"RECOVERY ACT"

FINANCIAL ASSISTANCE
FUNDING OPPORTUNITY ANNOUNCEMENT

U. S. Department of Energy - Headquarters
Advanced Research Projects Agency – Energy (ARPA-E)

BATTERIES FOR ELECTRICAL ENERGY STORAGE IN TRANSPORTATION
(BEEST)

Funding Opportunity Number: DE-FOA-0000207
Announcement Type: Modification No. 003
CFDA Number: 81.135

Issue Date:	**12/7/2009**
Amended:	**3/1/2010**
Concept Paper Submission - CLOSED:	**1/15/2010 at 5:00 PM Eastern**
Full Application Submission Deadline:	**3/15/2010 at 5:00 PM Eastern**
Response to Reviewer Feedback Deadline:	**4/19/2010 at 5:00 PM Eastern***

* Applicants will have 4 calendar days to prepare and submit a Response to Reviewer Feedback. Please see Section IV.D for full details.

TO: All Prospective Applicants

SUBJECT: Modification No. 003 to Announcement DE-FOA-0000207, Recovery Act: BEEST

I. **The purpose of this amendment is to revise the Funding Opportunity Announcement (FOA) to update the required appendices for the Full Application in Sections I.B.7 and IV.C. All recipients are to read this amendment in its entirety.**

II. **All times were changed from EST to Eastern Time for clarification.**

III. **The Cost Sharing Requirement language was clarified in Sections I.A.1 and III.B.** ARPA-E recognizes that this clarification may require adjustments to cost share allocations in Full Applications. To ease the burden on applicants, ARPA-E will not consider the cost share allocations as "final," and will allow applicants to adjust the cost share allocations and/or obtain additional funding sources and commitment letter between the date of selection and the date of issuance of the award.

IV. **Additional language was added in Section II.A to provide additional information on Technology Investment Agreements (TIAs).**

V. **Language in Section IV.B on the handling of sensitive information in the Concept Papers was changed to be consistent with the language in Section IV.C.4. Since the Concept Paper deadline has passed, this change is for clarification purposes only.**

VI. **In Section IV.C.4 a start date of July 1, 2010 was noted for pricing purposes and further budget file details were provided.**

VII. **The Funding Restrictions in Section IV.G were expanded.**

VIII. **In Section V, Merit Review criteria were added.**

IX. **In Section V.B, the mandatory requirements for the Full Application were stated. They are the same as the mandatory requirements for the Full Application.**

X. **A Review and Selection Process section was added to Section V, it is now labeled Section V.D.**

XI. **In Section VI information on award notices and reporting requirements was added.**

XII. **The contact e-mail address was changed to ARPA-E-CO@hq.doe.gov for all non-IP rights questions.**

All changes from FOA modification 2 are highlighted in yellow in this document.

Dear Colleagues,

Let me first thank you for your interest in ARPA-E. I want to use this opportunity to explain and elaborate on ARPA-E's vision and report on where we are now.

We are living in challenging times, but are surrounded by opportunities. The widespread use of fossil fuels has long driven the engine of economic growth, and yet our dependence on these fuels severely threatens our national and environmental security due to our growing foreign energy dependence as well as climate change. Business as usual is not an option, as the outcome will be devastating. This is true not only for the U.S., but also for all nations in this interconnected world. The nation that successfully grows its economy with more efficient energy use, a clean domestic energy supply, and a smart energy infrastructure will lead the global economy of the 21st century. In many cases, we are lagging behind. We as a nation need to change course with fierce urgency.

Let us try to comprehend the scale of this challenge with the following question: What were those innovations of the 20th century that changed the course of humankind's history? Perhaps the most important one was the Haber-Bosch process of creating artificial fertilizers by fixing atmospheric nitrogen to form ammonia. It touched humanity like none other because it led to massive increase in food production and an almost four-fold increase in global population in 100 years. But there were plenty of other game-changers: creating semi-dwarf, high-yield strains of wheat that introduced the green revolution; antibiotics; polio vaccination; the transistor and integrated circuits; electrification; the airplane; nuclear energy; optical and wireless communication; the internet; and so on. Now imagine all of these innovations happening in a span of just 10-20 years: That is the scale and pace of game-changing innovations that we now need to address the energy and climate change challenge of our and future generations.

ARPA-E was created to be a catalyst for such a transformation, and to do so with fierce urgency. Our nation's history is replete with examples of pioneers and entrepreneurs who took risks. These innovators often failed initially, but quickly learned from those failures, competed against each other, and innovated in both technology and business to create the largest industrial base the world has ever seen. ARPA-E's goal is to tap into this truly American ethos, and to identify and support the pioneers of the future. With the best R&D infrastructure in the world, a thriving innovation ecosystem in business and entrepreneurship, and a generation of youth that is willing to engage with fearless intensity, we have all the ingredients necessary for future success. The goal of ARPA-E is to harness them and make a full-court press to address our technological gaps and leapfrog over current approaches. In this respect, ARPA-E has made a great start and it is worth reflecting on its 10 months of incubation and delivery.

The first Funding Opportunity Announcement (FOA) was made in May 2009, and it received an unprecedented response from the R&D community: 3700 concept papers, 334 full proposals, and eventually 37 selected for funding. All this happened in a span of 6 months. We are now in the process of finalizing the last award agreements; this was completed at a record setting pace by an immensely dedicated staff.

As the numbers suggest, only 1 percent of proposals were selected for funding. By all measures, this is very low. To some extent, this depended on the level of funding. ARPA-E could have easily broken it down into small funding levels and made many more awards. But the decision was made – and I concur - that ARPA-E ought to be selective and fund the most game-changing ideas with significant levels of financial support that will enable the recipients to accelerate technical progress so that after the

projects are completed, the technologies are ready to be adopted by the other stakeholders.

I am quite sure that there were many excellent proposals that were not funded. We urge you to return to ARPA-E with your ideas for future workshops and to help us create new programs. We are organizing the Energy Innovation Summit, which will be held March 1-3, 2010 and will be an annual event where we not only want to highlight the technologies that we support, but also invite teams that did not get funded, so that we can connect them to other offices within DOE as well as other funding agencies and organizations. More information can be found at: http://www.ct-si.org/events/EnergyInnovation/. In short, we know that we cannot financially support everyone, but we also realize that we need to build a large community beyond ARPA-E for our nation to change course with fierce urgency.

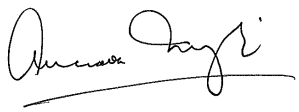
If we are to foster rapid technological innovations, we also need to innovate in creating a system and a process that enables them to thrive. We are now creating that "DNA" of ARPA-E. First and foremost, we are recruiting a team of some of the best and brightest program directors who have one foot in science, with the other in technology and business, and who are willing to serve the nation at this critical juncture in our history. These will be term appointments for 3 years. In addition, we are also forming a technology outreach team, whose responsibility will be to identify pathways for ARPA-E funded technologies to create business opportunities and be adopted in the market, and explain to the public and all stakeholders how these innovations could be beneficial to society. Finally, we have an operations team that is streamlining the transactions and interactions between ARPA-E and the awardees. The value of an ARPA-E award will be much more than just money. Awardees will have the opportunity to draw on the expertise of three ARPA-E teams: technical program, technology outreach, and operations.

It is very important that we get our DNA right, especially in these early stages. I thank you for taking interest in and working with ARPA-E. I would be delighted to receive feedback from you about how we are doing, and how we could serve you better.

We have now launched our second round of FOAs for a total of $100M. In contrast to the first FOA, which was open to all topics related to energy, these FOAs are more focused. The topics resulted from several workshops that we had over the last 3 months, where we received input from the technical community. A few of the workshop participants included those who did not get funded in the first round, but who returned to educate ARPA-E about specific technical barriers and potential game changing ideas. We urge you to continue informing and educating us through such forums, and also through one-on-one interactions with the program directors. In short, ARPA-E is looking for the best ideas and we are coming to the table with an open mind.

On behalf of the ARPA-E team, thank you again. Please visit our website http://arpa-e.energy.gov/ for more information and updates.

Sincerely,



Arun Majumdar
Director, ARPA-E

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Section I - FUNDING OPPORTUNITY DESCRIPTION

A. FUNDING OPPORTUNITY ANNOUNCEMENT (FOA) OVERVIEW

A.1. OVERVIEW

Federal Agency Name: Department of Energy: Advanced Research Projects Agency - Energy
Funding Opportunity Title: BATTERIES FOR ELECTRICAL ENERGY STORAGE IN TRANSPORTATION (BEEST)
Funding Opportunity Number: DE-FOA-0000207
Catalog of Federal Domestic Assistance Numbers (CFDA): 81.135
FOA issue date: December 7, 2009, Updated March 1, 2010
Concept Paper submission deadline: January 15, 2010 at 5:00PM Eastern Time - CLOSED
Full Application submission deadline: March 15, 2010 at 5:00 PM Eastern Time
Response to Reviewer Feedback deadline: April 19, 2010 at 5:00 PM Eastern Time
* Applicants will have 4 calendar days to prepare and submit a Response to Reviewer Feedback. Please see Section IV.D for full details.
Anticipated Individual Awards: Awards will be for the Government's share of the allowable project costs to be in the range of $500,000 to $10 million. Multiple awards are anticipated, but not required. The Government reserves the right for one, several, or no awards under this FOA.
Types of Agreements that may be Awarded: Cooperative Agreement or Technology Investment Agreement (TIA)
Cost Sharing Requirements: If an applicant is exclusively a university or other educational institution ("Educational Institution"), a cost share of at least 10% of the total allowable costs will be required. For consortia or teams consisting exclusively of Educational Institutions, cost share of at least 10% is required. If an applicant is not an Educational Institution ("Other Applicant"), a cost share of at least 20% of the total allowable costs will be required. For consortia or teams including one or more Other Applicants, cost share of at least 20% is required. For awards where ARPA-E determines that use of a TIA is appropriate -- when a standard cooperative agreement is not feasible or appropriate -- a cost share of at least 50% of the total allowable costs will be required to the maximum extent practicable. The Government share shall include any costs incurred by Federally Funded Research and Development Centers. Cost sharing beyond the required minimum amount is encouraged and may be considered during the selection process. Monetary cost share is preferred; however, in-kind cost share is permitted and will be considered. Further information can be found in Appendix 4.
Period of Performance: Not to exceed 36 months
Agency Contact:
ARPA-E-CO@hq.doe.gov
Advanced Research Projects Agency - Energy
U.S. Department of Energy
1000 Independence Avenue, S.W.
Washington, D.C. 20585

A.2. INTRODUCTION

This Funding Opportunity Announcement (FOA), funded through the American Recovery and Reinvestment Act of 2009[1], is one of three (3) FOAs which are being issued concurrently in the second round of ARPA-E financial assistance awards. The first FOA (DE-FOA-0000065), which closed on August 28, 2009, was narrowly focused on transformational R&D, but intentionally broad on the applications and technologies which could apply. This FOA will seek to further technical objectives related directly to BATTERIES FOR ELECTRICAL ENERGY STORAGE IN TRANSPORTATION (BEEST), as outlined in Section I.B. Program Overview.

A.3. AMERICAN RECOVERY AND REINVESTMENT ACT OF 2009 (RECOVERY ACT)

Projects under this FOA will be funded, in whole or in part, with funds appropriated by the Recovery Act. The Act's purposes are to stimulate the economy and to create and retain jobs. The Act gives preference to activities that can be started and completed expeditiously. Accordingly, special consideration will be given to projects that promote and enhance the objectives of the Act, especially job creation, job preservation and economic recovery, in an expeditious manner. Be advised that special terms and conditions apply to projects funded by the Act. (See Section IX)

A.4. ADVANCED RESEARCH PROJECTS AGENCY – ENERGY

The Advanced Research Projects Agency – Energy (ARPA-E) is an agency within the Department of Energy (DOE), chartered by Congress in the America COMPETES Act (P. L. 110-69) to create transformational new energy technologies and systems through funding and managing research and development (R&D) efforts. The mission of ARPA-E is to overcome the long-term and high-risk technological barriers in the development of energy technologies that can achieve the following ARPA-E Mission Areas, with no direct detriment to any of these 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.

Under this announcement, ARPA-E will achieve these goals by funding energy technology projects that (1) translate scientific discoveries and cutting-edge inventions into technological innovations and (2) accelerate transformational technological advances in areas that industry by itself is not likely to undertake because of high technical or financial risk.

A.5. STRATEGY FOR AMERICAN INNOVATION

ARPA-E contributes to a broader national innovation strategy and will help lay the foundation for innovation that leads to quality jobs and shared prosperity.[2] It is expected that energy technologies funded by ARPA-E will help catalyze breakthroughs for national priorities which:

[1] P.L. 111-5 or the Recovery Act or Act. For all projects funded through the Recovery Act, special terms and conditions apply. Details are provided in this announcement.
[2] http://www.whitehouse.gov/administration/eop/nec/StrategyforAmericanInnovation/

- Harness science and technology to address the "grand challenges" of the 21st century;
- Unleash a clean energy revolution.

Under this FOA, ARPA-E is seeking R&D applications for technologies that, when in wide-spread use, will make substantial, significant, quantitative contributions to these national priorities and ARPA-E Mission Areas. In addition, the proposed technology when in use may not have a negative impact on any of the ARPA-E Mission Areas.

A.6. DESCRIPTION OF FUNDING OPPORTUNITY

Recipients of ARPA-E financial assistance 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. This may be a single performer or team, may be one or more institutions, and may include operational experts along with the research team.

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.

Concept Paper
Applicants are required to submit a Concept Paper consisting of an abstract, technical section, and cost summary, as outlined in Section IV. The Concept Paper must address the programmatic goals, objectives, and/or performance metrics as stated in Section I.B. Program Overview. Based on the review of Concept Paper submissions, applicants will be Encouraged or Discouraged to submit Full Applications.

Submission of Concept Papers began on December 7, 2009, at 1:00PM Eastern Time. The Concept Paper submission closing date and time was January 15, 2010, at 5:00PM Eastern Time. Instructions for completing the Concept Paper submission are in Section IV of this FOA. Concept Papers are no longer being accepted for this FOA.

Applicants will be notified by e-mail whether they are Encouraged or Discouraged to submit a Full Application on February 12, 2010. This e-mail shall be considered the "Concept Paper notification". Applicants must submit a compliant Concept Paper to receive a Concept Paper notification and to be eligible to submit a Full Application.

Full Application
An applicant may submit a Full Application anytime before the closing date established in their Concept Paper notification. The Full Application is due by March 15, 2010 at 5:00 PM Eastern Time, unless ARPA-E elects to establish an alternative deadline. Applicants will be sent notification of the status of their Concept Paper on February 12, 2010 and will have 31 calendar days to prepare and submit a Full Application. In the event that ARPA-E elects to establish an alternative deadline, ARPA-E will notify each applicant (specifically, the Administrative and Technical points of contact) of the new deadline.

Responses to Reviewer Comments
Applicants will receive comments and questions from reviewers related to their Full Application on or about Friday, April 16, 2010. Applicants will have the opportunity to submit a maximum two-page text

response to reviewer feedback with one additional page for tables and figures in PDF format by Monday, April 19, 2010 at 5:00 PM Eastern Time.

B. PROGRAM OVERVIEW

B.1. BACKGROUND

Petroleum consumption in the United States transportation sector represents the dominant source of U.S. foreign energy dependence and a major source of U.S. greenhouse gas emissions. In 2008, the U.S. consumed 19.5 million barrels of petroleum per day, 57% of which was imported from foreign sources. The transportation sector dominates U.S. petroleum consumption and petroleum consumption dominates the U.S. transportation sector, with nearly 70% of U.S. petroleum consumption occurring in the transportation sector and 95% of U.S. transportation energy provided by petroleum. Light-duty vehicles represent the dominant source of U.S petroleum usage, representing more than 60% of all petroleum usage in the transportation sector.[3] The petroleum-powered U.S. transportation sector is also a dominant contributor to U.S. greenhouse gas emissions, accounting for ~30% of U.S. CO_2 emissions.[4]

The development and widespread deployment of cost-effective electrified light-duty vehicles represents a tremendous opportunity for dramatic reductions in U.S. oil imports and greenhouse gas emissions by shifting the U.S. transportation energy supply from petroleum to the domestically powered U.S. electric grid. Plug-in hybrid (PHEV) and all-electric electric vehicles (EV) hold the potential to completely eliminate oil usage in the U.S. transportation sector. Electric vehicles powered by the current ~50% coal powered U.S. power generation mix can also reduce CO_2 emissions per mile by ~34% relative to current internal combustion engine based vehicles, with avoided CO_2 emissions increasing further as the U.S. electric grid continues to decarbonize going forward.[5]

Electric vehicles have the further advantage of offering significantly reduced fuel prices relative to petroleum powered vehicles. Assuming $3.00/gallon gasoline and 10¢/kWh electricity prices, fuel savings of up to 10¢/mile can be realized in electric vehicles.[6] However, the widespread deployment of electric vehicles has been prevented to date by their limited range and high upfront capital costs due to the limitations of currently available battery technologies. Currently available high performance Lithium-ion battery technologies are limited to system level energy densities of ~100-120 Wh/kg, costs of $800-$1200/kWh, and short cycle life, resulting in unacceptably short driving range for the vast majority of consumers and un-economically high lifetime costs for electric vehicles.

The U.S. Department of Energy's Office of Vehicle Technologies (OVT) and the United States Advanced Battery Consortium (USABC) have provided critical support for the development of advanced Lithium-ion batteries to enable widespread cost-effective deployment of hybrid electric vehicles (HEVs), with a 2010 goal to enable high performance Lithium-ion HEV power batteries at $20/kW. With this impressive goal nearly accomplished, these U.S. battery R&D funding organizations are now turning their focus toward their 2014 goal of increasing the energy density and decreasing the cost of Lithium-ion batteries for PHEVs to enable battery systems with energy densities of 140 Wh/kg to provide 40 miles of all electric range (PHEV-40) at a total battery cost of $3,400 or less (<$300/kWh). With this ambitious 6

[3] Department of Energy, Energy Administration Agency, http://www.eia.doe.gov.
[4] "Inventory of Greenhouse Gas Emissions and Sinks: 1990-2007", Environmental Protection Agency, Report #: EPA 430-R-09-004.
[5] ARPA-E internal analysis. Assumptions: 485 g CO_2/mile baseline, 698 g CO_2/kWh current U.S. electric grid carbon intensity.
[6] ARPA-E internal analysis. Assumptions: $3.00/gallon gasoline, 25 mpg internal combustion engine vehicle, 10c/kWh, 4 miles/kWh electric vehicle.

year PHEV-40 program, the DOE OVT and USABC are pushing up against the fundamental energy density limits of traditional Lithium-ion based batteries.

