

Not Specified /Other

**FINANCIAL ASSISTANCE
FUNDING OPPORTUNITY ANNOUNCEMENT**



**U. S. Department of Energy
National Energy Technology Laboratory
FY 2011 Vehicle Technologies Program Wide
Funding Opportunity Announcement
Funding Opportunity Number: DE-FOA-0000239**

Announcement Type: Initial

CFDA Number: 81.086 Conservation Research and Development

Issue Date:	December 16, 2010
Letter of Intent Due Date:	January 18, 2011
Pre-Application Due Date:	Not Applicable
Application Due Date:	February 28, 2011 at 8:00:00 PM Eastern Standard Time

NOTE: REGISTRATION/SUBMISSION REQUIREMENTS

Registration Requirements

There are several one-time actions you must complete in order to submit an application in response to this Announcement (e.g., obtain a Dun and Bradstreet Data Universal Numbering System (DUNS) number, register with the Central Contractor Registration (CCR), and register with Grants.gov). Applicants who are not registered with CCR and Grants.gov, should allow at least 21 days to complete these requirements. It is suggested that the process be started as soon as possible. **Failure to complete any of these one-time actions in a timely manner will result in the applicant's inability to submit and application through Grants.gov; and the Government will only consider applications submitted through Grants.gov for an award.**

Applicants must obtain a DUNS number. DUNS website: <http://fedgov.dnb.com/webform>.

Applicants must register with the CCR. CCR website: <http://www.ccr.gov/>

Applicants must register with Grants.gov. Grants.gov website: <http://grants.gov/>

Applicants must register with FedConnect to submit questions. FedConnect website: www.fedconnect.net

Questions

Questions relating to the **system requirements or how an application form works** must be directed to Grants.gov at 1-800-518-4726 or support@grants.gov.

Questions regarding the **content** of the announcement must be submitted through the FedConnect portal. You must register with FedConnect to respond as an interested party to submit questions, and to view responses to questions. **It is recommended that you register as soon after release of the FOA as possible to have the benefit of all responses to questions submitted.** DOE will try to respond to a question within 3 business days, unless a similar question and answer have already been posted on the website. All questions submitted shall clearly identify the Area of Interest (AOI) and Subtopic Area to insure a timely and accurate response. Failure to identify the AOI/Subtopic area may result in additional time to address the question or require further correspondence for further clarification regarding the submitted questions. Please be as specific as possible when asking questions to insure that questions will be adequately addressed.

Application Preparation and Submission

Applicants must download the application package, application forms and instructions, from Grants.gov. Grants.gov website: <http://www.grants.gov/>
(Additional instructions are provided in Section IV A of this FOA.)

Where to Submit

Applications must be submitted through Grants.gov to be considered for award. You cannot submit an application through Grants.gov unless you are registered. Please read the registration requirements carefully and start the process immediately. Remember you have to update your CCR registration annually. If you have any questions about your registration, you should contact the Grants.gov Helpdesk at 1-800-518-4726 to verify that you are still registered in Grants.gov.

IMPORTANT NOTICE TO POTENTIAL APPLICANTS: When you have completed the process, you should call the Grants.gov Helpdesk at 1-800-518-4726 to verify that you have completed the final step (i.e. Grants.gov registration).

PART I-FUNDING OPPORTUNITY DESCRIPTION	5
PART II-AWARD INFORMATION	26
A. TYPE OF AWARD INSTRUMENT	26
B. ESTIMATED FUNDING	26
C. MAXIMUM AND MINIMUM AWARD SIZE	26
D. EXPECTED NUMBER OF AWARDS	28
E. ANTICIPATED AWARD SIZE	29
F. PERIOD OF PERFORMANCE	30
G. TYPE OF APPLICATION	30
PART III-ELIGIBILITY INFORMATION	31
A. ELIGIBLE APPLICANTS	31
B. COST SHARING	31
PART IV- APPLICATION AND SUBMISSION INFORMATION	35
A. ADDRESS TO REQUEST APPLICATION PACKAGE	35
B. LETTER OF INTENT AND PRE-APPLICATION	35
C. CONTENT AND APPLICATION FORMS	35
E. SUBMISSION DATES AND TIMES	46
F. INTERGOVERNMENTAL REVIEW	46
G. FUNDING RESTRICTIONS	46
H. OTHER SUBMISSION AND REGISTRATION REQUIREMENTS	47
PART V- APPLICATION REVIEW INFORMATION	48
A. CRITERIA	48
B. REVIEW AND SELECTION PROCESS	51
C. ANTICIPATED NOTICE OF SELECTION AND AWARD DATES	51
PART VI- AWARD ADMINISTRATION INFORMATION	52
A. AWARD NOTICES	52
B. ADMINISTRATIVE AND NATIONAL POLICY REQUIREMENTS	52
DUNS AND CCR REQUIREMENTS	52
SUBAWARD AND EXECUTIVE REPORTING	52
C. REPORTING	53
PART VII- QUESTIONS/AGENCY CONTACTS	54
A. QUESTIONS	54
B. AGENCY CONTACT	54
PART VIII- OTHER INFORMATION	55
A. MODIFICATIONS	55
B. GOVERNMENT RIGHT TO REJECT OR NEGOTIATE	55
C. COMMITMENT OF PUBLIC FUNDS	55
D. PROPRIETARY APPLICATION INFORMATION	55
E. EVALUATION AND ADMINISTRATION BY NON-FEDERAL PERSONNEL	55
F. INTELLECTUAL PROPERTY DEVELOPED UNDER THIS PROGRAM	56
G. NOTICE OF RIGHT TO REQUEST PATENT WAIVER	56
H. NOTICE REGARDING ELIGIBLE/INELIGIBLE ACTIVITIES	56

PART I-FUNDING OPPORTUNITY DESCRIPTION

Program and Project Description:

The Department of Energy’s (DOE) National Energy Technology Laboratory (NETL), on behalf of the DOE Office of Energy Efficiency and Renewable Energy (EERE), Vehicle Technologies (VT) Program, is issuing a Funding Opportunity Announcement (FOA) entitled “FY2011 Vehicle Technologies Program Wide Funding Opportunity Announcement.”

The mission of the VT program is to develop more energy-efficient and environmentally friendly technologies for highway transportation vehicles (cars and trucks) that will meet or exceed performance expectations and environmental requirements, and enable America to use significantly less petroleum and reduce greenhouse gas (GHG) emissions. The VT program focuses on highway vehicles, which account for 55 percent of total U.S. oil use — more than all U.S. domestic oil production. Cost-competitive, more energy-efficient and fuel diverse vehicles will enable individuals and businesses to accomplish their daily tasks while reducing consumption of gasoline and diesel fuels. This will reduce U.S. demand for petroleum, lower carbon emissions, and decrease energy expenditures. A description of VT Program Planning to support the aforementioned mission is located at

http://www1.eere.energy.gov/vehiclesandfuels/pdfs/pir/vtp_planning.pdf.

The VT Program funds the advanced technology Research & Development (R&D) needed to achieve these goals. In the near to mid-term, transportation energy use can be reduced through improved vehicle energy efficiency from more efficient advanced combustion engines, Hybrid-Electric Vehicle (HEV) and Plug-In Hybrid Electric Vehicle (PHEV) powertrains, and reducing vehicle weight. Other alternative fuels, such as ethanol, natural gas, electricity with storage, and biodiesel, can also provide attractive means for reducing oil use through fuel displacement. The VT Multi-Year Program plan can be viewed at

http://search.nrel.gov/query.html?fs=http%3A//www1.eere.energy.gov/vehiclesandfuels/pdfs/mypp/a1_cps_mypp_cros.pdf&ws=0&rq=0&qm=0&charset=utf-8&style=eere&col=eren&qc=eren&qp=url%3Awww1.eere.energy.gov/vehiclesandfuels/+url%3Awww.eere.energy.gov/vehiclesandfuels/.

Program Areas of Interest:

This funding opportunity announcement (FOA) contains multiple Areas of Interest and Subtopic Areas as shown below.

Area of Interest and Subtopic Area	TITLE	Minimum Cost Share Requirements
AREA OF INTEREST 1- ADVANCED FUELS AND LUBRICANTS TECHNOLOGIES		
1A	Fuels and Lubricants for Advanced Combustion Regimes	20%
1B	Direct Petroleum Displacement by Liquid Alternative Fuels for Compression-Ignition Engines in Transportation	20%
1C	Lubricant Formulations to Enhance Engine Efficiency	20%
AREA OF INTEREST 2- LIGHTWEIGHTING MATERIALS		
2A	Low-Cost Development of Magnesium	50%
2B	Development of Low-Cost Carbon Fiber	50%
2C	Demonstration Project to Develop and Construct a Magnesium Intensive Vehicle Front End Sub-Structure	50%
2D	Demonstration Project to Validate Crash Model For Carbon Fiber Composites to Enable Production-Feasible Composites in Primary-Structural Automotive Crash and Energy Management Applications	50%

Not Specified /Other

AREA OF INTEREST 3 –DEMONSTRATION PROJECT FOR A MULTI-MATERIAL LIGHT-WEIGHT PROTOTYPE VEHICLE AS PART OF THE CLEAN ENERGY DIALOGUE WITH CANADA		
3	Demonstration Project for a Multi-Material Light-Weight Prototype Vehicle as Part of the Clean Energy Dialogue with Canada	50%
AREA OF INTEREST 4- DEVELOP ADVANCED CELLS AND DESIGN TECHNOLOGY FOR ELECTRIC DRIVE BATTERIES		
4A	Develop Advanced Cells for Electric Drive Vehicle Batteries	20%
4B	Develop Cells and/or Battery Packs with Significant Cost Improvement	20%
4C	Improve Cell and/or Battery Pack Inactive Component Designs for Significant Cost Improvement	20%
4D	Improve Cell and/or Battery Pack Thermal Management Approaches	20%
AREA OF INTEREST 5- ADVANCED POWER ELECTRONICS AND ELECTRIC MOTORS (APEEM) TECHNOLOGIES		
5A	Modular, Scalable Inverter for Advanced Electric Drive Vehicle Electric Traction Drives	20%
5B	Motors with Reduced or Eliminated Use of Rare Earth Permanent Magnets for Advanced EDV Electric Traction Drives	20%
AREA OF INTEREST 6-THERMOELECTRICS AND ENABLING ENGINE TECHNOLOGIES		
6A	Solid State Thermoelectric Energy Conversion Devices	20%
6B	Enabling Technologies for Engine and Powertrain Systems	20%
AREA OF INTEREST 7-FLEET EFFICIENCY		
7A	Fuel Efficient Tires	20%
7B	Driver Feedback Technology	20%
AREA OF INTEREST 8-ADVANCED VEHICLE TESTING AND EVALUATION		
8	Advanced Vehicle Testing and Evaluation	20%

NOTE 1:

All applications are Due (Insert Date Here), 8:00 PM EST and all applications must be submitted prior to the closing date through [Grants.gov](https://www.grants.gov).

NOTE 2:

The Government is contemplating multiple selections for the various Areas of Interest (AOI) contingent upon the number of applications received in a particular AOI and the availability of funds. Therefore, DOE may elect to notify applicants selected for award in a given AOI(s) rather than notifying all of the applicants selected for award from the entire announcement. Essentially ,DOE may elect to stagger selection dates per AOI.

NOTE 3:

Applicants must identify the Area of Interest and Subtopic Area they are applying to in the project Narrative and identify the Area of Interest and Subtopic Area in the file name. For example if an applicant were applying to Area of Interest 1 and Subtopic 1A (Project01A.pdf); if applying to Area of Interest 2 and Subtopic Area 2A (Project02A.pdf); if applying to Area of Interest 3 (Project03 (identify vehicle type here in title).pdf); and if applying to Area of Interest 4 and Subtopic 4A (Project04A.pdf) and so forth down the line per Area of Interest and Subtopic Area. Each application must have its own unique title.

