



**U.S. Department of Energy  
Advanced Research Projects Agency – Energy**

**Announcement and Request for Information on  
Draft Open Funding Opportunity Announcement (Open FOA)  
DE-FOA-0000663**

On or about March 2, 2012, the Advanced Research Projects Agency – Energy (“ARPA-E”) intends to issue an Open Funding Opportunity Announcement (“Open FOA” or “FOA”). The objective of the Open FOA is to identify high-risk, high-reward concepts for energy-related technologies that may enhance our nation’s energy and economic security. This FOA will be open to any energy-related technology that, if successful, will have a transformational and disruptive effect on the energy sector.

ARPA-E is seeking your comments on the draft Open FOA, which is appended hereto as Attachment A. An overview of the application process is provided in Section I.B of the draft FOA, and a draft list of Technical Categories and Subcategories is provided in Section I.E of the draft FOA. **Please submit your written comments by email to [ARPA-E-OpenFOA@hq.doe.gov](mailto:ARPA-E-OpenFOA@hq.doe.gov) by 5 PM Eastern Time on Wednesday, February 29, 2012. ARPA-E will not review or consider comments submitted by other means.** Please insert “Comments on Draft Open FOA” in the subject line of your email, and include your name, organization, email address, and telephone number in the body of your email.

All feedback provided will be taken into consideration, but ARPA-E will not respond to individual submissions or publish publicly a compendium of responses. **Neither this Announcement nor Attachment A constitutes the formal request for this funding opportunity announcement.** The Federal Government will not pay for the provision of any information, nor will it compensate any respondents for the development of such information.

This Announcement is also intended to provide an opportunity for potential Applicants to begin the process of developing partnerships and gathering data for their applications. **Applicants should not rely on this Announcement or Attachment A for guidance on applying to the Open FOA.** All of the information in this Announcement and Attachment A is subject to change. **Applicants must refer to the final FOA issued in March 2012 for instructions on submitting an application** and for the terms and conditions of funding. ARPA-E will not review or consider noncompliant and/or nonresponsive applications.

Once the final FOA is issued in March 2012, Applicants will have a limited amount of time to submit a mandatory Notice of Intent in ARPA-E eXCHANGE, ARPA-E’s online application portal (<https://arpa-e-foa.energy.gov>). **Applicants must submit a separate Notice of Intent for each Concept Paper through ARPA-E eXCHANGE by the deadline stated in the FOA. Failure to comply with this requirement will render the Applicant’s Concept Paper ineligible for consideration** (see Section III.C.1 of the draft FOA).

Please note that the draft Open FOA is designated as DE-FOA-0000663. When issued in March 2012, the final Open FOA will have a different designation, namely DE-FOA-0000670.

# **ATTACHMENT A**

# DRAFT FOR PUBLIC COMMENT

## FINANCIAL ASSISTANCE FUNDING OPPORTUNITY ANNOUNCEMENT



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

## OPEN FUNDING OPPORTUNITY ANNOUNCEMENT (OPEN FOA)

Announcement Type: Initial Announcement  
Funding Opportunity No. DE-FOA-0000663  
CFDA Number 81.135

FOA Issue Date:	[DATE]
Submission Deadline for Notice of Intent:	5 PM ET, [DATE]
First Deadline for Questions to <a href="mailto:ARPA-E-OpenFOA@hq.doe.gov">ARPA-E-OpenFOA@hq.doe.gov</a> :	5 PM ET, [DATE]
Submission Deadline for Concept Papers:	5 PM ET, [DATE]
Second Deadline for Questions to <a href="mailto:ARPA-E-OpenFOA@hq.doe.gov">ARPA-E-OpenFOA@hq.doe.gov</a> :	5 PM ET, [DATE]
Submission Deadline for Full Applications:	5 PM ET, [DATE]
Submission Deadline for Replies to Reviewer Comments:	5 PM ET, [DATE]
Expected Date for Selection Notifications:	[DATE]

- See Section I.E of the FOA for a list of Technical Categories and Subcategories.
- **Notices of Intent, Concept Papers, Full Applications, and Replies to Reviewer Comments must be submitted through ARPA-E eXCHANGE** (<https://arpa-e-foa.energy.gov/>), ARPA-E's online application portal (see Section IV.H.1 of the FOA). **ARPA-E will not review or consider applications submitted through other means.** For detailed guidance on using ARPA-E eXCHANGE, please refer to the "ARPA-E eXCHANGE User Guide" (<https://arpa-e-foa.energy.gov/Manuals.aspx>). See Section IV.H.1 of the FOA for guidance on ARPA-E eXCHANGE.
- Applicants are responsible for meeting each submission deadline. **Applicants are strongly encouraged to submit their applications at least 48 hours in advance of the submission deadline.**
- **Applicants should not wait until the last minute to begin the submission process.** During the final hours before the submission deadline, Applicants may experience server/connection congestion that prevents them from completing the necessary steps in ARPA-E eXCHANGE to submit their applications. **ARPA-E will not extend the submission deadline for Applicants that fail to submit required information and documents due to server/connection congestion.**
- **ARPA-E will not review or consider noncompliant applications** (see Section III.C.1 of the FOA), **including incomplete applications and applications submitted after the deadline stated in the FOA.** In addition, ARPA-E will not review or consider nonresponsive applications (see Section III.C.2 of the FOA).

Questions about this FOA? Email [ARPA-E-OpenFOA@hq.doe.gov](mailto:ARPA-E-OpenFOA@hq.doe.gov) (with FOA name and number in subject line); see FOA Sec. VII.A.  
Problems with ARPA-E eXCHANGE? Email [ExchangeHelp@hq.doe.gov](mailto:ExchangeHelp@hq.doe.gov) (with FOA name and number in subject line).

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### REQUIRED DOCUMENTS CHECKLIST

Notices of Intent, Concept Papers, Full Applications, and Replies to Reviewer Comments must be submitted through ARPA-E eXCHANGE (<https://arpa-e-foa.energy.gov/>), ARPA-E's online application portal. ARPA-E will not review or consider applications submitted through other means. For detailed guidance on using ARPA-E eXCHANGE, please refer to the "ARPA-E eXCHANGE User Guide" (<https://arpa-e-foa.energy.gov/Manuals.aspx>). Templates for the Concept Paper, the Technical Volume of the Full Application, and the Reply to Reviewer Comments are available at <https://arpa-e-foa.energy.gov>. Required forms for Full Applications are also available at <https://arpa-e-foa.energy.gov>.

<u>SUBMISSION</u>	<u>COMPONENTS</u>	<u>OPTIONAL/ MANDATORY</u>	<u>FOA SECTION</u>	<u>DEADLINE</u>
<b>Notice of Intent</b>	<ul style="list-style-type: none"><li>Each Applicant must enter the following information into ARPA-E eXCHANGE by the stated deadline:<ul style="list-style-type: none"><li>Project Title;</li><li>Lead Organization;</li><li>Organization Type (Business &lt; 500 Employees; Business &gt; 1000 Employees; Business 500-1000 Employees; Federally Funded Research and Development Center (FFRDC); Government Owned and Operated; Non-Profit; University);</li><li>% of effort contributed by the Lead Organization;</li><li>Principal Investigator, Team Members, and Key Participants;</li><li>Technical Subcategory or Subcategories (see Section I.E of the FOA); and</li><li>Abstract – The abstract provided should be 200 words in length, and should provide a truncated explanation of the proposed project.</li></ul></li></ul>	Mandatory	IV.B	[DATE]
<b>Concept Paper</b>	<ul style="list-style-type: none"><li>Each Applicant must submit a Concept Paper in Adobe PDF format by the stated deadline. The Concept Paper must include the following:<ul style="list-style-type: none"><li>Technology Description (2 pages max.)</li><li>Addendum (1 page max.)</li></ul></li></ul>	Mandatory	IV.C	[DATE]
<b>Full Application</b>	[TO BE INSERTED BY FOA MODIFICATION IN JUNE 2012]	Mandatory	IV.D	[DATE]
<b>Reply to Reviewer Comments</b>	[TO BE INSERTED BY FOA MODIFICATION IN JUNE 2012]	Optional	IV.E	[DATE]

Questions about this FOA? Email [ARPA-E-OpenFOA@hq.doe.gov](mailto:ARPA-E-OpenFOA@hq.doe.gov) (with FOA name and number in subject line); see FOA Sec. VII.A.  
Problems with ARPA-E eXCHANGE? Email [ExchangeHelp@hq.doe.gov](mailto:ExchangeHelp@hq.doe.gov) (with FOA name and number in subject line).

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## EXECUTIVE SUMMARY

<b>Federal Agency</b>	Advanced Research Projects Agency – Energy (ARPA-E), U.S. Department of Energy	
<b>FOA Title</b>	<b>Open Funding Opportunity Announcement (Open FOA)</b>	
<b>FOA Type</b>	Initial announcement	
<b>FOA Number</b>	DE-FOA-0000663	
<b>CFDA Number</b>	81.135	
<b>FOA Issue Date:</b>	[DATE]	
<b>Submission Deadline for Notice of Intent:</b>	5 PM ET, [DATE]	
<b>First Deadline for Questions to <a href="mailto:ARPA-E-OpenFOA@hq.doe.gov">ARPA-E-OpenFOA@hq.doe.gov</a>:</b>	5 PM ET, [DATE]	
<b>Submission Deadline for Concept Papers:</b>	5 PM ET, [DATE]	
<b>Second Deadline for Questions to <a href="mailto:ARPA-E-OpenFOA@hq.doe.gov">ARPA-E-OpenFOA@hq.doe.gov</a>:</b>	5 PM ET, [DATE]	
<b>Submission Deadline for Full Applications:</b>	5 PM ET, [DATE]	
<b>Submission Deadline for Replies to Reviewer Comments:</b>	5 PM ET, [DATE]	
<b>Expected Date for Selection Notifications:</b>	[DATE]	
<b>Means of Submission</b>	Notices of Intent, Concept Papers, Full Applications, and Replies to Reviewer Comments must be submitted through ARPA-E eXCHANGE ( <a href="https://arpa-e-foa.energy.gov/">https://arpa-e-foa.energy.gov/</a> ), ARPA-E's online application portal. ARPA-E will not review or consider applications submitted through other means. For detailed guidance on using ARPA-E eXCHANGE, please refer to the "ARPA-E eXCHANGE User Guide" ( <a href="https://arpa-e-foa.energy.gov/Manuals.aspx">https://arpa-e-foa.energy.gov/Manuals.aspx</a> ).	
<b>Total Amount to Be Awarded</b>	Approximately \$150 million	
<b>Anticipated Awards</b>	ARPA-E may issue one, multiple, or no awards under this FOA. Awards may vary between \$250,000 and \$10 million.	
<b>Types of Funding Agreements</b>	Cooperative Agreements, Technology Investment Agreements, Work Authorizations, and Interagency Agreements	
<b>Period of Performance</b>	Expected up to 36 months	
<b>Eligibility – Domestic Entities</b>	Educational institutions, nonprofits, <sup>1</sup> and for-profit entities	May apply as Standalone Applicant, as lead organization for a Project Team, or as member of a Project Team
	FFRDCs, including DOE/NNSA FFRDCs	May apply as lead organization for a Project Team or as

<sup>1</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 Recipient or Subrecipient.