There are strong doubts in the battery community as to whether the energy density of Lithium-ion batteries will be able to be pushed to the 200+ Wh/kg system level energy densities required for widespread deployment of all-electric vehicles. Furthermore, with current HEV battery production and Lithium-ion battery production dominated by Japan, South Korea, and to a growing extent China, there are doubts as to whether traditional Lithium-ion based battery production for electrified vehicles offers an opportunity for the U.S. to assert domestic technology and manufacturing leadership within the context of the existing Lithium-ion based battery technology platform. For these reasons, and given the strong existing focus of the DOE Office of Vehicle Technologies and the USABC on Lithium-ion battery technologies, ARPA-E has strong interest in supporting the development of new high energy, low cost battery technology approaches beyond traditional Lithium-ion batteries.

In this Funding Opportunity Announcement (FOA), ARPA-E seeks to develop a new generation of ultra-high energy density, low-cost battery technologies capable of providing sufficient performance and cost to enable widespread deployment of long all-electric range PHEVs (PHEV-100+) and all electric EVs and with high potential to provide an opportunity for the U.S. to gain technology and manufacturing leadership in the emerging EV battery market. While ARPA-E's interest is in batteries for both long range PHEVs and EVs, the ambitious targets for this FOA are largely based upon the long term EV battery goals that the USABC has determined must be met for widespread deployment of EVs.[7] These targets include a system level specific energy density of 200 Wh/kg, volumetric energy density of 300 Wh/liter, cycle life of 1000, and a cost of $250/kWh.[8] As discussed below, these ambitious energy density and cost goals represent the greatest challenge for future battery development and thus will be the primary focus of this FOA. ARPA-E's objective is to fund high risk, high reward research efforts that, if successful, will have a transformational impact on the rate and scale of deployment of long range PHEVs and all electric EVs and provide U.S. technology and manufacturing leadership in advanced batteries for electrified vehicles.

B.2. OBJECTIVES

This FOA is primarily focused on the development of advanced battery chemistries, architectures, and manufacturing processes with the potential to provide EV battery system level energy densities exceeding 200 Wh/kg (mass density) and 300 Wh/liter (volumetric density) at system level costs of $250/kWh or below. The ability for proposed battery technologies to achieve system level target metrics on a number of other key performance parameters (detailed below) is of significant, but secondary, importance, as it is ARPA-E's belief that the required ambitious energy density and cost metrics for widespread adoption of EVs represent the most significant challenges and emerging technology opportunities facing battery technology development for EV applications today.

Due to the strong focus of existing U.S. battery research and development programs (DOE OVT, USABC) on traditional spiral-wound and pouch-based Lithium-ion cell based systems consisting of carbon-based anodes and Lithium-intercalation based cathodes (including $LiCoO_2$ and lower cost variants

[7] "USABC Goals for Advanced Batteries for EVs", United States Advanced Battery Consortium (United States Council on Automotive Research), http://www.uscar.org

[8] Note: The long term USABC EV battery goal for battery system cost is $100/kWh. The $250/kWh goal here is an updated ARPA-E goal derived from ARPA-E's "Workshop on Electrical Energy Storage for Vehicles" on Nov 3, 2009 and is based on a higher gasoline price relative to that assumed when USABC goals were created in 1991. Average gasoline prices in 1991 were $1.10/gallon. Assuming $2.27/gallon current gasoline prices an updated cost metric of $250/kWh was determined.

– $Li(Ni,Co,Al)O_2$, $Li(Ni,Mn,Co)O_2$, $LiMn_2O_4$, $LiFePO_4$ and various derivative systems)), combined with the limited remaining potential for energy density improvements in traditional Lithium-ion intercalation based systems, ARPA-E's primary focus in this FOA is to support the development of novel battery storage technologies beyond carbon-based anode/Li-intercalation cathode systems. Furthermore, in order to enable U.S. manufacturing leadership in the next generation of high performance, low cost EV batteries, ARPA-E is particularly interested in supporting new battery technology approaches that are enabled by new architectures and manufacturing approaches that go beyond the current state-of-the-art slurry coating based process that is currently dominated by non-U.S. battery manufacturers.

B.3. AREAS OF INTEREST

Any technology able to meet or exceed the "Primary Technical Requirements" and to meet or exceed the majority of the "Secondary Technical Targets" stated below will be considered for award under this FOA. However, areas of particular interest for this FOA include, but are not limited to, the following:

- Metal-air battery approaches that address the low cycle life, low power density, and low round trip efficiency of current approaches; especially related to improvements in the bifunctional air cathode. All Metal-air battery chemistries are of interest. ARPA-E believes that particularly strong opportunities exist to borrow innovations from the fuel cell field to improve the bifunctional air cathode.
- Lithium-sulfur battery approaches that address the low cycle life and high self-discharge of existing state-of-the-art technology.
- Disruptive new Lithium-air battery concepts that have the potential to dramatically increase device level power density, cycle life, and round trip efficiency from their current low levels; with particular interest in advanced approaches for dramatically improving the performance and cycle life of the bifunctional air cathode. ARPA-E believes that particularly strong opportunities exist to borrow innovations from the fuel cell field to improve the bifunctional air cathode.
- Advanced batteries with novel Li-metal anode protection schemes.
- Non lithium based intercalation batteries.
- Advanced Lithium-ion based battery systems that greatly exceed the energy density potential of existing traditional Lithium-ion based systems, including displacement reaction cathodes and other advanced approaches.
- Other highly novel battery/electrical energy storage approaches with potential for very high energy density and low cost.
- Novel battery architectures, manufacturing processes, and packaging schemes.
- Advanced battery chemistries, architectures, and manufacturing processes that hold strong potential to enable the U.S. to gain leadership in EV battery technology development and manufacturing.

ARPA-E is not interested in funding projects with any of the following attributes:

- Incremental improvements in Lithium-ion batteries.
- Component innovations that are not validated through demonstration of device and/or system level performance demonstration.
- Technology areas that have already received significant support from the DOE Office of Vehicles (including its Batteries for Advanced Transportation Technologies (BATT) program) and the United States Automotive Battery Consortium. These funding programs have mainly focused on traditional and emerging Lithium-ion battery approaches to date.
- Technology areas with clear technology show stoppers in any of the Primary Technical Requirements or Secondary Technical Targets that are not addressed clearly by the applicant.

B.4. TECHNICAL REQUIREMENTS

B.4.1 Quantitative Technical Metrics

This FOA is focused around supporting battery technology research and development projects that are able to address the specific quantitative target performance and cost metrics described below. Proposed technology development plans must have well justified, realistic potential to meet or exceed the stated "Primary Technical Requirements" by the end of the period of performance of the proposed project in order to be considered for award. Proposed technologies will secondarily be evaluated against their well justified, realistic potential to approach the "Secondary Technical Targets" by the end of the period of performance of the proposed project. Proposed technologies will still be considered for award if they fall short of one or more of the Secondary Technical Targets below, but will be evaluated and compared to one another according to their ability to address these targets.

The general expectation is that applicants will be proposing to develop and demonstrate technologies at the cell level. Relevant cell and system level metrics are defined below. ARPA-E will assume a 50% mass and volume packing fraction for cells in systems for the purposes of this FOA. However, projects where cell and/or system architecture innovations are core to the proposed innovative technology approach may assume other mass and volume packing fractions if they can be well justified. System level metrics may be estimated using reasonable assumptions, which must be clearly stated.

The Primary Technical Requirements and Secondary Technical Targets for this FOA are clearly stated in the two tables below.

PRIMARY TECHNICAL REQUIREMENTS:

Requirement ID Number	***Requirement Category***	***System Value (Units)***	***Cell Value (Units)***
1.1	Specific Energy Density (at C/3 discharge rate)	200 Wh/kg	400 Wh/kg
1.2	Volumetric Energy Density (at C/3 discharge rate)	300 Wh/liter	600 Wh/liter
1.3	System Cost	Realistic potential for < $250 / kWh (System)	

SECONDARY TECHNICAL TARGETS:

Target ID Number	***Target Category***	***Description***
2.1	Specific Power Density (80% Depth of Discharge, 30s)	400 W/kg (system), 800 W/kg (cell)
2.2	Volumetric Power Density (80% Depth of Discharge, 30s)	600W/liter (system), 1200 W/liter (cell)
2.3	Cycle Life	1000 cycles at 80% Depth of Discharge (cell/system), with cycle life defined as number of cycles at which a >20% reduction in any energy/power density metric occurs relative their initial values

2.4	Round Trip Efficiency	80% at C/3 charge and discharge
2.5	Temperature Tolerance	-30 to 65C, with <20% relative degradation of energy density, power density, cycle life and round trip efficiency relative to 25C performance
2.6	Self Discharge	<15%/month self discharge (of initial specific energy density or volumetric energy density)
2.7	Safety	Tolerant of abusive charging conditions and physical damage without catastrophic failure
2.8	Calendar Life	10 years

ARPA-E will not consider selecting projects for award that do not clearly demonstrate realistic, well-justified potential to meet or exceed the Primary Technical Requirements stated above by the end of the period of performance. Furthermore, ARPA-E will give particularly strong consideration to projects that can significantly exceed these Primary Technical Requirements.

With regard to Primary Technical Requirement 1.3, the system level cost requirement, ARPA-E understands that not all applicants will have access to sophisticated battery system cost modeling. It is expected that all applicants will make a strong effort to estimate the potential materials and manufacturing costs of the proposed technology to justify how the technology holds promise to approach, meet, or exceed this FOA's $250/kWh system level cost target.

ARPA-E expects that all novel high energy density battery approaches with low cost potential that have strong potential to meet or exceed the Primary Technical Requirements for this FOA will likely have unique technology challenges in meeting one or more of the Secondary Technical Targets for this FOA, and thus ARPA-E will expect that each proposed technology development plan will have strengths and weaknesses as it relates to its ability to meet or exceed one or more of the Secondary Technical Targets. Thus, proposed battery technology research and development plans with end of project performance target shortcomings relative to one or more Secondary Technical Targets will not be precluded from consideration for selection for award. However, it is expected that all proposed battery technology research and development plans will at least approach the stated Secondary Technical Targets by the end of the project period of performance and proposals will be evaluated against the proposed technology research and development plan's ability to do so.

ARPA-E will set aggressive intermediate "go-no go" metrics for each project selected for award under this FOA and will use independent external partners to validate the demonstrated performance of all battery prototype devices/systems developed under this FOA, including standard tests of safety/abuse tolerance and accelerated testing to determine calendar life

B.4.2 Other Technical Requirements

In addition to the Primary Technical Requirements and Secondary Technical Targets detailed above, applicants must address the following key technical requirements.

A. Manufacturability of Proposed Technology at Scale

The applicant must describe the manufacturing approach(es) that will most likely ultimately be used to scale up the proposed battery technology to be prototyped in the proposed research and development project and must discuss the ability of this/these manufacturing approach(es) to scale at sufficiently low cost to address the $250/kWh Primary Technical Requirement. The applicant is also encouraged to describe whether or not the proposed battery technology offers an opportunity for the U.S. to take a leadership role in battery manufacturing and to provide justification.

B. Technical Strength of the Performance Team
The applicant should describe the unique elements/background/skills of the proposed technical team that make the team uniquely suited to successfully execute the proposed battery research and development plan.

B.5. CONCEPT PAPER STRUCTURE

Applicants are required to first submit a Concept Paper describing the essence and novelty of their new technology concept in order to be considered for award under this FOA. The purpose of the Concept Paper phase of this FOA is to allow applicants to communicate their battery technology concept to ARPA-E, with a minimal level of investment in time and resources, and receive feedback on ARPA-E's level of interest in the concept before ARPA-E requests the submission of a more time and resource intensive Full Application.

General Concept Paper requirements can be found in Section IV.B.2 of this FOA. Specific requirements and key elements that each Concept Paper must address are found in this section (Section I.B.5) and in the rest of Section I.B.

As stated in Section IV.B.2, Concept Paper will consist of a body not exceeding five (5) pages in length containing the following sections: 1.) Abstract and 2.) Technical Section. The Concept Paper will also include a one page "Cost Summary" (described in Section IV.B.2) and a one page completed "End of Project Targets" table that should be included in a single Concept Paper file, but will not count toward the five (5) page Concept Paper body limit. The End of Project Targets table will include the end of project target for the scale and form factor of the prototype device deliverable, as well as the end of project targets for all Primary Technical Requirements and Secondary Technical Targets. The "End of Project Targets" template can be found in Appendix 1 in Section X.

TECHNICAL SECTION
Specific issues/questions that should be considered and addressed in the Technical Section include the following:

- Identification of whether the applicant is applying for an award under the "Proof of Concept Seedling" category or the "Advanced Device Prototyping" category.
- A detailed description of the novel technology approach to be developed in the proposed project, including a description of its basic operating principles of how the proposed approach is unique and innovative.
- A description of the current state-of-the-art in the proposed technology area, including key shortcomings/limitations/challenges, and how the proposed project will seek to significantly improve upon the current state-of-the-art performance and overcome current key shortcomings/limitations.
- The applicant should provide a brief paragraph addressing the following issues for each of the Primary Technical Requirements (1.1-1.3) and Secondary Technical Targets (2.1-2.8)
    - What is the current state-of-the-art performance level for the proposed technology area for the specified requirement/target?
    - What level of performance will the project proposed here target for the specified requirement/target? What are the specific technical issues that have limited performance of this technology to date for the specified requirement or target?
    - How does the project proposed here address these specific technical issues to provide enhanced performance relative to the specified requirement or target? The applicant should provide technical justification for why this proposed target can credibly be met.
    - What are the key technical risks/issues associated with the technology development plan

related to the specified requirement or target?

- A brief description of the manufacturing approach by which the proposed battery technology would most likely be scaled and the scalability/cost issues related to this approach.
- A brief description of how the project, if successful, would impact U.S. leadership in battery technology development and manufacturing.
- A brief description of the project team and why they are uniquely suited to successfully execute the proposed battery research and development plan.
- A brief description of the impact ARPA-E funding of the proposed project would have relative to other previous or existing funding sources the project team has secured.

B.6. CONCEPT PAPER EVALUATION CRITERIA

General Concept Paper Evaluation Criteria are found in Section V.A. of this FOA. More specific Concept Paper Evaluation Criteria are described in this section.

Concept Papers will be evaluated against the following evaluation criteria in decreasing order of importance:

- To what degree does the Concept Paper present a battery technology development plan that demonstrates credible and well-justified technical potential to meet or exceed each of the Primary Technical Requirements of this FOA. Technology approaches will be evaluated in a quantitative fashion, with technology approaches rated according to the degree to which they fall short of, meet, or exceed each quantitative Primary Technical Requirement.
- To what degree does the Concept Paper present a battery technology development plan that demonstrates credible and well-justified technical potential to meet or exceed each of the Secondary Technical Targets of this FOA. Technology approaches will be evaluated in a quantitative fashion, with technology approaches rated according to the degree to which they fall short of, meet, or exceed each quantitative Secondary Technical Target.
- To what degree does the Concept Paper present a unique and innovative technical approach to significantly improve battery performance over the current state-of-the-art
- To what degree does the Concept Paper present a clearly demonstrated understanding of the current state-of-the-art and technical limitations of the current state-of-the-art in the relevant technology area.
- To what degree does the battery technology proposed in the Concept Paper hold potential to enable U.S. manufacturing leadership in EV battery systems.
- To what degree does the proposed technical team have the skills and knowledge to successfully execute the project plan
- To what degree will ARPA-E funding have a leveraged impact on the development of the proposed technology relative to other funding sources for the project team.

B.7 FULL APPLICATION STRUCTURE

This section describes BEEST-program specific considerations relevant to the structure and content of the Technical Volume of the Full Application. The general requirements for the structure of the Full Application are found in Section IV.C of this FOA.

The following includes additional program specific considerations that should be taken into account in preparing the Full Application Technical Volume. These specific considerations complement and amplify upon the general considerations and guidance found in Section IV.C.

As indicated in Section IV.C, the Full Application Technical Volume shall consist of the follow sections with the indicated page limits. Program specific considerations are indicated in *italics* below.

Abstract (1 page)
Provide a concise summary of the proposed research and development. The description should be understandable by technically literate but non-specialist readers. This abstract can, but does not have to, contain confidential information. *Please begin the abstract with a sentence declaring the "award category" under which you are submitting your Full Application, i.e. "This Full Application submission to ARPA-E's BEEST Program is being made under the 'xxx' award category". The two possible award categories are "Proof of Concept Seedling" and "Advanced Device Prototyping".*

Research & Development Tasks (1 page)
Describe succinctly the purpose of the overall research and development program, the underlying hypothesis(es)/technical concept(s) guiding the approach, and a list of the specific tasks you will undertake and accomplish to achieve your purpose. *Please begin the "Research & Development Tasks" section with a sentence declaring the "award category" under which you are submitting your Full Application, i.e. "This Full Application submission to ARPA-E's BEEST Program is being made under the 'xxx' award category". The two possible award categories are "Proof of Concept Seedling" and "Advanced Device Prototyping".*

Research & Development Strategy (28 pages)

- **a.** *Innovation* Describe the current status of the field and how the work proposed here extends beyond currently available technology. Describe the current state of the art in the specific technology area of your research and development plan and how it will represent a significant improvement to the current state of the art. Describe how the work, if successful, could leapfrog over today's approaches and have significant impact on both technology and business. Clearly describe how the proposed approach differs from others under investigation in the field.
- **b.** *Approach* Provide detailed experimental plans for the completion of the tasks and goals specified in the Research & Development Tasks section. Provide sufficient detail that specialists in the field can understand and evaluate each and every relevant step.
- **c.** *Preliminary Results* Provide preliminary data and results, if available, that support the feasibility of your proposed work-plan.
- **d.** *Significance With Respect to FOA Requirements and Targets*. Describe specifically how the proposed effort is responsive to the FOA and the impact that successful completion of the proposed work would have on the FOA target areas. Be sure to consider each aspect requested in the detailed FOA topic description in Section II. *In particular, this section of the Technical Volume should provide specific sub-sections addressing the following issues for each of the Primary Technical Requirements (1.1-1.3) and Secondary Technical Targets (2.1-2.8)*
    - *i. What is the current state-of-the-art performance level for the proposed technology area for the specified requirement/target?*
    - *ii. What level of performance will the project proposed here target for the specified requirement/target? What are the specific technical issues that have limited performance of this technology to date for the specified requirement or target?*
    - *iii. How does the project proposed here address these specific technical issues to provide enhanced performance relative to the specified requirement or target? The applicant should provide technical justification for why this proposed target can credibly be met.*
    - *iv. What are the key technical risks/issues associated with the technology development plan related to the specified requirement or target?*

e. *Milestones* Using the illustrative milestone template provided below as a guide, please provide a set of milestones that provide a clear path to completion of the proposed Research & Development Tasks, with specific proposed "Go-No Go" milestones at the end of each year of the proposed project Milestones should be objective and, where possible, quantitative. *Note: For clarity's sake and to avoid any confusion, the template below shows an example that relates to biofuels. Of course, for Full Applications to the BEEST program, the content of this milestones chart will relate to vehicle electrical energy storage related R&D plans.*

f. *Performance Team* Describe the specific attributes of the assembled performance team that uniquely qualifies it to successfully conduct the proposed research. This section should be a narrative description of the relevant strengths, experience, and expertise of the individual team members and the complementarity of these individual's strengths, experience, and expertise across the assembled team, not a synopsis of research accomplishments.