Applicants must submit their application under the Program Area of Interest and Subtopic Area that

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they feel best fits the majority of the effort to be performed and identify the Area of Interest and Subtopic Area intent upfront. If DOE believes an application fits more appropriately in a Program Area of Interest and Subtopic Area other than the one to which it was submitted, DOE may consider the application under the more appropriate Area of Interest and Subtopic Area with the written approval of the applicant. Do not submit identical applications under more than one Area of Interest and Subtopic Area or single applications which address multiple Areas of Interest and Subtopic Areas. If multiple applications are received under a single Area of Interest and Subtopic Area from an applicant, DOE will contact the applicant for clarification on which application they would like to have evaluated.

Applicants may submit applications to one or more Areas of Interest or Subtopic Areas. HOWEVER, the applicant must submit an application for each Area of Interest and Subtopic Area separately. Multiple Areas of Interest and Subtopic Areas cannot be applied for in one application. In the event, that a single application addresses multiple Areas of Interest and Subtopic Areas the application will only be reviewed under the Area of Interest and Subtopic Area to which is was submitted.

NOTE 4:

As outlined in PART III-Eligibility Information, Section C-Other Eligibility Requirements Performance of Work in the United States. As a condition of award under this announcement, applicants must agree that at least 75% of the direct labor cost for the project (including subcontractor/subrecipient labor) will be incurred in the United States unless the applicant can demonstrate to DOE that the US economic interest will be better served through a greater percentage of work performed outside the US.. See Part III, Section C for more information. The requirement applies to all AOIs except AOI 3.

Area of Interest (AOI) 1: Advanced Fuels and Lubricants Technologies:

The goal of this AOI is to support advanced fuels and lubricants technologies that will enable optimal performance of advanced combustion engines for passenger and commercial vehicle applications. Applications are sought proposing fuels- and lubricant-related R&D projects in accordance with the subtopics identified below. For all subtopics, technologies may be applicable to compression ignition and/or spark ignition engines.

Subtopic 1A: Fuels and Lubricants for Advanced Combustion Regimes:

This subtopic seeks fuel-focused research on the facilitation or enhancement of advanced combustion regime engine operation— e.g., Homogeneous Charge Compression Ignition (HCCI), Low Temperature Combustion (LTC), etc. In the most-general terms, the term “advanced combustion regimes” is intended to encompass clean and highly-efficient, liquid-fueled combustion engines. Such engines may incorporate novel thermodynamic cycles, but should not simply involve regurgitation of existing concepts (e.g., Miller Cycle, reference: http://en.wikipedia.org/wiki/Miller_cycle).The engines shall have extremely low engine-out nitrogen oxides (NOx) and particulate matter (PM) as a target; and shall have efficiency similar to state-of-the-art direct injection diesel engines (i.e., approximately 45% peak thermal efficiency for light duty and greater-than 50% peak thermal efficiency for heavy duty). It is highly encouraged that applicants collaborate and team with an original equipment manufacturer (OEM) or industrial supplier.

Subtopic 1B: Direct Petroleum Displacement by Liquid Alternative Fuels in Vehicle Applications

This subtopic seeks research and development projects or demonstration activities related to novel renewable or alternative fuels which displace petroleum-derived fuels in vehicle applications without significant infrastructure changes, e.g., drop-in fuels or blendstocks. Fuels currently sourced or that can be sourced in the United States are highly encouraged. Such fuels should be currently available, or have the potential to become, commercially practical within the next 10 years. An analysis supporting assumptions associated with commercial practicality shall be addressed in the application.

Subtopic 1C: Lubricant Formulations to Enhance Engine Efficiency

This subtopic seeks research and development projects on novel lubricant formulations expected to improve the efficiency of advanced combustion regime engines by at least 10% (improvement based on comparison to similarly configured 2002 or later commercially available combustion engine).

Area of Interest 2: Lightweighting Materials:

The objective of this AOI is to accelerate the realization of lighter weight vehicle materials made from magnesium and carbon fiber capable of attaining 50% weight reduction of passenger vehicles. Reducing the weight of the vehicle makes it more fuel efficient and, in turn, reduces the use of petroleum and the release of greenhouse gasses. Currently, the most promising light weight materials for this application are magnesium and carbon fiber composites each demonstrating potential for greater than 50% weight savings. The successful market implementation of these materials in vehicles requires that they be low cost and available in sufficient abundance to make a compelling business case. For this reason the focus of this AOI includes the development of low-cost approaches to the manufacturing of both magnesium and carbon fiber.

Subtopic Area 2A: Low-Cost Development of Magnesium

This subtopic area is for development of a low-cost approach to making magnesium which would include a strategy utilizing readily available raw materials from the United States, an energy conversion approach that is clean and efficient, and a form of the product that is sufficiently pure as to be readily inserted into a vehicle manufacturing value stream enabling a straightforward commercialization strategy into the vehicular market. Applications shall include an analysis which includes quantifiable metrics (e.g., progress toward clean production of the product measured in tons per year) documenting the viability of a United States domestic process for manufacturing magnesium that is cleaner and emits less greenhouse gases compared to current standard practice as well as the estimated improvement in the following attributes: cleaner process, cost reduction, and production viability. It is highly encouraged that applicants collaborate and team with an original equipment manufacturer (OEM) or industrial supplier.

Subtopic Area 2B: Development of Low-Cost Carbon Fiber

This subtopic seeks to study alternative routes to the formation of viable low-cost carbon fiber (approximately \$5/lb or less). This topic requests a plan that demonstrates a route to low-cost carbon fiber by making precursor, converting it to carbon fiber, and making and testing polymer composites to validate the carbon fiber properties. A cost analysis shall demonstrate the successful low-cost manufacture using the proposed route. Validation of the approach shall demonstrate, with quantifiable metrics, the viability of a low-cost carbon fiber that meets the following goals that, when implemented to reduce the weight of the vehicle, will enable a significant reduction in the emission of greenhouse gases:

- Cost at less than or equal to \$5/lb;
- Strength of greater than or equal to 250Ksi;
- Modulus of greater than or equal to 25Msi; and
- Strain of greater than or equal to 1%,

While not a requirement, it is highly desirable that the starting material not be dependent on petroleum precursors. Likewise the intention of this effort is not to duplicate prior work on lignin precursors but to develop and evaluate innovative alternative approaches to making a low-cost carbon fiber. The ideal approach would include low-cost and domestic abundant raw materials, and low-cost and clean energy conversion to the final form of carbon that has sufficient mechanical attributes to successfully realize a straightforward commercialization strategy into vehicular composites. Validation shall include the incorporation of the carbon fiber into polymer composite test specimens and appropriate mechanical characterization using standard testing protocols. Collaboration with or participation by industrial suppliers is strongly encouraged. Applications shall identify a clear path to commercialization that includes prior examples of successful commercialization of new automotive technologies on the scale needed to positively impact the reduction of greenhouse gasses.

Subtopic Area 2C: Demonstration Project to Develop and Construct a Magnesium Intensive Vehicle Front End Sub-structure

This subtopic seeks to develop and construct a magnesium intensive vehicle front end sub-structure that is enabled through the application of new alloy, processing, joining, and modeling techniques. A magnesium intensive front end sub-structure should be assembled from sheet, die cast, and extruded magnesium components along with other materials as necessary to demonstrate multi-material joining techniques and adequate structural/crash performance. The goal is to establish a performance baseline for structural systems manufactured primarily in magnesium while also improving the state of the art in the following key technical areas: crashworthiness; noise, vibration, and harshness (NVH); fatigue and durability; corrosion and surface treatment; extrusion; sheet manufacturing and forming; casting; welding and joining; and modeling and computational engineering. This topic seeks to advance existing technologies closer to commercial use and to identify key technology gaps in existing processing methods. The ideal approach includes development of computer models for structural, durability, and failure performance which can then be validated against results from actual sub-structure performance tests. Validation and testing of a large number of assemblies is anticipated in order to adequately demonstrate technology performance and model accuracy. The development and construction of a magnesium intensive front end sub-structure shall

Not Specified /Other

include participation from automotive OEM(s), automotive suppliers, magnesium suppliers, universities, and international collaborators. The application must cite previous experience in design of magnesium intensive automotive structures and include a preliminary design for this topic. Applications shall identify a clear path to commercialization that includes prior examples of successful commercialization of new automotive technologies on the scale needed to positively impact the reduction of greenhouse gasses.

Subtopic Area 2D: Demonstration Project to Validate Crash Model For Carbon Fiber Composites to Enable Production-Feasible Composites in Primary-Structural Automotive Crash and Energy Management Applications.

This subtopic seeks demonstration projects focusing on reducing the weight of the vehicle by enabling the use of carbon fiber structural composites through validation of existing multi-scale model(s) for crash energy management by designing, manufacturing, and testing an appropriate demonstration primary structural part made of carbon fiber composites. The goal is to verify and validate the physics-based computational tools by predicting quasi-static and dynamic behavior and structural crash performance of a demonstration part such as an automotive subassembly (e.g., front-end). ***This topic does not seek to develop new models, but rather to validate existing model(s) by comparing actual test data to predicted data.*** While it is desirable that such a predictive tool be incorporated into any existing composite material-damage model, it is sufficient for there to be a feasible path to do so. This topic seeks innovation by measuring the capability of the model through validation and, as such, it is highly recommended that applicants include a vertically integrated team consisting of OEM(s), composite manufacturers, and universities. The proposed application must cite previous data that supports good agreement between the model(s) and test data on a coupon size sample level in order to verify that validation on a larger demonstration part is clearly the next step.

Area Of Interest 3: Demonstration Project for a Multi-Material Light-Weight Prototype Vehicle as part of the Clean Energy Dialogue with Canada

Applications submitted within this AOI shall propose a demonstration project for a prototype multi-material light-weight vehicle that is part of the Clean Energy Dialogue between the United States and Canada (Reference: <http://www.energy.gov/news2009/7552.htm>). This effort shall design, build and validate a light-weight material prototype vehicle that is 50% lighter through reduction in weight of the vehicle when compared to a baseline light-duty vehicle commercially available in 2002. ***Off-road vehicles, motorcycles, three-wheeled vehicles, neighborhood electric vehicles, low-speed vehicles, medium-duty vehicles, heavy-duty vehicles and other non-conventional passenger vehicles are not desired and will be deemed nonresponsive to this announcement.***

This AOI seeks innovative approaches in three ways: 1) in the materials design of the lighter weight system, 2) the inclusion of a vertical partnership that includes a supplier and an original equipment manufacturer (OEM) partner who will validate the built system, and 3) in the resulting impact on the way lighter weight materials are integrated into the vehicle system on the factory floor. The successful integration of all three of these innovative elements shall result in a significantly new approach that enables lighter weight and lower cost while maintaining excellent safety for vehicles of the future.

Applications shall have a Statement of Project Objectives (SOPO) that includes tasks to be performed both in the United States and in Canada to facilitate the necessary cooperation between the U.S. and Canada under the umbrella of the Clean Energy Dialogue and show an understanding and integration of the work to be funded by the two respective countries. Each country is responsible for funding and performing its own tasks. The results of the work done in each country shall be shared with the supporting entity of the other country.

. The DOE under this AOI will only fund cost shared tasks that are performed in the United States and will not fund tasks performed in Canada. Therefore the requirement that 75% of direct labor costs be incurred in the U.S. does not apply under this AOI, rather 100% of the DOE and applicant cost shared tasks must be

Not Specified /Other

performed in the United States. If selected, the entire award value will include the effort performed in Canada, but the cost of the Canadian effort will not be part of the non-federal source of cost share to meet the costs share requirements for this particular AOI. Cost associated with the tasks being performed in Canada shall be included in the overall budget proposed for the project.