Questions about this FOA? Email [ARPA-E-OpenFOA@hq.doe.gov](mailto:ARPA-E-OpenFOA@hq.doe.gov) (with FOA name and number in subject line); see FOA Sec. VII.A.  
Problems with ARPA-E eXCHANGE? Email [ExchangeHelp@hq.doe.gov](mailto:ExchangeHelp@hq.doe.gov) (with FOA name and number in subject line).



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		member of a Project Team
	DOE/NNSA Government-Owned Government-Operated laboratories (GOGOs)	Not eligible to apply for funding
	Non-DOE/NNSA GOGOs	May apply as member of a Project Team
	State and local government entities	May apply as member of a Project Team
<b>Eligibility – Foreign Entities</b>	May apply as Standalone Applicant, lead organization for a Project Team, or as member of a Project Team. However, all work by foreign entities must be performed by subsidiaries or affiliates incorporated or otherwise headquartered in the United States.	
<b>Eligibility – Consortium Entities</b>	Consortium entities, which may include domestic and foreign entities, must designate one member of the consortium as the consortium representative to the Project Team. The consortium representative must be incorporated or otherwise headquartered in the United States. The eligibility of the consortium will be determined by reference to the eligibility of the consortium representative under Section III.A of the FOA.	
<b>Cost Share Requirement</b>	Domestic educational institution or domestic nonprofit applying as a Standalone Applicant	Greater than or Equal to ( $\geq$ ) 5% of the Total Project Cost
	Project Teams composed exclusively of domestic educational institutions, domestic nonprofits, and/or FFRDCs	$\geq$ 5% of the Total Project Cost
	Project Teams where domestic educational institutions, domestic nonprofits, and/or FFRDCs perform $\geq$ 80%, but less than 100%, of the work under the funding agreement, as measured by the Total Project Cost	$\geq$ 10% of the Total Project Cost
	Technology Investment Agreements	$\geq$ 50% of the Total Project Cost, to the maximum extent practicable
	All other projects	$\geq$ 20% of the Total Project Cost
<b>Number of Applications</b>	Applicants may submit more than one application to this FOA, provided that each application is scientifically distinct.	
<b>Agency Contact</b>	See Section VII.A of the FOA for guidance on submitting questions to ARPA-E.	
<b>Application Forms</b>	Required forms for Full Applications are available at <a href="https://arpa-e-foa.energy.gov">https://arpa-e-foa.energy.gov</a> .	

Questions about this FOA? Email [ARPA-E-OpenFOA@hq.doe.gov](mailto:ARPA-E-OpenFOA@hq.doe.gov) (with FOA name and number in subject line); see FOA Sec. VII.A.  
Problems with ARPA-E eXCHANGE? Email [ExchangeHelp@hq.doe.gov](mailto:ExchangeHelp@hq.doe.gov) (with FOA name and number in subject line).

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## I. FUNDING OPPORTUNITY DESCRIPTION

### A. AGENCY OVERVIEW

The Advanced Research Projects Agency – Energy (ARPA-E) is an organization within the Department of Energy, chartered by Congress in the America COMPETES Act (Pub. L. No. 110-69) to support the creation of transformational energy technologies and systems through funding and managing Research and Development (R&D) efforts. Originally chartered in 2007, the Agency was first funded through the American Recovery and Reinvestment Act of 2009. Since that time the Agency has funded over 180 projects totaling more than \$500 million across the entire technology landscape.<sup>2</sup>

The mission of ARPA-E is to identify and fund research to translate science into breakthrough energy technologies that are too risky for the private sector and that, if successfully developed, will create the foundation for entirely new industries. Successful projects will address at least one of ARPA-E's two Mission Areas:

1. Enhance the economic and energy security of the United States through the development of energy technologies that result in:
  - a. reductions of imports of energy from foreign sources;
  - b. reductions of energy-related emissions, including greenhouse gases; and
  - c. improvement in the energy efficiency of all economic sectors; and
2. Ensure that the United States maintains a technological lead in developing and deploying advanced energy technologies.

**ARPA-E funds applied research and development.** ARPA-E exists to fund applied research and development, defined by Office of Management and Budget as a “study (designed) to gain knowledge or understanding necessary to determine the means by which a recognized and specific need may be met” and as the “systematic application of knowledge or understanding, directed toward the production of useful materials, devices, and systems or methods, including design, development, and improvement of prototypes and new processes to meet specific requirements.” ARPA-E funds technology-focused applied research to create real-world solutions to important problems in energy creation, distribution and use and, as such, will not support basic research, defined as a “systematic study directed toward fuller knowledge or understanding of the fundamental aspects of phenomena and of observable facts without specific applications towards processes or products in mind.” While it is anticipated that in some instances some minor aspects of fundamental science will be clarified or uncovered during the conduct of the supported applied research, the major portion of activities supported by ARPA-E are directed towards research on new technologies.

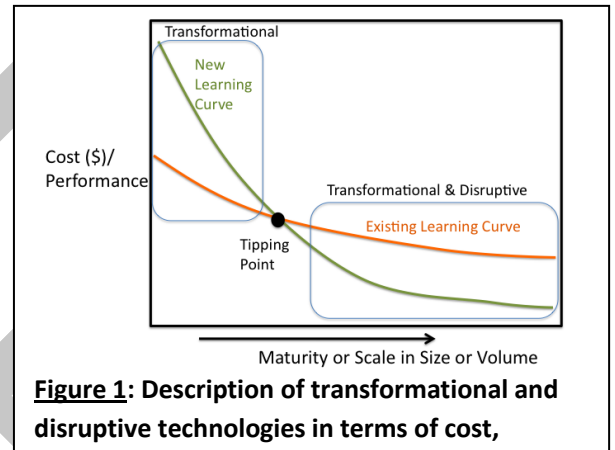
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<sup>2</sup> Information on ARPA-E's projects is available at <http://arpa-e.energy.gov/ProgramsProjects/Programs.aspx>.

While all technology-focused applied research will be considered, two instances are especially fruitful for the creation of transformational technologies:

- the first establishment of a technology upon recently elucidated scientific principles; and
- the synthesis of scientific principles drawn from disparate fields that do not typically intersect.

**ARPA-E exists to support transformational, rather than incremental, research.** Technologies exist on learning curves. Following the creation of a technology, refinements to that technology and economies of scale that accrue as manufacturing and widespread distribution develop drive technology down that learning curve until an equilibrium price is found. While this incremental improvement of technology is important to the ultimate success of a technology in the marketplace, ARPA-E exists to fund transformational research – i.e., research that creates fundamentally new learning curves rather than moving existing technologies down their learning curves.



**ARPA-E funded technology has 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, are widely adopted and displace existing technologies from the marketplace or create entirely new markets. Energy technologies typically become disruptive at maturity rather than close to inception and the maturation of nascent technologies often require significant incremental development to drive the technology down its natural learning curve to its ultimate equilibrium price. Such development might include modification of the technology itself, the means to produce and distribute that technology, or both. Thus, while early incarnations of the automobile were transformational in the sense that they created a fundamentally new learning curve for transportation, they were not disruptive, because of the unreliability and high cost of early automobiles. Continuous, incremental refinement of the technology ultimately led to the Ford Model T: as the first affordable, reliable, mass-produced vehicle, the Model T had a disruptive effect on the transportation market.

ARPA-E will not support technology development for extended periods of time; rather, ARPA-E supports the initial creation of technology. Following initial testing of the first prototype of a device, a system, or a process, other Federal agencies and the private sector will support the incremental development necessary to bring the technology to market. While ARPA-E does not require technologies to be disruptive at the conclusion of ARPA-E funding, ARPA-E will not

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support technologies that cannot be disruptive even if successful. Examples of such technologies are approaches that require elements with insufficient abundances of materials to be deployed at scale, or technologies that could not scale to levels required to be impactful because of, for example, physical limits to productivity.

***ARPA-E will not support basic research aimed at discovery and fundamental knowledge generation, nor will it undertake large-scale demonstration projects of existing technologies.***

ARPA-E is not a substitute for existing R&D organizations within the Department of Energy, but rather complements existing organizations by supporting R&D objectives that are transformational and translational. Applicants interested in receiving basic research financial assistance should work with the Department of Energy's Office of Science (<http://science.energy.gov/>). Similarly, projects focused on the improvement of existing technology platforms may be appropriate for support by the applied programs – for example, the Office of Energy Efficiency and Renewable Energy (<http://www.eere.energy.gov/>), the Office of Fossil Energy (<http://fossil.energy.gov/>), the Office of Nuclear Energy (<http://nuclear.energy.gov/>), and the Office of Electricity Delivery and Energy Reliability (<http://energy.gov/oe/office-electricity-delivery-and-energy-reliability>).

***ARPA-E does not own or manage any laboratories.*** ARPA-E will accomplish its mission by funding scientists, engineers, and technologists outside ARPA-E to perform research with the purpose of enabling major technological advances that address its mission.

Recipients of ARPA-E awards may include a full range of R&D entities. ARPA-E encourages collaboration and the mix of complementary expertise to perform the proposed R&D objectives. This may be a single performer or team, may be one or more institutions, and may include operational experts along with the research team.

### **B. APPLICATION PROCESS OVERVIEW**

The first step in applying to the Open FOA is the timely submission of a Notice of Intent, which is required to obtain a Control Number. Next, Applicants must submit a Concept Paper by the deadline stated in the FOA. ARPA-E will encourage a subset of Applicants to submit Full Applications. Other Applicants will be discouraged from submitting a Full Application in order to save them the time and expense of preparing an application that is unlikely to be selected for award negotiations. Following ARPA-E's review of Full Applications, Applicants will have a brief opportunity to submit an optional Reply to Reviewer Comments. ARPA-E will then perform a down-select of Full Applications that may include discussions and/or site visits with those remaining Applicants. ARPA-E will select Full Applications for award negotiations from this pool of remaining Applicants. ARPA-E considers a mix of quantitative and qualitative criteria (see Sections V.A and V.B.1 of the FOA) in determining whether to encourage the submission of a Full Application and whether to select a Full Application for award negotiations.

