THIRD COMPONENT: LETTER(S) OF INTENT**

The Letter(s) of Intent must be submitted in Adobe PDF format. A Letter of Intent from at least one Commercialization Partner is required for the Full Application. Commercialization Partners may or may not be members of the proposed Project Team. Applicants should provide letter(s) from all third-party collaborators (including Commercialization or Financial Partners). Each letter should state the intended role of the third-party, including their authority within the proposed project, and clearly describe any constraints/restrictions. Any letters should also specify whether the third-party is committed to providing a specific minimum dollar amount of cost share for the Total Proposed Project Cost. If committed to providing cost share, identify the following information in the budget justification: (1) the name of the organization; (2) the proposed dollar amount to be provided; (3) the amount as a percentage of the total project cost; and (4) the proposed type of cost share – cash, services, or property (e.g., equipment or facilities). Where equipment or facilities are offered, each should be described and the basis for their value provided in the budget justification if their use will be charged to the project.

Financial Partners are optional, and hence not a requirement of the SCALEUP Ready NOFO; however, their inclusion by an Applicant and commitment to the proposed project will be considered in Awardee selections. Applicants should include Letter(s) of Intent from any committed Financial Partner(s) with the Full Application. Financial Partners may be included as members of the Project Team or may be included as non-member third parties.

### **4. FOURTH COMPONENT: SF-424**

The SF-424 must be submitted in Adobe PDF format using the available template. An instructional document is also available on ARPA-E eXCHANGE. Applicants must complete all required fields in accordance with the instructions. Applicants may identify and include in Block 14 the entities, their addresses, and corresponding census tract numbers for any project activities that will occur within any designated Qualified Opportunity Zone (QOZ). To locate QOZ, go to: <https://www.cdfifund.gov/opportunity-zones>.

Recipients and Subrecipients are required to complete SF-LLL (Disclosure of Lobbying Activities), also available on ARPA-E eXCHANGE, if any non-Federal funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any Federal

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agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with your application or funding agreement. The completed SF-LLL must be appended to the SF-424.

ARPA-E provides the following supplemental guidance on completing the SF-424:

- Each Project Team should submit only one SF-424 (i.e., a Subrecipient should not submit a separate SF-424).
- The list of certifications and assurances in Block 21 can be found at <https://www.energy.gov/management/articles/certifications-and-assurances-use-sf-424>.
- The dates and dollar amounts on the SF-424 are for the entire period of performance, not a portion thereof.
- Applicants are responsible for ensuring that the proposed costs listed in eXCHANGE match those listed on forms SF-424 and the Budget Justification Workbook/SF-424A. Inconsistent submissions may impact ARPA-E's final award determination.

## **5. FIFTH COMPONENT: BUDGET JUSTIFICATION WORKBOOK/SF-424A**

Applicants are required to complete the Budget Justification Workbook/SF-424A Excel spreadsheet using the available template. Recipients must complete each tab of the Budget Justification Workbook for the project as a whole, including all work to be performed by the Recipient and its Subrecipients and Contractors. The SF-424A form included with the Budget Justification Workbook will “auto-populate” as the Applicant enters information into the Workbook. Applicants should carefully read the “Instructions and Summary” tab provided within the Budget Justification Workbook, and all instructions at the top of each category tab. For more information, an ARPA-E Budget Justification Guidance document is also available on ARPA-E eXCHANGE.

Subrecipient information must be submitted as follows:

- Each Subrecipient incurring greater than or equal to 10% of the Total Project Cost must complete a separate Budget Justification workbook to justify its proposed budget. These worksheets must be inserted as additional sheets within in the Recipient's Budget Justification.
- Subrecipients incurring less than 10% of the Total Project Cost are not required to complete a separate Budget Justification workbook. However, such Subrecipients are required to provide supporting documentation to justify their proposed budgets. At a minimum, the supporting documentation must show which tasks/subtasks are being performed, the purpose/need for the effort, and a sufficient basis for the estimated costs.