Program Element		Major Tasks	Key Milestones & Deliverables
Program Element 1: Develop a bioreactor for the energy-efficient production of lipid biomass. The ultimate goal of this program element is to develop a bioreactor system with a measured energy efficiency ≥ 95% ($Energy_{IN}/Energy_{OUT}$) .	**Q1**	1. Complete energy modeling analysis to support development of bioreactor prototype	1. Energy modeling complete 2. Q1 Progress Report complete
	Q2	1. Complete first phase of bioreactor development 2. Operate bioreactor and assess all initial performance metrics over five 10 hour performance runs 3. Select microorganisms to be piloted based on the following criteria (*list criteria*) (e.g. nutrient requirements).	1. Achieve initial bioreactor performance metrics (*list metrics and quantifiable targets*) 2. Selection of microorganisms to be piloted 3. Q2 Progress Report complete
	Q3	1. Complete second phase of bioreactor development 2. Verify all bioreactor performance metrics for all microorganisms over 3, 7, and 14 days of operation	1. Bioreactor performance will achieve the following performance metrics (*list metrics and quantifiable targets*) 2. Q3 Progress Report complete
	Q4	1. Complete experiments to determine optimal conditions for bioreactor operation for the energy efficient production of lipid biomass 2. Complete design report for bioreactor scale-up to *X* liters 3. Construct a cost model for bioreactor operations	1. Finalize bioreactor operational conditions to achieve 95% energy efficiency 2. Finalize methodology and empirically quantify all bioreactor performance metrics 3. Cost model and design report for bioreactor scale up 4. Q4 Final Report complete

End of Project Targets Table (1 page)
The end of project targets table for the proposed R&D project should be filled out to the extent relevant and included in the format shown in the "End of Project Targets Template" found in Appendix 1.

Transition/Commercialization Strategy (1 page)
ARPA-E seeks to support energy technology R&D projects for a finite period of time at critical high-risk points in the technology development cycle. Describe succinctly the phases of development required for the proposed technology to be developed from its current TRL to commercial deployment. Please describe the specific phase of development that will be executed in the proposed ARPA-E project and how this fits into the overall commercialization plan, why a successful project outcome will result in a

high likelihood of next stage financial support, and how the technology will be transitioned at the end of ARPA-E support to the next stage in the path toward commercial deployment. *Please also provide a description of the manufacturing approach by which the proposed battery technology would most likely be scaled and the scalability/cost issues related to this approach. Please also provide a description of how the project, if successful, would impact U.S. leadership in battery technology development and manufacturing.*

Management Plan (1 page)
Provide a management plan that ensures continuous effective communication between performance members. The management plan should clearly define the roles of each team member and describe any critical handoffs/interdependencies between team members. The management plan should also include an intellectual property management plan. This plan is especially important for large performance groups and performance groups that are geographically distributed.

Appendices (no page limit)

1. **Qualifications, Experience, and Capabilities** (no page limit)
    a. Personnel involved – discussion of qualifications and experience to conduct the R&D proposed.
        - You must include the following information for the Principle Investigator and key participants. Each personal qualification summary can be no longer than three (3) sides of a page in length.
        - Each personal qualification summary must include:
            1. Education/training
            2. Employment history
            3. Awards and honors
            4. Up to 10 peer-reviewed publications specifically related to this project
            5. Up to 10 other peer-reviewed publications demonstrating capabilities in the broad field
            6. Up to 10 non-peer reviewed publications and patent demonstrating capabilities in the field.
    b. Organizations involved
        1. Give the organizations involved in the work and why they are qualified to accomplish their portion of the proposed R&D.
        2. If one or more foreign entities are on the team, address what work will occur outside the U.S. (Must not exceed 10%.)
    c. Facilities and equipment required, available, requested
        1. Describe facilities and equipment necessary to accomplish the proposed R&D.
            a. Detail the quantity and quality of the space the team has access to, highlighting any specialized facilities and/or major equipment
            b. Identify any additional equipment or other facilities that are needed to complete the project that the applicant does not already have access to.
        2. For equipment acquired as part of the proposed effort, give the proposed disposition of the equipment after the project is completed or state if it is your intent to continue using the equipment for the authorized purpose of the project for its useful life.

2. **Other Programmatic Issues** (no page limit)
    - Cost Share –
        - What is the cost share that you propose to offer?
        - Which of the entities are contributing what amounts?
        - What is the proposed form of contribution – monetary, in-kind or both?
        - Describe all in-kind contributions and what the relevance of that contribution is to the

work.

- TIAs –
  - Is the applicant requesting consideration for a TIA? If so, why?
  - What is the benefit to the project?

3. **Literature Cited** (no page limit)
   Provide sufficient reference to the primary research literature to justify claims and approaches made in the Technical Volume.
4. **Additionality of ARPA-E Funding Relative to Other Sources of Support** (no page limit)
   ARPA-E seeks to fund high risk, high reward R&D projects where ARPA-E support represents strong additionality and little or no overlap relative to other available sources of funding for the project. Please explain how ARPA-E funding for the proposed R&D project would represent strong additionality relative to other prior or existing sources of support or sources of support being currently pursued. Please describe all current and pending sources of support available for the proposed R&D project, if any. Academic, National Laboratory, and non-profit performers should list all existing sources of support for the proposed R&D project, current and pending, both external and internal. For-profit applicants should list all prior, existing, and pending financial support that has been or is available for the proposed R&D project, including pending funding applications to public and non-profit sources of support that impinge directly or indirectly on the proposed work and internal sources of funding for the proposed work or related work that impinges on the proposed R&D program. If no internal sources of funding are available for the proposed work or related work a clear statement to this effect must be included. Appendix must at least include:
   a. Identify all other funding the proposed Principal Investigator and key participants currently receive from DOE. Explain how the proposed work is not redundant with on-going DOE funded work.
   b. Identify all other funding sources, whether Federal or not, that the proposed Principal Investigator and key participants currently receives which support the substance of the proposed work.
   c. Identify whether the proposed Principal Investigator and key participants have previously submitted the substance of this work to DOE, regardless of whether it was funded. If so, identify when it was submitted and to what DOE Program
   d. Identify all pending funding the Principal Investigator and key participants are waiting to receive notification on, noting the source of the funding and any overlap in the scope of the work with the tasks in the ARPA-E proposal.

B.8. FULL APPLICATION EVALUATION CRITERIA

General Full Application Evaluation Criteria are found in Section V.B. of this FOA. BEEST program specific Full Application Evaluation Criteria are described in this section.

Full Applications will be evaluated against the following BEEST program specific evaluation criteria:

- To what degree does the Concept Paper present a battery technology development plan that demonstrates credible and well-justified technical potential to meet or exceed each of the Primary Technical Requirements of this FOA. Technology approaches will be evaluated in a quantitative fashion, with technology approaches rated according to the degree to which they fall short of, meet, or exceed each quantitative Primary Technical Requirement.
- To what degree does the Concept Paper present a battery technology development plan that demonstrates credible and well-justified technical potential to meet or exceed each of the Secondary Technical Targets of this FOA. Technology approaches will be evaluated in a quantitative fashion, with technology approaches rated according to the degree to which they fall short of, meet, or exceed each quantitative Secondary Technical Target.

- To what degree does the Concept Paper present a unique and innovative technical approach to significantly improve battery performance over the current state-of-the-art
- To what degree does the Concept Paper present a clearly demonstrated understanding of the current state-of-the-art and technical limitations of the current state-of-the-art in the relevant technology area.
- To what degree does the battery technology proposed in the Concept Paper hold potential to enable U.S. manufacturing leadership in EV battery systems.
- To what degree does the proposed technical team have the skills and knowledge to successfully execute the project plan
- To what degree will ARPA-E funding have a leveraged impact on the development of the proposed technology relative to other funding sources for the project team.

B.9. AWARD CATEGORIES AND AWARD INFORMATION

This FOA will expect to fund up to $35M in advanced battery technology research and development projects. Project durations will be from 24-36 months. ARPA-E will accept Concept Papers and Full Applications in two award categories: 1.) a "Proof of Concept Seedling" category and 2.) an "Advanced Device Prototyping" category.

Proof of Concept Seedling Category

The "Proof of Concept Seedling" category for this FOA will focus on supporting early stage proof-of-concept level research and development efforts. This category of the FOA will seek to support particularly high-risk, high reward, highly speculative new electrical energy/battery storage technology concepts that have yet to achieve a definitive "proof of concept" level of technology demonstration. By the end of the period of performance, projects in this category will be expected to provide proof-of-concept device performance levels that address the Primary Technical Requirements and Secondary Technical Targets of this FOA based on demonstrations at the coin-cell scale or larger. ARPA-E expects to select 5-15 projects for award under this category with awards expected to be in the range of $500k-$1M over 24-36 month project durations.

Advanced Device Prototyping Category

The "Advanced Device Prototyping" category of this FOA will focus on supporting early stage device prototyping and optimization of battery technology concepts for which a proof-of-concept demonstration already exists. Projects in this category will be expected to focus on the development and demonstration of prototype cells and/or systems that address the critical shortcoming of existing battery technologies. Projects including small scale demonstration of manufacturing scale-up feasibility will also be considered under this award category. By the end of the period of performance, projects in this category will be expected to deliver prototype cells and/or systems/sub-systems in form factors and sizes relevant for actual EV battery applications (i.e. size/capacity equivalent to current standard cylindrical/pouch cells or greater). ARPA-E expects to select 5-15 projects for award under this category with awards expected to be in the range of $3-$5M (with projects up to $10M considered in exceptional cases) over 24-36 month project durations.

Section II - AWARD INFORMATION

A. TYPE OF AWARD INSTRUMENT

ARPA-E anticipates awarding Cooperative Agreements or Technology Investment Agreements (TIAs) under this FOA. Cooperative Agreements are the most likely instruments to be used because of the need for substantial government interaction to review and assess technical progress and determine continuation of funding during the performance of research and development (R&D) projects.

A TIA may offer more flexibility for tailoring requirements than standard financial assistance awards in certain areas, including intellectual property terms, financial management systems that comply with Generally Accepted Accounting Principals for for-profit applicants; and cost accounting systems. Any applicant considering a TIA should contact ARPA-E's IP attorney before they submit their Full Application to discuss the Intellectual Property (IP) details and restrictions associated with a TIA. Please see Section VIII for contact details. While a TIA would typically offer flexibility in terms of audit provisions, ARPA-E's flexibility for these provisions is limited under this FOA. The funds for this FOA have been appropriated by the Recovery Act, which includes express requirements with respect to audit provisions. ARPA-E is also limited in its flexibility regarding tangible property management, including, for example, real property and equipment. Otherwise, it is ARPA-E's general policy to avoid requirements that would force participants to use different financial management, property management, and purchasing systems than those currently in use.

An applicant may request a TIA if the applicant believes that using a TIA could benefit the objectives of the program and can document these benefits. After an applicant is selected for negotiations, the Contracting Officer and the ARPA-E Program Director will determine if awarding a TIA would benefit the objectives of the program in ways that likely would not happen with a typical financial assistance agreement.

Before deciding that a TIA is appropriate, the contracting officer also must judge that using a TIA could benefit the RD&D objectives in ways that likely would not happen if another type of assistance instrument were used (e.g., a cooperative agreement subject to all of the requirements of 10 CFR part 600).

Considerations:

- Will the use of a TIA permit the involvement of any commercial firms or business units of firms that would not otherwise participate in the project?
- If so: What are the expected benefits of those firms' or divisions' participation (e.g., is there a specific technology that could be better, more readily available, or less expensive)?
- What precludes participation if an instrument other than a TIA were used? For example, if the RD&D effort is based substantially on a for-profit firm's privately developed technology a for-profit firm may not participate unless the Government's intellectual property rights in the technology are modified.
- Will the use of a TIA allow firms or business units of firms that traditionally accept Government awards to use new business practices in the execution of the RD&D project that will foster better technology, new technology more quickly or less expensively, or facilitate partnering with commercial firms?
- Are there any other benefits of the use of a TIA that could help DOE meet its objectives in carrying out the project?

B. ESTIMATED FUNDING

Awards will be for the Government's share of the allowable project costs in the range USD $500,000 to $10 million. Multiple awards are anticipated, but not required. The government reserves the right to make one or more, or no awards on this FOA. The applicant should propose a funding level that is appropriate to the work, without introducing additional risk by either underfunding or adding extraneous tasks or large management reserves that will drive up the R&D cost.

ARPA-E anticipates awarding agreements totaling up to USD $35 million for this FOA. However, the amount of resources made available under this announcement will depend on the quality of the proposed R&D projects and other programmatic considerations.

C. MAXIMUM AND MINIMUM AWARD SIZE

Ceiling for the Federal Government's share of allowable project costs (i.e., the maximum amount for an individual award made under this announcement):

USD $ 10,000,000

Floor for the Federal Government's share of allowable project costs (i.e., the minimum amount for an individual award made under this announcement):

USD $ 500,000

D. EXPECTED NUMBER OF AWARDS

Multiple awards are anticipated, but not required. The government reserves the right to make one or more, or no awards on this FOA; however, it is anticipated that between 5 and 15 awards will be made under this FOA.

E. ANTICIPATED AWARD SIZE

The award size will reflect the level of effort expected to achieve the project objectives. ARPA-E anticipates an average award size between USD $1 million and $5 million for the Federal Government's share of allowable project costs.

F. PERIOD OF PERFORMANCE

The period of performance may be no more than 36 months. ARPA-E anticipates that the majority of awards will have a period of performance between 24 and 36 months.

Section III - ELIGIBILITY INFORMATION

A. ELIGIBLE APPLICANTS

ARPA-E welcomes submissions from any type of capable technology research and development entity. This includes, but is not limited to, for-profit entities, academic institutions, research foundations, not-for-profit entities, collaborations, and consortia. A Federally Funded Research and Development Center (FFRDC) may submit a proposal as a project lead entity only if the FFRDC is the lead for a consortium, collaboration, or other teaming arrangement. The FFRDC may not submit a proposal as a stand alone entity. A minimum of 90% of the work, as defined by total project costs, must be performed on U.S. soil, which includes the United States proper and its territories.

A.1. PARTICIPATION BY FOREIGN ENTITIES

Foreign-owned entities may participate under this FOA as a recipient or sub-recipient if the foreign-owned entity is incorporated within the United States. A minimum of 90% of the work, as defined by total project costs, must be performed on U.S. soil, which includes the United States proper and its territories. U.S. preference and manufacturing requirements under the Bayh-Dole Act, 35 U.S.C. 200-212, and DOE regulations and policies will apply to all recipients and sub-recipients. Agreements resulting from the FOA will require recipients to promote manufacturing within the U.S. of products that embody the technology(ies) developed with ARPA-E funding.

A.2. ORGANIZATIONAL CONFLICTS OF INTEREST

ARPA-E may elect to utilize contractor services to support program creation, administration, and testing. To avoid both real and perceived conflicts of interest, ARPA-E only allows a company or other entity to be a R&D performer if the company is not a support contractor to ARPA-E, because support contractors may be involved in the program creation, administration, and testing phases. By submitting a Concept Paper or Full Application, the applicant and all subcontractors or team members on that application are stating that they are not performing support contractor services for ARPA-E, either as a prime contractor or subcontractor. If it is found that a lead applicant or any of the other entities on the application are support contractors to ARPA-E, the application may be rejected by ARPA-E without further review.

If a prospective applicant believes that any conflict of interest exists or may exist (whether organizational or otherwise), the applicant should promptly raise the issue with ARPA-E by sending the applicant's contact information and a summary of the potential conflict by email to ARPA-E-CO@hq.doe.gov, before time and effort are expended in preparing an application.

B. COST SHARING

If an applicant is exclusively a university or other educational institution ("Educational Institution"), a cost share of at least 10% of the total allowable costs will be required. For consortia or teams consisting exclusively of Educational Institutions, cost share of at least 10% is required. If an applicant is not an Educational Institution ("Other Applicant"), a cost share of at least 20% of the total allowable costs will be required. For consortia or teams including one or more Other Applicants, cost share of at least 20% is required. For awards where ARPA-E determines that use of a TIA is appropriate -- when a standard cooperative agreement is not feasible or appropriate -- a cost share of at least 50% of the total allowable costs will be required to the maximum extent practicable. The Government share shall include any costs incurred by Federally Funded Research and Development Centers. Cost sharing beyond the required minimum amount is encouraged and may be considered during the selection process. Monetary cost share is preferred; however, in-kind cost share is permitted and will be considered. Further information

can be found in Appendix 4.

C. OTHER ELIGIBILITY REQUIREMENTS

Federally Funded Research and Development Center (FFRDC) Contractors

A FFRDC contractor may not submit a proposal as a standalone entity. FFRDC contractors may submit a proposal as a project lead entity for a consortium, collaboration, or other teaming arrangement, subject to the following guidelines:

Authorization for non-DOE/NNSA FFRDCs.
The Federal agency sponsoring the FFRDC contractor must authorize in writing the use of the FFRDC contractor on the proposed project. This authorization is not required for the concept paper submission, but is required for the Full Applications. The use of a FFRDC contractor must be consistent with the contractor's authority under its award and must not place the FFRDC contractor in direct competition with the private sector.

Authorization for DOE/NNSA FFRDCs.
The cognizant contracting officer for the FFRDC must authorize in writing the use of a DOE/NNSA FFRDC contractor on the proposed project. This authorization is not required for the concept paper submission, but is required for the Full Applications. The following wording is acceptable for this authorization.