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**Notices of Intent, Concept Papers, Full Applications, and Replies to Reviewer Comments must be submitted through ARPA-E eXCHANGE** (<https://arpa-e-foa.energy.gov/>), ARPA-E's online application portal (see Section IV.H.1 of the FOA). **ARPA-E will not review or consider applications submitted through other means.** Applicants must register with ARPA-E eXCHANGE (<https://arpa-e-foa.energy.gov/Registration.aspx>) and then register for the Open FOA. For detailed guidance on using ARPA-E eXCHANGE, please refer to the "ARPA-E eXCHANGE User Guide" (<https://arpa-e-foa.energy.gov/Manuals.aspx>).

Applicants are responsible for meeting each submission deadline. **Applicants are strongly encouraged to submit their applications at least 48 hours in advance of the submission deadline.** Under normal conditions (i.e., at least 48 hours in advance of the submission deadline), Applicants should allow at least 1 hour to submit a Notice of Intent, Concept Paper, or Full Application and at least 15 minutes to submit a Reply to Reviewer Comments.

**Applicants should not wait until the last minute to begin the submission process.** During the final hours before the submission deadline, Applicants may experience server/connection congestion that prevents them from completing the necessary steps in ARPA-E eXCHANGE to submit their applications. **ARPA-E will not extend the submission deadline for Applicants that fail to submit required information and documents due to server/connection congestion.**

**ARPA-E will not review or consider noncompliant applications** (see Section III.C.1 of the FOA), **including incomplete applications and applications submitted after the deadline stated in the FOA.** The following errors could cause an application to be deemed "incomplete" and thus noncompliant:

- Failing to comply with the form and content requirements in Section IV of the FOA;
- Failing to enter required information in ARPA-E eXCHANGE;
- Failing to upload required document(s) to ARPA-E eXCHANGE;
- 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.

**ARPA-E will not review or consider nonresponsive applications** (see Section III.C.2 of the FOA).

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Any “Applications Specifically Not of Interest,” as described in Section I.F of the FOA, will be deemed nonresponsive and not reviewed or considered.

### 1. NOTICES OF INTENT

**Applicants must submit a separate Notice of Intent for each Concept Paper through ARPA-E eXCHANGE by the deadline stated in the FOA. Failure to comply with this requirement will render the Applicant’s Concept Paper ineligible for consideration** (see Section III.C.1 of the FOA). Instructions on submitting a Notice of Intent may be found in Section IV.B of the FOA.

Applicants must submit a Notice of Intent early in the FOA process by the deadline stated in the FOA. The Notice of Intent consists of a short abstract and basic information about the proposed project, including project title, lead organization, organization type, percentage of work performed by the lead organization, Principal Investigator and Key Participants, and Technical Subcategory or Subcategories.

ARPA-E performs a preliminary review of Notices of Intent to determine whether they are compliant, as described in Section III.C.1 of the FOA. ARPA-E will not review or consider noncompliant Notices of Intent.

ARPA-E eXCHANGE automatically assigns a Control Number upon the submission of a compliant Notice of Intent. Once logged in to ARPA-E eXCHANGE (<https://arpa-e-foa.energy.gov/login.aspx>), Applicants may access their submissions by clicking the “My Submissions” link in the navigation on the left side of the page. Every application that the Applicant has submitted to ARPA-E and the corresponding Control Number is displayed on that page. If the Applicant submits more than one application to a particular FOA, a different Control Number is shown for each application. The Control Number must be included in the header of the Concept Paper, Full Application, and optional Reply to Reviewer Comments.

ARPA-E is using Notices of Intent to facilitate and expedite the merit review process. ARPA-E expects to receive a large number of applications and it is essential that each application have a unique identifier. Notices of Intent also ensure that ARPA-E has sufficient reviewers in each technical area of interest.

### 2. CONCEPT PAPERS

Applicants must submit their Concept Papers by the deadline stated in the FOA. **Failure to comply with this requirement will render the Applicant’s Full Application ineligible for consideration** (see Section III.C.1 of the FOA). The assigned Control Number must be marked in the header of the Concept Paper. Instructions on submitting a Concept Paper may be found in Section IV.C of the FOA.



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The Concept Paper consists of three pages: a two-page Technology Description and a one-page Addendum consisting of the Technical Subcategory and Subcategories (see Section I.E of the FOA), the funding category (see Section II.A of the FOA), a brief description of the Project Team, and any visual displays of data (e.g., charts, graphs).

ARPA-E performs a preliminary review of Concept Papers to determine whether they are compliant and responsive, as described in Section III.C of the FOA. ARPA-E will not review or consider noncompliant and/or nonresponsive Concept Papers.

ARPA-E makes an independent assessment of each Concept Paper based on the criteria and program policy factors in Sections V.A.1 and V.B.1 of the FOA. ARPA-E will encourage a subset of Applicants to submit Full Applications. Other Applicants will be discouraged from submitting a Full Application in order to save them the time and expense of preparing an application that is unlikely to be selected for award negotiations. By discouraging the submission of a Full Application, ARPA-E intends to convey its lack of programmatic interest in the proposed project. Such assessments do not necessarily reflect judgments on the merits of the proposed project. Unsuccessful Applicants should continue to submit innovative ideas and concepts to future FOAs.

Due to the expected volume of submissions, ARPA-E will not provide feedback on Concept Papers.

### **3. FULL APPLICATION**

Applicants must submit their Full Application by the deadline stated in the FOA. The assigned Control Number must be marked in the header of each component of the Full Application. Instructions on submitting a Full Application may be found in Section IV.D of the FOA.

Applicants will have approximately 30 days from receipt of the Encourage/Discourage notification to prepare and submit a Full Application. The Full Application consists of seven components, including the Technical Volume, Forms SF-424 and SF-424A, Summary for Public Release, Summary Slide, Disclosure of Other Sources of Funding form, and Business Assurances Form.

ARPA-E performs a preliminary review of Full Applications to determine whether they are compliant and responsive, as described in Section III.C of the FOA. ARPA-E will not review or consider noncompliant and/or nonresponsive Full Applications.

If selected for award negotiations, Applicants will be required to complete additional paperwork within 21 calendar days of the selection announcement, including a Budget

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Justification Workbook (see Section VI.B.3 of the FOA) and Environmental Impact Questionnaire (see Section VI.B.7 of the FOA).

### 4. REPLY TO REVIEWER COMMENTS

Once ARPA-E has completed its review of Full Applications, reviewer comments on compliant and responsive Full Applications are made available to Applicants via ARPA-E eXCHANGE. Each Applicant will have access only to comments on its own application(s). Applicants may submit an optional Reply to Reviewer Comments, which must be submitted by the deadline stated in the FOA. The assigned Control Number must be marked in the header of the Reply. Instructions on submitting a Reply may be found in Section IV.E of the FOA.

Applicants have approximately 4 calendar days from receipt of the reviewer comments to prepare and submit a Reply. The Reply to Reviewer Comments consists of two pages of text and one page of visual displays of data.

ARPA-E performs a preliminary review of Replies to determine whether they are compliant, as described in Section III.C.1 of the FOA. ARPA-E will not reviewer or consider noncompliant Replies. Submitting a Reply to Reviewer Comments is optional. ARPA-E will review and consider each compliant and responsive Full Application, even if no Reply is submitted or if the Reply is found to be noncompliant.

### 5. “DOWN-SELECT” PROCESS

Once ARPA-E completes its review of Full Applications and Replies to Reviewer Comments, it will perform a “down-select” of Full Applications. The DOE Contracting Officer will invite certain Applicants to participate in a meeting with ARPA-E via webinar, videoconference, or conference call. In the alternative, the DOE Contracting Officer may invite Applicants to meet in person at ARPA-E’s offices, the recipient’s site, or a mutually agreed upon location. The DOE Contracting Officer may also arrange pre-selection site visits to certain Applicants’ facilities. ARPA-E will not reimburse Applicants for travel and other expenses relating to pre-selection meetings and site visits.

The DOE Contracting Officer may arrange one, multiple, or no pre-selection meetings and site visits. ARPA-E may select applications for funding 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—selection determinations are made at a later time.

ARPA-E may obtain additional information through pre-selection meetings and site visits that will be used to make a final selection determination. However, ARPA-E will not accept any new or updated application materials from Applicants during pre-selection meetings and site visits.



## **6. SELECTION FOR AWARD NEGOTIATIONS**

ARPA-E carefully considers all of the information obtained through the application process and makes an independent assessment of each compliant and responsive Full Application based on the criteria and program policy factors in Sections V.A.2 and V.B.1 of the FOA. ARPA-E may select or not select a Full Application for award negotiations. ARPA-E may also postpone a final selection determination on one or more Full Applications until a later date, subject to availability of funds and other factors. ARPA-E will enter into award negotiations only with selected Applicants.

Applicants are promptly notified of ARPA-E's determination. Please refer to Section VI.A of the FOA for guidance on award notifications.

### **C. PROGRAM OVERVIEW**

Over a remarkably short period of time – from the early 19th Century forward – the production, distribution and use of energy completely reshaped the United States, including tremendous changes to how Americans live, travel and work. The production of massive quantities of fungible energy – as electricity, liquid fuels and natural gas – entirely transformed the American economy, enabling manufacturing at massive levels, and providing a suite of goods and services entirely unimaginable even a few decades ago.

Today, the United States ranks second in the world in overall energy use, and seventh in per capita energy consumption. The United States comprises some 5% of the world's population but consumes more than a quarter of the total energy produced worldwide. Although per capita energy demand has remained relatively constant in the United States over the last several decades (due in part to increased energy efficiency and the movement of manufacturing overseas), the energy demands of emerging economies is growing rapidly and will continue to grow over the coming decades, in lockstep with rising standards of living. This growth will inevitably strain the finite resources of the planet.

Despite the rapid development and deployment of renewable resources, the energy economy of the United States remains largely based on hydrocarbon resources, including oil, coal, and natural gas. Although the United States possesses significant quantities of some hydrocarbon resources, others are already insufficient to meet domestic demand, and even those resources that are plentiful are finite and will eventually be depleted. Today the United States imports some 9 million barrels of oil per day, roughly half the country's total need, at a cost of nearly \$1 billion per day and accounting for over a third of the US trade deficit. Both coal and natural gas exports from the United States to developing economies will increase price pressures on these vital resources.

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Given the inexorable increase in demand for energy services, both in the United States and world-wide, there is a tremendous need for revolutionary approaches to the generation, transmission and use of energy and energy services. This FOA is designed to address those needs, by supporting revolutionary technological advances across the entire energy space.