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## **6. SIXTH COMPONENT: SUMMARY FOR PUBLIC RELEASE**

Applicants are required to provide a 250-word maximum Summary for Public Release following the instructions in the available template. The Summary for Public Release must be submitted in Adobe PDF format. For applications selected for award negotiations, the Summary may be used as the basis for a public announcement by ARPA-E; therefore, this summary should not include any confidential, proprietary, or privileged information. This summary may not include any graphics, figures, or tables. The summary should be written for a lay audience (e.g., general public, media, Congress) using plain English.

## **7. SEVENTH COMPONENT: SUMMARY SLIDE**

Applicants are required to provide a three-slide PowerPoint presentation summarizing the proposed project. The slides must be submitted in Microsoft PowerPoint format. These slides will be used during ARPA-E's evaluation of Full Applications. A summary slide template, including content requirements, is available on ARPA-E eXCHANGE (<https://arpa-e-foa.energy.gov>).

Summary Slides must conform to the content requirements described in the template.

## **8. EIGHTH COMPONENT: BUSINESS ASSURANCES & DISCLOSURES FORM**

Applicants are required to provide the information requested in the Business Assurances & Disclosures Form. The information must be submitted in Adobe PDF format and digitally signed by all required parties. The fillable Business Assurances & Disclosures Form template on ARPA-E eXCHANGE includes instructions for items the Applicant is required to disclose, describe, or request a waiver for.

### **C. REPLIES TO REVIEWER COMMENTS**

Written feedback on Full Applications is made available to Applicants before the submission deadline for Replies to Reviewer Comments. Applicants have a brief opportunity to prepare a short Reply to Reviewer Comments responding to one or more comments or supplementing their Full Application. A fillable Reply to Reviewer Comments template is available on ARPA-E eXCHANGE (<https://arpa-e-foa.energy.gov>).

Replies to Reviewer Comments must conform to the following requirements:

- The Reply to Reviewer Comments must be submitted in Adobe PDF format.
- The Reply to Reviewer Comments 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. Use Times New Roman typeface, a black font color, and a font size of 12 points or larger (except in figures and tables).

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- The Reply to Reviewer Comments must be a maximum of 3 pages – 2 pages maximum for text, and 1 page maximum for images (e.g., graphics, charts, or other data).
- The Control Number must be prominently displayed on the upper right corner of the header of every page. Page numbers must be included in the footer of every page.

#### **IV. SUBMISSION REQUIREMENTS AND DEADLINES**

All documents, templates, and instructions required to apply to this NOFO are either linked in this document or available on ARPA-E eXCHANGE at <https://arpa-e-foa.energy.gov>.

Full Applications and Replies to Reviewer Comments must be submitted through ARPA-E eXCHANGE. ARPA-E will not review or consider applications submitted through other means (e.g., fax, hand delivery, email, postal mail).

ARPA-E expects to retain copies of all 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.

##### **A. UNIQUE ENTITY IDENTIFIER AND SAM REGISTRATION**

Applicants must register with the System for Award Management (SAM) at [www.sam.gov/SAM](http://www.sam.gov/SAM) prior to submitting an application, at which time the system will assign (if newly registered) a Unique Entity Identifier (UEI). Applicants should commence this process as soon as possible. Registering with SAM and obtaining the UEI could take several weeks.

Recipients must:

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

Subrecipients are not required to complete a full registration in SAM.gov but must obtain a UEI.

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

##### **B. OPTIONAL PRE-SUBMISSION DISCUSSIONS**

Prior to submitting a Full Application to this NOFO, Applicants are encouraged to meet with an ARPA-E Technology-to-Market (T2M) Advisor to discuss their proposed SCALEUP Ready project

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and potential responsiveness. Interested Applicants should reach out to [ARPA-E-SCALEUP@hq.doe.gov](mailto:ARPA-E-SCALEUP@hq.doe.gov) and include:

- A brief summary of the proposed SCALEUP Ready project and underlying technology;
- The iEdison number or software title of the qualifying subject invention; and
- The ARPA-E program and award number the technology was initially funded through.