"Authorization is granted for the [Name] Laboratory to participate in the proposed project. The work proposed for the laboratory is consistent with or complementary to the missions of the laboratory, will not adversely impact execution of the DOE/NNSA assigned programs at the laboratory, and will not place the laboratory in direct competition with the domestic private sector."

For Full Applications where an FFRDC is on the team, but not the lead entity:

- Value/Funding - The value of, and funding for, the FFRDC contractor portion of the work will not normally be included in the award to a successful applicant.
- Responsibility - The applicant, if successful, will be the responsible authority regarding the settlement and satisfaction of all contractual and administrative issues, including but not limited to, disputes and claims arising out of any agreement between the applicant and the FFRDC contractor.

Section IV - APPLICATION AND SUBMISSION INFORMATION

A. REGISTRATION REQUIREMENTS

There are several one-time actions the applicant must complete in order to submit a Full Application in response to this FOA. The applicant must:

- Register with ARPA-E through the ARPA-E eXCHANGE (please see Section IV.B. for details)
- Obtain a Dun and Bradstreet Data Universal Numbering System (DUNS) number at http://fedgov.dnb.com/webform
- Register with the Central Contractor Registry (CCR) at https://www.ccr.gov/

These registration requirements could take several weeks to process and are necessary in order for a potential applicant to submit a Full Application. Therefore, although not required in order to submit a Concept Paper, all potential applicants lacking any of the registration requirements above should complete them as soon as possible.

ARPA-E Web-Based Submission Information

All Concept Paper and Full Application submissions are to be made via the ARPA-E eXCHANGE at https://arpa-e-foa.energy.gov/ . In order to gain access to the ARPA-E eXCHANGE, the applicant must first register and create an account on the main ARPA-E eXCHANGE site. This account will then allow the user to register new Concept Papers for any open ARPA-E FOAs, to submit Full Applications for any responsive Concept Paper, and to submit Responses to Reviewer Feedback. It is recommended that each organization or business unit, whether acting as a team or a single entity, utilize one account as the appropriate contact information for each submission will be entered later.

The applicant will receive an automated response when the Concept Paper, Full Application, or Response to Reviewer Feedback is received; this will serve as a confirmation of ARPA-E receipt – please do not reply to the automated response. The applicant will have the opportunity to re-submit a revised Concept Paper, Full Application, or Response to Reviewer Feedback for any reason so as long as the relevant submission is submitted by the specified deadline. A "User Guide" for the ARPA-E eXCHANGE can be found on the ARPA-E website https://arpa-e-foa.energy.gov/Manuals.aspx after logging in to the system. Any other questions which arise during the application process should be sent to ARPA-E-CO@hq.doe.gov.

ARPA-E will not accept any submissions through FedConnect.

Letters of Intent

Letters of Intent are not requested nor required.

B. CONCEPT PAPER STRUCTURE AND SUBMISSION INFORMATION

Concept Papers are no longer being accepted for this FOA.

The typical Concept Paper should express a consolidated effort in support of one or more related technical concepts or ideas. Disjointed or unrelated efforts should not be consolidated into a single Concept Paper. No facsimile or hard copy submissions will be accepted; Concept Paper submissions are to be made via the ARPA-E eXCHANGE at https://arpa-e-foa.energy.gov/.

The Concept Paper must be submitted through the web based submission system discussed in Section IV.B. The total Concept Paper is limited to six (6) pages, including a cost summary page. If a Concept Paper exceeds the page limitation, only the first six (6) pages will be reviewed. All pages must be formatted to fit on 8-1/2 by 11 inch paper with type not smaller than 12 point font and margins not less than one inch on every side. The Concept Paper must be submitted as a PDF file. The page limitation for Concept Papers includes all figures, tables, and charts. The submission of other supporting materials is strongly discouraged unless specifically called for in Section I.B. Program Overview. Concept Papers must contain all pertinent information – no external data sources (e.g., websites) should be required for Concept Paper review. All applications must be written in English.

A Concept Paper may contain proprietary data. The Concept Paper is a source-selection sensitive document which will be held in confidence by DOE and ARPA-E and will not be shared outside of DOE unless review by a non-government subject matter relevant expert is required. Non-governmental reviewers will be selected based upon outstanding technical credentials, will be screened for any conflict-of-interest, and will be required to sign a non-disclosure agreement.

Patentable ideas, trade secrets, proprietary or confidential commercial or financial information, the disclosure of which may harm the applicant, should not be included in a concept paper or Full Application, unless such information is necessary to convey an understanding of the proposed project. The use and disclosure of such data may be restricted, provided the applicant includes the following legend on the first page of the project narrative and specifies the pages of the application which are to be restricted:

> "The data contained in pages [APPLICANT MUST IDENTIFY PAGES] of this application have been submitted in confidence and contain trade secrets or proprietary information, and such data shall be used or disclosed only for review and evaluation purposes, provided that if this applicant receives an award as a result of or in connection with the submission of this application, DOE shall have the right to use or disclose the data herein to the extent provided in the award. Any disclosure outside the Government shall be made only to a party subject to an appropriate obligation to the Government to protect the confidentiality of the application. This restriction does not limit the government's right to use or disclose data obtained without restriction from any source, including the applicant."

Applicants are required to identify in the bracketed space above the page numbers on which the patentable ideas, trade secrets, proprietary or confidential commercial or financial information appears. Failure to comply with this requirement will result in the waiver of any right to restricted treatment.

Further, each line or paragraph on the pages containing patentable ideas, trade secrets, proprietary or confidential commercial or financial information must be specifically identified and marked with a legend similar to the following:

> "The following contains proprietary information that (NAME OF APPLICANT) requests not be released to persons outside the Government, except for purposes of review and evaluation."

Failure to comply with this requirement will result in the waiver of any right to restricted treatment.

Concept Paper Structure

The concept paper is limited to five (5) pages for the Abstract Section and Technical Section, with one (1) additional page allotted for the Cost Summary:

- ***Abstract*** (limited to 150 words or less) - The abstract should summarize the Concept Paper, providing the essence of the transformative concept, how the proposed research plan will develop this concept and what the potential impact of this applied research is likely to be to the relevant field and application.
- ***Technical Section*** - In this section, describe the proposed technology as it relates to the Concept Paper evaluation criteria stated in Section V.A. The Technical Section must also address the programmatic goals, objectives, and/or performance metrics as stated in Section I.B. Program Overview. This section must also identify the current technology readiness level (TRL, described in Appendix 3) of the technology and the anticipated TRL at project completion. Preliminary technical data is highly desirable. This section should focus on what is new and innovative about the concept and proposed R&D. It is important the Technical Section also distinguish the proposed work from other R&D in substantively similar areas.
- ***Cost Summary*** - Include a one (1) page summary of costs. The Cost Summary should identify the general amount of time in hours anticipated on this project for every person funded under the project (people may be identified by role, such as "technician" rather than by name in the Concept Paper). It is important that the Cost Summary identify any major equipment purchases which will need to be made using ARPA-E funding. If multiple team members are proposed, include a top-level break-down of costs by team member. Note that the Cost Summary is not binding.

C. FULL APPLICATION STRUCTURE AND SUBMISSION INFORMATION

Only Full Applications which received a control number and were deemed compliant by ARPA-E in the Concept Paper phase will be considered for selection. Full Application submissions are to be made via the ARPA-E eXCHANGE at https://arpa-e-foa.energy.gov/.

NO FACSIMILE OR HARD COPY SUBMISSIONS WILL BE ACCEPTED. ALL FULL APPLICATIONS SHOULD BE SUBMITTED VIA THE ARPA-E eXCHANGE https://arpa-e-foa.energy.gov/

Full Application Structure

All applications must be in the format given below. Nonconforming applications may be rejected without review. All pages shall be formatted to fit on 8-1/2 by 11 inch paper with type not smaller than 12 point and margins not less than one inch on every side. The page limitation for the Full Application includes all figures, tables, and charts. The submission of other supporting materials along with the applications is strongly discouraged as they will not be considered for review. All applications must be written in English.

Full Application Submission

Applicants must complete the mandatory forms in accordance with the instructions on the forms and the additional instructions below. Files that are attached to the forms must be named using the prescribed file name format and in Adobe Portable Document Format (PDF) unless otherwise specified in this announcement.

The following application forms and/or instructions can be found on the ARPA-E website (https://arpa-e-foa.energy.gov/).

Full Application Format

The Full Application is composed of 7 items:

Required Document	Document Summary	Document Naming Convention
Technical Volume (PDF)	Technical application (can contain confidential information)	Control#_Institution_Technical.PDF (e.g. 206_9999_Corporation XYZ_Technical.pdf)
SF424 (PDF)	Application for Federal assistance	Control#_Institution_App424.pdf
SF424a (XLS)	High level budget spreadsheet	Budget named Control#_ Institution_SF424a.xls Please submit file as a .XLS only (not .XLSX or other formats)
SF424 Budget Justification (XLS)	Detailed budget spreadsheet	Control#_ Institution_BudgetJustification.XLS
NEPA Compliance Form (PDF)	Environmental compliance certification form	Control#_ Institution_Environmental.PDF
Summary for Public Release (PDF)	Public (non-confidential) project summary in paragraph format	Control#_Institution_PublicSummary.PDF
Summary Slide (PPT)	Project summary in PowerPoint format	Control#_ Institution_Summary.ppt Please submit file as a .PPT only (not .PPTX or other formats)

Additional items will not be considered.

SF-424 – Application for Federal Assistance

Complete all required fields in accordance with the instructions to the form. In Field 17a, assume a project start date of July 1, 2010. The list of certifications and assurances in Field 21 can be found at http://management.energy.gov/business_doe/business_forms.htm, under Certifications and Assurances.

Note: The dates and dollar amounts on the SF 424 are for the complete project period and not just the first year, first phase or other subset of the project period.

Technical Volume

Note: The following presents the general requirements for the Technical Volume. Please see Section I.B.7 for additional BEEST program specific guidance on the Technical Volume.

The Technical Volume should be submitted in PDF format. The Technical Volume must contain the following sections, in the order given and conforming to the page limits specified below. All pages shall be formatted to fit on 8-1/2 by 11 inch paper with type not smaller than 12 point and margins not less than one inch on every side. The control number shall be included on the upper right of every page. Applicants should read and understand the Full Application evaluation criteria (given in Sections I and V) and keep the criteria in mind while preparing the application.

Abstract (1 page)
Provide a concise summary of the proposed research and development. The description should be

understandable by technically literate but non-specialist readers. This abstract can, but does not have to, contain confidential information.

Research & Development Tasks (1 page)
Describe succinctly the purpose of the overall research and development program, the underlying hypothesis(es)/technical concept(s) guiding the approach, and a list of the specific tasks you will undertake and accomplish to achieve your purpose.

Research & Development Strategy (28 pages)

- **a.** *Innovation* Describe the current status of the field and how the work proposed here extends beyond currently available technology. Describe the current state of the art in the specific technology area of your research and development plan and how it will represent a significant improvement to the current state of the art. Describe how the work, if successful, could leapfrog over today's approaches and have significant impact on both technology and business. Clearly describe how the proposed approach differs from others under investigation in the field.
- **b.** *Approach* Provide detailed experimental plans for the completion of the tasks and goals specified in the Research & Development Tasks section. Provide sufficient detail that specialists in the field can understand and evaluate each and every relevant step.
- **c.** *Preliminary Results* Provide preliminary data and results if available, that support the feasibility of your proposed work-plan.
- **d.** *Significance With Respect to FOA Requirements and Targets*. Describe specifically how the proposed effort is responsive to the FOA and the impact that successful completion of the proposed work would have on the FOA target areas. Be sure to consider each aspect requested in the detailed FOA topic description in Section II.
- **e.** *Milestones* Using the illustrative milestone template provided below as a guide, please provide a set of milestones that provide a clear path to completion of the proposed Research & Development Tasks, with specific proposed "Go-No Go" milestones at the end of each year of the proposed project Milestones should be objective and, where possible, quantitative. (Note: For clarity's sake and to avoid any confusion, the template below shows an example that relates to biofuels. Of course, for Full Applications to the BEEST program, the content of this milestones chart will relate to vehicle electrical energy storage related R&D plans.)
- **f.** *Performance Team* Describe the specific attributes of the assembled performance team that uniquely qualifies it to successfully conduct the proposed research. This section should be a narrative description of the relevant strengths, experience, and expertise of the individual team members and the complementarity of these individual's strengths, experience, and expertise across the assembled team, not a synopsis of research accomplishments.

Program Element		Major Tasks	Key Milestones & Deliverables
Program Element 1: Develop a bioreactor for the energy-efficient production of lipid biomass. The ultimate goal of this program element is to develop a bioreactor system with a measured energy efficiency ≥ 95% ($Energy_{IN}/Energy_{OUT}$) .	**Q1**	1. Complete energy modeling analysis to support development of bioreactor prototype	1. Energy modeling complete 2. Q1 Progress Report complete
	Q2	1. Complete first phase of bioreactor development 2. Operate bioreactor and assess all initial performance metrics over five 10 hour performance runs 3. Select microorganisms to be piloted based on the following criteria (*list criteria*) (e.g. nutrient requirements).	1. Achieve initial bioreactor performance metrics (*list metrics and quantifiable targets*) 2. Selection of microorganisms to be piloted 3. Q2 Progress Report complete
	Q3	1. Complete second phase of bioreactor development 2. Verify all bioreactor performance metrics for all microorganisms over 3, 7, and 14 days of operation	1. Bioreactor performance will achieve the following performance metrics (*list metrics and quantifiable targets*) 2. Q3 Progress Report complete
	Q4	1. Complete experiments to determine optimal conditions for bioreactor operation for the energy efficient production of lipid biomass 2. Complete design report for bioreactor scale-up to *X* liters 3. Construct a cost model for bioreactor operations	1. Finalize bioreactor operational conditions to achieve 95% energy efficiency 2. Finalize methodology and empirically quantify all bioreactor performance metrics 3. Cost model and design report for bioreactor scale up 4. Q4 Final Report complete

End of Project Targets Table (1 page)
The end of project targets table for the proposed R&D project should be filled out to the extent relevant and included in the format shown in the "End of Project Targets Template" found in Appendix 1.

Transition/Commercialization Strategy (1 page)
ARPA-E seeks to support energy technology R&D projects for a finite period of time at critical high-risk points in the technology development cycle. Describe succinctly the phases of development required for the proposed technology to be developed from its current TRL to commercial deployment. Please describe the specific phase of development that will be executed in the proposed ARPA-E project and how this fits into the overall commercialization plan, why a successful project outcome will result in a high likelihood of next stage financial support, and how the technology will be transitioned at the end of ARPA-E support to the next stage in the path toward commercial deployment.

Management Plan (1 page)
Provide a management plan that ensures continuous effective communication between performance members. The management plan should clearly define the roles of each team member and describe any critical handoffs/interdependencies between team members. The management plan should also include an intellectual property management plan. This plan is especially important for large performance groups and performance groups that are geographically distributed.

Appendices (no page limit)

1. **Qualifications, Experience, and Capabilities** (no page limit)
   a. Personnel involved – discussion of qualifications and experience to conduct the R&D proposed.

- You must include the following information for the Principle Investigator and key participants. A key person is any individual who contributes in a substantive, measurable way to the execution of the project. Each personal qualification summary can be no longer than three (3) sides of a page in length.
- Each personal qualification summary must include:
  1. Education/training
  2. Employment history
  3. Awards and honors
  4. Up to 10 peer-reviewed publications specifically related to this project
  5. Up to 10 other peer-reviewed publications demonstrating capabilities in the broad field
  6. Up to 10 non-peer reviewed publications and patent demonstrating capabilities in the field.

b. Organizations involved
   1. Give the organizations involved in the work and why they are qualified to accomplish their portion of the proposed R&D.
   2. If one or more foreign entities are on the team, address what work will occur outside the U.S. (Must not exceed 10%.)

c. Facilities and equipment required, available, requested
   1. Describe facilities and equipment necessary to accomplish the proposed R&D.
      a. Detail the quantity and quality of the space the team has access to, highlighting any specialized facilities and/or major equipment
      b. Identify any additional equipment or other facilities that are needed to complete the project that the applicant does not already have access to.
   2. For equipment acquired as part of the proposed effort, give the proposed disposition of the equipment after the project is completed or state if it is your intent to continue using the equipment for the authorized purpose of the project for its useful life.

2. Other Programmatic Issues (no page limit)

- Cost Share –
  - What is the cost share that you propose to offer?
  - Which of the entities are contributing what amounts?
  - What is the proposed form of contribution – monetary, in-kind or both?
  - Describe all in-kind contributions and what the relevance of that contribution is to the work. Foregone fee or profit by the applicant shall not be considered cost sharing under any resulting award.
  - Provide Cost Share Commitment Letters from each third party contributing cost sharing (i.e., a party other than the organization submitting the application) stating that the third party is committed to providing a specific minimum dollar amount of cost sharing. Identify the following information for each third party contributing cost sharing: (1) the name of the entity; (2) the proposed dollar amount to be provided; (3) the amount as a percentage of the total project cost; and (4) the proposed type of cost sharing - cash, services, or property. By submitting your application, you are providing assurance that you have signed the letter of commitment. Successful applicants will be required to submit these signed letters of commitments.
- TIAs –
  - Is the applicant requesting consideration for a TIA? If so, why?
  - What is the benefit to the project?

3. **Literature Cited** (no page limit)

Provide sufficient reference to the primary research literature to justify claims and approaches made in the Technical Volume.

4. **Additionality of ARPA-E Funding Relative to Other Sources of Support** (no page limit)

ARPA-E seeks to fund high risk, high reward R&D projects where ARPA-E support represents strong additionality and little or no overlap relative to other available sources of funding for the project. Please explain how ARPA-E funding for the proposed R&D project would represent strong additionality relative to other prior or existing sources of support or sources of support being currently pursued. Please describe all current and pending sources of support available for the proposed R&D project, if any. Academic, National Laboratory, and non-profit performers should list all existing sources of support for the proposed R&D project, current and pending, both external and internal. For-profit applicants should list all prior, existing, and pending financial support that has been or is available for the proposed R&D project, including pending funding applications to public and non-profit sources of support that impinge directly or indirectly on the proposed work, and internal sources of funding for the proposed work or related work that impinges on the proposed R&D program. If no internal sources of funding are available for the proposed work or related work a clear statement to this effect must be included. Appendix must at least include:

a. Identify all other funding the proposed Principal Investigator and key participants currently receive from DOE. Explain how the proposed work is not redundant with on-going DOE funded work.
b. Identify all other funding sources, whether Federal or not, that the proposed Principal Investigator and key participants currently receives which support the substance of the proposed work.
c. Identify whether the proposed Principal Investigator and key participants have previously submitted the substance of this work to DOE, regardless of whether it was funded. If so, identify when it was submitted and to what DOE Program
d. Identify all pending funding the Principal Investigator and key participants are waiting to receive notification on, noting the source of the funding and any overlap in the scope of the work with the tasks in the ARPA-E proposal.