### D. PROGRAM OBJECTIVES

To address the challenges imposed by the rapidly evolving global energy market, ARPA-E seeks to support transformational research in all areas of energy R&D, including resource identification, extraction, transportation and use, and energy generation, storage, transmission and use in both the transportation and stationary power sectors. Areas of research responsive to this FOA include (but are not limited to) electricity generation by both renewable and non-renewable means, electricity transmission, storage, and distribution; energy efficiency for buildings, manufacturing and commerce, and personal use; and all aspects of transportation, including the production and distribution of both renewable and non-renewable fuels, electrification, and energy efficiency in transportation.

The result of a successful ARPA-E project will be such that at the end of the project the transformational technology will be sufficiently advanced and well defined in terms of performance and risk to promote next-stage development or transfer of the project to next-stage developers. Projects under this FOA must be aimed at *more than progress toward* identified project goals; the project must be aimed at *actual delivery* of these project goals. The R&D effort on later-stage technology development projects must carry the risk reduction process for the technology to the point at which entrepreneurial decisions can be made with confidence.

### E. TECHNICAL CATEGORIES AND SUBCATEGORIES OF INTEREST

Applicants may propose any idea that addresses ARPA-E's Mission Areas and the types of projects that ARPA-E funds, as described in Section I.A of the FOA. These ideas may span multiple disciplinary boundaries. Each Notice of Intent, Concept Paper, and Full Application must identify the Technical Subcategory for the Applicant's proposed technology. Applicants may select a single Technical Subcategory or multiple Technical Subcategories and Subcategories for their proposed technology, as appropriate. See the chart below for the list of Technical Categories and Subcategories.

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<u>CATEGORY</u>	<u>SUBCATEGORY</u>	<u>DESCRIPTION</u>
<b>CATEGORY 1: RENEWABLE POWER (NON-BIO)</b>	<b><u>Subcategory A:</u> 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><u>Subcategory B:</u> Wind - Energy Conversion</b>	Technologies that lead to better conversion of wind power into useable energy, such as motors and magnetic materials, electronics, etc. specifically designed for wind energy.
	<b><u>Subcategory C:</u> 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><u>Subcategory D:</u> Ocean Energy</b>	Technologies for capturing and/or converting ocean energy such as hydrokinetic, osmotic, etc.
	<b><u>Subcategory E:</u> Solar - PV/CPV</b>	Technologies for solar PV/CPV systems including materials, cell configurations, BOS and other technologies for solar cells that convert light into electricity or fuel
	<b><u>Subcategory F:</u> Solar - Thermal</b>	Technologies for solar thermal systems including materials, configurations, BOS, and other technologies that use or convert solar thermal energy
	<b><u>Subcategory G:</u> Power Electronics - Renewable Generation</b>	Technologies which include semiconductor designs and materials, circuit designs, magnetic materials, capacitors, switches, etc applied to renewable power generation
	<b><u>Subcategory H:</u> Renewable Power - Other</b>	Renewable energy technologies that do not fit one of the above categories. Including, but not limited to, solar concentrators, methods for cheaper installation, resource identification and modeling, sensors, etc.
<b>CATEGORY 2: BIOENERGY</b>	<b><u>Subcategory A:</u> Biomass Production</b>	Technologies which improve biomass characteristics, such as yield and sustainability, and decrease cost of production and/or water use.

Questions about this FOA? Email [ARPA-E-OpenFOA@hq.doe.gov](mailto:ARPA-E-OpenFOA@hq.doe.gov) (with FOA name and number in subject line); see FOA Sec. VII.A.  
Problems with ARPA-E eXCHANGE? Email [ExchangeHelp@hq.doe.gov](mailto:ExchangeHelp@hq.doe.gov) (with FOA name and number in subject line).

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	<b><u>Subcategory B:</u> Biofuel Production - Biological Methods</b>	Technologies which utilize a biological agent in a principle step of feedstock conversion to fuels.
	<b><u>Subcategory C:</u> Biofuel Production - Nonbiological Methods</b>	Technologies which do not utilize any biological agent in the conversion of organic feedstock to fuels, such as thermochemical and hybrid approaches or biomimetics.
	<b><u>Subcategory D:</u> Bioenergy Supply Chain</b>	Technologies critical to supply chain development, such as feedstock collection and handling.
	<b><u>Subcategory E:</u> Bioenergy - Other</b>	Transformational technologies for bioenergy which do not fit in one of the above bins. Including but not limited to bioreactors, balance of plant, bioproducts, microbial fuel cells, sensors
<b><u>CATEGORY 3:</u> TRANSPORTATION</b>	<b><u>Subcategory A:</u> Alternative Fuels (Non-Bio)</b>	Technologies which create fuels that are substitutes for gasoline/diesel, but are not bio based.
	<b><u>Subcategory B:</u> Engines - Transportation</b>	Technologies for improved internal combustion engines specifically for transportation application
	<b><u>Subcategory C:</u> Electric Motors – Transportation</b>	Technologies for improved electric motors specifically for transportation application
	<b><u>Subcategory D:</u> Fuel Cells - Transportation</b>	Technologies for improved fuel cells specifically for transportation application
	<b><u>Subcategory E:</u> Advanced Vehicle Designs And Materials</b>	Advanced or alternative vehicle designs and/or key enabling technologies. Examples could include ultralightweight vehicles or components, significantly different vehicle designs or components from current models, etc.
	<b><u>Subcategory F:</u> Transportation Management</b>	Technologies for traffic management, transportation behavior, self-driving cars and other advanced transportation management scenarios
	<b><u>Subcategory G:</u> Power Electronics - Transportation</b>	New semiconductor designs and materials, circuit designs, magnetic materials, capacitors, switches, etc applied to specifically to transportation applications
	<b><u>Subcategory H:</u> Non-Vehicular Transportation</b>	Technologies for advanced airplanes, human powered vehicles, marine, trains, etc.

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	<b><u>Subcategory I:</u> Batteries - Transportation</b>	Technologies for improved batteries for or a wide range of vehicle applications, including hybrid electric vehicles (HEVs), plug-in hybrid electric vehicles (PHEVs), and battery electric vehicles (EVs)
	<b><u>Subcategory J:</u> Non-Battery Storage For Transportation</b>	Technologies which apply thermal storage, and non-battery electric storage, such as supercapacitors and others specifically for transportation application
	<b><u>Subcategory K:</u> Transportation - Other</b>	Transformational transportation energy technologies that do not fit one of the above categories
<b>CATEGORY 4: CONVENTIONAL GENERATION (NON- RENEWABLE)</b>	<b><u>Subcategory A:</u> Combined Processes - Conventional Generation</b>	Improved conventional generation designs which use a combination of technologies (for example- fuel cells and turbines)
	<b><u>Subcategory B:</u> Stationary Engines/Turbines For Conventional Generation</b>	Improved engines/turbines for conventional generation applications
	<b><u>Subcategory C:</u> Stationary Fuel Cells For Conventional Generation</b>	Improved fuel cells intended to be coupled with conventional generation sources
	<b><u>Subcategory D:</u> Nuclear Power Generation And Materials</b>	Technologies which enhance fission, fusion, or materials specifically for nuclear power generation
	<b><u>Subcategory E:</u> Carbon Capture, Use, And Storage</b>	Technologies for carbon capture, use, and storage
	<b><u>Subcategory F:</u> Exploration And Extraction (Non-Geothermal) Of Conventional Resources</b>	Technologies/tools for resource identification, classification, and modeling, as well as technologies to extract conventional resources. This bin can include sensors and imaging technologies, predictive models and algorithms, and drills, pumps, etc.
	<b><u>Subcategory G:</u> Planning And Operations For Conventional Generation</b>	Technologies which improve the planning and operation of conventional power generation

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	<b>Subcategory H:</b> <b>Combustible Gas Infrastructure</b>	Technologies for storage, transportation and/or handling of combustible gases. This could include tanks, pipelines, pumps, etc.
	<b>Subcategory I:</b> <b>Chemical Conversions From Fossil</b>	Technologies which improve chemical conversions of fossil resources such as gas to liquids (GTL), coal to liquids (CTL), and other forms of energy transduction
	<b>Subcategory J:</b> <b>Water Conservation In Conventional Generation</b>	Technologies which will enable significant water savings in the generation of power, such as water recovery/recirculation systems or dry cooling of power plants
	<b>Subcategory K:</b> <b>Conventional Generation – Other</b>	Transformational conventional generation technologies that do not fit into one of the categories above
<b>CATEGORY 5:</b> <b>GRID</b>	<b>Subcategory A:</b> <b>Grid Transmission</b>	Technologies for transmission systems (>69 kV) and operations.
	<b>Subcategory B:</b> <b>Grid Distribution</b>	Technologies for medium voltage distribution systems (≤69 kV) and operation.
	<b>Subcategory C:</b> <b>Modeling, Software, Algorithms, And Control For The Grid</b>	Modeling or algorithms that describe grid operations, including market modeling
	<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, thermal storage, etc
	<b>Subcategory F:</b> <b>Grid Security</b>	Advanced concepts in cybersecurity, as well as fault protection (transmission or distribution) technologies
	<b>Subcategory G:</b> <b>Grid – Other</b>	Grid technologies that do not fit into one of the above categories. Includes, but not limited to: balance of plant, power plant interface to transmission, sensors, etc.
<b>CATEGORY 6: BUILDING EFFICIENCY</b>	<b>Subcategory A:</b> <b>CHP</b>	Technologies which improve current Combined Heat and Power (CHP) designs/scenarios
	<b>Subcategory B:</b> <b>HVAC</b>	Technologies which significantly improve the efficiency of HVAC systems