A Technology-to-Market Advisor will then respond to Applicant inquiries.

During Optional Pre-Submission Discussions, any information submitted to T2M Advisors at this stage should not be proprietary. T2M Advisors are not permitted to address questions related to eligibility for SCALEUP Ready. All eligibility questions must be directed to the Grants Officer at [ARPA-E-CO@hq.doe.gov](mailto:ARPA-E-CO@hq.doe.gov).

Prior communication with an ARPA-E T2M Advisor is encouraged but not required prior to Full Application submission. Furthermore, prior communication with an ARPA-E T2M Advisor, or the lack thereof, is not taken into consideration in the technical review of a submitted Full Application.

Once a Full Application is submitted to the NOFO, any communications regarding that submission must be through the Grants Officer via [ARPA-E-CO@hq.doe.gov](mailto:ARPA-E-CO@hq.doe.gov).

This NOFO and the NOFO selection process will control all ARPA-E selection decisions. The Grants Officer is the **only individual authorized** to 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 Grants Officer, either explicit or implied, is neither valid nor binding.

### C. USE OF ARPA-E EXCHANGE

To apply to this NOFO, Applicants must register with ARPA-E eXCHANGE (<https://arpa-e-foa.energy.gov/Registration.aspx>). 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 “Submissions” and then “My Submissions” links 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 NOFO, a different Control Number is shown for each application.

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## D. REQUIRED DOCUMENTS CHECKLIST

The following table outlines the required documents and their submission deadlines.

SUBMISSION	COMPONENTS	OPTIONAL/ MANDATORY	NOFO SECTION
Full Application	<ul style="list-style-type: none"> <li>Each Applicant must submit a Technical Volume in Adobe PDF format. The Technical Volume must include only the following: <ul style="list-style-type: none"> <li>Executive Summary (1 page max.);</li> <li>Sections 1-8 (20 pages max.); <ol style="list-style-type: none"> <li>Project Summary and Objectives</li> <li>Technology Status</li> <li>Intellectual Property (IP) Position and Strategy</li> <li>Commercialization Plan</li> <li>Project Plan</li> <li>Team Organization and Capabilities</li> <li>Anticipated Impacts</li> <li>Budget</li> </ol> </li> <li>References and Business Documents (no page limit); and</li> <li>Personal Qualification Summaries (each PQS limited to 5 pages in length, no cumulative page limit).</li> </ul> </li> <li>The Technical Volume must be accompanied by: <ul style="list-style-type: none"> <li>Letter(s) of Intent (no page limit, Adobe PDF format);</li> <li>SF-424 (no page limit, Adobe PDF format);</li> <li>Budget Justification Workbook/SF424A (no page limit, Microsoft Excel format);</li> <li>Project Plan Workbook (Excel format) – Applicants may use the Project Plan Workbook template available on ARPA-E eXCHANGE (<a href="https://arpa-e-foa.energy.gov">https://arpa-e-foa.energy.gov</a>);</li> <li>Summary for Public Release (250 words max., Adobe PDF format);</li> <li>Summary Slides (3 page limit, Microsoft PowerPoint format); and</li> <li>Completed and signed Business Assurances &amp; Disclosures Forms (no page limit, Adobe PDF format).</li> </ul> </li> </ul>	Mandatory	III.B
Reply to Reviewer Comments	<ul style="list-style-type: none"> <li>Each Applicant may submit a Reply to Reviewer Comments in Adobe PDF format. This submission is optional. The Reply may include: <ul style="list-style-type: none"> <li>Up to 2 pages of text; and</li> <li>Up to 1 page of images.</li> </ul> </li> </ul>	Optional	III.C
Oral Presentations	<ul style="list-style-type: none"> <li>Selected Finalists (and selected commercialization partners) will be invited to meet with ARPA-E representatives to present the contents of their Full Application and respond to questions posed by ARPA-E.</li> </ul>	Mandatory	VI.A.2

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## **E. COMPLIANCE**

**ARPA-E may not review or consider incomplete applications and applications received after the deadline stated in the NOFO.** Such applications may be deemed noncompliant (see Section II.D of the NOFO). 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 III of the NOFO;
- 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 NOFO;
- 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.