In order to validate that the application is supportive of the Clean Energy Dialogue, the application shall include a letter of intent from a Canadian government entity indicating that certain tasks included in the project proposed under this AOI are being funded by that entity under the Clean Energy Dialogue. The letter must be signed by the person authorized to commit the expenditure of funds by the entity.

Applications seeking to support this topic that do not contain a letter of intent as described above, will be deemed nonresponsive to this announcement and will not be considered for comprehensive merit review.

Applications shall address the innovation both for the technology as well as the approach (materials design, a vertically integrated partnership, and the approach to integration of the materials on the factory floor). Economic benefits to both the U.S. and Canada should be identified as appropriate; however the benefit to the U.S. shall clearly be identified in a separate metric. Also, in order for the resulting demonstration project to contribute to the reduction of green house gas emissions as well as the reduction of use of petroleum, the innovations developed under this topic must penetrate the marketplace. Applications shall identify a clear path to commercialization that includes prior examples of successful commercialization of new automotive technologies on the scale needed to positively impact the reduction of greenhouse gasses.

AOI 4: Develop Advanced Cells and Design Technology for Electric Drive Batteries

The purpose of this AOI is to develop high energy or high power Electronically Driven Vehicles (EDVs) cells that significantly exceed existing state-of-the-art technologies in terms of performance and/or cost. The subtopic areas include extremely high energy cells for use in Electric Vehicles (EVs) and Plug-In Hybrid Electric vehicles (PHEVs) with extended all electric range and high power systems that offer significant performance enhancements and cost reductions over existing technologies for Hybrid Electric Vehicle (HEV) applications. Cell development using domestic suppliers of active and inactive cell materials is highly encouraged.

Subtopic 4A: Develop Advanced Cells for Electric Drive Vehicle Batteries

The purpose of this subtopic is development and demonstration of new materials and cells that offer a significant (approaching 2x) improvement in either energy or power density (measured in Watthours per liter (Wh/l) or Watts per liter (W/l)) over state-of-the-art Lithium-ion (Li-ion) cell technologies while maintaining comparable performance standards in terms of cycle life (300-1000 cycles at 80% depth of discharge), calendar life (5-10 years), and durable cell construction and design capable of being affordably mass produced. Projected commercial costs of this product shall be developed from internal cost estimates. Analysis shall be provided by the applicant to document the baseline material or cell used for comparison while calculating improvements and shall also include a cost comparison which documents the rationale for the projected cost of the developed end item. End item cell performance will be measured using USABC PHEV or EV test procedures (http://www.uscar.org/guest/article_view.php?articles_id=74) in DOE independent validation tests using deliverables resulting from this effort.

Some specific technologies which are of interest include (but are not limited to) battery cells (minimum 2 amp-hour (Ah) capacity) that incorporate one or more of the following:

- High voltage (5V) and/or high capacity (>300 milliamp-hour/gram (mAh/g) active material) cathodes
- Alloy or Li metal anodes
- High voltage and solid polymer composite electrolytes
- Li/air and Li/S systems
- Other novel technologies or cells

Subtopic 4A Deliverables to be included in the SOPO:

1. Cell and battery test plans
2. Cell design documentation
3. Appropriate cell or battery performance and abuse test reports
4. 18 baseline cells, 18 interim cells and 24 final design cells for independent testing

All hardware deliverables shall be provided to the Department of Energy for validation testing to be performed at DOE National Laboratories. Non-Destructive Performance Validation testing will be conducted on the deliverable materials, cells, modules or full battery systems (developed end items) to validate performance. This testing will be conducted outside the Statement of Project Objectives for this agreement and therefore should not be addressed in the SOPO nor included in the total estimated project costs associated with this application. Participation by DOE test agencies in test planning and execution will be addressed by a Non Disclosure Agreement (NDA) between the test agency and the end item manufacturer. Test procedures will incorporate specifications and limits supplied by the manufacturer for the specific technology such as voltage and current limits, state of charge, charging, and temperature recommendations, number of test sequences, or other relevant test conditions as appropriate. The results of the DOE laboratory testing will be documented in a publicly releasable Summary Test Report (approved by both DOE and the Recipient prior to release) that validates performance of the deliverables relative to the end item performance targets as well as the technology deployment impact relative to DOE strategic goals. The Summary Test Report will be approved by, and delivered to, the DOE (Vehicle Technologies Program) and end item manufacturer. Test materials, cells, modules, full battery systems (manufacturing end item), or special test equipment supplied by the end item manufacturer for the purposes of the test will be returned at the conclusion of testing at no cost to the recipient or the project.

Subtopic 4B: Develop Cells and/or Battery Packs With Significant Cost Improvement

The focus of this subtopic is the development and demonstration of new materials or battery components that offer a 50% reduction in cost over existing state-of-the-art Li-ion technologies while maintaining, or nearly maintaining, existing performance standards. Performance requirements are critical for commercialization, and applicants shall demonstrate that their technology is capable of achieving them. However, the main focus of work in this area shall be to develop and demonstrate cells that show revolutionary cost reductions over existing cells and batteries while maintaining DOE electric drive vehicle battery performance and life requirements. Analysis shall be provided to document the baseline material or cell used for comparison while calculating cost improvements. Analysis shall document any performance degrading aspects of the proposed technology concept. End item cell performance will be measured using USABC EV test procedures (http://www.uscar.org/guest/article_view.php?articles_id=74) in DOE independent validation tests using deliverables resulting from this effort.

Some specific technologies which are of interest include (but are not limited to) one or more of the following:

- Asymmetric ultracapacitors (developer may propose to deliver cells, modules, or battery packs)
- High-power lead acid systems (developer may propose to deliver cells, modules, or battery packs)
- Technologies that reduce the time needed for Li-ion cell formation and improved Li-ion coating process through the use of either dry processing techniques or more environmentally benign solvents, such as water
- Other novel technologies or battery components

Subtopic 4B Deliverables to be included in the SOPO:

1. Cell and battery test plans
2. Battery and/or cell design documentation
3. Appropriate cell or battery performance and abuse test reports
4. 18 baseline, 18 interim cells and 24 final design cells
5. 3 battery packs using baseline cells and 3 battery packs using final design cells (if applicable)
6. Cost model and estimate for high volume production (minimum 100,000 battery packs or 6,000,000 cells per year)

Not Specified /Other

All hardware deliverables will be provided to the Department of Energy for validation testing. Non-Destructive Performance Validation testing will be conducted on the deliverable materials, cells, modules or full battery systems (developed end items) to validate performance. This testing will be conducted outside the Statement of Project Objectives for this agreement and therefore should not be addressed in the SOPO nor included in the total estimated project costs associated with this application. Participation by DOE test agencies in test planning and execution will be addressed by a Non Disclosure Agreement (NDA) between the test agency and the end item manufacturer. Test procedures will incorporate specifications and limits supplied by the manufacturer for the specific technology such as voltage and current limits, state of charge, charging, and temperature recommendations, number of test sequences, or other relevant test conditions as appropriate. The results of the DOE laboratory testing will be documented in a publicly releasable Summary Test Report (to be approved by both DOE and the Recipient prior to release) that validates performance of the deliverables relative to the end item performance targets as well as the technology deployment impact relative to DOE strategic goals. The Summary Test Report will be approved by, and delivered to, the DOE (Vehicle Technologies Program) and end item manufacturer. Test materials, cells, modules, full battery systems (manufacturing end item), or special test equipment supplied by the end item manufacturer for the purposes of the test will be returned at the conclusion of testing at no cost to the recipient or the project.

Subtopic 4C: Improve Cell and/or Battery Pack Inactive Component Designs for Significant Cost Improvement

The focus of this subtopic is research, development, and demonstration of technology that reduces the cell or battery inactive component weight, volume, and/or cost by at least 20%. Only a small percentage of a battery's weight (approximately 25 to 30%) is due to the active materials that store energy. Performance requirements are critical for commercialization, and applicants shall be able to demonstrate that their technology is capable of achieving them. However, the main focus of work in this area shall be to develop and demonstrate cells with inactive component weight, volume, and/or cost reductions while maintaining overall cell or battery performance. Analysis shall be provided to document the baseline material or cell used for comparison while calculating volume, weight, and/or cost improvements. Analysis shall document any performance degrading aspects of the proposed technology concept. End item cell performance will be measured using USABC EV test procedures (http://www.uscar.org/guest/article_view.php?articles_id=74) in DOE independent validation tests using deliverables resulting from this effort.

Subtopic 4C Deliverables to be included in the SOPO:

1. Cost assessment of Li-ion battery or cell manufactured using the current vs. improved design
2. 18 cells or 3 battery packs manufactured using the developer's current design and 18 cells or 3 battery packs using the improved design, (if the applicant is developing a technology that primarily impacts cell performance and/or design)
3. 3 battery packs manufactured using the developer's current design and 3 battery packs using the improved design, (if the applicant is developing a technology that primarily impacts battery pack performance and/or design)
4. Cell or battery test plan and test result report
5. Appropriate performance and abuse tolerance test reports
6. Cost Assessment: Cost assessment should identify areas of technology change and the associated impacts on product costs while documenting assumptions such as market penetration, market price, unit cost reduction, life cycle costs, returns to scale, and economics of scale, etc that would provide analytical evidence of projected reductions.

All hardware deliverables will be provided to the Department of Energy for validation testing. Non-Destructive Performance Validation testing will be conducted on the deliverable materials, cells, modules or full battery systems (developed end items) to validate performance. This testing will be conducted outside the Statement of Project Objectives for this agreement and therefore should not be addressed in the SOPO nor included in the total estimated project costs associated with this application. Participation by DOE test agencies in test planning and execution will be addressed by a Non Disclosure Agreement (NDA) between the test agency and the end item manufacturer. Test procedures will incorporate specifications and limits supplied by the manufacturer for the specific technology such as voltage and current limits, state of charge, charging, and temperature recommendations, number of test sequences, or other relevant test

Not Specified /Other

conditions as appropriate. The results of the DOE laboratory testing will be documented in a publicly releasable Summary Test Report (to be approved by both DOE and the Recipient prior to release) that validates performance of the deliverables relative to the end item performance targets as well as the technology deployment impact relative to DOE strategic goals. The Summary Test Report will be approved by, and delivered to, the DOE (Vehicle Technologies Program) and end item manufacturer. Test materials, cells, modules, full battery systems (manufacturing end item), or special test equipment supplied by the end item manufacturer for the purposes of the test will be returned at the conclusion of testing at no cost to the recipient or the project.

Subtopic 4D: Improve Cell and/or Battery Pack Thermal Management Approaches

The focus of this subtopic is research, development, and demonstration of technology concepts that reduce the cell or battery weight, complexity (component count), and/or cost by at least 20% through the use of a novel thermal management technology, approach, or system to manage cell or battery temperature. Approaches that extend the upper or lower operating temperature range of the cell or battery by at least 30% are also of interest. Performance requirements are critical for commercialization, and applicants shall be able to demonstrate that their technology is capable of achieving them. However, the main focus of work in this area shall be to develop and demonstrate cells with validated weight, complexity (component count), and/or cost reductions while maintaining overall cell or battery performance. Analysis shall be provided to document the baseline material or cell used for comparison while calculating battery weight, complexity (component count), cost reductions, or temperature range enhancements. Analysis shall document any performance degrading aspects of the proposed technology concept. End item cell performance will be measured using USABC EV test procedures (http://www.uscar.org/guest/article_view.php?articles_id=74) in DOE independent validation tests using deliverables resulting from this effort.