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	<b><u>Subcategory C:</u> Building Energy Demand Management</b>	Demand response technologies such as smart meters, other building energy conservation technologies such as automatic control systems
	<b><u>Subcategory D:</u> Lighting</b>	Energy efficient and environmentally-friendly advanced lighting technologies
	<b><u>Subcategory E:</u> Building Envelope</b>	Materials with less embedded energy (windows, etc.), building designs leading to better energy efficiency/ Technologies could be applied to windows, insulation, roofing, etc.
	<b><u>Subcategory F:</u> Building Efficiency - Other</b>	Building energy technologies that do not fit into one of the categories above.
<b><u>CATEGORY 7:</u> OTHER</b>	<b><u>Subcategory A:</u> Water Production/Reuse</b>	Technologies which could enable cost-effective ways of providing fresh water
	<b><u>Subcategory B:</u> Thermal Energy Storage</b>	Thermal energy storage technologies that can apply to multiple applications
	<b><u>Subcategory C:</u> Advanced Manufacturing</b>	Innovative technologies for advanced manufacturing
	<b><u>Subcategory D:</u> Behavior/Education</b>	Socio-economic energy technologies, research and/or education to use energy in efficient ways, or behave in such a way that leads to more optimal use of energy
	<b><u>Subcategory E:</u> Appliance And Consumer Electronics Efficiency (End Use)</b>	Technologies which significantly improve the efficiency of appliances and consumer electronics, including but not limited to: refrigerators, washers, dryers, televisions, stoves, laptops, phones, etc.
	<b><u>Subcategory F:</u> Data Centers And Computation</b>	Technologies to improve the energy efficiency of computing devices and computational infrastructure
	<b><u>Subcategory G:</u> Industrial Efficiency – Materials</b>	Technologies which improve the efficiency of industrial materials. Including but not limited to glass, paper, iron, steel, plastics, aluminum, etc
	<b><u>Subcategory H:</u> Industrial Efficiency – Other</b>	Technologies which improve the efficiency of industrial processes which are not covered by other bins

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	<b><u>Subcategory I:</u> Heat Recovery</b>	Technologies for heat recovery including but not limited to thermoelectrics, Sterling engines, heat exchangers, conversion of waste heat, bottoming cycles, heat capture methods, materials, devices, etc.
	<b><u>Subcategory J:</u> High Temperature Materials</b>	Materials designed specifically to withstand extremely high temperatures in order to enable new energy generation technologies
	<b><u>Subcategory K:</u> Semiconductors</b>	Technologies which enable the development of new semiconductor materials or the use of semiconductor materials in innovative applications
	<b><u>Subcategory L:</u> Portable Power</b>	Technologies for portable power applications such as piezoelectrics, portable fuel cells, batteries, etc.
	<b><u>Subcategory M:</u> Critical Materials</b>	Technologies which reduce or replace energy critical materials including but not limited to alternatives for magnetics, phosphors, catalysts. This could also include advanced technologies for processing and recycling of critical materials
<b><u>CATEGORY 8:</u> NONE OF THE ABOVE</b>	<b><u>Subcategory A:</u> Technologies Which Do Not Fit In Any Of The Above Categories</b>	

Questions about this FOA? Email [ARPA-E-OpenFOA@hq.doe.gov](mailto:ARPA-E-OpenFOA@hq.doe.gov) (with FOA name and number in subject line); see FOA Sec. VII.A.  
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### F. APPLICATIONS SPECIFICALLY NOT OF INTEREST

The following types of applications will not be reviewed or considered (see Section III.C.2 of the FOA):

- Applications that were already submitted to pending ARPA-E FOAs.
- Applications that are not scientifically distinct from applications submitted to pending ARPA-E FOAs.
- Applications for basic research aimed at discovery and fundamental knowledge generation.
- Applications for large-scale demonstration projects of existing technologies.
- Applications for proposed technologies that represent incremental improvements to existing technologies.
- Applications for proposed technologies that are not based on sound scientific principles.
- Applications for proposed technologies that are not transformational, as described in Section I.A of the FOA. Transformational, as illustrated in Fig. 1 above, is the promise of high pay-off in some sector of the energy economy.
- Applications for proposed technologies that do not have the potential to become disruptive in nature, as described in Section I.A of the FOA. Technologies must be scalable such that they could be disruptive with sufficient technical progress (see Fig. 1 above).

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### II. AWARD INFORMATION

#### A. AWARD OVERVIEW

Approximately \$150 million is expected to be available for new awards under this FOA, subject to the availability of appropriated funds. ARPA-E anticipates making approximately 80-120 awards under this FOA. ARPA-E may issue one, multiple, or no awards.

Individual awards may vary between \$250,000 and \$10 million. ARPA-E will provide support at the upper ranges only for applications with significant technology risk, aggressive timetables, and careful management and mitigation of the associated risks.

The period of performance for funding agreements may range between a minimum of 12 months and a maximum of 36 months. ARPA-E expects the start date for funding agreements to be January 1, 2013, or as negotiated.

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

ARPA-E may issue awards in one or both of the following funding categories: “Proof-of-Concept Seedling Project” and “Technology Development Project.”

- **Proof-of-Concept Seedling Project** awards focus on early-stage, proof-of-concept level R&D efforts. Applicants should submit evidence of an idea, described in sufficient technical detail to allow reviewers to meaningfully evaluate the proposed project. ARPA-E may issue approximately 50 - 70 awards in this category, with an average award amount of \$500,000.
- **Technology Development Project** awards focus on early-stage prototypes of various technology concepts for which some kind of initial proof-of-concept component demonstration already exists. Applicants should submit concrete data that supports the success of the proposed project. ARPA-E may issue approximately 30-50 awards in this category, with an average award amount of \$3 million.

#### B. ARPA-E FUNDING AGREEMENTS

Through Cooperative Agreements, Technology Investment Agreements, 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.

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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 has substantial involvement in the direction of every project, as described in Section II.C below.

### 1. COOPERATIVE AGREEMENTS

ARPA-E generally uses Cooperative Agreements to provide financial and other support to Prime Recipients.<sup>4</sup>

Cooperative Agreements involve the provision of financial or other support to accomplish a public purpose of support or stimulation authorized by Federal statute. Under Cooperative Agreements, the Government and Prime Recipients share responsibility for the direction of projects.

ARPA-E encourages Prime Recipients to review the Model Cooperative Agreement, which is available at [http://arpa-e.energy.gov/FundingAgreements/Overview/Award.aspx#Cooperative\\_Agreements](http://arpa-e.energy.gov/FundingAgreements/Overview/Award.aspx#Cooperative_Agreements), in advance of award negotiations. ARPA-E created the Model Cooperative Agreement to facilitate and expedite award negotiations. **By submitting a Full Application, the Applicant accepts all terms and conditions in Attachments 1, 2, 4, and 6 of the ARPA-E’s Model Cooperative Agreement.** ARPA-E will not consider any changes to Attachments 1, 2, 4, and 6 unless they are requested in the Business Assurances Form submitted with the Full Application.

### 2. FUNDING AGREEMENTS WITH FFRDCs, GOGOs, AND FEDERAL INSTRUMENTALITIES<sup>5</sup>

Any FFRDCs involved as a member of a Project Team must complete the “FFRDC Authorization” and “Field Work Proposal” section of the Business Assurances Form, which is submitted with the Applicant’s Full Application.

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

<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 Prime Recipient is the signatory to the funding agreement with ARPA-E.

<sup>5</sup> DOE/NNSA GOGOs are not eligible to apply for funding, as described in Section III.A of the FOA.

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When a FFRDC or non-DOE/NNSA GOGO is a *member* of a Project Team, ARPA-E executes a funding agreement directly with the FFRDC or non-DOE/NNSA GOGO and a single, separate Cooperative Agreement with the rest of the Project Team. Notwithstanding the use of multiple agreements, the Prime Recipient under the Cooperative Agreement is the lead organization for the entire project, including all work performed by the FFRDC or non-DOE/NNSA GOGO 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, and Federal instrumentalities (e.g., Tennessee Valley Authority) generally take the form of Interagency Agreements. Any funding agreement with a FFRDC or non-DOE/NNSA GOGO will have substantially similar terms and conditions as ARPA-E's Model Cooperative Agreement (<http://arpa-e.energy.gov/FundingAgreements/CooperativeAgreements.aspx>).

### 3. TECHNOLOGY INVESTMENT AGREEMENTS

ARPA-E may use its “other transactions” authority under the America COMPETES Reauthorization Act of 2010 or DOE’s “other transactions” authority under the Energy Policy Act of 2005 to enter into Technology Investment Agreements with Prime Recipients. ARPA-E may negotiate a Technology Investment Agreement in order to:

- Encourage for-profit entities to participate in projects in which they would not otherwise participate;
- Facilitate the creation of new relationships among participants in a team that will foster better technology;
- Encourage Prime Recipients to use new business practices that will foster better technology or new technology more quickly or less expensively; or
- Enhance U.S. economic and energy security and/or maintain U.S. technological leadership in key energy sectors.

In a Technology Investment Agreement, ARPA-E may modify standard Government terms and conditions, including but not limited to:

- Intellectual property provisions: ARPA-E may negotiate special arrangements with Prime Recipients to avoid the encumbrance of existing intellectual property rights or

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to facilitate the commercial deployment of inventions conceived or first actually reduced to practice under the ARPA-E funding agreement.

- Accounting provisions: ARPA-E may authorize the use of generally accepted accounting principles (GAAP) where Prime Recipients do not have accounting systems that comply with Government recordkeeping and reporting requirements.

If Applicants are seeking to negotiate a Technology Investment Agreement, they are required to include an explicit request in their Full Applications. Please refer to the Business Assurances Form for guidance on the content and form of the request.

Please refer to Section III.B.2 of the FOA for guidance on cost share requirements for TIAs.

### 4. GRANTS

Although ARPA-E has the authority to provide financial support to Prime Recipients through Grants, ARPA-E generally does not fund projects through Grants.

### 5. PROCUREMENT CONTRACTS

Although ARPA-E has the authority to contract with Applicants to purchase goods or services for the benefit of the Government, ARPA-E generally does not fund projects through Contracts.

## C. STATEMENT OF SUBSTANTIAL INVOLVEMENT

Generally, ARPA-E is substantially involved in the direction of projects (regardless of the type of funding agreement) from inception to completion. For the purposes of an ARPA-E project, substantial Involvement means:

- ARPA-E shares responsibility with Prime Recipients for the direction of projects.
- ARPA-E may intervene at any time to address the conduct or performance of project activities.
- ARPA-E does not limit its involvement to the administrative requirements of the ARPA-E funding agreement. Instead, ARPA-E has substantial involvement in the project as a whole.
- Prime Recipients are required to submit detailed quarterly technical and financial reports on the project, as described in Attachment 4 to ARPA-E's Model Cooperative

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Agreement ([http://arpa-e.energy.gov/FundingAgreements/Overview/Award.aspx#Cooperative\\_Agreements](http://arpa-e.energy.gov/FundingAgreements/Overview/Award.aspx#Cooperative_Agreements))

- ARPA-E Program Directors share responsibility with Prime Recipients for the direction of projects. During award negotiations, ARPA-E Program Directors establish an aggressive schedule of quantitative milestones and deliverables that must be met every quarter. Prime Recipients document the achievement of these milestones and deliverables in quarterly progress reports, which are reviewed and evaluated by ARPA-E Program Directors. ARPA-E Program Directors visit each Prime Recipient at least twice per year, and hold periodic meetings, conference calls, and webinars with Project Teams. ARPA-E Program Directors may modify or terminate projects that fail to achieve predetermined technical milestones and deliverables.
- ARPA-E reviews reimbursement requests for compliance with applicable Federal cost principles and Prime Recipients' cost share obligations.<sup>6</sup> Upon request, Prime Recipients are required to provide additional information and documentation to support claimed expenditures. Prime Recipients are required to comply with agency-specific and programmatic requirements. Please refer to Section VI.B.4-5 of the FOA for guidance on proof of cost share commitment and cost share reporting.
- ARPA-E works closely with Prime Recipients to facilitate and expedite the deployment of ARPA-E-funded technologies to market. ARPA-E works with other Government agencies and nonprofits to provide mentoring and networking opportunities for Prime Recipients. ARPA-E also organizes and sponsors events to educate Prime Recipients about key barriers to the deployment of their ARPA-E-funded technologies. In addition, ARPA-E establishes collaborations with private and public entities to provide continued support for the development and deployment of ARPA-E-funded technologies.