## **F. INTERGOVERNMENTAL REVIEW**

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

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## **V. APPLICATION REVIEW INFORMATION**

### **A. RESPONSIVENESS**

#### **1. TECHNICAL RESPONSIVENESS REVIEW**

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

- Submissions that do not identify a subject invention from a prior or ongoing ARPA-E award.
- Submissions that have been submitted in response to other currently issued ARPA-E NOFOs.
- Submissions that are not scientifically distinct from applications submitted in response to this NOFO or other currently issued ARPA-E NOFOs.
- Submissions for basic research aimed solely at discovery and/or fundamental knowledge generation.
- Submissions for early-stage R&D projects aimed at developing a proof-of-concept technology.
- 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 NOFO.
- Submissions for proposed technologies that do not have the potential to become disruptive in nature, as described in Section I.A of the NOFO.
- Submissions that are not distinct in technical 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 technical approach or objective from activities currently supported by or actively under consideration for funding by other government agencies or the private sector.
- Submissions that are not distinct and propose increasing throughput or incremental improvement of an existing pilot or manufacturing facility.
- Submissions that describe but do not propose a technology scaling R&D plan that allows ARPA-E to evaluate the submission under the applicable merit review criteria provided in Section V.B of the NOFO.
- Submissions that are not scaling technology developed under ARPA-E awards (both prior and ongoing), and do not have a confirmed subject invention report filing with ARPA-E/iEdison.

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- Submissions that fail to adequately prove ownership or licensing of the intellectual property necessary to accomplish the proposed project.
- Submissions that propose using funding for construction, alteration, maintenance, or repair of public infrastructure in the United States.

## **B. REVIEW CRITERIA**

ARPA-E considers a mix of quantitative and qualitative criteria in determining whether to select a Full Application as a Finalist or for award negotiations.

### **1. CRITERIA FOR FULL APPLICATIONS**

Full Applications are evaluated based on the following criteria:

(1) *Project Feasibility and Technical Merit* (33.33%) - This criterion involves consideration of the following:

- The problem to be addressed, technology scaling challenges, and timeline for the proposed project;
- How R&D activities subsequent to the original ARPA-E award have helped mitigate any technical and business risks;
- The readiness of the technology for scaling in support of validating commercially viable cost and performance;
- Clearly defined milestones, including Go/No-Go decision points, and a statement of project deliverables;
- Control of the necessary intellectual property (IP) rights, including a well-formulated IP strategy that supports commercialization of the technology;
- Identification of key risks (including any potential safety, health and environmental risks) during the project and following project completion with clearly articulated mitigation strategies;
- The impact the SCALEUP Ready project will have on advancing the technology from its current state to validated commercial viability. Include performance, yield, conversion, throughput, scale, cost, and/or efficiency metrics, etc.;
- A techno-economic analysis that adequately addresses the main cost, performance, and value drivers; and
- A Project Plan and budget that includes the necessary technical resources – people and assets – to execute the proposed SCALEUP Ready project.

(2) *Commercial Viability, Strategy, and Impact* (33.33%) - This criterion involves consideration of the following:

- Why the goals of the proposed project are required for commercialization of the technology;

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- A path to market that addresses both entry and long-term commercialization factors. Include evidence of product-market fit with a quantifiable market opportunity;
- Evidence of a compelling customer value proposition compared to existing and emerging alternatives, including differentiation based on a competitive analysis;
- Evidence of previous market validation efforts with findings that support a path to market;
- Characterization of the end-to-end value chain for the technology, including the supply chain, distribution channels, and plans to address any vulnerabilities and gaps;
- Planned business model tested against target customer feedback;
- Credible financial projections for at least 5-years with justification/validation;
- Identification of key commercialization risks during the project and following project completion, with clearly articulated mitigation strategies; and
- Extent to which the commercialized technology will impact at least one of ARPA-E's statutory goals in Section I.A of the NOFO.