5. **Intellectual Property Strategy** –

Applicants must address:

- The new intellectual property and data will you create as part of this effort
- The background intellectual property which will be necessary to exercise the new intellectual property
- The plan for disposition/ownership of the intellectual property
- How the intellectual property strategy will further the probability that your transformational technology will reach market and widely penetrate the installed base

Budget Volume

Please note that no recipient of ARPA-E funding can make a profit or fee from their award; all money must be spent on activities or equipment directly related to meeting the project milestones. If necessary, consultants, contractors and vendors may include payment of reasonable fee or profit under an ARPA-E award. For example, to a contractor providing goods or services under a contract (See 10 CFR 600.318 for Grants/Cooperative Agreements) or when making purchases from suppliers of goods (e.g., supplies and equipment or services needed to carry out the RD&D) (See 10 CFR 603.230 for TIA's).

For pricing purposes assume an award date of July 1, 2010.

SF 424 A Excel, Budget Information - Non-Construction Programs File

You must provide a separate budget (SF424A) for each year of support requested and a cumulative budget for the total project period. Use the SF 424 A Excel, "Budget Information Non-Construction Programs" form.

You may request funds under any of the Object Class Categories as long as the item and amount are necessary to perform the proposed work, meet all the criteria for allowability under the applicable Federal cost principles, and are not prohibited by the funding restrictions in this announcement. Save the information in a single file named " Control#_ Institution_424A.xls."

Note: Patent Costs (if proposed) must be proposed in accordance with paragraph G below and requested in your budget)

See Appendix 4 for Budget Justification Guidance.

Budget Justification File

Using the budget justification spreadsheet, you must justify the costs proposed in each Object Class Category/Cost Classification category (e.g., identify key persons and personnel categories and the estimated costs for each person or category; provide a list of equipment and cost of each item; identify proposed subaward/consultant work and cost of each subaward/consultant; describe purpose of proposed travel, number of travelers, and number of travel days; list general categories of supplies and amount for each category; and provide any other information you wish to support your budget). Provide the name of your cognizant/oversight agency, if you have one, and the name and phone number of the individual responsible for negotiating your indirect rates. Save the budget justification information in a single file named " Control#_ Institution_BudgetJustification.xls."

Recovery Act Additional Budget Justification Information

Applications shall provide information which validates that all laborers and mechanics on projects funded directly by or assisted in whole or in part by and through funding appropriated by the Act are paid wages at rates not less than those prevailing on projects of a character similar in the locality as determined by subchapter IV of Chapter 31 of title 40, United States Code (Davis-Bacon Act). For guidance on how to comply with this provision, see http://www.dol.gov/esa/whd/contracts/dbra.htm.

Subaward Budget File(s)

Using the budget justification spreadsheet discussed above, you must provide a separate worksheet in your budget file (i.e., a separate budget (SF 424 A) for each year of support requested and a cumulative budget (SF 424A) for the total project period) for each subawardee that is expected to perform work estimated to be more than $100,000 or 50 percent of the total work effort (which ever is less). Use the SF 424 A Excel for Non Construction Programs or the SF 424 C Excel for Construction Programs (Appendix 3).

Budget for DOE/NNSA Federally Funded Research and Development Center (FFRDC) Contractor, if applicable

If a DOE/NNSA FFRDC contractor is to perform a portion of the work, you must provide a budget justification spreadsheet discussed above and a separate worksheet in your budget file (i.e., a separate budget (SF 424 A) for each year of support requested and a cumulative budget (SF 424 A) for the total project period) for each FFRDC that is expected to perform work for each DOE Field Work Proposal in

accordance with the requirements in DOE Order 412.1 Work Authorization System. This order and the DOE Field Work Proposal form are available at http://management.energy.gov/business_doe/business_forms.htm.

4. Restrictive Markings on Concept Papers and Applications

It is the policy of ARPA-E to treat all concept papers and Full Applications as competitive information and to disclose their contents only for the purpose of review and evaluation or as required by federal law. ARPA-E reserves the right to retain copies of all concept papers and Full Applications. No concept papers or Full Applications will be returned. ARPA-E reserves the right to publicly disclose the Summary for Public Release in any form and for any purpose.

In conducting review of Concept Papers and the merit review evaluation of Full Applications, the Government may seek the advice of qualified non-Federal personnel as reviewers. The Government may also use non-Federal personnel to conduct routine, nondiscretionary administrative activities. The applicant, by submitting its application, consents to the use of non-Federal reviewers/administrators. Non-Federal reviewers are bound by appropriate obligations of conflict of interest and confidentiality prior to reviewing an application. Applications may also be handled, for administrative or other purposes, by a support contractor. This support contractor is bound by appropriate obligations of confidentiality.

Patentable ideas, trade secrets, proprietary or confidential commercial or financial information, the disclosure of which may harm the applicant, should not be included in a concept paper or Full Application, unless such information is necessary to convey an understanding of the proposed project. The use and disclosure of such data may be restricted, provided the applicant includes the following legend on the first page of the project narrative and specifies the pages of the application which are to be restricted:

> "The data contained in pages [APPLICANT MUST IDENTIFY PAGES] of this application have been submitted in confidence and contain trade secrets or proprietary information, and such data shall be used or disclosed only for review and evaluation purposes, provided that if this applicant receives an award as a result of or in connection with the submission of this application, DOE shall have the right to use or disclose the data herein to the extent provided in the award. Any disclosure outside the Government shall be made only to a party subject to an appropriate obligation to the Government to protect the confidentiality of the application. This restriction does not limit the government's right to use or disclose data obtained without restriction from any source, including the applicant."

Applicants are required to identify in the bracketed space above the page numbers on which the patentable ideas, trade secrets, proprietary or confidential commercial or financial information appears. Failure to comply with this requirement will result in the waiver of any right to restricted treatment.

Further, each line or paragraph on the pages containing patentable ideas, trade secrets, proprietary or confidential commercial or financial information must be specifically identified and marked with a legend similar to the following:

> "The following contains proprietary information that (NAME OF APPLICANT) requests not be released to persons outside the Government, except for purposes of review and evaluation."

Failure to comply with this requirement will result in the waiver of any right to restricted treatment.

5. Summary of Required Forms/Files

Your full application must include the following documents:

	Name of Document	Format	File Name
1	Technical Volume Abstract Research Tasks Research Strategy Transition Strategy Management Plan Literature Cited Supporting Documentation	PDF	Control#_Institution_Technical.pdf
2	Application for Federal Assistance – SF424	PDF	Control#_Institution_App424.pdf
3	SF 424A File - Budget Information for Non-Construction Programs Additional worksheets included in one file for subaward Budget(s) and FFRDC Contractors (if applicable)	Excel	Control#_Institution_SF424A.xls
4	Budget Justification File	Excel	Control#_ Institution_BudgetJustification.pdf
5	ARPA-E Environmental Questionnaire	PDF	Control#_ Institution_Environmental.PDF
6	Program Summary for Public Release	PDF	Control#_Institution_PublicSummary.PDF
7	Program Summary Slide	Power Point	Control#_ Institution_Summary.ppt

7. Submissions from Successful Applicants

If selected for negotiations, ARPA-E reserves the right to request additional or clarifying information for any reason deemed necessary, such as:

- Indirect cost information.
- Other budget information.
- Name and phone number of the Designated Responsible Employee for complying with national policies prohibiting discrimination (See 10 CFR 1040.5). Also, the applicant must complete and submit the DOE Form 1600.5 Assurance of Compliance – Nondiscrimination in Federally Assistance Programs and the DOE Office of Civil Rights Questionnaire.
- Representation of Limited Rights Data and Restricted Software, if applicable.
- Commitment Letter from Third Parties Contributing to Cost Sharing, if applicable.
- Certification as to U.S. status of prime awardee or national status of any subawardee.

D. RESPONSES TO REVIEWER FEEDBACK – LIMITED OPPORTUNITY TO SUPPLEMENT FULL APPLICATIONS

NO FACSIMILE OR HARD COPY SUBMISSIONS WILL BE ACCEPTED. ALL RESPONSES SHOULD BE SUBMITTED IN PDF FORMAT VIA THE ARPA-E eXCHANGE https://arpa-e-foa.energy.gov/

ARPA-E intends to provide all Full Application applicants with a limited, optional opportunity to supplement their Full Applications. The principal goal is to offer Applicants the opportunity to respond to substantive reviewer comments or questions regarding the contents of Full Applications. Substantive reviewer comments and questions will be provided by ARPA-E to each Full Application applicant.

Applicants' responses – as specified below - should address issues raised in the reviewer comments and questions. In addition, or alternatively, Applicants may use the Response to provide ARPA-E with new information or data in support of concepts addressed in their Full Applications.

This opportunity is optional: each Full Application will still be considered on the merits of the Full Application regardless of whether a Response is submitted. Also, Responses that are submitted are not expected to respond to each of the reviewers' comments and questions – only those that the Applicant believes need clarification, correction or supplementing information.

To accomplish the above intent, on or about Friday, April 16, 2010, ARPA-E will notify each applicant (specifically, the Administrative and Technical points of contact) to log into the ARPA-E eXCHANGE to view the reviewer comments and questions regarding that applicant's Full Application. All responses from applicants must be in the format given below. The Response must be received by the ARPA-E eXCHANGE by 5:00 PM Eastern Time on Monday, April 19, 2010.

Responses shall be uploaded to the ARPA-E eXCHANGE in PDF format. Responses shall consist of not more than two pages of text and one of figures. Each page shall be formatted to fit on 8-1/2 by 11 inch paper with type not smaller than 12 point and margins not less than one inch. The submission of other supporting materials along with the three page replies will not be considered for review. Also, Internet links to web sites/information cited in the responses will not be read or considered. All Responses must be written in English.

E. SUBMISSION DATES AND TIMES

It is the responsibility of the applicant to complete and submit their submissions before the established deadlines. **Applicants are urged not to wait until the closing dates for the Full Application, but instead should submit as soon as possible. Because internet and data server traffic can be heavy on the ultimate due dates, and especially in the last several hours, applicants are urged to submit in a timely manner so as not to have difficulties meeting the deadlines.**

ARPA-E was created to be a catalyst for the next Industrial Revolution in clean energy technologies, and to pursue this transformation with fierce urgency. To foster rapid technological innovations, it is the policy of ARPA-E to establish and observe strict deadlines for all applicants.

Concept Paper Due Date

Concept Papers must be received by ARPA-E by January 15, 2010 at 5:00PM Eastern Time. CONCEPT PAPERS RECEIVED AFTER THE DEADLINE WILL NOT BE REVIEWED OR CONSIDERED FOR AWARD.

Full Application Due Date

Full Applications must be received by 5:00 PM Eastern Time on March 15, 2010, 31 calendar days from Concept Paper notification. **You are encouraged to transmit your Full Application well before the deadline.** FULL APPLICATIONS RECEIVED AFTER THE DEADLINE WILL NOT BE REVIEWED OR CONSIDERED FOR AWARD.

Responses to Reviewer Feedback Due Date

Applicants will receive reviewer comments and questions regarding their Full Application on or about Friday, April 16, 2010. Applicants will have approximately four calendar days to prepare and submit a maximum two-page text response with one additional page for tables and figures in PDF format. The

deadline for submitting responses to reviewer feedback will be 5:00 PM Eastern Time on Monday, April 19, 2010. RESPONSES TO REVIEWER FEEDBACK RECEIVED AFTER THE DEADLINE WILL NOT BE REVIEWED OR CONSIDERED.

F. INTERGOVERNMENTAL REVIEW

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

G. FUNDING RESTRICTIONS

Costs must be allowable in accordance with the applicable federal cost principles referenced in 10 CFR Part 600. The cost principles for commercial organization are in FAR Part 31.

Patent costs are allowable to the extent they are incurred as a requirement under the award. The costs enumerated in subparagraphs (1), (2) and (3) below are deemed to be required by the award, and therefore are allowable, subject to the limits set forth therein.

1) Costs of preparing invention disclosures of subject inventions that are submitted to DOE, and related reports and other documents in accordance with the Patent Rights Clause;

2) Costs for searching the art to the extent reasonable and necessary to make the invention disclosures submitted to DOE in accordance with the Patent Rights Clause; and

3) Other costs in connection with the filing and prosecution of U.S. patent applications on subject inventions disclosed to DOE in accordance with the Patent Rights clause, subject to a limitation of $15,000 total for all such filed U.S. patent applications.

Patent costs, including the cost of filing any foreign patent applications, not required by the award as set forth above are unallowable.

Section V - APPLICATION REVIEW INFORMATION

Merit Review Criteria

Applications that pass the initial review will be subject to a merit review in accordance with the guidance provided in the "Department of Energy Merit Review Guide for Financial Assistance and Unsolicited Proposals." This guide is available under Financial Assistance, Regulations and Guidance at http://www.management.energy.gov/documents/meritrev.pdf.

A. CONCEPT PAPER EVALUATION CRITERIA

ARPA-E will perform an initial Concept Paper review to determine that (1) the applicant is eligible for an award; (2) the information required by the announcement has been submitted; (3) all mandatory requirements are satisfied; and (4) the proposed project is responsive to the objectives of the funding opportunity announcement.

Mandatory Requirements

- Total cost to ARPA-E does not exceed $10 million;
- Period of performance does not exceed 36 months;
- No less than 90% of total project costs (exclusive of equipment not available in the U.S.) performed on U.S. soil

Evaluation of Concept Papers will be performed using the following criteria: (1) Impact of the Proposed Technology Relative to State of the Art and (2) Overall Scientific and Technical Merit. Concept Papers will not be evaluated against each other since they are not submitted in accordance with a common work statement. The following are descriptions of the above listed criteria:

1. **Impact of the Proposed Technology Relative to State of the Art**
   The proposed technology must directly address one or more ARPA-E Mission Areas. Quantitative material and/or technology metrics must be proposed that demonstrate the potential for a transformational (not incremental) advancement in one or more energy-related fields. The applicant must demonstrate an awareness of competing commercial and emerging technologies and identify how its proposed concept/technology provides significant improvement over these other solutions. The applicant must have a strong and convincing transition strategy, including a feasible pathway to transition the program results to the next logical stage of R&D or directly into industrial development and deployment. The applicant must address the program-specific requirements identified for the Concept Paper phase in Section I.B. Program Overview.

2. **Overall Scientific and Technical Merit**
   The work must be unique and innovative. The proposed work should be high risk, but must be feasible. The applicant must demonstrate a sound technical approach to accomplish the proposed R&D objectives. The outcome and deliverables of the program, if successful, should be clearly defined. The applicant must address the program-specific requirements identified for the Concept Paper phase in Section I.B. Program Overview.

B. FULL APPLICATION EVALUATION CRITERIA

ARPA-E will perform an initial Full Application review to determine that (1) the applicant is eligible for an award; (2) the information required by the announcement has been submitted; (3) all mandatory requirements are satisfied; and (4) the proposed project is responsive to the objectives of the funding

opportunity announcement.

Mandatory Requirements

- Total cost to ARPA-E does not exceed $10 million;
- Period of performance does not exceed 36 months;
- No less than 90% of total project costs (exclusive of equipment not available in the U.S.) performed on U.S. soil;

Evaluation of Full Applications will be accomplished using the following criteria: (1) Impact of the Proposed Technology Relative to State of the Art; (2) Overall Scientific and Technical Merit; (3) Qualifications, Experience, and Capabilities; and (4) Sound Management Plan. Full Proposals will not be evaluated against each other since they are not submitted in accordance with a common work statement. The following are descriptions of the above listed criteria:

1. **Impact of the Proposed Technology Relative to State of the Art**
   The proposed technology must directly address one or more ARPA-E Mission Areas. Quantitative material and/or technology metrics must be proposed that demonstrate the potential for a transformational (not incremental) advancement in one or more energy-related fields. The applicant must demonstrate an awareness of competing commercial and emerging technologies and identify how its proposed concept/technology provides significant improvement over these other solutions. The applicant must have a strong and convincing transition strategy, including a feasible pathway to transition the program results to the next logical stage of R&D or directly into industrial development and deployment. The applicant must address the program-specific requirements identified for the Full Application phase as described in Section II of this FOA.

2. **Overall Scientific and Technical Merit**
   The work must be unique and innovative. The proposed work should be high risk, but must be feasible. The applicant must demonstrate a sound technical approach to accomplish the proposed R&D objectives. The outcome and deliverables of the program, if successful, should be clearly defined. The applicant must address the program-specific requirements identified for the Full Application phase as described in Section II of this FOA.

3. **Qualifications, Experience, and Capabilities**
   The proposed Principal Investigator or technical team should have the expertise and experience needed to accomplish the proposed project. In addition, the applicant should have access to all facilities required to accomplish the R&D effort or has proposed the necessary missing equipment as part of the effort. The applicant's prior experience must demonstrate an ability to perform R&D of similar risk and complexity.

4. **Sound Management Plan**
   The proposed effort must have a workable plan to manage people and resources. Appropriate levels or people and resources should be allocated to tasks. The application should identify major technical R&D risks and have adequately planned mitigation efforts that are clearly defined and feasible. The proposed schedule should be reasonable. The applicant's prior experience in similar efforts must clearly demonstrate an ability to manage an R&D project of the same proposed complexity that meets the proposed technical performance within the proposed budget schedule.

Awards(s) will be made to applicants whose applications are determined to be the most advantageous to the objectives of ARPA-E to support transformational energy R&D efforts, all factors considered, including the evaluation of the applications against the criteria listed above and programmatic

considerations. ARPA-E will consider the programmatic balance of the awards; the distribution across ARPA-E mission impact areas; the application areas and scientific disciplines; the match to national energy priorities; the economic benefits under the Recover Act; and other programmatic specifics.