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<sup>6</sup> To request reimbursement, Prime Recipients must submit: (1) a Standard Form (SF) 270 ("Request for Advance or Reimbursement"); (2) a "Reimbursement Request Spreadsheet," which must contain the information shown in Appendix B to Attachment 1 of ARPA-E's Model Cooperative Agreement ([http://arpa-e.energy.gov/FundingAgreements/Overview/Award.aspx#Cooperative\\_Agreements](http://arpa-e.energy.gov/FundingAgreements/Overview/Award.aspx#Cooperative_Agreements)); and (3) supporting documentation, which may consist of summary information (e.g., printouts from internal financial systems) or detailed documentation (e.g., invoices on appropriate letterhead, time cards, travel vouchers). The supporting documentation must show the method by which the Prime Recipient calculated the total Federal share and non-Federal cost share.

### **III. ELIGIBILITY INFORMATION**

#### **A. ELIGIBLE APPLICANTS**

##### **1. DOMESTIC ENTITIES**

For-profit entities, educational institutions, and nonprofits<sup>7</sup> that are incorporated or otherwise headquartered in the United States are eligible to apply for funding as a Standalone Applicant,<sup>8</sup> as the lead organization for a Project Team,<sup>9</sup> or as a member of a Project Team.

FFRDCs are eligible to apply for funding as the lead organization for a Project Team or as a member of a Project Team, but not as a Standalone Applicant.

DOE/NNSA GOGOs are not eligible to apply for funding.

Non-DOE/NNSA GOGOs are eligible to apply for funding as a member of a Project Team, but not as a Standalone Applicant or as the lead organization for a Project Team.

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

##### **2. FOREIGN ENTITIES**

Foreign entities, whether for-profit or otherwise, are eligible to apply for funding as Standalone Applicants, as the lead organization for a Project Team, or as a member of a Project Team. However, all work by foreign entities must be performed by subsidiaries or affiliates incorporated or otherwise headquartered in the United States.

If Applicants are seeking to perform certain work overseas, they are required to describe the proposed foreign work in the Business Assurances Form, which is part of the Full Application submitted to ARPA-E. Please refer to the Business Assurances Form for guidance on the content and form of the request.

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<sup>7</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 Recipient or Subrecipient.

<sup>8</sup> A Standalone Applicant is an Applicant that applies for funding on its own, not as part of a Project Team.

<sup>9</sup> The term “Project Team” is used to mean any entity with multiple players working collaboratively and could encompass anything from an existing organization to an ad hoc teaming arrangement. A Project Team consists of the Prime Recipient, Subrecipients, and others performing or otherwise supporting work under an ARPA-E funding agreement.



### **3. CONSORTIUM ENTITIES**

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

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

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

#### **B. COST SHARING OR MATCHING**<sup>10</sup>

Applicants are bound by the cost share proposed in their Full Applications. In the Business Assurances Form accompanying the Full Application, Applicants must provide written assurance of their cost share commitments. Please refer to the Business Assurances Form available on ARPA-E eXCHANGE (<https://www.arpa-e-foa.energy.gov>) for additional guidance.

#### **1. GENERAL COST SHARE REQUIREMENT**

Every Prime Recipient must provide at least 20% of the Total Project Cost<sup>11</sup> as cost share, except as provided below.<sup>12</sup>

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<sup>10</sup> Please refer to Section VI.B.4-5 of the FOA for guidance on cost share payments and reporting.



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### 2. INCREASED COST SHARE REQUIREMENT

Under Technology Investment Agreements, Prime Recipients are required to provide at least 50% of the Total Project Cost as cost share, to the maximum extent practicable.

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

### 3. REDUCED COST SHARE REQUIREMENT

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

- A domestic educational institution or domestic nonprofit applying as a Standalone Applicant is required to provide at least 5% of the Total Project Cost as cost share.
- Project Teams composed exclusively of domestic educational institutions, domestic nonprofits, and/or FFRDCs are required to provide at least 5% of the Total Project Cost as cost share.
- Project Teams where domestic educational institutions, domestic nonprofits, and/or FFRDCs 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 required to provide at least 10% of the Total Project Cost as cost share.

### 4. LEGAL RESPONSIBILITY

Although the cost share requirement applies to the Project Team as a whole, the funding agreement makes the Prime Recipient legally responsible for paying the entire cost share. The Prime Recipient's cost share obligation is expressed in the funding agreement as a static amount in U.S. dollars (cost share amount) and as a percentage of the Total Project Cost (cost share percentage). If the funding agreement is terminated prior to the end of the project period, the Prime Recipient is required to contribute at least the cost share percentage of total expenditures incurred through the date of termination.

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<sup>11</sup> The Total Project Cost is the sum of the Prime Recipient share and the Federal Government share of total allowable costs. The Federal Government share generally includes costs incurred by FFRDCs and GOGOs.

<sup>12</sup> Energy Policy Act of 2005, Pub.L. 109-58, sec. 988.

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The Prime Recipient is solely responsible for managing cost share contributions by the Project Team and enforcing cost share obligations assumed by Project Team members in subawards or related agreements.

### 5. COST SHARE ALLOCATION

Each Project Team is free to determine how much each Project Team member will contribute towards the cost share requirement. The amount contributed by individual Project Team members may vary, as long as the cost share requirement for the project as a whole is met.

### 6. COST SHARE TYPES AND ALLOWABILITY

Every cost share contribution must be allowable under the applicable Federal cost principles, as described in Section IV.G.1 of the FOA.

Project Teams may provide cost share in the form of cash or in-kind contributions. Cash contributions may be provided by the Prime Recipient or Subrecipients. Allowable in-kind contributions include but are not limited to personnel costs, indirect costs, facilities and administrative costs, rental value of buildings or equipment, and the value of a service, other resource, or third party in-kind contribution. Project Teams may use funding or property received from state or local governments to meet the cost share requirement, so long as the funding or property was not provided to the state or local government by the Federal Government.

The Prime Recipient may not use the following sources to meet its cost share obligations:

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

In addition, Project Teams may not use independent research and development (IR&D) funds to meet their cost share obligations under cooperative agreements. However, Project Teams may use IR&D funds to meet their cost share obligations under Technology investment 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.

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Cost share contributions must be specified in the project budget, verifiable from the Prime Recipient's records, and necessary and reasonable for proper and efficient accomplishment of the project. Every cost share contribution must be reviewed and approved in advance by the DOE Contracting Officer and incorporated into the project budget before the expenditures are incurred.

Applicants may wish to refer to 10 C.F.R. parts 600 and 603 for additional guidance on cost sharing, specifically 10 C.F.R. §§ 600.30, 600.123, 600.224, 600.313, and 603.525-555.

### **7. COST SHARE CONTRIBUTIONS BY FFRDCs AND GOGOs**

Because FFRDCs and GOGOs are funded by the Federal Government, costs incurred by FFRDCs and GOGOs 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.

### **8. COST SHARE COMMITMENT**

Applicants are required to describe their proposed cost share contributions in their Full Applications. Please refer to the Business Assurances Form for guidance on the cost share information that must be included.

Upon selection for award negotiations, Applicants are required to provide additional information and documentation regarding their cost share contributions. Please refer to Section VI.B.4 of the FOA for guidance on the requisite cost share information and documentation.

### **C. OTHER**

#### **1. COMPLIANT CRITERIA**

Notices of Intent are deemed compliant if:

- The Applicant submitted the required information in ARPA-E eXCHANGE by the deadline stated in the FOA.

ARPA-E will not review or consider noncompliant Notices of Intent, including Notices of Intent submitted through other means, Notices of Intent submitted after the applicable deadline, and incomplete Notices of Intent. A Notice of Intent is incomplete if it does not include required information, such as the Technology Subcategory or Subcategories (see Section I.E of the FOA).

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ARPA-E will not extend the submission deadline for Applicants that fail to submit required information due to server/connection congestion.

Concept Papers are deemed compliant if:

- The Applicant submitted a compliant Notice of Intent;
- The Applicant meets the eligibility requirements in Section III.A of the FOA;
- The Concept Paper complies with the content and form requirements in Section IV.C of the FOA; and
- The Applicant submitted the required information and documents in ARPA-E eXCHANGE by the deadline stated in the FOA.

ARPA-E will not review or consider noncompliant Concept Papers, including Concept Papers submitted through other means, Concept Papers submitted after the applicable deadline, and incomplete Concept Papers. A Concept Paper is incomplete if it does not include required information, such as the funding category (see Section II.A of the FOA). ARPA-E will not extend the submission deadline for Applicants that fail to submit required information and documents due to server/connection congestion.

Full Applications are deemed compliant if:

- The Applicant submitted a compliant Notice of Intent and compliant and responsive Concept Paper;
- The Applicant meets the eligibility requirements in Section III.A of the FOA;
- The Full Application complies with the content and form requirements in Section IV.D of the FOA; and
- The Applicant submitted the required information and documents in ARPA-E eXCHANGE by the deadline stated in the FOA.

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

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Replies to Reviewer Comments are deemed compliant if:

- The Applicant submitted the Reply in ARPA-E eXCHANGE by the deadline stated in the FOA.

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

### 2. RESPONSIVENESS CRITERIA

ARPA-E performs a preliminary technical review of Concept Papers and Full Applications. Any “Applications Specifically Not of Interest,” as described in Section I.F of the FOA, are deemed nonresponsive and are not reviewed or considered.

### 3. LIMITATION ON NUMBER OF APPLICATIONS

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

## IV. APPLICATION AND SUBMISSION INFORMATION

### A. APPLICATION FORMS

Required forms for Full Applications are available at <https://arpa-e-foa.energy.gov/>. Templates for the Concept Paper, the Technical Volume of Full Applications, and the Reply to Reviewer Comments are also available at <https://arpa-e-foa.energy.gov/>.