(3) *Project Team Qualifications, Experience, and Capabilities* (33.33%) - This criterion involves consideration of the following:

- Capabilities of the individuals performing the project, the key capabilities of the organizations comprising the Project Team, the roles and responsibilities of each organization supporting the proposed project, the composition of a Board of Directors and/or an Industry Advisory Board, and the demonstrated capabilities to advance the project to completion, and subsequent commercial deployment, as evidenced by:
  - A track record of successful scale-up and commercialization of new technologies;
  - The demonstrated ability to collect and analyze data, manage unexpected contingencies, and troubleshoot problems;
- Access to the equipment and facilities necessary to accomplish the proposed scaling effort and/or a clear plan to obtain access to necessary equipment and facilities;
- Commitment of Commercialization and Financial Partner(s) that will help enable the success of the project and ultimately the technology;
- Ability of the project team to clearly and succinctly communicate and describe the technical/commercial vision; and
- Applicants' previous work with ARPA-E, if applicable. Applicant's lack of prior work experience with ARPA-E (e.g., licensees of ARPA-E subject inventions) will not be disadvantaged for this subfactor.

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

## **2. CRITERIA FOR REPLIES TO REVIEWER COMMENTS**

ARPA-E has not established separate criteria to evaluate Replies to Reviewer Comments. Instead, Replies to Reviewer Comments are evaluated as an extension of the Full Application.

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### 3. CRITERIA FOR ORAL PRESENTATIONS

ARPA-E has not established separate criteria to evaluate the Oral Presentation. Instead, the Oral Presentation is evaluated as an extension of the Full Application.

#### C. PROGRAM POLICY FACTORS

In addition to the above criteria, ARPA-E may consider the following program policy factors for all application phases:

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

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throughout the United States. For a list or map of QOZs go to:  
<https://www.cdfifund.gov/opportunity-zones>.

## **D. REVIEW AND SELECTION PROCESS**

### **1. FULL APPLICATIONS**

ARPA-E performs a preliminary review of Full Applications to determine whether they are compliant and responsive. 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.B.1 and V.C of the NOFO.

### **2. 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. ARPA-E may also provide more direct feedback at this time. Applicants may submit an optional Reply to Reviewer Comments, which must be submitted by the deadline stated in the NOFO.

ARPA-E performs a preliminary review of Replies to determine whether they are compliant, as described in Section III.C of the NOFO. ARPA-E will review and consider compliant Replies only.

### **3. FINALIST ORAL PRESENTATIONS**

Based on merit review of Full Application submissions, ARPA-E will select Finalists. The Finalists proceed to the final evaluation phase, Oral Presentations. Applicants not selected as Finalists will receive a notification of non-selection.

The Finalists will meet with ARPA-E representatives to present the contents of their Full Applications and provide ARPA-E an opportunity to ask clarification questions regarding the proposed project. The information provided through the Oral Presentation contributes to ARPA-E's selection decisions.

In addition to the project, plan, and stakeholder engagement, Finalists must include detail from their applicants on current and future funding aspirations, an overview of financial projections (with and without SCALEUP Ready funding), a clear description of their strategy to meet the U.S. Competitiveness provisions referenced in Section VII.B.3 of the NOFO, and key risks (and mitigation plans) for successful project execution and follow on.

A maximum of two team members (one of which is the Principal Investigator) from the Applicant organization are permitted to present the Oral Presentation. Up to three of the proposed Commercialization Partners, Financial Partners, and/or Project Team members will be scheduled for separate, non-confidential presentations to discuss their role in the proposed

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SCALEUP Ready project. The Principal Investigator shall be present in the Commercialization Partner interviews. Finalists and Commercialization Partner(s) will be given a minimum of 2 weeks to prepare for Oral Presentations. Supplemental clarification questions on each Finalist's proposed SCALEUP Ready project will also be provided to the Applicant by ARPA-E within this timeframe. Furthermore, additional clarification questions may arise during Oral Presentations, and Finalists should be prepared to provide verbal responses. An estimated agenda for the oral presentation is represented in Figure 1, "Estimated Oral Presentation Agenda."