C. OTHER SELECTION FACTORS – PROGRAM POLICY FACTORS

ARPA-E may consider specific program policy factors during the selection process. In reviewing Concept Papers and Full Applications, the Selection Official may consider the following program policy factors in the evaluation:

a. Preference for Full Applications that promote and enhance the objectives of the American Recovery and Reinvestment Act of 2009, P.L. 111-5, especially job creation and retention, especially those with small and local businesses, and/or preservation and economic recovery in an expeditious manner.
b. Programmatic balance of risk and application areas
c. Degree to which proposed projects optimize use of available ARPA-E funding to achieve ARPA-E goals and objectives
d. Cost/budget considerations, including cost share beyond the required minimum
e. Whether the award would serve the economic interest of the United States, including but not limited to:
   - Proposed transition path is likely to lead to significant increased employment in the United States; and
   - Agreement by the applicant with respect to technology arising from or further developed under the award to promote manufacturing within the U.S. of products that embody the technology.
f. Regarding consortia, collaborations, or other teaming arrangements, consideration will be given to:
   - Technical and management qualifications of members of the consortium, and of the members as a team; and
   - Demonstrated ability to commercialize the technology; and
   - Balance of financial/technical/management contributions provided by each member of the consortium.

D. REVIEW AND SELECTION PROCESS

Selection - The Selection Official will consider the merit review recommendation, and may consider program policy factors and the amount of funds available.

Discussions and Award - ARPA-E may enter into discussions with a selected applicant for any reason deemed necessary, including but not limited to: (1) the budget is not appropriate or reasonable for the requirement; (2) only a portion of the application is selected for award; (3) ARPA-E needs additional information to determine that the recipient is capable of complying with the requirements in 10 CFR part 600; and/or (4) special terms and conditions are required. Failure to resolve satisfactorily the issues identified by ARPA-E will preclude award to the applicant.

E. ANTICIPATED NOTICE OF SELECTION AND AWARD DATES

Applicants will be notified whether they are Encouraged or Discouraged to submit a Full Application on February 12, 2010. Selections for this FOA expect to be announced in May 2010.

Section VI - AWARD ADMINISTRATION INFORMATION

A. AWARD NOTICES

Selected Applicants Notification
ARPA-E will notify applicants selected for negotiations; this notice is not an authorization to begin performance.

Negotiations of cooperative agreements/TIA's: Rapid negotiations and execution of the legal instrument for the proposed effort are essential to meeting the goals of the Recovery Act. Reasonable requests to modify standard government instruments – cooperative agreements, and TIA's – will be considered, within the guidelines of applicable statues and regulations. However, impasses caused by unreasonable requests can delay implementation of a project. Upon careful consideration, ARPA-E may decide there is a need to set-aside a proposal due to such a delay. Proposers may familiarize themselves with standard provisions in legal instruments at the following web pages. In addition, after selection of finalists, ARPA-E intends to conduct a public seminar (webinar or similar) on APRA-E legal instruments.

For standard provisions in Cooperative agreements, including standard intellectual property provisions for assistance transactions, see under "awards terms" at: http://www.management.energy.gov/business_doe/business_forms.htm. The ARPA-E Special Terms and Conditions for Use In Cooperative Agreements are located in the ARPA-E Model Agreements at http://arpa-e.energy.gov/About/KeyDocuments.aspx

TIA's: http://management.energy.gov/policy_guidance/715.htm

Non-Selected Notification
Respondents whose applications have not been selected will be advised as promptly as practicable.

Notice of Award
A Notice of Financial Assistance Award or Assistance Agreement issued by the contracting officer is the authorizing award document. It normally includes either as an attachment or by reference: (1) Special Terms and Conditions; (2) Applicable program regulations, if any; (3) Application as approved by ARPA-E; (4) DOE assistance regulations at 10 CFR part 600; (5) National Policy Assurances to be Incorporated as Award Terms; (6) Budget Summary; and (7) Federal Assistance Reporting Checklist, which identifies the reporting requirements.

B. ADMINISTRATIVE AND NATIONAL POLICY REQUIREMENTS

Administrative Requirements
The administrative requirements for DOE grants and cooperative agreements are contained in 10 CFR Part 600 and for TIAs, in 10 CFR Part 603 (See: http://ecfr.gpoaccess.gov). Grants and cooperative agreements made to universities, non-profits and other entities subject to OMB Circular A-110 are subject to the Research Terms and Conditions located on the National Science Foundation website at http://www.nsf.gov/bfa/dias/policy/rtc/index.jsp .

Recovery Act Award Administration Information
Special Provisions relating to work funded under the American Recovery and Reinvestment Act of 2009, P. L. 111-5 shall apply. These special provisions are in Section IX.

Special Terms and Conditions and National Policy Requirements
The DOE Special Terms and Conditions for Use in Most Grants and Cooperative Agreements are located

at http://management.energy.gov/business_doe/business_forms.htm and the ARPA-E Model Agreements are located at http://arpa-e.energy.gov/About/KeyDocuments.aspx.

The National Policy Assurances to be incorporated as award terms are located at DOE http://management.energy.gov/business_doe/business_forms.htm .

Intellectual Property Provisions
The standard DOE financial assistance intellectual property provisions applicable to the various types of recipients are located at http://www.gc.doe.gov/financial_assistance_awards.htm and the ARPA-E Model Agreements located at: http://arpa-e.energy.gov/About/KeyDocuments.aspx.

Statement of Substantial Involvement
If ARPA-E selects your application as a cooperative agreement or TIA, a Statement of Substantial Involvement will be negotiated to implement the project and included as an Attachment to the award.

C. REPORTING

Reporting requirements are identified on the Federal Assistance Reporting Checklist, DOE F 4600.2, attached to the award agreement. For a sample Checklist, see http://management.energy.gov/business_doe/business_forms.htm

ARPA-E will do its best to make all reporting as non-burdensome as possible.

Reports may include:
(1) Monthly and Quarterly Reports.

- A monthly and quarterly technical and financial report must be sent to the ARPA-E Program Director. The report is meant to be a short summary of technical progress and financial status. Any significant deviations from the plan should be identified and discussed.

(2) Annual Milestone Report.

- A report must be submitted to ARPA-E once a year in the month following the end of each full year of the performance period. The annual report should include a description of the achievements of "Go-No Go" milestones as described in the applicant's proposal.

(3) Final Report

- At the conclusion of the performance period, a report must be submitted which includes a description of the progress of the project since the last annual report. The annual report should also include a comparison of the final performance results with the milestones described in the proposal.

(4) Recovery Act Reporting

- ARPA-E will assist all awardees on fulfilling ARRA requirements, including quarterly reports.

FOR RECOVERY ACT REPORTING REQUIREMENTS, SEE SECTION IX - SPECIAL PROVISIONS RELATING TO WORK FUNDED UNDER THE AMERICAN RECOVERY AND REINVESTMENT ACT OF 2009 (March 2009)

Section VII - QUESTIONS/AGENCY CONTACTS

A. QUESTIONS AND AGENCY CONTACT

ARPA-E will endeavor to respond to all questions submitted by March 13, 2010, in an expeditious and timely manner. Please submit your questions early; even though ARPA-E will make an effort to answer questions quickly, it is the applicants responsibly to meet all submission deadlines stated in this announcement. In all correspondence with ARPA-E please include the control number assigned to your submission.

Questions regarding program requirements must be directed to:

Program: Advanced Research Projects Agency - Energy
E-mail address: ARPA-E-CO@hq.doe.gov

Section VIII - OTHER INFORMATION

Modifications
Notices of any modifications to this announcement will be posted on the following websites, www.fedbizopps.gov, www.grants.gov, www.fedconnect.net, as well as the ARPA-E website www.arpa-e.energy.gov and ARPA-E eXCHANGE site.

Government Right to Reject or Negotiate
ARPA-E reserves the right, without qualification, to reject any or all applications received in response to this announcement, and to select any application, in whole or in part, as a basis for negotiation and/or award.

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

Intellectual Property Developed Under This Program
Patent Rights (IP)
In a grant or cooperative agreement, the government will have certain statutory rights in an invention that is conceived or first actually reduced to practice under a DOE award. For a grant or cooperative agreement, the Bayh-Dole Act (35 U.S.C. 202) assures that a domestic small business, university or a non-profit awardee will have the option to retain title to their own inventions, subject to the Government retaining a government purpose license, march-in rights and a U.S. preference in licensing. The patent clause that will apply these provisions can be found at 10 C.F.R. Part 600 Appendix A to Subpart D, PATENT RIGHTS-SMALL BUSINESS FIRMS AND NONPROFIT ORGANIZATIONS. For awardees that are not subject to the Bayh-Dole Act, (e.g., large businesses, foreign universities, and foreign companies), 42 U.S.C. 5908 provides that title to such inventions vests in the United States, unless a "waiver" is granted. For this FOA, ARPA-E intends to issue a "class waiver" which will assure that those awardees who are not subject to the Bayh-Dole Act will also have the option to retain title to their own inventions, subject to the same government retained rights identified above and provided they are cost sharing at least 20% and they agree to manufacture new technology created under an award resulting from this FOA in the U.S. or provide other net economic benefits to the U.S. The patent clause that will apply these provisions can be found at http://www.gc.doe.gov/documents/patwaivclau.pdf. The class waiver will allow for the negotiation of the requirement to manufacture new technology in the U.S. For those who are not subject to Bayh-Dole or do not meet the criteria of the class waiver, they may still request a waiver of all or any part of the rights of the United States in inventions conceived or first actually reduced to practice in performance of an agreement as a result of this announcement, in advance of or within 30 days after the effective date of the award. Even if such advance waiver is not requested or the request is denied, the recipient will have a continuing right under the award to request a waiver of the rights of the United States in the title to identified inventions, i.e., individual inventions conceived or first actually reduced to practice in performance of the award. Any individual patent waiver that may be granted is subject to certain terms and conditions in 10 CFR 784; http://www.gc.doe.gov/documents/patwaivclau.pdf.

This FOA allows applicants to request a TIA. In a TIA, the intellectual property rights are not subject to the requirements of the Bayh-Dole Act or 42 U.S.C. 5908 and are negotiable. If ARPA-E determines it is appropriate to award a TIA, patent rights will be negotiated pursuant to

the guidance set out in 10 C.F.R. 603.840 through 10 C.F.R. 603.875.

Rights in Technical Data
DOE normally retains unlimited rights in technical data first produced under the Agreement. Proprietary software or data developed solely at private expense will not normally be required to be delivered to the Government except as specifically negotiated in a particular agreement to satisfy ARPA-E's own needs to monitor work progress. For this FOA, ARPA-E has determined that special protected data rights may apply. The provisions provide for the protection from public disclosure, for a period of up to five (5) years from the development of the information, of data that would be trade secret, or commercial or financial information that is privileged or confidential, if the information had been obtained from a non-Federal party. Generally, the provision entitled, Rights in Data – Programs Covered Under Special Protected Data Statutes, (10 C.F.R. 600 Appendix A to Subpart D), would apply, but will be modified to list and identify data or categories of data first produced in the performance of the award that will be made available to the public, notwithstanding the statutory authority to withhold data from public dissemination, and will identify data that will be recognized by the parties as protected data.

To assist in understanding how IP rights will be addressed the applicant may contact:

Linda Field
DOE IP Attorney
(202) 586-3440, Linda.Field@hq.doe.gov

The DOE IP Attorney is available to respond to questions regarding IP rights, but will not engage in any negotiations.

Notice Regarding Eligible/Ineligible Activities
Eligible activities under this program include those which describe and promote the understanding of scientific and technical aspects of specific energy technologies, but not those which encourage or support political activities such as the collection and dissemination of information related to potential, planned or pending legislation.

Section IX - SPECIAL PROVISIONS RELATING TO WORK FUNDED UNDER THE AMERICAN RECOVERY AND REINVESTMENT ACT OF 2009 (March 2009)

Preamble

The American Recovery and Reinvestment Act of 2009, Pub. L. 111-5, (Recovery Act) was enacted to preserve and create jobs and promote economic recovery, assist those most impacted by the recession, provide investments needed to increase economic efficiency by spurring technological advances in science and health, invest in transportation, environmental protection, and other infrastructure that will provide long-term economic benefits, stabilize State and local government budgets, in order to minimize and avoid reductions in essential services and counterproductive State and local tax increases. Recipients shall use grant funds in a manner that maximizes job creation and economic benefit.

The Recipient shall comply with all terms and conditions in the Recovery Act relating generally to governance, accountability, transparency, data collection and resources as specified in Act itself and as discussed below.

Recipients should begin planning activities for their first tier subrecipients, including obtaining a DUNS number (or updating the existing DUNS record), and registering with the Central Contractor Registration (CCR).

Be advised that Recovery Act funds can be used in conjunction with other funding as necessary to complete projects, but tracking and reporting must be separate to meet the reporting requirements of the Recovery Act and related guidance. For projects funded by sources other than the Recovery Act, Contractors must keep separate records for Recovery Act funds and to ensure those records comply with the requirements of the Act.

The Government has not fully developed the implementing instructions of the Recovery Act, particularly concerning specific procedural requirements for the new reporting requirements. The Recipient will be provided these details as they become available. The Recipient must comply with all requirements of the Act. If the recipient believes there is any inconsistency between ARRA requirements and current award terms and conditions, the issues will be referred to the Contracting Officer for reconciliation.

Definitions

For purposes of this clause, Covered Funds means funds expended or obligated from appropriations under the American Recovery and Reinvestment Act of 2009, Pub. L. 111-5. Covered Funds will have special accounting codes and will be identified as Recovery Act funds in the grant, cooperative agreement or TIA and/or modification using Recovery Act funds. Covered Funds must be reimbursed by September 30, 2015.

Non-Federal employer means any employer with respect to covered funds -- the contractor, subcontractor, grantee, or recipient, as the case may be, if the contractor, subcontractor, grantee, or recipient is an employer; and any professional membership organization, certification of other professional body, any agent or licensee of the Federal government, or any person acting directly or indirectly in the interest of an employer receiving covered funds; or with respect to covered funds received by a State or local government, the State or local government receiving the funds and any contractor or subcontractor receiving the funds and any contractor or subcontractor of the State or local government; and does not mean any department, agency, or other entity of the

federal government.

Recipient means any entity that receives Recovery Act funds directly from the Federal government (including Recovery Act funds received through grant, loan, or contract) other than an individual and includes a State that receives Recovery Act Funds.

Special Provisions

A. Flow Down Requirement

Recipients must include these special terms and conditions in any subaward.

B. Segregation of Costs

Recipients must segregate the obligations and expenditures related to funding under the Recovery Act. Financial and accounting systems should be revised as necessary to segregate, track and maintain these funds apart and separate from other revenue streams. No part of the funds from the Recovery Act shall be commingled with any other funds or used for a purpose other than that of making payments for costs allowable for Recovery Act projects.

C. Prohibition on Use of Funds

None of the funds provided under this agreement derived from the American Recovery and Reinvestment Act of 2009, Pub. L. 111-5, may be used by any State or local government, or any private entity, for any casino or other gambling establishment, aquarium, zoo, golf course, or swimming pool.

D. Access to Records

With respect to each financial assistance agreement awarded utilizing at least some of the funds appropriated or otherwise made available by the American Recovery and Reinvestment Act of 2009, Pub. L. 111-5, any representative of an appropriate inspector general appointed under section 3 or 8G of the Inspector General Act of 1988 (5 U.S.C. App.) or of the Comptroller General is authorized --

(1) to examine any records of the contractor or grantee, any of its subcontractors or subgrantees, or any State or local agency administering such contract that pertain to, and involve transactions that relate to, the subcontract, subcontract, grant, or subgrant; and

(2) to interview any officer or employee of the contractor, grantee, subgrantee, or agency regarding such transactions.

E. Publication

An application may contain technical data and other data, including trade secrets and/or privileged or confidential information, which the applicant does not want disclosed to the public or used by the Government for any purpose other than the application. To protect such data, the applicant should specifically identify each page including each line or paragraph thereof containing the data to be protected and mark the cover sheet of the application with the following Notice as well as referring to the Notice on each page to which the Notice applies:

Notice of Restriction on Disclosure and Use of Data
The data contained in pages ---- of this application have been submitted in confidence and contain

trade secrets or proprietary information, and such data shall be used or disclosed only for evaluation purposes, provided that if this applicant receives an award as a result of or in connection with the submission of this application, DOE shall have the right to use or disclose the data here to the extent provided in the award. This restriction does not limit the Government's right to use or disclose data obtained without restriction from any source, including the applicant.

Information about this agreement will be published on the Internet and linked to the website www.recovery.gov, maintained by the Accountability and Transparency Board. The Board may exclude posting contractual or other information on the website on a case-by-case basis when necessary to protect national security or to protect information that is not subject to disclosure under sections 552 and 552a of title 5, United States Code.

F. Protecting State and Local Government and Contractor Whistleblowers.

The requirements of Section 1553 of the Act are summarized below. They include, but are not limited to:

Prohibition on Reprisals: An employee of any non-Federal employer receiving covered funds under the American Recovery and Reinvestment Act of 2009, Pub. L. 111-5, may not be discharged, demoted, or otherwise discriminated against as a reprisal for disclosing, including a disclosure made in the ordinary course of an employee's duties, to the Accountability and Transparency Board, an inspector general, the Comptroller General, a member of Congress, a State or Federal regulatory or law enforcement agency, a person with supervisory authority over the employee (or other person working for the employer who has the authority to investigate, discover or terminate misconduct), a court or grant jury, the head of a Federal agency, or their representatives information that the employee believes is evidence of:

- gross management of an agency contract or grant relating to covered funds;
- a gross waste of covered funds;
- a substantial and specific danger to public health or safety related to the implementation or use of covered funds;
- an abuse of authority related to the implementation or use of covered funds; or
- as violation of law, rule, or regulation related to an agency contract (including the competition for or negotiation of a contract) or grant, awarded or issued relating to covered funds.

Agency Action: Not later than 30 days after receiving an inspector general report of an alleged reprisal, the head of the agency shall determine whether there is sufficient basis to conclude that the non-Federal employer has subjected the employee to a prohibited reprisal. The agency shall either issue an order denying relief in whole or in part or shall take one or more of the following actions:

- Order the employer to take affirmative action to abate the reprisal.
- Order the employer to reinstate the person to the position that the person held before the reprisal, together with compensation including back pay, compensatory damages, employment benefits, and other terms and conditions of employment that would apply to the person in that position if the reprisal had not been taken.
- Order the employer to pay the employee an amount equal to the aggregate amount of all costs and expenses (including attorneys' fees and expert witnesses' fees) that were reasonably incurred by the employee for or in connection with, bringing the complaint regarding the reprisal, as determined by the head of a court of competent jurisdiction.

Nonenforceablity of Certain Provisions Waiving Rights and remedies or Requiring Arbitration: Except as provided in a collective bargaining agreement, the rights and remedies provided to

aggrieved employees by this section may not be waived by any agreement, policy, form, or condition of employment, including any predispute arbitration agreement. No predispute arbitration agreement shall be valid or enforceable if it requires arbitration of a dispute arising out of this section.