Subtopic 4D Deliverables to be included in the SOPO:

1. Cost assessment of Li-ion battery or cell manufactured using the current vs. improved design
2. 18 cells or 3 battery packs manufactured using the developer's current design and 18 cells or 3 battery packs using the improved design, (if the contractor is developing a technology that primarily impacts cell performance and/or design)
3. 3 battery packs manufactured using the developer's current design and 3 battery packs using the improved design, (if the contractor is developing a technology that primarily impacts battery pack performance and/or design)
4. Cell or battery test plan and test result report
5. Appropriate performance and abuse tolerance test reports
6. Cost Assessment: Cost assessment should identify areas of technology change and the associated impacts on product costs while documenting assumptions such as market penetration, market price, unit cost reduction, life cycle costs, returns to scale, and economics of scale, etc that would provide analytical evidence of projected reductions.

All hardware deliverables will be provided to the Department of Energy for validation testing. Non-Destructive Performance Validation testing will be conducted on the deliverable materials, cells, modules or full battery systems (developed end items) to validate performance. This testing will be conducted outside the Statement of Project Objectives for this agreement and therefore should not be addressed in the SOPO nor included in the total estimated project costs associated with this application. Participation by DOE test agencies in test planning and execution will be addressed by a Non Disclosure Agreement (NDA) between the test agency and the end item manufacturer. Test procedures will incorporate specifications and limits supplied by the manufacturer for the specific technology such as voltage and current limits, state of charge, charging, and temperature recommendations, number of test sequences, or other relevant test conditions as appropriate. The results of the DOE laboratory testing will be documented in a publicly releasable Summary Test Report (to be approved by both DOE and the Recipient prior to release) that validates performance of the deliverables relative to the end item performance targets as well as the technology deployment impact relative to DOE strategic goals. The Summary Test Report will be approved by, and delivered to, the DOE (Vehicle Technologies Program) and end item manufacturer. Test materials, cells, modules, full battery systems (manufacturing end item), or special test equipment supplied by the end item manufacturer for the purposes of the test will be returned at the conclusion of testing at no

cost to the recipient or the project.

AOI 5: Advanced Power Electronics and Electric Motors (APEEM) Technologies

The purpose of this AOI is to develop the next generation of power inverters and electric motors. Both of these technologies must meet demanding performance targets while achieving significant reductions in cost to meet future commercial demands. The power electronic inverter, together with the advanced traction motor, is the principal propulsion component differentiating conventional and electric vehicles. The technology needs for hybrid electric vehicles (HEVs), plug-in hybrid electric vehicles (PHEVs), battery electric vehicles (BEVs), and fuel cell vehicles (FCVs) represent a continuous spectrum of requirements.

Joint applications with vertically integrated teams of OEM’s, component suppliers, and device manufacturers that demonstrate a path to product commercialization are highly encouraged.

Subtopic 5A: Modular, Scalable Inverter for Advanced Electric Drive Vehicle Electric Traction Drives

Electric Drive Vehicles (EDVs) require advancements in power inverter technology, such as lower cost, weight, and volume to achieve a greater share of the vehicle market. The focus of this subtopic is the development of an inverter that meets efficiency targets identified in Table 1 and the required inverter cost, weight, volume, and performance targets as identified in Table 2, with the added attributes of scalability. Scalability is important since the proposed solution shall be applicable to power levels ranging from 55 kW to 120 kW.

Table 1. Inverter Efficiency Targets

Power Range (kW)	0-10	10-20	20-40	40-50	50-55
Efficiency (%)	>85	>96	>98	>94	>91

Table 2. Inverter Requirements

Requirement	Target
Continuous power output (kW)	30
Peak power output for 18 seconds (kW)	55
Weight (kg)	≤3.9
Volume (l)	≤4.1
Unit Cost for quantities of 100,000 (\$)	≤182
Operating voltage (Vdc)	200 to 450; nominal: 325
Power factor of load	>0.8
Maximum current per phase (Arms)	400
Precharge time--0 to 200Vdc (sec)	2
Output current ripple –peak to peak (% of fundamental peak)	≤3
Maximum switching frequency (kHz)	20
Current loop bandwidth (kHz)	2
Maximum fundamental electrical frequency (Hz)	1000
Minimum isolation impedance-input and phase terminals to ground (Mohm)	1
Minimum motor input inductance (mH)	0.5
Ambient operating temperature (°C)	-40 to +140
For Liquid Cooled Concepts	

Not Specified /Other

Maximum cooling system flow rate (gpm)	2.5
Maximum inlet pressure (psi)	25
Maximum inlet pressure drop (psi)	2

Currently, inverter technology used in hybrid electric vehicles uses 70°C coolant that is supplied via a separate cooling loop in the automobile. It is desirable to eliminate the need for an additional cooling loop to reduce cost and complexity in the vehicle. Concepts that require a separate cooling loop shall include the penalty for weight, volume, and cost of the cooling loop as part of the inverter estimation values (alternatively, the applications shall use the following cost estimate information for liquid coolant loops: \$175, 1L, and 1kg to account for the additional cooling system). Applications for inverters requiring separate cooling loops which include innovative means to reduce the cost, size and weight of the coolant loop will also be considered. The concept must be described in detail with reasonable supporting documentation presented to justify the cost reduction of the cooling loop so that it can be shown that the cooling loop or alternative cooling method and inverter meet the cost targets of this subtopic. It should also be noted that the inverter shall occupy an under hood location. Under hood air temperatures can reach high ambient values, which results in the power devices within the inverter housing seeing extreme temperatures. Therefore, to yield maximum flexibility, it is highly desirable that the inverter shall be capable of operating in an ambient environment of about 150°C.

The inverter shall be capable of operating reliably for 15 years. If the inverter design relies on coolant supplied by a separate cooling system dedicated to the inverter the cost, volume, and weight penalties noted above decrease the subject target values. Analysis shall demonstrate the calculated/experimental efficiencies for each power level in Table 1. Scalability shall be demonstrated by fabricating and testing one unit rated at 55 kW and modeling or fabricating and testing another rated at 120 kW.

Building upon the latest advances in power electronics components, packaging, and topologies it is necessary that successful applicants clearly illustrate the potential advantages of the proposed innovative design in both cost and performance over commercially available technology. This may be demonstrated either by laboratory testing or mathematical modeling. The application must clearly demonstrate the commercial viability and increased value relationship in terms of reduced cost, volume, and mass.

The application shall contain a plan for the delivery of three inverters for confirmatory testing to establish performance and document pertinent characteristics (power, volume, etc.) of the devices. The application shall contain a plan for addressing this testing that should be included in the Statement of Project Objectives (SOPO) and budgeted accordingly. It is desired to have the confirmatory testing performed in an independent manner. Examples of this are: testing at an appropriate national laboratory, testing by an independent laboratory, and developing a test plan collaboratively with a national laboratory and having laboratory representatives witness the tests.

The application shall contain a plan for conducting a cost assessment to identify areas of technology change and the associated impacts on product costs while documenting assumptions such as market penetration, market price, unit cost reduction, life cycle costs, returns to scale, and economics of scale, etc. that would provide analytical evidence of projected reductions. Work shall also include a detailed production cost analysis for volumes of 100,000 units per year and a discussion of how costs will be reduced in manufacturing.

Subtopic 5A Deliverables to be Included in the SOPO:

1. Three inverters for confirmatory testing, including support and documentation necessary for DOE to complete confirmatory testing as defined above.
2. Technology cost and production cost assessments and supporting documentation.

Subtopic 5B: Motors with Reduced or Eliminated use of Rare Earth Permanent Magnets for Advanced EDV Electric Traction Drives

Smaller, lighter, and less expensive electric motors are critical for the adoption of EDVs in significant quantities, especially for HEV and PHEV applications where motors have to be packaged in a vehicle along with other large powertrain components such as engines and transmissions. Currently interior permanent magnet (IPM) motors are used for hybrid designs because of their high efficiency, specific-power (kW/kg) and power density (kW/l). However, there are concerns regarding the lack of transparency in the rare earth magnet supply market and its pricing structures, which imply rare earth magnets could be significantly more expensive and possibly not available in quantities appropriate for their use in vehicle traction drives in the future. Because of this, it is desired to pursue motor technologies that significantly reduce/eliminate the use of rare earth permanent magnets.

The goal of this subtopic is to develop and demonstrate a motor capable of achieving the performance requirements as outlined in Table 3 below using technologies that incorporate more abundant magnet materials (no rare earth elements) or motor technologies that do not use permanent magnets at all. The demonstrated motor shall be capable of operating for a minimum of 15 years. The design shall be scalable to 120 kW peak power for 18 seconds and 65 kW continuous power. Maximum speed of the motor shall not exceed 20,000 rpm. The desired motor efficiency contours are shown in Figure 1 below (note that if the maximum motor speed differs from 14,000 rpm these contours should be adjusted accordingly). The motor design shall demonstrate an efficiency contour as close as possible to this map in Figure 1. Confirmation shall be provided by showing the calculated/experimental efficiencies for at least 5 points in each of the five efficiency areas shown in Figure 1 below. At least two of the points in the highest efficiency island must achieve an efficiency of 95% or higher.

The preferred operating system voltage is 325V nominal. It is highly encouraged that scalability provisions be considered for operating at higher voltage levels.

Table 3. Motor Specifications

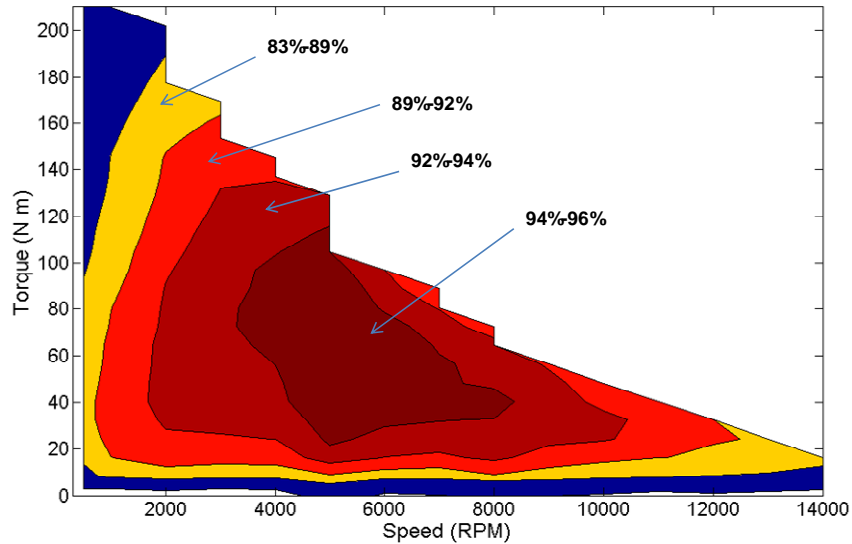
Requirement	Target
Maximum speed (rpm)	14,000
Peak power output at 20% of maximum speed for 18 seconds and nominal voltage (kW)	55
Continuous power output at 20 to 100% of maximum speed and nominal voltage (kW)	30
Weight (kg)	≤35
Volume (l)	≤9.7
Unit cost in quantities of 100,000 (\$)	≤275
Operating voltage (Vdc)	200 to 450; nominal 325
Maximum per phase current at motor (Arms)	400
Characteristic current ($\mu\text{mag/Ld}$)*	< Maximum current
Back EMF at 100% of maximum speed, peak line-to-line voltage (V) for IPM designs	< 600
Torque pulsations-not to exceed at any speed, percent of peak torque (%)	< 5
Ambient (outside housing) operating temperature (°C)	-40 to +140
Coolant inlet temperature (°C)	105

Not Specified /Other

Maximum coolant flow rate (liters/min)	10
Maximum coolant pressure drop (psi)	2
Maximum coolant inlet pressure (psi)	20
Minimum isolation impedance-phase terminals to ground (Mohm)	1

*if applicable (typically for a permanent magnet motor)

Figure 1. Motor Efficiency Targets



It is highly desired that the motor design shall be capable of being driven by a baseline, standard three-leg inverter with no additional circuitry. If the motor design requires additional features in the inverter the additional weight, volume, and cost incurred by the inverter shall be counted as a debit to the motor. Concepts that integrate the motor cooling function with a cooling system already on board standard vehicles (such as the transmission cooling system) or use air-cooling (using ambient air) would incur no cost, weight, or volume penalty associated with cooling the motor. Concepts that require a separate cooling loop shall incur a penalty associated with the dedicated cooling loop. The weight, volume, and cost of the cooling loop must be added to that of the motor (alternatively, the proposer may use the following values associated with liquid coolant loops: \$175, 1L, and 1kg to account for the additional cooling system). Applications for motors with innovative cooling concepts to reduce the cost, size and weight of the coolant loop will also be considered. The concept must be described in detail and reasonable supporting documentation presented to justify the cost reduction of the cooling loop so that it can be shown that the cooling loop or alternative cooling method and motor meet the cost targets of this subtopic as outlined above. Novel motor designs that realize cost, size, and weight savings from the baseline inverter may transfer these savings to the motor will also be considered.