**Table 3.** Estimated Oral Presentation Agenda (up to 3 hours total).

Description	Duration
Applicants provide project plan overview	60 minutes
Break	30 minutes
Separate Partner / Team Member Interviews (up to 3 Partners / Team Members	45 minutes
Applicant Q&A	45 minutes

ARPA-E will arrange to meet with the Finalists and their proposed Commercialization Partners in person at ARPA-E offices or a mutually agreed upon location, such as a Finalist's site location. Alternatively, ARPA-E may invite certain Finalists to present to ARPA-E via webinar, videoconference, or conference call.

ARPA-E will not reimburse Finalists nor their proposed Commercialization Partners for travel and other expenses relating to the Oral Presentations, nor will these costs be eligible for reimbursement as pre-award costs.

#### **4. 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 Grants 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.



## **5. 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, risk reviews, and program policy factors in Sections V.B, V.C, and V.G of the NOFO. ARPA-E considers a mix of quantitative and qualitative criteria in determining whether to select an application for award negotiation.

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.

### **E. 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 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 Grants Officer by email ([ARPA-E-CO@hq.doe.gov](mailto: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.

### **F. 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.

## **G. RISK REVIEW**

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.

Further, as DOE invests in critical infrastructure and funds critical and emerging technology areas, DOE also considers possible vectors of undue foreign influence in evaluating risk. If high risks are identified and cannot be sufficiently mitigated, DOE may elect to not fund the applicant. 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 of the People's Republic of China or another foreign country of concern;<sup>27</sup>
  - 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.

If high risks are identified and cannot be sufficiently mitigated, ARPA-E may elect to not fund the applicant.

## **VI. AWARD NOTICES AND AWARD TYPES**

### **A. AWARD NOTICES**

Recipients should register with FedConnect in order to receive notification that their funding agreement has been executed by the Grants Officer and to obtain a copy of the executed funding agreement. Please refer to <https://www.fedconnect.net/FedConnect/> for registration instructions.

#### **1. REJECTED FULL APPLICATIONS**

Noncompliant and nonresponsive Full Applications are rejected by the Grants Officer and are not merit reviewed or considered for award. The Grants 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 Full Application was rejected.

#### **2. FINALIST NOTIFICATIONS / ORAL PRESENTATION INVITATION**

ARPA-E will promptly notify Applicants of its Finalist determinations. ARPA-E 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 may inform Applicants that their Full Application was selected as a Finalist, or not selected. Please see Section II.E for more information on re-applying to this NOFO in the future.

Written feedback on Full Applications is made available to Applicants before the submission deadline for Replies to Reviewer Comments. By providing feedback, ARPA-E intends to guide the further development of the proposed technology and to provide a brief opportunity to respond to reviewer comments.

As part of the evaluation and selection process, ARPA-E will invite Finalists to provide an Oral Presentation. ARPA-E will arrange to meet with the invited Finalists in person at the ARPA-E offices or a mutually agreed upon location. Alternatively, ARPA-E may invite certain Finalists and their proposed Commercialization Partners to present to ARPA-E via webinar, videoconference, or conference call.

Finalist will have a minimum of 2 weeks from receipt of the invitation letter to prepare for and complete the Oral Presentation. During the Oral Presentation, Finalists will meet with ARPA-E representatives to present the contents of the Full Application and provide ARPA-E an opportunity to ask questions regarding the proposed project. The information provided by Finalists to ARPA-E through the Oral Presentation contributes to ARPA-E's selection decisions.