### B. CONTENT OF NOTICE OF INTENT

Each Applicant must enter the following information into ARPA-E eXCHANGE by the deadline stated in the FOA:

- Project Title;
- Lead Organization;

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- Organization Type (Business < 500 Employees; Business > 1000 Employees; Business 500-1000 Employees; Federally Funded Research and Development Center (FFRDC); Government Owned and Operated; Non-Profit; University);
- % of effort contributed by the Lead Organization;
- The Project Team, including:
  - The Principal Investigator for the Prime Recipient;
  - Team Members (i.e., Subrecipients); and
  - Key Participants (i.e., individuals who contribute in a substantive, measurable way to the execution of the proposed project).
- Technical Subcategory or Subcategories (see Section I.E of the FOA); and
- Abstract – The abstract provided should be 200 words in length, and should provide a truncated explanation of the proposed project.

ARPA-E will not review or consider noncompliant Notices of Intent (see Section III.C.1 of the FOA).

ARPA-E eXCHANGE automatically assigns a Control Number upon the submission of a compliant Notice of Intent. Once logged in to ARPA-E eXCHANGE (<https://arpa-e-foa.energy.gov/login.aspx>), Applicants may access their submissions by clicking the “My Submissions” link in the navigation on the left side of the page. Every application that the Applicant has submitted to ARPA-E and the corresponding Control Number is displayed on that page. If the Applicant submits more than one application to a particular FOA, a different Control Number is shown for each application. The Control Number must be included in the header of the Concept Paper, Full Application, and optional Reply to Reviewer Comments.

### **C. CONTENT AND FORM OF CONCEPT PAPERS**

The Concept Paper must conform to the following requirements:

- The Concept Paper must be submitted in Adobe PDF format.
- The Concept Paper must be written in English.
- All pages must be formatted to fit on 8-1/2 by 11 inch paper with margins not less than one inch on every side. Use Times New Roman typeface, a black font color, and a font size of 12 points or larger (except in figures and tables). A Symbol font may be used to insert Greek letters or special characters, but the font size requirement still applies.

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- 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.

ARPA-E will not review or consider noncompliant and/or nonresponsive Concept Papers (see Section III.C of the FOA).

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

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

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

SECTION	PAGE LIMIT	DESCRIPTION
<b>Technology Description</b>	2 pages maximum	<ul style="list-style-type: none"><li>• Applicants are required to describe succinctly:<ul style="list-style-type: none"><li>○ The proposed technology, including its basic operating principles and how it is unique and innovative;</li><li>○ The proposed technology's target level of performance (Applicants should provide technical data or other support to show how the proposed target could be met);</li><li>○ The current technology readiness level (TRL) of the proposed technology and the anticipated TRL at project completion;</li><li>○ The current state-of-the-art in the relevant field and application, including key shortcomings, limitations, and challenges;</li><li>○ How the proposed technology will overcome the shortcomings, limitations, and challenges in the relevant field and application;</li><li>○ The potential impact that the proposed project would have on the relevant field and application;</li><li>○ The key technical risks/issues associated with the proposed technology development plan; and</li><li>○ The impact that ARPA-E funding would have on the proposed project.</li></ul></li></ul>
<b>Addendum</b>	1 page maximum	<ul style="list-style-type: none"><li>• Each Concept Paper must identify the Technical Subcategory or Subcategories for the Applicant's proposed technology. See Section I.E of the FOA.</li><li>• Applicants must state whether the proposed budget for their project falls into the first or second funding category below:<ol style="list-style-type: none"><li>1. Proof-of-Concept Seedling Project: \$250,000 - \$999,999.99;</li></ol>or</li></ul>

Questions about this FOA? Email [ARPA-E-OpenFOA@hq.doe.gov](mailto:ARPA-E-OpenFOA@hq.doe.gov) (with FOA name and number in subject line); see FOA Sec. VII.A.  
Problems with ARPA-E eXCHANGE? Email [ExchangeHelp@hq.doe.gov](mailto:ExchangeHelp@hq.doe.gov) (with FOA name and number in subject line).

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		<p>2. Technology Development Project: \$1 million - \$10 million.</p> <ul style="list-style-type: none"><li>• Applicants may provide graphs, charts, or other data to supplement their Technology Description.</li><li>• Applicants are required to describe succinctly the qualifications, experience, and capabilities of the proposed Project Team, including:<ul style="list-style-type: none"><li>○ Whether the Principal Investigator and proposed technical team have the skill and expertise needed to successfully execute the project plan;</li><li>○ Whether the Applicant has prior experience which demonstrates an ability to perform R&amp;D tasks of similar risk and complexity;</li><li>○ Whether the Applicant has worked together with its teaming partners on prior projects or programs; and</li><li>○ Whether the Applicant has adequate access to equipment and facilities necessary to accomplish the R&amp;D effort and/or clearly explain how it intends to obtain access to necessary equipment and facilities.</li></ul></li></ul>
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### D. CONTENT AND FORM OF FULL APPLICATIONS

[TO BE INSERTED BY FOA MODIFICATION IN JUNE 2012]

### E. CONTENT AND FORM OF REPLIES TO REVIEWER COMMENTS

[TO BE INSERTED BY FOA MODIFICATION IN JUNE 2012]

### F. INTERGOVERNMENTAL REVIEW

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

### G. FUNDING RESTRICTIONS

[TO BE INSERTED BY FOA MODIFICATION IN JUNE 2012]

### H. OTHER SUBMISSION REQUIREMENTS

#### 1. USE OF ARPA-E eXCHANGE

To apply to this FOA, Applicants must register with ARPA-E eXCHANGE (<https://arpa-e-foa.energy.gov/Registration.aspx>) and then register for the Open FOA. Notices of Intent, Concept Papers, Full Applications, and Replies to Reviewer Comments must be submitted

Questions about this FOA? Email [ARPA-E-OpenFOA@hq.doe.gov](mailto:ARPA-E-OpenFOA@hq.doe.gov) (with FOA name and number in subject line); see FOA Sec. VII.A.  
Problems with ARPA-E eXCHANGE? Email [ExchangeHelp@hq.doe.gov](mailto:ExchangeHelp@hq.doe.gov) (with FOA name and number in subject line).



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through ARPA-E eXCHANGE (<https://arpa-e-foa.energy.gov/login.aspx>). ARPA-E will not review or consider applications submitted through other means (e.g., fax, hand delivery, email, postal mail). For detailed guidance on using ARPA-E eXCHANGE, please refer to the “ARPA-E eXCHANGE User Guide” (<https://arpa-e-foa.energy.gov/Manuals.aspx>).

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

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**V. APPLICATION REVIEW INFORMATION**

**A. CRITERIA**

ARPA-E also performs a preliminary review of Notices of Intent and Replies to Reviewer Comments to determine whether they are compliant. ARPA-E also performs a preliminary review of Concept Papers and Full Applications to determine whether they are compliant and responsive.

ARPA-E considers a mix of quantitative and qualitative criteria (see Sections V.A and V.B.1 of the FOA) in determining whether to encourage the submission of a Full Application and whether to select a Full Application for award negotiations.

**1. CRITERIA FOR CONCEPT PAPERS**

Concept Papers are evaluated based on the following criteria:

(1) *Impact of the Proposed Technology Relative to State of the Art* (50%) - This criterion involves consideration of the following factors:

- The extent to which the proposed quantitative material and/or technology metrics demonstrate the potential for a transformational and disruptive (not incremental) advancement in one or more energy-related fields;
- The extent to which the Applicant demonstrates a profound understanding of the current state-of-the-art and presents an innovative technical approach that significantly improves performance relative to the current state-of-the-art; and
- The extent to which the Applicant demonstrates awareness of competing commercial and emerging technologies and identifies how the proposed concept/technology provides significant improvement over existing solutions.

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

- The extent to which the proposed approach is unique and innovative;
- The feasibility of the proposed work;
- The extent to which the Applicant proposes a sound technical approach to accomplish the proposed R&D objectives;

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- The extent to which project outcomes and deliverables are clearly defined; and
- The extent to which the Applicant proposes a strong and convincing technology development strategy, including a feasible pathway to transition the program results to the next logical stage of R&D and/or directly into commercial development and deployment.

Submissions will not be evaluated against each other since they are not submitted in accordance with a common work statement. The above criteria will be weighted as follows:

Impact of the Proposed Technology Relative to State of the Art	50%
Overall Scientific and Technical Merit	50%

### 2. CRITERIA FOR FULL APPLICATIONS

[TO BE INSERTED BY FOA MODIFICATION IN JUNE 2012]

### 3. CRITERIA FOR REPLIES TO REVIEWER COMMENTS

[TO BE INSERTED BY FOA MODIFICATION IN JUNE 2012]

## B. REVIEW AND SELECTION PROCESS

### 1. PROGRAM POLICY FACTORS

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

- Programmatic balance of risk and technology areas;
- The degree to which the proposed project optimizes use of available ARPA-E funding to achieve programmatic objectives;
- Availability of funding from public and private sources to support the proposed project;
- The budget for the proposed project;
- The proposed cost share for the project;

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- For projects involving one or more large businesses, the cost share proposed by the large business(es);
- Whether the proposed cost share is above the minimum established by ARPA-E and appropriate for the maturity of the technology under development;
- The financial and other resources of the Applicant or Project Team;
- For projects involving a Project Team, the quality of the teaming arrangement;
- The extent to which the project includes industry participation;
- Demonstrated ability to meet technical objectives within predetermined budgets;
- Demonstrated ability to commercialize the technology;
- The technical, market, and organizational risks associated with the R&D project;
- Whether the project has a well-justified, realistic potential to meet or exceed most, if not all, of the Secondary Technical Targets;
- If the lead organization is a large business, why this R&D project is not being sponsored internally;
- If the lead organization is a small business sponsored by private investors, why this R&D project is not being supported by its investors;
- If the lead organization is a startup not sponsored by private investors, why this R&D project has been unable to attract private financing;
- If the lead organization is a university, nonprofit, or FFRDC, what sort of institutional resources will be leveraged, and why has this leverage not been available to date;
- Whether the proposed transition path is likely to lead to increased employment and manufacturing in the United States;
- Whether the project will accelerate transformational technological advances in areas that industry by itself is not likely to undertake because of technical and financial uncertainty; and

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- The degree to which the proposed project directly addresses ARPA-E's statutory mission to:
  - Enhance the economic and energy security of the United States through the development of energy technologies that result in reductions of imports of energy from foreign sources, reductions of energy-related emissions, and improvements in the energy efficiency of all economic sectors; and
  - Ensure that the United States maintains a technological lead in developing and deploying advanced energy technologies.
- Whether the project is expected to meet or surpass the 5% requirement for TT&O expenditures; and
- Whether the Applicant has submitted a credible proposal for a Technology Investment Agreement.