Building upon the latest advances in motor technology successful applicants shall clearly illustrate the potential advantages of the proposed innovative design in both cost and performance over commercially available technology. The application must clearly demonstrate the commercial viability and increased value relationship in terms of reduced cost, volume, and mass.

The application shall contain a plan for confirmatory testing of the hardware to establish its performance and document pertinent characteristics (power, volume, etc.). The application shall contain a plan for addressing this testing that should be included in the Statement of Project Objectives (SOPO) and budgeted accordingly. It is desired to have the confirmatory testing performed in an independent manner. Examples of this are: testing at an appropriate national laboratory, testing by an independent laboratory, and developing a test plan collaboratively with a national laboratory and having laboratory representatives witness the tests.

Not Specified /Other

The application shall contain a plan for conducting a cost assessment to identify areas of technology change and the associated impacts on product costs while documenting assumptions such as market penetration, market price, unit cost reduction, life cycle costs, returns to scale, and economics of scale, etc. that would provide analytical evidence of projected reductions. Work shall also include a detailed production cost analysis for volumes of 100,000 units per year and a discussion of how costs will be reduced in manufacturing.

Subtopic 5B Deliverables:

1. Three motors for confirmatory testing, including support and documentation necessary for DOE to complete confirmatory testing as defined above.
2. Technology cost and production cost assessments and supporting documentation

Area of Interest 6-- Thermoelectrics and Enabling Engine Technologies:

The goal of this AOI is to achieve improved efficiency and reduced emissions in advanced combustion engines for passenger and commercial vehicle applications through: 1) accelerated development of cost-competitive advanced second generation thermoelectric devices for vehicle applications; and 2) accelerated development of new or early stage enabling technologies needed to improve fuel efficiency, performance, and emissions in internal combustion engines.

Subtopic 6A: Solid State Thermoelectric Energy Conversion Devices

This subtopic is for research and development projects that use thermoelectric (TE) devices to offer:

- a) A five (5) percent fuel economy improvement by direct conversion of engine waste heat to useful electric power for light-duty vehicle application; or
- b) A two (2) percent fuel economy improvement by direct conversion of engine waste heat to useful electricity for heavy-duty application and can provide additional fuel savings by reducing or eliminating the need to idle the engine for hotel loads; or
- c) A thirty-three (33) percent reduction in energy consumption for heating/cooling of vehicle occupants.

For light duty passenger vehicles, the fuel economy improvement must be measured over the US06 cycle. For heavy duty vehicles, the fuel economy improvement must be measured under a load representative of a typical long-haul Class 8 truck with vehicle weight of 65,000 lbs traveling on a level road at 65 mph.

Solid state thermoelectric energy conversion devices such as thermoelectric generators (TEGs) and thermoelectric heating/cooling systems (TE HVAC) when widely implemented in transportation vehicles can make major contributions to improving the U.S. energy security, environment, and economy. TE HVAC for vehicle occupant comfort can supplement or replace the conventional R134a refrigerant air conditioner. The applicant shall address barriers to wide market acceptance of this revolutionary vehicle application of TE devices such as; the limited capability to mass manufacture these TE devices for the automotive market, their performance in the vehicle environment, and unknown costs. Significantly improved efficiency for next generation vehicular TE devices will also require development of commercially viable higher efficiency materials, improved manufacturing technology, and more effective heat exchanger design. Over the three-to-four year period of this activity, the selected participants will develop, test and eventually demonstrate these advanced TE devices and the associated efficiency gains on an engine dynamometer and full-scale vehicle. In order to bring the best possible resources to bear on this problem, appropriate teaming arrangements among suppliers, national labs, universities, and vehicle OEMs are encouraged.

The application shall contain a plan for confirmatory testing of the hardware to verify its performance in terms of fuel economy improvement. The application shall contain a plan for addressing this testing that should be included in the Statement of Project Objectives (SOPO) and budgeted accordingly. It is desired to have the confirmatory testing performed in an independent manner. Examples of this are: testing at an

Not Specified /Other

appropriate national laboratory, testing by an independent laboratory, and developing a test plan collaboratively with a national laboratory and having laboratory representatives witness the tests.

The application shall contain a plan for conducting a cost assessment to identify areas of technology change and the associated impacts on product costs while documenting assumptions such as market penetration, market price, unit cost reduction, life cycle costs, returns to scale, and economics of scale, etc. that would provide analytical evidence of projected reductions. Work shall also include a detailed production cost analysis for volumes of 100,000 units per year and a discussion of how costs will be reduced in manufacturing.

Applications shall include a clear path to commercialization in the narrative discussion including any prior examples of successful commercialization of new automotive technologies on the scale needed to positively impact the reduction of greenhouse gasses.

Subtopic 6B: Enabling Technologies for Engine and Powertrain Systems

The objective of this subtopic is to develop advances in enabling technologies for engine and powertrain systems for heavy-duty and light-duty vehicles, from vehicle and engine suppliers to support the achievement of breakthrough thermal efficiencies while meeting U.S. EPA emissions standards for the representative vehicle class technology. These novel approaches and ideas shall address existing barriers and limitations relating to the proposed technology which inhibit using advanced technologies on a mass market basis to address national energy concerns. Some of the enabling technologies to be considered include, but are not limited to:

- Low-cost, robust sensors and controls;
- Components for waste heat recovery systems such as Organic Rankine Cycle, including heat exchangers, control valves, expanders and working fluids;
- Advanced components for exhaust gas recirculation systems, including heat exchangers and valves;
- Variable compression ratio mechanisms;
- Variable valve actuation and timing mechanisms;
- Reduced friction approaches;
- Low heat rejection and thermal management approaches;
- Advanced fuel injectors;
- Advanced ignition systems;
- Intake air management systems; and
- Turbomachinery.

To validate the viability of the developed technology an engine or system level demonstration of the developed technologies shall be included as part of the scope of work.

Applications shall include a clear path to commercialization in the narrative discussion including any prior examples of successful commercialization of new automotive technologies on the scale needed to positively impact the reduction of greenhouse gasses.

Area of Interest 7 – Fleet Efficiency

The goal of this effort is to develop and demonstrate technologies that will positively affect efficiency of the fleet of passenger cars and commercial vehicles. Specifically, two technical topic areas are being targeted with this Area of Interest: fuel efficient tires and driver feedback technologies. It is expected that applications in either of these two topics will result in demonstrating technologies with potential to improve overall fleet efficiency by over 2%.

Subtopic 7A: Fuel Efficient Tires

Tires can contribute to reduction in the use of petroleum through several paths: reduction of tire rolling resistance, maintenance of specified tire pressure level, and capture of tire-generated heat energy. It is the intent of this subtopic to undertake research and development projects that would result in the development of fuel efficient tire technology. Tires for light-duty, medium-duty, and heavy-duty applications will be considered.

Specifically, applications must address the following criteria:

- An innovative and cost-effective technical approach to reduce vehicle petroleum use by at least 2% via fuel efficient tire technology;
- Technology potential for deployment evidenced by a letter of support from an automotive or transportation company; and
- Compliance with federal safety regulations.

Subtopic 7B: Driver Feedback Technology

The variation in fuel consumption due to driver differences can be as high as 25%. Developing a means of improving driver behavior to maximize fuel economy is a significant opportunity to reducing fuel consumption in existing fleets. One of the most promising approaches involves providing immediate information to the driver about the effect of driving behavior on fuel consumption. It is the intent of this subtopic to undertake research and development project(s) that would result in simple and inexpensive means of providing feedback to the driver on instantaneous fuel consumption.

Specifically, applications must address the following criteria:

- An innovative and cost effective technical approach to reduce fleet average fuel consumption by at least 2% via driver feedback technology;
- Compliance with federal safety and emissions regulations; and
- Ability to deploy the technology across the existing vehicle fleet.

Area of Interest 8: Advanced Vehicle Testing and Evaluation

The objective of this area of interest is for projects to conduct laboratory and field evaluations of advanced technology vehicles and their associated infrastructure and the development of new test procedures and/or modifications of existing test procedures necessary to accomplish these performance evaluations. The scope of the work shall include baseline performance, accelerated reliability, and fleet testing of state-of-the-art light-, medium-, and heavy-duty advanced technology vehicles and the required vehicle-to-infrastructure interface required for fueling/charging the vehicles. All vehicle purchases for testing shall be reviewed and approved in collaboration with DOE prior to testing.

Under the DOE Vehicle Technologies Program, the Advanced Vehicle Testing Activity (AVTA), in collaboration with industry, focuses on testing and evaluating commercially available and pre-production light-, medium-, and heavy-duty advanced technology vehicles using internal combustion engines burning advanced fuels (such as hydrogen and compressed natural gas (CNG) fuels); electric (EV), extended range electric (EREV), hybrid electric (HEV), Plug-in Hybrid Electric (PHEV), or fuel cell (FCV) powertrains; advanced energy storage technologies (such as batteries, ultra-capacitors, and hydrogen storage tanks);

Not Specified /Other

advanced drive trains; as well as the necessary infrastructure required to fuel and/or charge (EV, PHEV) advanced technology vehicles. The onboard engines may include, but are not limited to, fuel cells, internal combustion engines, and other energy-enabling engines and motors. The evaluation data collected through the AVTA is used to validate the results of research, modeling, and simulation activities using laboratory and field tests.

More information on the AVTA, including current test procedures, prior work and test results can be found at <http://avt.inl.gov> .

This area of interest seeks applicants with the capability to modify and/or develop advanced technology vehicle testing procedures, independently test advanced technology vehicles, provide advanced vehicle testing at DOE's direction using DOE test procedures, provide the infrastructure required to support the vehicle testing (hydrogen and Compressed Natural Gas (CNG) fueling infrastructure, electric vehicle charging infrastructure, etc.), test vehicle-to-infrastructure interfaces, and partner with other organizations to leverage AVTA testing resources. The tests performed will establish the commercial viability of advanced technology vehicles. **This is neither a demonstration nor a deployment activity but rather a testing and validation activity.**

Applications submitted under this area of interest shall focus on the laboratory and field evaluation of advanced technology vehicles and their supporting infrastructure including baseline performance, accelerated reliability, fleet testing, and end-of-life testing. Technologies including, but not limited to, battery electric, hybrid electric, plug-in hybrid electric, hydrogen fuel cells, advanced internal combustion engines, advanced technology powertrains, alternative fueled internal combustion engines, and other advanced technology vehicles will be evaluated for all classes of on- and off-road vehicles. The primary vehicle class tested will be on-road light duty vehicles; however, other testing may be performed for medium and heavy duty on-road vehicles, low speed on-road vehicles, and all classes of non-road vehicles. The applicant shall be capable of and experienced in developing test procedures and standards jointly with industry and utilizing the approved procedures as appropriate to collect needed data on the vehicle technology and infrastructure being evaluated. Typical evaluations for the program include repeatable, controlled, laboratory and closed-track baseline performance tests, on-road accelerated reliability testing with up to 65,000 miles per year per vehicle accumulated, and general fleet testing and evaluation not to exceed three years per vehicle. However, given the unique missions of off-road vehicles, other operational goals may be developed such as hours of operation, as future technologies are considered for testing.