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### 3. SELECTION NOTIFICATIONS

#### *a. SUCCESSFUL FINALISTS*

ARPA-E has discretion to select all or part of a proposed project for negotiation of an award. A notification letter selecting a Full Application for award negotiations does not authorize the Applicant to commence performance of the project. **ARPA-E selects Full Applications for award negotiations, not for award.** Applicants do not receive an award until award negotiations are complete and the Grants Officer executes the funding agreement. The notice of Federal award signed by the Grants Officer is the official document that obligates funds. ARPA-E may terminate award negotiations at any time for any reason.

The Grants 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 Grants Officer, either explicit or implied, is invalid.

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

#### *b. POSTPONED SELECTION DETERMINATIONS*

A notification letter postponing a final selection determination until a later date does not authorize the Applicant to commence performance of the project. ARPA-E may ultimately determine to select or not select the Full Application for award negotiations.

#### *c. UNSUCCESSFUL APPLICANTS*

By not selecting 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. ARPA-E hopes that unsuccessful Applicants will submit innovative ideas and concepts for future NOFOs. Please see Section II.E for more information on applying to this FOA again in the future.

### **B. 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 NOFO 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

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for a lesser amount than the Applicant expected, or if the costs incurred are not allowable, allocable, or reasonable.

### **C. RENEWAL AWARDS**

At ARPA-E's sole discretion, awards resulting from this NOFO 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.

### **D. FUNDING AGREEMENT TYPES**

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.

#### **1. COOPERATIVE AGREEMENTS**

ARPA-E generally uses Cooperative Agreements to provide financial and other support to Recipients.

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 Recipients share responsibility for the direction of projects.

ARPA-E encourages 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.

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

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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 Recipient, as the lead organization for the Project Team. Notwithstanding the use of multiple agreements, the 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 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 II.F.2 of the NOFO.

## **VII. POST-AWARD REQUIREMENTS AND ADMINISTRATION**

The 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 Recipient and a FFRDC contractor. Recipients are required to flow down these requirements to their Subrecipients through subawards or related agreements.

### **A. NATIONAL POLICY REQUIREMENTS**

The following national policy requirements apply to Recipients.

- 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 Recipient.
- 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 Recipient.

#### **1. NATIONAL POLICY ASSURANCES**

Project Teams, including Recipients and Subrecipients, are required to comply with the National Policy Assurances in effect on the date of award located at <https://www.nsf.gov/awards/managing/rtc.jsp> in accordance with 2 C.F.R. § 200.300.

#### **2. 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, 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 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.

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### **3. REAL PROPERTY AND EQUIPMENT**

Real property and equipment purchased with project funds (federal share and recipient cost share) are subject to the requirements at 2 CFR 200.310, 200.311, 200.313, and 200.316 (non-Federal entities, except for-profit entities) and 2 CFR 910.360 (for-profit entities). For projects selected for award under this NOFO, the recipient may (1) take disposition action on the real property and equipment; or (2) continue to use the real property and equipment after the conclusion of the award period of performance, with Grants Officer approval.

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

When the property is no longer needed for authorized project purposes, the recipient must request disposition instructions from DOE. For-profit entity disposition requirements are set forth at 2 CFR 910.360. Property disposition requirements for other non-federal entities are set forth in 2 CFR 200.310 – 200.316.

#### **B. ADMINISTRATIVE REQUIREMENTS**

##### **1. COST SHARE PAYMENTS<sup>17</sup>**

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

Minimum cost share payments must be provided on the following schedule:

- a. Cost share may be deferred for approximately the first year of the awarded project, specifically: the period beginning on the agreement's effective date and ending on the date on which the Prime Recipient incurs costs in an amount equal to 1/3<sup>rd</sup> of the estimated Total Project Costs as shown in the approved award budget.
- b. Thereafter, Prime Recipients subject to the Base Cost Share requirement set forth in Section II.F.2 of the NOFO will share 33.3% of all project costs incurred, including cost share deferred during the first third of the project.
- c. Prime Recipients subject to the Reduced Cost Share requirement set forth in Section II.F.3 of the NOFO will share 20% of all project costs incurred.
- d. For b. immediately above,

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<sup>17</sup> Please refer to Section II.F of the NOFO for guidance on cost share requirements.