Requirement to Post Notice of Rights and Remedies: Any employer receiving covered funds under the American Recovery and Reinvestment Act of 2009, Pub. L. 111-5, shall post notice of the rights and remedies as required therein. (Refer to section 1553 of the American Recovery and Reinvestment Act of 2009, Pub. L. 111-5, www.Recovery.gov, for specific requirements of this section and prescribed language for the notices.).

G. Reserved

H. False Claims Act

Recipient and sub-recipients shall promptly refer to the DOE or other appropriate Inspector General any credible evidence that a principal, employee, agent, contractor, sub-grantee, subcontractor or other person has submitted a false claim under the False Claims Act or has committed a criminal or civil violation of laws pertaining to fraud, conflict of interest, bribery, gratuity or similar misconduct involving those funds.

I. Information in Support of Recovery Act Reporting

Recipient may be required to submit backup documentation for expenditures of funds under the Recovery Act including such items as timecards and invoices. Recipient shall provide copies of backup documentation at the request of the Contracting Officer or designee.

J. Availability of Funds

Funds appropriated under the Recovery Act and obligated to this award are available for reimbursement of costs until September 30, 2015.

REPORTING AND REGISTRATION REQUIREMENTS UNDER SECTION 1512 OF THE RECOVERY ACT

(a) This award requires the recipient to complete projects or activities which are funded under the American Recovery and Reinvestment Act of 2009 (Recovery Act) and to report on use of Recovery Act funds provided through this award. Information from these reports will be made available to the public.

(b) The reports are due no later than ten calendar days after each calendar quarter in which the recipient receives the assistance award funded in whole or in part by the Recovery Act.

(c) Recipients and their first-tier recipients must maintain current registrations in the Central Contractor Registration (http://www.ccr.gov) at all times during which they have active federal awards funded with Recovery Act funds. A Dun and Bradstreet Data Universal Numbering System (DUNS) Number (http://www.dnb.com) is one of the requirements for registration in the Central Contractor Registration.

(d) The recipient shall report the information described in section 1512(c) of the Recovery Act using the reporting instructions and data elements that will be provided online at

http://www.FederalReporting.gov and ensure that any information that is pre-filled is corrected or updated as needed.

REQUIRED USE OF AMERICAN IRON, STEEL, AND MANUFACTURED GOODS -- SECTION 1605 OF THE AMERICAN RECOVERY AND REINVESTMENT ACT OF 2009

(a) Definitions. As used in this award term and condition--

(1) Manufactured good means a good brought to the construction site for incorporation into the building or work that has been--

(i) Processed into a specific form and shape; or

(ii) Combined with other raw material to create a material that has different properties than the properties of the individual raw materials.

(2) Public building and public work means a public building of, and a public work of, a governmental entity (the United States; the District of Columbia; commonwealths, territories, and minor outlying islands of the United States; State and local governments; and multi-State, regional, or interstate entities which have governmental functions). These buildings and works may include, without limitation, bridges, dams, plants, highways, parkways, streets, subways, tunnels, sewers, mains, power lines, pumping stations, heavy generators, railways, airports, terminals, docks, piers, wharves, ways, lighthouses, buoys, jetties, breakwaters, levees, and canals, and the construction, alteration, maintenance, or repair of such buildings and works.

(3) Steel means an alloy that includes at least 50 percent iron, between .02 and 2 percent carbon, and may include other elements.

(b) Domestic preference. (1) This award term and condition implements Section 1605 of the American Recovery and Reinvestment Act of 2009 (Recovery Act) (Pub. L. 111--5), by requiring that all iron, steel, and manufactured goods used in the project are produced in the United States except as provided in paragraph (b)(3) and (b)(4) of this section and condition.

(2) This requirement does not apply to the material listed by the Federal Government as follows:

_____

[Award official to list applicable excepted materials or indicate "none"]

(3) The award official may add other iron, steel, and/or manufactured goods to the list in paragraph (b)(2) of this section and condition if the Federal Government determines that--

(i) The cost of the domestic iron, steel, and/or manufactured goods would be unreasonable. The cost of domestic iron, steel, or manufactured goods used in the project is unreasonable when the cumulative cost of such material will increase the cost of the overall project by more than 25 percent;

(ii) The iron, steel, and/or manufactured good is not produced, or manufactured in the United States in sufficient and reasonably available quantities and of a satisfactory quality; or

(iii) The application of the restriction of section 1605 of the Recovery Act would be inconsistent with the public interest.

(c) Request for determination of inapplicability of Section 1605 of the Recovery Act . (1)(i) Any recipient request to use foreign iron, steel, and/or manufactured goods in accordance with paragraph (b)(3) of this section shall include adequate information for Federal Government evaluation of the request, including--

(A) A description of the foreign and domestic iron, steel, and/or manufactured goods;

(B) Unit of measure;

(C) Quantity;

(D) Cost;

(E) Time of delivery or availability;

(F) Location of the project;

(G) Name and address of the proposed supplier; and

(H) A detailed justification of the reason for use of foreign iron, steel, and/or manufactured goods cited in accordance with paragraph (b)(3) of this section.

(ii) A request based on unreasonable cost shall include a reasonable survey of the market and a completed cost comparison table in the format in paragraph (d) of this section.

(iii) The cost of iron, steel, and/or manufactured goods material shall include all delivery costs to the construction site and any applicable duty.

(iv) Any recipient request for a determination submitted after Recovery Act funds have been obligated for a project for construction, alteration, maintenance, or repair shall explain why the recipient could not reasonably foresee the need for such determination and could not have requested the determination before the funds were obligated. If the recipient does not submit a satisfactory explanation, the award official need not make a determination.

(2) If the Federal Government determines after funds have been obligated for a project for construction, alteration, maintenance, or repair that an exception to section 1605 of the Recovery Act applies, the award official will amend the award to allow use of the foreign iron, steel, and/or relevant manufactured goods. When the basis for the exception is nonavailability or public interest, the amended award shall reflect adjustment of the award amount, redistribution of budgeted funds, and/or other actions taken to cover costs associated with acquiring or using the foreign iron, steel, and/or relevant manufactured goods. When the basis for the exception is the unreasonable cost of the domestic iron, steel, or manufactured goods, the award official shall adjust the award amount or redistribute budgeted funds by at least the differential established in 2 CFR 176.110(a).

(3) Unless the Federal Government determines that an exception to section 1605 of the Recovery Act applies, use of foreign iron, steel, and/or manufactured goods is noncompliant with section 1605 of the American Recovery and Reinvestment Act.

(d) Data. To permit evaluation of requests under paragraph (b) of this section based on unreasonable cost, the Recipient shall include the following information and any applicable supporting data based on the survey of suppliers:

Foreign and Domestic Items Cost Comparison

Description	Unit of measure	Quantity	Cost (dollars)*
Item 1:			
Foreign steel, iron, or manufactured good	_____	_____	_____
Domestic steel, iron, or manufactured good	_____	_____	_____
Item 2:			
Foreign steel, iron, or manufactured good	_____	_____	_____
Domestic steel, iron, or manufactured good	_____	_____	_____

[List name, address, telephone number, email address, and contact for suppliers surveyed. Attach copy of response; if oral, attach summary.]

[Include other applicable supporting information.]
[*Include all delivery costs to the construction site.]

REQUIRED USE OF AMERICAN IRON, STEEL, AND MANUFACTURED GOODS (COVERED UNDER INTERNATIONAL AGREEMENTS)--SECTION 1605 OF THE AMERICAN RECOVERY AND REINVESTMENT ACT OF 2009

(a) Definitions. As used in this award term and condition--

Designated country --(1) A World Trade Organization Government Procurement Agreement country (Aruba, Austria, Belgium, Bulgaria, Canada, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hong Kong, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea (Republic of), Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Singapore, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, and United Kingdom;

(2) A Free Trade Agreement (FTA) country (Australia, Bahrain, Canada, Chile, Costa Rica, Dominican Republic, El Salvador, Guatemala, Honduras, Israel, Mexico, Morocco, Nicaragua, Oman, Peru, or Singapore); or

(3) A United States-European Communities Exchange of Letters (May 15, 1995) country: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovak Republic, Slovenia, Spain, Sweden, and United Kingdom. Designated country iron, steel, and/or manufactured goods --(1) Is wholly the growth, product, or manufacture of a designated country; or

(2) In the case of a manufactured good that consist in whole or in part of materials from another country, has been substantially transformed in a designated country into a new and different manufactured good distinct from the materials from which it was transformed.

Domestic iron, steel, and/or manufactured good --(1) Is wholly the growth, product, or manufacture of the United States; or

(2) In the case of a manufactured good that consists in whole or in part of materials from another country, has been substantially transformed in the United States into a new and different manufactured good distinct from the materials from which it was transformed. There is no requirement with regard to the origin of components or subcomponents in manufactured goods or products, as long as the manufacture of the goods occurs in the United States.

Foreign iron, steel, and/or manufactured good means iron, steel and/or manufactured good that is not domestic or designated country iron, steel, and/or manufactured good.

Manufactured good means a good brought to the construction site for incorporation into the building or work that has been--

(1) Processed into a specific form and shape; or

(2) Combined with other raw material to create a material that has different properties than the properties of the individual raw materials.

Public building and public work means a public building of, and a public work of, a governmental entity (the United States; the District of Columbia; commonwealths, territories, and minor outlying islands of the United States; State and local governments; and multi-State, regional, or interstate entities which have governmental functions). These buildings and works may include, without limitation, bridges, dams, plants, highways, parkways, streets, subways, tunnels, sewers, mains, power lines, pumping stations, heavy generators, railways, airports, terminals, docks, piers, wharves, ways, lighthouses, buoys, jetties, breakwaters, levees, and canals, and the construction, alteration, maintenance, or repair of such buildings and works.

Steel means an alloy that includes at least 50 percent iron, between .02 and 2 percent carbon, and may include other elements.

(b) Iron, steel, and manufactured goods. (1) The award term and condition described in this section implements--

(i) Section 1605(a) of the American Recovery and Reinvestment Act of 2009 (Pub. L. 111--5) (Recovery Act), by requiring that all iron, steel, and manufactured goods used in the project are produced in the United States; and

(ii) Section 1605(d), which requires application of the Buy American requirement in a manner consistent with U.S. obligations under international agreements. The restrictions of section 1605 of the Recovery Act do not apply to designated country iron, steel, and/or manufactured goods. The Buy American requirement in section 1605 shall not be applied where the iron, steel or manufactured goods used in the project are from a Party to an international agreement that obligates the recipient to treat the goods and services of that Party the same as domestic goods and services. This obligation shall only apply to projects with an estimated value of $7,443,000 or more.

(2) The recipient shall use only domestic or designated country iron, steel, and manufactured goods in performing the work funded in whole or part with this award, except as provided in paragraphs (b)(3) and (b)(4) of this section.

(3) The requirement in paragraph (b)(2) of this section does not apply to the iron, steel, and

manufactured goods listed by the Federal Government as follows:

_____

[Award official to list applicable excepted materials or indicate "none"]

(4) The award official may add other iron, steel, and manufactured goods to the list in paragraph (b)(3) of this section if the Federal Government determines that--

(i) The cost of domestic iron, steel, and/or manufactured goods would be unreasonable. The cost of domestic iron, steel, and/or manufactured goods used in the project is unreasonable when the cumulative cost of such material will increase the overall cost of the project by more than 25 percent;

(ii) The iron, steel, and/or manufactured good is not produced, or manufactured in the United States in sufficient and reasonably available commercial quantities of a satisfactory quality; or

(iii) The application of the restriction of section 1605 of the Recovery Act would be inconsistent with the public interest.

(c) Request for determination of inapplicability of section 1605 of the Recovery Act or the Buy American Act. (1)(i) Any recipient request to use foreign iron, steel, and/or manufactured goods in accordance with paragraph (b)(4) of this section shall include adequate information for Federal Government evaluation of the request, including--

(A) A description of the foreign and domestic iron, steel, and/or manufactured goods;

(B) Unit of measure;

(C) Quantity;

(D) Cost;

(E) Time of delivery or availability;

(F) Location of the project;

(G) Name and address of the proposed supplier; and

(H) A detailed justification of the reason for use of foreign iron, steel, and/or manufactured goods cited in accordance with paragraph (b)(4) of this section.

(ii) A request based on unreasonable cost shall include a reasonable survey of the market and a completed cost comparison table in the format in paragraph (d) of this section.

(iii) The cost of iron, steel, or manufactured goods shall include all delivery costs to the construction site and any applicable duty.

(iv) Any recipient request for a determination submitted after Recovery Act funds have been obligated for a project for construction, alteration, maintenance, or repair shall explain why the recipient could not reasonably foresee the need for such determination and could not have

requested the determination before the funds were obligated. If the recipient does not submit a satisfactory explanation, the award official need not make a determination.

(2) If the Federal Government determines after funds have been obligated for a project for construction, alteration, maintenance, or repair that an exception to section 1605 of the Recovery Act applies, the award official will amend the award to allow use of the foreign iron, steel, and/or relevant manufactured goods. When the basis for the exception is nonavailability or public interest, the amended award shall reflect adjustment of the award amount, redistribution of budgeted funds, and/or other appropriate actions taken to cover costs associated with acquiring or using the foreign iron, steel, and/or relevant manufactured goods.. When the basis for the exception is the unreasonable cost of the domestic iron, steel, or manufactured goods, the award official shall adjust the award amount or redistribute budgeted funds, as appropriate, by at least the differential established in 2 CFR 176.110(a).

(3) Unless the Federal Government determines that an exception to section 1605 of the Recovery Act applies, use of foreign iron, steel, and/or manufactured goods other than designated country iron, steel, and/or manufactured goods is noncompliant with the applicable Act.

(d) Data. To permit evaluation of requests under paragraph (b) of this section based on unreasonable cost, the applicant shall include the following information and any applicable supporting data based on the survey of suppliers:

Foreign and Domestic Items Cost Comparison

Description	Unit of measure	Quantity	Cost (dollars)*
Item 1:			
Foreign steel, iron, or manufactured good	_____	_____	_____
Domestic steel, iron, or manufactured good	_____	_____	_____
Item 2:			
Foreign steel, iron, or manufactured good	_____	_____	_____
Domestic steel, iron, or manufactured good	_____	_____	_____

[List name, address, telephone number, email address, and contact for suppliers surveyed. Attach copy of response; if oral, attach summary.]

[Include other applicable supporting information.]

[*Include all delivery costs to the construction site.]

WAGE RATE REQUIREMENTS UNDER SECTION 1606 OF THE RECOVERY ACT

(a) Section 1606 of the Recovery Act requires that all laborers and mechanics employed by contractors and subcontractors on projects funded directly by or assisted in whole or in part by and through the Federal Government pursuant to the Recovery Act shall be paid wages at rates not less than those prevailing on projects of a character similar in the locality as determined by the Secretary of Labor in accordance with subchapter IV of chapter 31 of title 40, United States Code.

Pursuant to Reorganization Plan No. 14 and the Copeland Act, 40 U.S.C. 3145, the Department of Labor has issued regulations at 29 CFR parts 1, 3, and 5 to implement the Davis-Bacon and related Acts. Regulations in 29 CFR 5.5 instruct agencies concerning application of the standard

Davis-Bacon contract clauses set forth in that section. Federal agencies providing grants, cooperative agreements, and loans under the Recovery Act shall ensure that the standard Davis-Bacon contract clauses found in 29 CFR 5.5(a) are incorporated in any resultant covered contracts that are in excess of $2,000 for construction, alteration or repair (including painting and decorating).

(b) For additional guidance on the wage rate requirements of section 1606, contact your awarding agency. Recipients of grants, cooperative agreements and loans should direct their initial inquiries concerning the application of Davis-Bacon requirements to a particular federally assisted project to the Federal agency funding the project. The Secretary of Labor retains final coverage authority under Reorganization Plan Number 14.

RECOVERY ACT TRANSACTIONS LISTED IN SCHEDULE OF EXPENDITURES OF FEDERAL AWARDS AND RECIPIENT RESPONSIBILITIES FOR INFORMING SUBRECIPIENTS

(a) To maximize the transparency and accountability of funds authorized under the American Recovery and Reinvestment Act of 2009 (Pub. L. 111--5) (Recovery Act) as required by Congress and in accordance with 2 CFR 215.21 "Uniform Administrative Requirements for Grants and Agreements" and OMB Circular A--102 Common Rules provisions, recipients agree to maintain records that identify adequately the source and application of Recovery Act funds. OMB Circular A--102 is available at http://www.whitehouse.gov/omb/circulars/a102/a102.html.

(b) For recipients covered by the Single Audit Act Amendments of 1996 and OMB Circular A--133, "Audits of States, Local Governments, and Non-Profit Organizations," recipients agree to separately identify the expenditures for Federal awards under the Recovery Act on the Schedule of Expenditures of Federal Awards (SEFA) and the Data Collection Form (SF--SAC) required by OMB Circular A--133. OMB Circular A--133 is available at http://www.whitehouse.gov/omb/circulars/a133/a133.html. This shall be accomplished by identifying expenditures for Federal awards made under the Recovery Act separately on the SEFA, and as separate rows under Item 9 of Part III on the SF--SAC by CFDA number, and inclusion of the prefix "ARRA-" in identifying the name of the Federal program on the SEFA and as the first characters in Item 9d of Part III on the SF--SAC.

(c) Recipients agree to separately identify to each subrecipient, and document at the time of subaward and at the time of disbursement of funds, the Federal award number, CFDA number, and amount of Recovery Act funds. When a recipient awards Recovery Act funds for an existing program, the information furnished to subrecipients shall distinguish the subawards of incremental Recovery Act funds from regular subawards under the existing program.

(d) Recipients agree to require their subrecipients to include on their SEFA information to specifically identify Recovery Act funding similar to the requirements for the recipient SEFA described above. This information is needed to allow the recipient to properly monitor subrecipient expenditure of ARRA funds as well as oversight by the Federal awarding agencies, Offices of Inspector General and the Government Accountability Office.

Applicable for ARRA awards when WAGE RATE REQUIREMENTS UNDER SECTION 1606 OF THE RECOVERY ACT article is used.

DAVIS BACON ACT REQUIREMENTS

Note: Where necessary to make the context of these articles applicable to this award, the term "Contractor" shall mean "Recipient" and the term "Subcontractor" shall mean "Subrecipient or Subcontractor" per the following definitions.