Due to the focus on evaluation of vehicles utilizing advanced hydrogen-fueled, internal combustion engine and fuel cell vehicles, CNG fueled internal combustion engine vehicles, and electric vehicles, the applicant should have a detailed understanding of and experience with operation of the infrastructure required to support these vehicles. The applicant must have access to a proven reliable hydrogen fueling system and a CNG fueling system. The applicant must have all levels of electric vehicle charging supply equipment, including a sufficient number of chargers to support the vehicles in the testing program. The applicant shall also have access to facilities enabling the closed-track testing of vehicles. The applicant must also have the capability to conduct testing of fuel-cell hybrid vehicles when they become available from the manufacturers.

It is expected that the applicant will work in close coordination with DOE National Laboratories for testing and data collection. The applicant shall be responsible for all baseline, accelerated reliability, fleet, and end-of-life data collection, with the exception of the chassis dynamometer testing performed by a DOE National Laboratory. In order to provide an independent, consistent data repository, the data collected from all testing shall be provided to the DOE's Idaho National Laboratory (INL) for data analysis. The reports and data generated from the baseline and end-of-life testing shall be provided to INL for dissemination via the AVTA website. The DOE National Laboratories will be responsible for chassis dynamometer testing of the vehicles unless the vehicle technology (such as medium or heavy duty vehicles) dictates the use of non DOE chassis testing facilities. Although DOE National Labs will be performing the chassis testing, the applicant will be responsible for transportation of the vehicles to and from the chassis tests, and for preparing the vehicle for dynamometer testing, including performing tests to determine the coastdown

Not Specified /Other

coefficients required for dynamometer testing.

Provisions should be made and costs should be accounted for within the project to purchase production vehicles for testing. It is expected that non-production vehicles will be provided by the program office or other outside party for testing. The project shall test at least four (4) identical vehicles in fleet or accelerated reliability testing for each production model to be tested to reduce project risk and improve the test accuracy. For each model, one (1) of the four (4) vehicles will undergo baseline testing. Two (2) of each Pre-production, medium-duty, heavy-duty, and non-road vehicle under evaluation should be tested.

The project should include the costs for operating both the production and non-production vehicles, including fuel, maintenance, repairs, insurance, and other operating costs. It is expected that a minimum of forty (40) total production vehicles and six (6) non-production vehicles will be tested per year. Most of the vehicle testing will take over one year to complete and vehicle testing will overlap as a result. Expected testing to be included in project costs are in the below table. Note that the numbers represent the number of vehicles that start testing each year. Given that some vehicle models will be tested for more than one year, the below table does not reflect the total numbers of vehicles in testing beyond the first year. Again, it only reflects an estimate of the number of vehicles that will initiate testing each year.

Vehicle Type	Estimated Vehicles to be tested				
	Year 1	Year 2	Year 3	Year 4	Year 5
Hybrid Electric	12	12	12	9	9
Plug-in Hybrid Electric	16	16	16	12	12
EV	16	16	16	12	12
Hydrogen/Fuel Cell	0	2	2	2	2
Medium/Heavy duty	0	2	2	2	2
Other Advanced Powertrain	0	1	1	1	1
Other Alternative Fuel Vehicle	3	3	3	3	3
Estimated Total per year	47	52	52	41	41

At a minimum, projects proposed under this area of interest are to be structured into the following eight (8) tasks:

Task 1: Advanced Technology Vehicle Test Procedure Development

The AVTA has previously established advanced technology vehicle technical specifications and test procedures for various vehicle technologies. The current test procedures, prior work and test results can be found at <http://avt.inl.gov>. The vehicle technical specifications are listed separately, but they are considered part of the testing procedures for Baseline Performance testing.

If a new class or classes of advanced technology vehicles are selected for testing, and the appropriate test procedures have not previously been developed, test procedures will be completed before any testing work is initiated. The deliverables for Task 1 are a complete set of technical specifications and test procedures for each new type of testing to be performed. The test procedures will allow the Recipient to easily develop and implement test plans including: the required levels of data acquisition, data sampling, data validation, and data analyses, the schedule for evaluating each vehicle (sequence of test tasks, decision points - if vehicles fail to meet minimum performance standards, and adequacy of time for each task), and the planned assignment of responsibilities and level of manpower to complete the testing.

If technology advances render an existing testing procedure invalid, the Recipient will be required to modify the existing procedure or develop a new procedure to allow for testing of the subject advanced

Not Specified /Other

vehicles. These new procedures shall include all of the components listed in the prior paragraph. In addition, the new testing procedures will incorporate industry standard test procedures as appropriate.

Candidate vehicles include primarily light-, medium-, and heavy-duty vehicles; including production EV, PHEV, EREV, NEV, HEV, FCV, internal combustion engine vehicles, and alternative fuel vehicles. In addition, non-production vehicles may include vehicles operating on alternative fuels, advanced internal combustion engine vehicles, vehicles which are modified to run on electricity (conversion vehicles) or are designed as electric vehicles from the ground up; vehicles which are modified to run using various hybrid power systems; vehicles which are designed as hybrid vehicles from the ground up; vehicles equipped with an internal combustion engine that operates on advanced fuels such as 100% hydrogen; fuel cell vehicles; and other advanced technology prototypes. The testing will primarily focus on vehicles equipped with advanced energy storage systems, advanced hybrid power systems, or advanced internal combustion engine systems.

Task 2: Baseline Performance Testing of Advanced Technology Vehicles

Test procedures developed for baseline performance testing should include but not be limited to the following types of tests:

- Acceleration
- Gradeability
- Energy Consumption(s)
- Maximum Speed
- Vehicle Range(s)
- Operating modes
- Braking
- Time to recharge (if the vehicle is grid connected)
- Electrical Energy Storage

Testing should be performed on a closed track. Chassis dynamometer testing will be performed on the vehicles at a DOE National Laboratory or other test facility if the vehicle technology dictates a different test facility (heavy duty vehicle, etc) or test procedure (off highway vehicle). Baseline testing is expected to last 60 days for each vehicle tested, with an additional 90 days required for the completion of a test report for each vehicle tested. Deliverables for Task 2 are test results data sheets. Awardees will be responsible for obtaining, operating, insuring, and maintaining the vehicles they test. The Recipient will be responsible for transportation costs associated with baseline chassis testing.

Task 3: Accelerated Reliability Testing of Advanced Technology Vehicles

Accelerated reliability testing is a test of four (4) production vehicles or at least one (1) non-production vehicle of the same make and model to document vehicle reliability, maintenance requirements, long-term performance, energy efficiency, lifecycle costs, and user acceptance. This testing is expected to last one to three years. However, accelerated reliability testing may exceed three years if the vehicles are anticipated to have extended operational lives. Test vehicles will normally be required to accumulate a minimum of 65,000 miles during the test year unless the vehicle is not capable of achieving this amount due to the limited range and refueling time required (electric vehicle charge time, etc). This testing will determine the actual performance and lifecycle costs of advanced technology vehicles. For test vehicles using traction batteries, the battery pack(s) for each vehicle shall be tested at one (1) interim point in the vehicle testing. The deliverables for Task 3 are interim and final reports or fact sheets that include vehicle reliability and operating performance, fuel use, and lifecycle costs. The Recipient will provide data to the Idaho National Laboratory, including maintenance costs, fuel use, capital depreciation (by selling the vehicles at the end of testing), and any other operational costs such as licensing and insurance. Proceeds from the sale of the vehicles will be applied back into the project to purchase additional vehicles for testing under the project. The Recipient will be responsible for purchasing or leasing, operating, insuring, and maintaining the vehicles they test. In addition, the Recipient will be responsible for purchasing and installing onboard data loggers for several vehicle technologies as decided in conjunction with DOE. The data will be transmitted to the DOE Idaho National Laboratory for storage and analysis in the vehicle database reporting system.

Not Specified /Other

Task 4: Fleet Testing of Advanced Technology Vehicles

Fleet testing is a test of one or more (preferably four) vehicles in a fleet to determine vehicle reliability, maintenance requirements, long-term performance, lifecycle costs, and user acceptance. Vehicles will be tested under actual fleet conditions. This will determine the ability of the vehicle to meet fleet missions. Testing is normally expected to last one year. However, fleet testing may exceed one year if the vehicles are anticipated to have extended operational lives. Vehicles under test will normally be required to accumulate at least 5,000 miles during the test year. Deliverables under Task 4 are interim and final reports or vehicle fact sheets of fleet testing results. However, onboard data loggers will be installed in all vehicles and the raw data from the onboard data loggers will be provided to the Idaho National Laboratory for storage, analysis, and reporting. Awardees will be responsible for the activities of purchasing or leasing, insuring, operating, and maintaining the advanced vehicles they test. This activity may also include testing of the infrastructure and/or the infrastructure-to-vehicle interface required for charging, fueling, and operational support of advanced technology vehicles.

Task 5: Interim Component Testing

This task consists of component testing during fleet or accelerated reliability testing. The test shall include vehicle performance and battery testing, when applicable. Deliverables for Task 5 are test result data sheets. However, raw data from testing may also be requested for further analysis by the Idaho National Laboratory.

Task 6: End-of-Life Vehicle and Component Testing

This task consists of vehicle testing post-fleet or accelerated reliability testing. The test shall include vehicle performance and battery testing, when applicable. Deliverables for Task 6 are test result data sheets. However, raw data from testing may also be requested for further analysis by the Idaho National Laboratory.

Task 7: Infrastructure Test and Evaluation

This task consists of testing vehicle and infrastructure interface, operations, and reliability. For grid-connected electric-drive vehicles the testing shall include charger efficiency, vehicle to grid communication, bi-directional power flow (if applicable), and evaluation of advanced electric vehicle supply equipment. The evaluation shall collect data on the installation, operation, energy, and maintenance costs of the infrastructure and track user feedback related to the overall interface and operations of the infrastructure. Deliverables for Task 7 are test results data sheets and a report on the cost, safety, operations, maintenance, and reliability of the infrastructure.

Task 8: Additional Procedure Development, Testing or Test Support

This task consists of various additional procedure development, testing, and test support activities that may be determined necessary by either the DOE AVTA or the applicant.

PART II-AWARD INFORMATION

A. TYPE OF AWARD INSTRUMENT

DOE anticipates awarding cooperative agreements for all selected applications under this funding opportunity announcement (See Section VI.B.2 Statement of Substantial Involvement).

B. ESTIMATED FUNDING

Approximately \$184 million dollars of federal funding is expected to be available for all Areas of Interest and Subtopic Areas for new awards under this announcement.