- The entirety of the cost share owed for the expended award project costs must be paid by the end of the award POP or at earlier termination. That is, if the award is terminated at, for example, 18 months, the cost share for the 18 month period must be contributed/paid by the recipient.
- The Prime Recipient is required to pay the cost share amount as a percentage of the total project costs in each invoice period in which it is due.

Applicants selected for award negotiations may propose alternate cost share payment schedules. Proposed alternate schedules must not, at any time during the proposed period of performance, result in cumulative cost share payments less than the amount resulting from application of the minimum payment schedule above. At the agreement's conclusion (i.e., award expiration or termination), the Prime Recipient is required to pay its share (i.e., percentage) of the Total Project Cost incurred to date as of the termination or end date of the award.

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.

## **2. 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 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 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.

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### 3. 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 NOFO.

#### U.S. Competitiveness

The Contractor (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

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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 NOFO for more information on the DEC and DOE Patent Waiver.

#### **4. NONDISCLOSURE AND CONFIDENTIALITY AGREEMENTS REPRESENTATIONS**

In submitting an application in response to this NOFO 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.

## **5. 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 NOFO, 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.

## **6. COMPLIANCE AUDIT REQUIREMENT**

A 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 Recipient or a Subrecipient and has expended \$1,000,000 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.

## **C. REPORTING**

Recipients are required to submit periodic, detailed reports on technical, financial, and other aspects of the project, as described in Attachment 4 to ARPA-E's Model Cooperative Agreement

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(<https://arpa-e.energy.gov/technologies/project-guidance/pre-award-guidance/funding-agreements>).

## **1. FRAUD, WASTE, AND ABUSE**

An applicant, recipient, or subrecipient must promptly disclose whenever in connection with the federal award (including any activities or subawards thereunder), it has credible evidence of the commission of a violation of Federal criminal law involving fraud, conflict of interest, bribery, or gratuity violations found in Title 18 of the United States Code or a violation of the civil False Claims Act (31 U.S.C. 3729-3733). The disclosure must be made in writing to the Federal agency, the agency's Office of Inspector General, and pass-through entity (if applicable.) Recipients and subrecipients are also required to report matters related to recipient integrity and performance in accordance with Appendix XII of this part. Failure to make required disclosures can result in any of the remedies described in 2 C.F.R. §200.339. (See also 2 C.F.R. part 180, 31 U.S.C. 3321, and 41 U.S.C. 2313.)

For guidance on reporting such violations and information to the DOE Office of Inspector General (OIG), please visit <https://www.energy.gov/ig/ig-hotline>.

## **2. 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.

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## **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 NOFO. 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 VII.B.3 of this NOFO.
  - 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 NOFO made to a Bayh-Dole entity (domestic small businesses and nonprofit organizations) shall include the U.S. Competitiveness Provision in accordance with Section VII.B.3 of this NOFO. 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 Recipients and Subrecipients retain title to subject inventions, the U.S. Government retains certain rights.

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## **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 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 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.

*Questions about this NOFO? Check the Frequently Asked Questions available at <https://arpa-e.energy.gov/faqs>. For questions that have not already been answered, email [ARPA-E-CO@hq.doe.gov](mailto:ARPA-E-CO@hq.doe.gov) (with NOFO name and number in subject line). Problems with ARPA-E eXCHANGE? Email [ExchangeHelp@hq.doe.gov](mailto:ExchangeHelp@hq.doe.gov) (with NOFO name and number in subject line).*

#### **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).

## **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:** The Advanced Research Projects Agency – Energy, an agency of the U.S. Department of Energy.

**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

**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).

**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.

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**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.

**PI:** Principal Investigator.

**Project Team:** A Project Team consists of the 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.

**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 Recipient share and the Federal Government share of total allowable costs. The Federal Government share generally includes costs incurred by GOGOs, FFRDCs, and GOCOs.