Recipient means the organization, individual, or other entity that receives an award from DOE and is financially accountable for the use of any DOE funds or property provided for the performance of the project, and is legally responsible for carrying out the terms and conditions of the award.

Subrecipient means the legal entity to which a subaward is made and which is accountable to the recipient for the use of the funds provided. The term may include foreign or international organizations (such as agencies of the United Nations).

Davis-Bacon Act

(a) Definition.--"Site of the work"--

(1) Means--

(i) The primary site of the work. The physical place or places where the construction called for in the award will remain when work on it is completed; and

(ii) The secondary site of the work, if any. Any other site where a significant portion of the building or work is constructed, provided that such site is--

(A) Located in the United States; and

(B) Established specifically for the performance of the award or project;

(2) Except as provided in paragraph (3) of this definition, includes any fabrication plants, mobile factories, batch plants, borrow pits, job headquarters, tool yards, etc., provided--

(i) They are dedicated exclusively, or nearly so, to performance of the award or project; and

(ii) They are adjacent or virtually adjacent to the "primary site of the work" as defined in paragraph (a)(1)(i), or the "secondary site of the work" as defined in paragraph (a)(1)(ii) of this definition;

(3) Does not include permanent home offices, branch plant establishments, fabrication plants, or tool yards of a Contractor or subcontractor whose locations and continuance in operation are determined wholly without regard to a particular Federal award or project. In addition, fabrication plants, batch plants, borrow pits, job headquarters, yards, etc., of a commercial or material supplier which are established by a supplier of materials for the project before opening of bids and not on the Project site, are not included in the "site of the work." Such permanent, previously established facilities are not a part of the "site of the work" even if the operations for a period of time may be dedicated exclusively or nearly so, to the performance of a award.

(b) (1) All laborers and mechanics employed or working upon the site of the work will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the

Secretary of Labor under the Copeland Act (29 CFR Part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, or as may be incorporated for a secondary site of the work, regardless of any contractual relationship which may be alleged to exist between the Contractor and such laborers and mechanics. Any wage determination incorporated for a secondary site of the work shall be effective from the first day on which work under the award was performed at that site and shall be incorporated without any adjustment in award price or estimated cost. Laborers employed by the construction Contractor or construction subcontractor that are transporting portions of the building or work between the secondary site of the work and the primary site of the work shall be paid in accordance with the wage determination applicable to the primary site of the work.

(2) Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph (e) of this article; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such period.

(3) Such laborers and mechanics shall be paid not less than the appropriate wage rate and fringe benefits in the wage determination for the classification of work actually performed, without regard to skill, except as provided in the article entitled Apprentices and Trainees. Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein; provided, that the employer's payroll records accurately set forth the time spent in each classification in which work is performed.

(4) The wage determination (including any additional classifications and wage rates conformed under paragraph (c) of this article) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the Contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

(c) (1) The Contracting Officer shall require that any class of laborers or mechanics which is not listed in the wage determination and which is to be employed under the award shall be classified in conformance with the wage determination. The Contracting Officer shall approve an additional classification and wage rate and fringe benefits therefore only when all the following criteria have been met:

(i) The work to be performed by the classification requested is not performed by a classification in the wage determination.

(ii) The classification is utilized in the area by the construction industry.

(iii) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(2) If the Contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives and the Contracting Officer agree on the classification and wage rate (including the amount designated for fringe benefits, where appropriate), a report of the action taken shall be sent by the Contracting Officer to the Administrator of the:

Wage and Hour Division
Employment Standards Administration
U.S. Department of Labor
Washington, DC 20210

The Administrator or an authorized representative will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the Contracting Officer or will notify the Contracting Officer within the 30-day period that additional time is necessary.

(3) In the event the Contractor, the laborers or mechanics to be employed in the classification, or their representatives, and the Contracting Officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the Contracting Officer shall refer the questions, including the views of all interested parties and the recommendation of the Contracting Officer, to the Administrator of the Wage and Hour Division for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the Contracting Officer or will notify the Contracting Officer within the 30-day period that additional time is necessary.

(4) The wage rate (including fringe benefits, where appropriate) determined pursuant to subparagraphs (c)(2) and (c)(3) of this article shall be paid to all workers performing work in the classification under this award from the first day on which work is performed in the classification.

(d) Whenever the minimum wage rate prescribed in the award for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the Contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

(e) If the Contractor does not make payments to a trustee or other third person, the Contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program; provided, that the Secretary of Labor has found, upon the written request of the Contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the Contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

Rates of Wages [Note to Specialist -- Include the DOL Wage Determination as an attachment to the award.]

The minimum wages to be paid laborers and mechanics under this award involved in performance of work at the project site, as determined by the Secretary of Labor to be prevailing for the corresponding classes of laborers and mechanics employed on projects of a character similar to the contract work in the pertinent locality, are included as an attachment to this award. These wage rates are minimum rates and are not intended to represent the actual wage rates that the Contractor may have to pay.
Payrolls and Basic Records

(a) Payrolls and basic records relating thereto shall be maintained by the Contractor during the course of the work and preserved for a period of 3 years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid

(including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made, and actual wages paid. Whenever the Secretary of Labor has found, under paragraph (d) of the article entitled Davis-Bacon Act, that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the Contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

(b)(1) The Contractor shall submit weekly for each week in which any award work is performed a copy of all payrolls to the Contracting Officer. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under paragraph (a) of this article. This information may be submitted in any form desired. Optional Form WH-347 (Federal Stock Number 029-005-00014-1) is available for this purpose and may be purchased from the --

Superintendent of Documents
U.S. Government Printing Office
Washington, DC 20402

The Prime Contractor is responsible for the submission of copies of payrolls by all subcontractors.

(2) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the Contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the award and shall certify --

(i) That the payroll for the payroll period contains the information required to be maintained under paragraph (a) of this article and that such information is correct and complete;

(ii) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the award during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in the Regulations, 29 CFR Part 3; and

(iii) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the award.

(3) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by subparagraph (b)(2) of this article.

(4) The falsification of any of the certifications in this article may subject the Contractor or subcontractor to civil or criminal prosecution under Section 1001 of Title 18 and Section 3729 of

Title 31 of the United States Code.

(c) The Contractor or subcontractor shall make the records required under paragraph (a) of this article available for inspection, copying, or transcription by the Contracting Officer or authorized representatives of the Contracting Officer or the Department of Labor. The Contractor or subcontractor shall permit the Contracting Officer or representatives of the Contracting Officer or the Department of Labor to interview employees during working hours on the job. If the Contractor or subcontractor fails to submit required records or to make them available, the Contracting Officer may, after written notice to the Contractor, take such action as may be necessary to cause the suspension of any further payment. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

Withholding of Funds

The Contracting Officer shall, upon his or her own action or upon written request of an authorized representative of the Department of Labor, withhold or cause to be withheld from the Contractor under this award or any other Federal award with the same Prime Contractor, or any other federally assisted award subject to Davis-Bacon prevailing wage requirements, which is held by the same Prime Contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the Contractor or any subcontractor the full amount of wages required by the award. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work, all or part of the wages required by the award, the Contracting Officer may, after written notice to the Contractor, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

Apprentices and Trainees

(a) Apprentices.

(1) An apprentice will be permitted to work at less than the predetermined rate for the work they performed when they are employed--

(i) Pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship and Training, Employer, and Labor Services (OATELS) or with a State Apprenticeship Agency recognized by the OATELS; or

(ii) In the first 90 days of probationary employment as an apprentice in such an apprenticeship program, even though not individually registered in the program, if certified by the OATELS or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice.

(2) The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the Contractor as to the entire work force under the registered program.

(3) Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated in paragraph (a)(1) of this article, shall be paid not less than the applicable

wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed.

(4) Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the Contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination.

(5) Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination.

(6) In the event OATELS, or a State Apprenticeship Agency recognized by OATELS, withdraws approval of an apprenticeship program, the Contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(b) Trainees.

(1) Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer, and Labor Services (OATELS). The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by OATELS.

(2) Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed in the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate in the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the OATELS shall be paid not less than the applicable wage rate in the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate in the wage determination for the work actually performed.

(3) In the event OATELS withdraws approval of a training program, the Contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(c) Equal employment opportunity. The utilization of apprentices, trainees, and journeymen under this article shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR Part 30.

Compliance with Copeland Act Requirements

The Contractor shall comply with the requirements of 29 CFR Part 3, which are hereby incorporated by reference in this award.
Subcontracts (Labor Standards)

(a) Definition. "Construction, alteration or repair," as used in this article means all types of work done by laborers and mechanics employed by the construction Contractor or construction subcontractor on a particular building or work at the site thereof, including without limitation--

(1) Altering, remodeling, installation (if appropriate) on the site of the work of items fabricated off-site;

(2) Painting and decorating;

(3) Manufacturing or furnishing of materials, articles, supplies, or equipment on the site of the building or work;

(4) Transportation of materials and supplies between the site of the work within the meaning of paragraphs (a)(1)(i) and (ii) of the "site of the work" as defined in the article entitled Davis Bacon Act of this award, and a facility which is dedicated to the construction of the building or work and is deemed part of the site of the work within the meaning of paragraph (2) of the "site of work" definition; and

(5) Transportation of portions of the building or work between a secondary site where a significant portion of the building or work is constructed, which is part of the "site of the work" definition in paragraph (a)(1)(ii) of the Davis-Bacon Act article, and the physical place or places where the building or work will remain (paragraph (a)(1)(i) of the Davis Bacon Act article, in the "site of the work" definition).

(b) The Contractor or subcontractor shall insert in any subcontracts for construction, alterations and repairs within the United States the articles entitled--

(1) Davis-Bacon Act;

(2) Contract Work Hours and Safety Standards Act -- Overtime Compensation (if the article is included in this award);

(3) Apprentices and Trainees;

(4) Payrolls and Basic Records;

(5) Compliance with Copeland Act Requirements;

(6) Withholding of Funds;

(7) Subcontracts (Labor Standards);

(8) Contract Termination -- Debarment;

(9) Disputes Concerning Labor Standards;

(10) Compliance with Davis-Bacon and Related Act Regulations; and

(11) Certification of Eligibility.

(c) The Prime Contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor performing construction within the United States with all the award articles cited in paragraph (b).

(d)(1) Within 14 days after issuance of the award, the Contractor shall deliver to the Contracting Officer a completed Standard Form (SF) 1413, Statement and Acknowledgment, for each subcontract for construction within the United States, including the subcontractor's signed and dated acknowledgment that the articles set forth in paragraph (b) of this article have been included in the subcontract.

(2) Within 14 days after the award of any subsequently awarded subcontract the Contractor shall deliver to the Contracting Officer an updated completed SF 1413 for such additional subcontract.

(e) The Contractor shall insert the substance of this article, including this paragraph (e) in all subcontracts for construction within the United States.

Contract Termination -- Debarment

A breach of the award articles entitled Davis-Bacon Act, Contract Work Hours and Safety Standards Act -- Overtime Compensation, Apprentices and Trainees, Payrolls and Basic Records, Compliance with Copeland Act Requirements, Subcontracts (Labor Standards), Compliance with Davis-Bacon and Related Act Regulations, or Certification of Eligibility may be grounds for termination of the whole award or in part for the Recovery Act covered work only, and for debarment as a Contractor and subcontractor as provided in 29 CFR 5.12.

Compliance with Davis-Bacon and Related Act Regulations

All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR Parts 1, 3, and 5 are hereby incorporated by reference in this award.

Disputes Concerning Labor Standards

The United States Department of Labor has set forth in 29 CFR Parts 5, 6, and 7 procedures for resolving disputes concerning labor standards requirements. Such disputes shall be resolved in accordance with those procedures and not the Disputes and Appeals as defined in 10 CFR 600.22. Disputes within the meaning of this article include disputes between the Contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

Certification of Eligibility

(a) By entering into this award, the Contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the Contractor's firm is a person or firm ineligible to be awarded Government awards by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(b) No part of this award shall be subcontracted to any person or firm ineligible for award of a Government award by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(c) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

Approval of Wage Rates

All straight time wage rates, and overtime rates based thereon, for laborers and mechanics engaged in work under this award must be submitted for approval in writing by the head of the contracting activity or a representative expressly designated for this purpose, if the straight time wages exceed the rates for corresponding classifications contained in the applicable Davis-Bacon Act minimum wage determination included in the award. Any amount paid by the Contractor to any laborer or mechanic in excess of the agency approved wage rate shall be at the expense of the Contractor and shall not be reimbursed by the Government. If the Government refuses to authorize the use of the overtime, the Contractor is not released from the obligation to pay employees at the required overtime rates for any overtime actually worked.

Section X - APPENDICES/REFERENCE MATERIAL

APPENDIX 1: END OF PROJECT TARGETS TEMPLATE

Final Deliverable Prototype Scale/Form Factor

Requirement Category	*Scale (Ah & Wh)*	*Form Factor (i.e. cylindrical, pouch, system, etc)*
End of Project Deliverable		

Primary Technical Requirements:

Requirement ID Number	*Requirement Category*	*End of Project Target System Value (Units)*	*End of Project Target Cell Value (Units)*
1.1	Specific Energy Density (at C/3 discharge rate)	(if applicable)	
1.2	Volumetric Energy Density (at C/3 discharge rate)	(if applicable)	
1.3	System Cost Estimate		

Secondary Technical Targets:

Target ID Number	*Target Category*	*End of Project Target*
2.1	Specific Power Density (80% Depth of Discharge, 30s)	
2.2	Volumetric Power Density (80% Depth of Discharge, 30s)	
2.3	Cycle Life (80% DOD)	
2.4	Round Trip Efficiency (at C/3 charge/discharge)	
2.5	Temperature Tolerance	
2.6	Self Discharge	
2.7	Safety	
2.8	Calendar Life	

APPENDIX 2: FULL APPLICATION DATA

The following information will be required by the ARPA-E eXCHANGE (for details please see Section IV.B) for each Full Application submitted.

- Project Title
- Abstract
- Lead Organization
- Organization Type
- Team Members
- Total Cost to ARPA-E
- Proposed Cost Share
- Period of Performance
- Technical Point of Contact
- Administrative Point of Contact
- Technology Readiness Level (Current)
- Technology Readiness Level (Project End)
- Full Application consisting of:
    1. Technical Volume
    2. SF-424
    3. SF-424A
    4. SF-424A Budget Justification
    5. NEPA Compliance Form
    6. Public Summary
    7. Summary Slide

APPENDIX 3: TECHNOLOGY READINESS LEVEL

TRL-1. **Basic principles observed and reported**
This is lowest level of technology readiness. 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 research and development. Example might include studies of a technology's basic properties.

TRL-2. **Technology concept and/or application formulated**
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.

TRL-3. **Analytical and experimental critical function and/or characteristic proof of concept**
Active research and development 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.

TRL-4. **Component and/or breadboard validation in laboratory environment**
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.

TRL-5. **Component and/or breadboard validation in relevant environment**
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.

TRL-6. **System/subsystem model or prototype demonstration in a relevant environment**
Representative model or prototype system, which is well beyond that of RL-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.

TRL-7. **System prototype demonstration in a operational environment**
This represents a major step up from RL-6. 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.

TRL-8. **Actual system completed and qualified through test and demonstration**
Technology has been proven to work in its final form and under expected conditions. In almost all cases, this RL-8 represents the end of true system development. Examples include developmental test and evaluation of the system in its intended parent system to determine if it meets design specifications.

TRL-9. **Actual system proven through successful mission operations**
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.

DEFINITIONS (for Appendix 3)

"BREADBOARD": Integrated components that provide a representation of a system/subsystem and that can be used to determine concept feasibility and to develop technical data. These tools are typically configured for laboratory use to demonstrate technical principles of immediate interest. These may resemble final system/subsystem in function only.

"HIGH FIDELITY": Addresses form, fit and function. High-fidelity laboratory environment would involve testing with equipment that can simulate and validate all system specifications within a laboratory setting.

"LOW FIDELITY": A representative of the component or system that has limited ability to provide anything but first order information about the end product. Low-fidelity assessments are used to provide trend analysis.

"MODEL": A functional form of a system generally reduced in scale, near or at operational specification. Models will be sufficiently developed to allow demonstration of the technical and operational capabilities required of the final system.

"OPERATIONAL ENVIRONMENT": Environment that addresses all of the operational requirements and specifications required of the final system to include platform/packaging.

"PROTOTYPE": The first early representation of the system that offers the expected functionality and performance expected of the final implementation. Prototypes will be sufficiently developed to allow demonstration of the technical and operational capabilities required of the final system.

"RELEVANT ENVIRONMENT": Testing environment that simulates the key aspects of the operational environment.

"SIMULATED OPERATIONAL ENVIRONMENTAL": Either 1) a real environment that can simulate all of the operational requirements and specifications required of the final system, or 2) a simulated environment that allows for testing of a virtual prototype; used in either case to determine whether a developmental system meets the operational requirements and specifications of the final system.

APPENDIX 4: COST SHARE INFORMATION

The regulations that govern Federal Financial Assistance for DOE are found at 10 Code of Federal Regulations (CFR) Part 600 and 603. Specifically, Sections 600.123, 600.224, 600.313, "Cost sharing and matching", and 603.525 through 603.555, "Cost Sharing" provide guidance on acceptable contributions toward cost share requirements, as well as guidance on the valuation and documentation of contributions, for "for profit" organizations. These requirements, as contained in the regulations, are summarized below.

Acceptable contributions, including cash contributions and third party contributions, must be accepted as part of the recipient's cost sharing or matching if such contributions meet all of the following criteria:

- They are verifiable from the recipient's records.
- They are not included as contributions for any other federally-assisted project or program.
- They are necessary and reasonable for proper and efficient accomplishment of the project.
- They are allowable under the applicable cost principles for the applicant.
- They are not paid by the Federal Government under another award unless authorized by Federal statute to be used for cost sharing or matching.
- They are provided for in the approved budget.
- They conform to other provisions of this part, as applicable.

Cost sharing may include in-kind contributions. General examples of potentially allowable cost share are shown below. However, applicants must confirm with DOE upon selection that the cost share proposed in response to this FOA is allowable.

- Cash provided directly by the recipient, or a sub-recipient;
- State or local government funds provided to support the proposed project, which were not provided to the State by the federal Government;
- Employees' salaries included in the budget, if paid by the employer (recipient or sub-recipient), and not reimbursed by the federal funding of the project;
- Rental value of buildings or equipment necessary to the success of the proposed project and the value of which is included in the budget for the project;
- Monetary value of SOPO activities to be performed by a third party which are included in the project budget and will not be reimbursed by federal funds.