C. MAXIMUM AND MINIMUM AWARD SIZE

Ceiling (i.e., the anticipated maximum amount for an individual award made under this announcement):

Area of Interest and Subtopic Area	Title	Anticipated Maximum Award Size for Any One Individual Award (DOE SHARE)
AREA OF INTEREST 1- ADVANCED FUELS AND LUBRICANTS TECHNOLOGIES		
1A	Fuels and Lubricants for Advanced Combustion Regimes	\$1.5M
1B	Direct Petroleum Displacement by Liquid Alternative Fuels for Compression-Ignition Engines in Transportation	\$1.5M
1C	Lubricant Formulations to Enhance Engine Efficiency	\$1.5M
AREA OF INTEREST 2- LIGHTWEIGHTING MATERIALS		
2A	Low-Cost Development of Magnesium	\$6.0M
2B	Development of Low-Cost Carbon Fiber	\$8.0M
2C	Demonstration Project to Develop and Construct a Magnesium Intensive Vehicle Front End Sub-Structure	\$3.0M
2D	Demonstration Project to Validate Crash Model For Carbon Fiber Composites to Enable Production-Feasible Composites in Primary-Structural Automotive Crash and Energy Management Applications	\$3.5 M
AREA OF INTEREST 3 –DEMONSTRATION PROJECT FOR A MULTI-MATERIAL LIGHT-WEIGHT PROTOTYPE VEHICLE AS PART OF THE CLEAN ENERGY DIALOGUE WITH CANADA		
3	Demonstration Project for a Multi-Material Light-Weight Prototype Vehicle as Part of the Clean Energy Dialogue with Canada	\$10.0M
AREA OF INTEREST 4- DEVELOP ADVANCED CELLS AND DESIGN TECHNOLOGY FOR ELECTRIC DRIVE BATTERIES		
4A	Develop Advanced Cells for Electric Drive Vehicle Batteries	\$5.0M
4B	Develop Cells and/or Battery Packs with Significant Cost Improvement	\$6.0M
4C	Improve Cell and/or Battery Pack Inactive Component Designs for Significant Cost Improvement	\$3.0M
4D	Improve Cell and/or Battery Pack Thermal Management Approaches	\$3.0M
AREA OF INTEREST 5- ADVANCED POWER ELECTRONICS AND ELECTRIC MOTORS (APEEM) TECHNOLOGIES		
5A	Modular, Scalable Inverter for Advanced Electric Drive Vehicle Electric Traction Drives	\$6.0M

Not Specified /Other

5B	Motors with Reduced or Eliminated Use of Rare Earth Permanent Magnets for Advanced EDV Electric Traction Drives	\$6.0M
AREA OF INTEREST 6-THERMOELECTRICS AND ENABLING ENGINE TECHNOLOGIES		
6A	Solid State Thermoelectric Energy Conversion Devices	\$10.0M
6B	Enabling Technologies for Engine and Powertrain Systems	\$3.0M
AREA OF INTEREST 7-FLEET EFFICIENCY		
7A	Fuel Efficient Tires	\$1.5M
7B	Driver Feedback Technology	\$1.5M
AREA OF INTEREST 8-ADVANCED VEHICLE TESTING AND EVALUATION		
8	Advanced Vehicle Testing and Evaluation	\$50.0M

Floor (i.e., the anticipated minimum amount for an individual award made under this announcement):

NONE

D. EXPECTED NUMBER OF AWARDS

Under this announcement, DOE expects to make the following number of awards for each Program /Topic Area:

Area of Interest and Subtopic Area	Title	Estimated Number of Selections Anticipated
AREA OF INTEREST 1- ADVANCED FUELS AND LUBRICANTS TECHNOLOGIES		
1A	Fuels and Lubricants for Advanced Combustion Regimes	1 - 2
1B	Direct Petroleum Displacement by Liquid Alternative Fuels for Compression-Ignition Engines in Transportation	1 - 2
1C	Lubricant Formulations to Enhance Engine Efficiency	1 - 2
AREA OF INTEREST 2- LIGHTWEIGHTING MATERIALS		
2A	Low-Cost Development of Magnesium	1 - 2
2B	Development of Low-Cost Carbon Fiber	1 - 2
2C	Demonstration Project to Develop and Construct a Magnesium Intensive Vehicle Front End Sub-Structure	1
2D	Demonstration Project to Validate Crash Model For Carbon Fiber Composites to Enable Production-Feasible Composites in Primary-Structural Automotive Crash and Energy Management Applications	1
AREA OF INTEREST 3 –DEMONSTRATION PROJECT FOR A MULTI-MATERIAL LIGHT-WEIGHT PROTOTYPE VEHICLE AS PART OF THE CLEAN ENERGY DIALOGUE WITH CANADA		
3	Demonstration Project for a Multi-Material Light-Weight Prototype Vehicle as Part of the Clean Energy Dialogue with Canada	1
AREA OF INTEREST 4- DEVELOP ADVANCED CELLS AND DESIGN TECHNOLOGY FOR ELECTRIC DRIVE BATTERIES		
4A	Develop Advanced Cells for Electric Drive Vehicle Batteries	4 - 6
4B	Develop Cells and/or Battery Packs with Significant Cost Improvement	2 - 4
4C	Improve Cell and/or Battery Pack Inactive Component Designs for Significant Cost Improvement	2 - 3
4D	Improve Cell and/or Battery Pack Thermal Management Approaches	2 - 3
AREA OF INTEREST 5- ADVANCED POWER ELECTRONICS AND ELECTRIC MOTORS (APEEM) TECHNOLOGIES		
5A	Modular, Scalable Inverter for Advanced Electric Drive Vehicle Electric Traction Drives	1 - 2
5B	Motors with Reduced or Eliminated Use of Rare Earth Permanent Magnets for Advanced EDV Electric Traction Drives	1 - 2
AREA OF INTEREST 6-THERMOELECTRICS AND ENABLING ENGINE TECHNOLOGIES		
6A	Solid State Thermoelectric Energy Conversion Devices	3 - 4
6B	Enabling Technologies for Engine and Powertrain Systems	3 - 4
AREA OF INTEREST 7-FLEET EFFICIENCY		
7A	Fuel Efficient Tires	1 - 2
7B	Driver Feedback Technology	1 - 2
AREA OF INTEREST 8-ADVANCED VEHICLE TESTING AND EVALUATION		
8	Advanced Vehicle Testing and Evaluation	1 - 2

Not Specified /Other

E. ANTICIPATED AWARD SIZE

The anticipated award size for projects under each Program/Topic Area in this announcement is:

Area of Interest and Subtopic Area	Title	Anticipated Award Sizes Per Award (DOE funding Only)
AREA OF INTEREST 1- ADVANCED FUELS AND LUBRICANTS TECHNOLOGIES		
1A	Fuels and Lubricants for Advanced Combustion Regimes	\$0.75M to \$1.5M
1B	Direct Petroleum Displacement by Liquid Alternative Fuels for Compression-Ignition Engines in Transportation	\$0.75M to \$1.5M
1C	Lubricant Formulations to Enhance Engine Efficiency	\$0.75M to \$1.5M
AREA OF INTEREST 2- LIGHTWEIGHTING MATERIALS		
2A	Low-Cost Development of Magnesium	\$2M to \$4M
2B	Development of Low-Cost Carbon Fiber	\$3M to \$4M
2C	Demonstration Project to Develop and Construct a Magnesium Intensive Vehicle Front End Sub-Structure	\$3M
2D	Demonstration Project to Validate Crash Model For Carbon Fiber Composites to Enable Production-Feasible Composites in Primary-Structural Automotive Crash and Energy Management Applications	\$3.5M
AREA OF INTEREST 3 –DEMONSTRATION PROJECT FOR A MULTI-MATERIAL LIGHT-WEIGHT PROTOTYPE VEHICLE AS PART OF THE CLEAN ENERGY DIALOGUE WITH CANADA		
3	Demonstration Project for a Multi-Material Light-Weight Prototype Vehicle as Part of the Clean Energy Dialogue with Canada	\$10M
AREA OF INTEREST 4- DEVELOP ADVANCED CELLS AND DESIGN TECHNOLOGY FOR ELECTRIC DRIVE BATTERIES		
4A	Develop Advanced Cells for Electric Drive Vehicle Batteries	\$3M to \$5M
4B	Develop Cells and/or Battery Packs with Significant Cost Improvement	\$3M to \$6M
4C	Improve Cell and/or Battery Pack Inactive Component Designs for Significant Cost Improvement	\$2M to \$3M
4D	Improve Cell and/or Battery Pack Thermal Management Approaches	\$2M to \$3M
AREA OF INTEREST 5- ADVANCED POWER ELECTRONICS AND ELECTRIC MOTORS (APEEM) TECHNOLOGIES		
5A	Modular, Scalable Inverter for Advanced Electric Drive Vehicle Electric Traction Drives	\$3M to \$6M
5B	Motors with Reduced or Eliminated Use of Rare Earth Permanent Magnets for Advanced EDV Electric Traction Drives	\$3M to \$6M
AREA OF INTEREST 6-THERMOELECTRICS AND ENABLING ENGINE TECHNOLOGIES		
6A	Solid State Thermoelectric Energy Conversion Devices	\$8M to \$10M
6B	Enabling Technologies for Engine and Powertrain Systems	\$1.5M to \$3M
AREA OF INTEREST 7-FLEET EFFICIENCY		
7A	Fuel Efficient Tires	\$0.75M to \$1.5M
7B	Driver Feedback Technology	\$0.75M to \$1.5M
AREA OF INTEREST 8-ADVANCED VEHICLE TESTING AND EVALUATION		
8	Advanced Vehicle Testing and Evaluation	\$50M

F. PERIOD OF PERFORMANCE

The anticipated period of performance for projects under each Program/Topic Area in this announcement is:

Area of Interest and Subtopic Area	Title	Period of Performance
AREA OF INTEREST 1- ADVANCED FUELS AND LUBRICANTS TECHNOLOGIES		
1A	Fuels and Lubricants for Advanced Combustion Regimes	36 months
1B	Direct Petroleum Displacement by Liquid Alternative Fuels for Compression-Ignition Engines in Transportation	36 months
1C	Lubricant Formulations to Enhance Engine Efficiency	36 months
AREA OF INTEREST 2- LIGHTWEIGHTING MATERIALS		
2A	Low-Cost Development of Magnesium	36 months
2B	Development of Low-Cost Carbon Fiber	36 months
2C	Demonstration Project to Develop and Construct a Magnesium Intensive Vehicle Front End Sub-Structure	36 months
2D	Demonstration Project to Validate Crash Model For Carbon Fiber Composites to Enable Production-Feasible Composites in Primary-Structural Automotive Crash and Energy Management Applications	48 months
AREA OF INTEREST 3 –DEMONSTRATION PROJECT FOR A MULTI-MATERIAL LIGHT-WEIGHT PROTOTYPE VEHICLE AS PART OF THE CLEAN ENERGY DIALOGUE WITH CANADA		
3	Demonstration Project for a Multi-Material Light-Weight Prototype Vehicle as Part of the Clean Energy Dialogue with Canada	48 months
AREA OF INTEREST 4- DEVELOP ADVANCED CELLS AND DESIGN TECHNOLOGY FOR ELECTRIC DRIVE BATTERIES		
4A	Develop Advanced Cells for Electric Drive Vehicle Batteries	36 months
4B	Develop Cells and/or Battery Packs with Significant Cost Improvement	36 months
4C	Improve Cell and/or Battery Pack Inactive Component Designs for Significant Cost Improvement	36 months
4D	Improve Cell and/or Battery Pack Thermal Management Approaches	36 months
AREA OF INTEREST 5- ADVANCED POWER ELECTRONICS AND ELECTRIC MOTORS (APEEM) TECHNOLOGIES		
5A	Modular, Scalable Inverter for Advanced Electric Drive Vehicle Electric Traction Drives	36 months
5B	Motors with Reduced or Eliminated Use of Rare Earth Permanent Magnets for Advanced EDV Electric Traction Drives	36 months
AREA OF INTEREST 6-THERMOELECTRICS AND ENABLING ENGINE TECHNOLOGIES		
6A	Solid State Thermoelectric Energy Conversion Devices	36-48 months
6B	Enabling Technologies for Engine and Powertrain Systems	36-48 months
AREA OF INTEREST 7-FLEET EFFICIENCY		
7A	Fuel Efficient Tires	24-36 months
7B	Driver Feedback Technology	24-36 months
AREA OF INTEREST 8-ADVANCED VEHICLE TESTING AND EVALUATION		
8	Advanced Vehicle Testing and Evaluation	60 months

G. TYPE OF APPLICATION

DOE will accept only new applications under this announcement.

PART III-ELIGIBILITY INFORMATION

A. ELIGIBLE APPLICANTS

All types of entities, including DOE/NNSA National Laboratories (as defined in EPACT 2005, Section 989), are eligible to apply as prime Recipients, except other Federal agencies, , and nonprofit organizations described in section 501(c)(4) of the Internal Revenue Code of 1986 that engaged in lobbying activities after December 31, 1995.