### 2. ARPA-E REVIEWERS

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

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

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

### 3. ARPA-E SUPPORT CONTRACTOR

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.

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By submitting an application to ARPA-E, Applicants represent that they are not performing support contractor services for ARPA-E in any capacity and did not obtain the assistance of ARPA-E's support contractor to prepare the application. ARPA-E will not consider any applications that are submitted by or prepared with the assistance of its support contractors.

### C. ANTICIPATED ANNOUNCEMENT AND AWARD DATES

[TO BE INSERTED BY FOA MODIFICATION IN JUNE 2012]

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## **VI. AWARD ADMINISTRATION INFORMATION**

### **A. AWARD NOTICES**

#### **1. REJECTED SUBMISSIONS**

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

#### **2. CONCEPT PAPER NOTIFICATIONS**

Applicants are promptly notified of ARPA-E's determination to encourage or discourage the submission of a Full Application. ARPA-E sends a notification letter by email to the technical and administrative points of contact designated by the Applicant in ARPA-E eXCHANGE. Due to the anticipated volume of applications, ARPA-E is unable to provide feedback on Concept Papers.

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

A notification letter encouraging the submission of a Full Application does not authorize the Applicant to commence performance of the project. Please refer to Section IV.G.2 of the FOA for guidance on pre-award costs.

#### **3. FULL APPLICATION NOTIFICATIONS**

[TO BE INSERTED BY FOA MODIFICATION IN JUNE 2012]

### **B. ADMINISTRATIVE AND NATIONAL POLICY REQUIREMENTS**

[TO BE INSERTED BY FOA MODIFICATION IN JUNE 2012]

### **C. REPORTING**



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### **VII. AGENCY CONTACTS**

#### **A. COMMUNICATIONS WITH ARPA-E**

Upon the issuance of a FOA, ARPA-E personnel are prohibited from communicating (in writing or otherwise) with Applicants regarding the FOA. This “quiet period” remains in effect until ARPA-E’s public announcement of its project selections.

During the “quiet period,” Applicants are required to submit all questions regarding this FOA to [ARPA-E-OpenFOA@hq.doe.gov](mailto:ARPA-E-OpenFOA@hq.doe.gov).

- Every Friday, ARPA-E will post responses to any questions that were received by Wednesday at 12 PM Eastern Time. (Questions received after Wednesday at 12 PM Eastern Time will be answered the following week.) ARPA-E may re-phrase questions or consolidate similar questions for administrative purposes.
- ARPA-E will cease to accept questions 72 hours in advance of each submission deadline. Responses to questions received before the cutoff will be posted at least 24 hours in advance of the submission deadline. ARPA-E may re-phrase questions or consolidate similar questions for administrative purposes.
- Responses are posted to “Frequently Asked Questions” on ARPA-E’s website (<http://arpa-e.energy.gov/About/FAQs.aspx>).

Applicants may submit questions regarding ARPA-E eXCHANGE, ARPA-E’s online application portal, to [ExchangeHelp@hq.doe.gov](mailto:ExchangeHelp@hq.doe.gov). ARPA-E will promptly respond to emails that raise legitimate, technical issues with ARPA-E eXCHANGE. ARPA-E will refer any questions regarding the FOA to [ARPA-E-OpenFOA@hq.doe.gov](mailto:ARPA-E-OpenFOA@hq.doe.gov).

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

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

#### **B. DEBRIEFINGS**

ARPA-E does not offer or provide debriefings to unsuccessful Applicants. Due to the anticipated volume of applications, ARPA-E is unable to provide feedback on Concept Papers. However,

Questions about this FOA? Email [ARPA-E-OpenFOA@hq.doe.gov](mailto:ARPA-E-OpenFOA@hq.doe.gov) (with FOA name and number in subject line); see FOA Sec. VII.A.  
Problems with ARPA-E eXCHANGE? Email [ExchangeHelp@hq.doe.gov](mailto:ExchangeHelp@hq.doe.gov) (with FOA name and number in subject line).

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ARPA-E provides Applicants with feedback on compliant and responsive Full Applications. Reviewer comments on Full Applications are made available before the submission deadline for Replies to Reviewer Comments.

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### **VIII. OTHER INFORMATION**

#### **A. FOAs AND FOA MODIFICATIONS**

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

#### **B. OBLIGATION OF PUBLIC FUNDS**

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

#### **C. REQUIREMENT FOR FULL AND COMPLETE DISCLOSURE**

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

- The rejection of a Concept Paper, Full Application, and/or Reply to Reviewer Comments;
- The termination of award negotiations;
- The modification, suspension, and/or termination of a funding agreement;
- The initiation of debarment proceedings, debarment, and/or a declaration of ineligibility for receipt of Federal contracts, subcontracts, and financial assistance and benefits; and
- Civil and/or criminal penalties.

#### **D. RETENTION OF SUBMISSIONS**

ARPA-E expects to retain copies of all Notices of Intent, Concept Papers, Full Applications,

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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.

### **E. MARKING OF CONFIDENTIAL INFORMATION**

ARPA-E will use data and other information contained in Notices of Intent, Concept Papers, Full Applications, and Replies to Reviewer Comments strictly for evaluation purposes. Applicants should not include confidential, proprietary, or privileged information in their Notices of Intent, Concept Papers, Full Applications, or Replies to Reviewer Comments unless such information is necessary to convey an understanding of the proposed project.

Notices of Intent, Concept Papers, Full Applications, Replies to Reviewer Comments, and other submissions containing confidential, proprietary, or privileged information must be marked as described below. Failure to comply with these marking requirements may result in the disclosure of the unmarked information under the Freedom of Information Act or otherwise. The U.S. Government is not liable for the disclosure or use of unmarked information, and may use or disclose such information for any purpose.

The cover sheet of the Concept Paper, Full Application, Reply to Reviewer Comments, or other submission must be marked as follows and identify the specific pages containing confidential, proprietary, or privileged information:

Notice of Restriction on Disclosure and Use of Data:  
Pages [\_\_\_\_] of this document may contain confidential, proprietary, or privileged information that is exempt from public disclosure. Such information shall be used or disclosed only for evaluation purposes or in accordance with a financial assistance or loan agreement between the submitter and the Government. The Government may use or disclose any information that is not appropriately marked or otherwise restricted, regardless of source.

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

### **F. TITLE TO SUBJECT INVENTIONS**

[TO BE INSERTED BY FOA MODIFICATION IN JUNE 2012]

### **G. GOVERNMENT RIGHTS IN SUBJECT INVENTIONS**

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### H. RIGHTS IN TECHNICAL DATA

[TO BE INSERTED BY FOA MODIFICATION IN JUNE 2012]

### I. 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).

### J. ANNUAL COMPLIANCE AUDITS FOR FOR-PROFIT ENTITIES

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### 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 Notice of Intent, Concept Paper, Full Application, and Reply to Reviewer Comments.

**ARPA-E:** Advanced Research Projects Agency-Energy.

**Cost Share:** The Prime Recipient share of the Total Project Cost.

**DOE:** U.S. Department of Energy.

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

**Down-Select Process:** Once ARPA-E completes its review of Full Applications and Replies to Reviewer Comments, it will perform a “down-select” of Full Applications. Certain Applicants will be invited to participate in a meeting with ARPA-E via webinar, videoconference, or conference call. In the alternative, ARPA-E may invite Applicants to meet in person at ARPA-E’s offices, the recipient’s site, or a mutually agreed upon location. ARPA-E may also conduct pre-selection site visits to certain Applicants’ facilities.

**FFRDCs:** Federally Funded Research and Development Centers.

**FOA:** Funding Opportunity Announcement.

**GOGOs:** U.S. Government-Owned, Government-Operated laboratories.

**Key Participant:** Any individual who would contribute in a substantive, measurable way to the execution of the proposed project.

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

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

**R&D:** Research and development.

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



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

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

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

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### **APPENDIX 1: TECHNOLOGY READINESS LEVEL SCALE**

TRL	Description
1	<i>Basic principles observed and reported</i> Scientific research begins with a systematic study directed toward greater knowledge or understanding of the fundamental aspects of phenomena and of observable facts without specific applications or products in mind. The knowledge or understanding will later be translated into applied R&D objectives. Example might include studies of a technology's basic properties.
2	<i>Technology concept and/or application formulated</i> Invention begins. Once basic principles are observed, practical applications can be invented. Applications are speculative and there may be no proof or detailed analysis to support the assumptions.
3	<i>Analytical and experimental critical function and/or characteristic proof of concept.</i> Active R&D work is initiated. This includes analytical studies and laboratory studies to physically validate analytical predictions of separate elements of the technology. Examples include components that are not yet integrated or representative.
4	<i>Component and/or breadboard validation in laboratory environment.</i> Basic technological components are integrated to establish that they will work together. This is relatively "low fidelity" compared to the eventual system. Examples include integration of "ad hoc" hardware in the laboratory.
5	<i>Component and/or breadboard validation in relevant environment.</i> Fidelity of breadboard technology increases significantly. The basic technological components are integrated with reasonably realistic supporting elements so it can be tested in a simulated environment. Examples include "high fidelity" laboratory integration of components.
6	<i>System/subsystem model or prototype demonstration in a relevant environment.</i> Representative model or prototype system, which is well beyond that of TRL-5, is tested in a relevant environment. This represents a major step up in a technology's demonstrated readiness. Examples include testing a prototype in a high-fidelity laboratory environment or in simulated operational environment.
7	<i>System prototype demonstration in an operational environment.</i> It requires the demonstration of an actual system prototype in an operational environment, such as in a light duty vehicle on the road. Examples include testing a prototype battery in an operational hybrid gas-electric vehicle.
8	<i>Actual system completed and qualified through test and demonstration.</i> Technology has been proven to work in its final form and under expected conditions. Examples include developmental test and evaluation of the system in its intended parent system to determine if it meets design specifications.
9	<i>Actual system proven through successful mission operations.</i> The technology is applied and operated in its final form and under real life conditions, such as those encountered in operational test and evaluation. In almost all cases, this is the end of the last "bug fixing" aspects of true system development. Examples include using the system under various real life conditions.

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### **APPENDIX 2: SAMPLE TECHNICAL MILESTONES AND DELIVERABLES**

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### **APPENDIX 3: SAMPLE SUMMARY SLIDE**

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### **APPENDIX 4: SAMPLE RESPONSE TO “OTHER SOURCES OF FUNDING”**

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