It should be noted that if a DOE/NNSA National Laboratory is selected as a prime recipient under this announcement, it is DOE's intent to award the selection through the Field Work Proposal (FWP) process. . The laboratory will also be responsible for providing non-federal source cost share to meet the cost share requirements as outlined in this announcement.

Authorization for DOE/NNSA National Laboratories/FFRDCs. The cognizant contracting officer for the FFRDC must authorize in writing the use of a DOE/NNSA FFRDC contractor on the proposed project and this authorization must be submitted with the application. The following wording is acceptable for this authorization.

"Authorization is granted for the [*Name*] Laboratory to participate in the proposed project. The work proposed for the Laboratory is consistent with or complimentary to the missions of the Laboratory, will not adversely impact execution of the DOE/NNSA assigned programs at the Laboratory.

B. COST SHARING

ALL SUBTOPIC AREAS UNDER AREA OF INTEREST 1

The recipient cost share must be at least **20%** of the total allowable costs of the project (i.e., the sum of the Government share, including FFRDC contractor costs if applicable, and the recipient share of allowable costs equals the total allowable cost of the project) and must come from non-Federal sources unless otherwise allowed by law. **However, it is highly encouraged that recipients exceed the minimum cost share requirements.** (See the table below for a snap shot of the cost share requirements.)

ALL SUBTOPIC AREAS UNDER AREA OF INTEREST 2

The recipient cost share must be at least **50%** of the total allowable costs of the project (i.e., the sum of the Government share, including FFRDC contractor costs if applicable, and the recipient share of allowable costs equals the total allowable cost of the project) and must come from non-Federal sources unless otherwise allowed by law. (See the table below for a snap shot of the cost share requirements.)

AREA OF INTEREST 3

The recipient cost share must be at least **50%** of the total allowable costs of the project (i.e., the sum of the Government share, including FFRDC contractor costs if applicable, and the recipient share of allowable costs equals the total allowable cost of the project) and must come from non-Federal sources unless otherwise allowed by law. (See the table below for a snap shot of the cost share requirements.)

AREA OF INTEREST 4 (SUBTOPICS 4A & 4B)

The recipient cost share must be at least **20%** of the total allowable costs of the project (i.e., the sum of the Government share, including FFRDC contractor costs if applicable, and the recipient share of allowable costs equals the total allowable cost of the project) and must come from non-Federal sources unless otherwise allowed by law. (See the table below for a snap shot of the cost share requirements.)

AREA OF INTEREST 4 (SUBTOPICS 4C & 4D)

The recipient cost share must be at least **20%** of the total allowable costs of the project (i.e., the sum of the Government share, including FFRDC contractor costs if applicable, and the recipient share of allowable costs equals the total allowable cost of the project) and must come from non-Federal sources unless otherwise allowed by law. **However, it is highly encouraged that recipients exceed the minimum cost share requirements.** (See the table below for a snap shot of the cost share requirements.)

ALL SUBTOPIC AREAS UNDER AREA OF INTEREST 5

The recipient cost share must be at least **20%** of the total allowable costs of the project (i.e., the sum of the Government share, including FFRDC contractor costs if applicable, and the recipient share of allowable costs equals the total allowable cost of the project) and must come from non-Federal sources unless otherwise allowed by law. **However, it is highly encouraged that recipients exceed the minimum cost share requirements.** (See the table below for a snap shot of the cost share requirements.)

ALL SUBTOPIC AREAS UNDER AREA OF INTEREST 6

The recipient cost share must be at least **20%** of the total allowable costs of the project (i.e., the sum of the Government share, including FFRDC contractor costs if applicable, and the recipient share of allowable costs equals the total allowable cost of the project) and must come from non-Federal sources unless otherwise allowed by law. **However, it is highly encouraged that exceed the minimum cost share requirements.** (See the table below for a snap shot of the cost share requirements.)

ALL SUBTOPIC AREAS UNDER AREA OF INTEREST 7

The recipient cost share must be at least **20%** of the total allowable costs of the project (i.e., the sum of the Government share, including FFRDC contractor costs if applicable, and the recipient share of allowable costs equals the total allowable cost of the project) and must come from non-Federal sources unless otherwise allowed by law. **However, it is highly encouraged that recipients exceed the minimum cost share requirements.** (See the table below for a snap shot of the cost share requirements.)

AREA OF INTEREST 8

The recipient cost share must be at least **20%** of the total allowable costs of the project (i.e., the sum of the Government share, including FFRDC contractor costs if applicable, and the recipient share of allowable costs equals the total allowable cost of the project) and must come from non-Federal sources unless otherwise allowed by law. **However, it is highly encouraged that recipients exceed the minimum cost share requirements.** (See the table below for a snap shot of the cost share requirements.)

Not Specified /Other

Summary of Required and Encouraged Recipient Cost Share

Area of Interest and Subtopic Area	Title	Minimum Recipient Cost Share Percentage
AREA OF INTEREST 1- ADVANCED FUELS AND LUBRICANTS TECHNOLOGIES		
1A	Fuels and Lubricants for Advanced Combustion Regimes	20%
1B	Direct Petroleum Displacement by Liquid Alternative Fuels for Compression-Ignition Engines in Transportation	20%
1C	Lubricant Formulations to Enhance Engine Efficiency	20%
AREA OF INTEREST 2- LIGHTWEIGHTING MATERIALS		
2A	Low-Cost Development of Magnesium	50%
2B	Development of Low-Cost Carbon Fiber	50%
2C	Demonstration Project to Develop and Construct a Magnesium Intensive Vehicle Front End Sub-Structure	50%
2D	Demonstration Project to Validate Crash Model For Carbon Fiber Composites to Enable Production-Feasible Composites in Primary-Structural Automotive Crash and Energy Management Applications	50%
AREA OF INTEREST 3 –DEMONSTRATION PROJECT FOR A MULTI-MATERIAL LIGHT-WEIGHT PROTOTYPE VEHICLE AS PART OF THE CLEAN ENERGY DIALOGUE WITH CANADA		
3	Demonstration Project for a Multi-Material Light-Weight Prototype Vehicle as Part of the Clean Energy Dialogue with Canada	50%
AREA OF INTEREST 4- DEVELOP ADVANCED CELLS AND DESIGN TECHNOLOGY FOR ELECTRIC DRIVE BATTERIES		
4A	Develop Advanced Cells for Electric Drive Vehicle Batteries	20%
4B	Develop Cells and/or Battery Packs with Significant Cost Improvement	20%
4C	Improve Cell and/or Battery Pack Inactive Component Designs for Significant Cost Improvement	20%
4D	Improve Cell and/or Battery Pack Thermal Management Approaches	20%
AREA OF INTEREST 5- ADVANCED POWER ELECTRONICS AND ELECTRIC MOTORS (APEEM) TECHNOLOGIES		
5A	Modular, Scalable Inverter for Advanced Electric Drive Vehicle Electric Traction Drives	20%
5B	Motors with Reduced or Eliminated Use of Rare Earth Permanent Magnets for Advanced EDV Electric Traction Drives	20%
AREA OF INTEREST 6-THERMOELECTRICS AND ENABLING ENGINE TECHNOLOGIES		
6A	Solid State Thermoelectric Energy Conversion Devices	20%
6B	Enabling Technologies for Engine and Powertrain Systems	20%
AREA OF INTEREST 7-FLEET EFFICIENCY		
7A	Fuel Efficient Tires	20%
7B	Driver Feedback Technology	20%
AREA OF INTEREST 8-ADVANCED VEHICLE TESTING AND EVALUATION		
8	Advanced Vehicle Testing and Evaluation	20%

C. OTHER ELIGIBILITY REQUIREMENTS

FFRDC/National Laboratories

Federally Funded Research and Development Center (FFRDC) Contractors. FFRDC contractors are eligible as prime Recipients for an award under this announcement as outlined in PART III-Eligibility Information, under Eligible Applicants and they may also propose as a team member on another entity's application 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 and this authorization must be submitted with the application. The use of a FFRDC contractor must be consistent with the contractor's authority under its award

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 and this authorization must be submitted with the application. 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 complimentary to the missions of the Laboratory, will not adversely impact execution of the DOE/NNSA assigned programs at the Laboratory.

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. Usually, DOE/NNSA will fund a DOE/NNSA FFRDC contractor through the DOE field work proposal system and other FFRDC contractors through an interagency agreement with the sponsoring agency.

Cost Share. The applicant's cost share requirement will be based on the total cost of the project, including the applicant's and the FFRDC contractor's portions of the effort.

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.

Performance of Work in the United States

As a condition under this announcement, applicants must propose that at least 75% of the direct labor cost for the project (including subcontractor/subrecipient labor) will be incurred in the United States unless the applicant can demonstrate to the satisfaction of the DOE that the United States economic interest will be better served through a greater percentage of work performed outside the United States. For example, an Applicant may provide evidence that expertise to develop a technology exists only outside the United States, but that ultimate commercialization of the technology will result in substantial benefits to the United States such as improved electricity reliability, increased employment, increased exports of U.S.-manufactured products, etc. **This requirement applies to all AOIs except AOI 3. For AOI 3, 100% of direct labor cost for the project must be incurred in the United States.**

PART IV- APPLICATION AND SUBMISSION INFORMATION

A. ADDRESS TO REQUEST APPLICATION PACKAGE

Application forms and instructions are available at Grants.gov. To access these materials, go to <http://www.grants.gov>, select “Apply for Grants,” and then select “Download Application Package.” Enter the CFDA and/or the funding opportunity number located on the cover of this Announcement then follow the prompts to save the application package.

B. LETTER OF INTENT AND PRE-APPLICATION

Letter of Intent:

Applicants are requested to submit a letter of intent by **January 18, 2011**. This letter should include the name of the applicant, area of interest and subtopic as required, and the title of the project. Failure to submit such letters will not negatively affect a responsive application submitted in a timely fashion. Letters of intent will be used by DOE for planning purposed only so DOE can organize and expedite the merit review process. The letter of intent should be sent by E-mail to Jeffrey.Kooser@netl.doe.gov. Please do not submit any other documentation other than what has been requested above. Please do not submit an application package via email, applications will only be accepted through Grants.gov as outlined in this announcement. The submission of an application through any other system other than through Grants.gov will result in your application not being evaluated.

Pre-application:

Pre-applications are not required

C. CONTENT AND APPLICATION FORMS

You must complete the mandatory forms and any applicable optional forms (e.g., Disclosure of Lobbying Activities (SF-LLL)) in accordance with the instructions on the forms and the additional instructions below. Files that are attached to the forms must be in Adobe Portable Document Format (PDF) unless otherwise specified in this announcement.

1.SF 424 (R&R) Complete this form first to populate data in other forms. Complete all the required fields in accordance with the pop-up instructions on the form. The list of certifications and assurances referenced in Field 17 can be found on the DOE Financial Assistance Forms Page at http://management.energy.gov/business_doe/business_forms.htm under Certification and Assurances.

Note that the Project/Performance Site Congressional District is entered in the format of the 2 digit state code followed by a dash and a 3 digit Congressional district code, for example VA-001. Hover over this field for additional instructions.

2.PROJECT/PERFORMANCE SITE LOCATION(S)

Indicate the primary site where the work will be performed. If a portion of the project will be performed at any other site(s), identify the site location(s) in the blocks provided.

Use the Next Site button to expand the form to add additional Project/Performance Site Locations.

3.RESEARCH AND RELATED Other Project Information

Complete questions 1 through 6 and attach files. The files must comply with the following instructions:

Project Summary/Abstract

The project summary/abstract must contain a summary of the proposed activity suitable for dissemination to the public. It should be a self-contained document that identifies the name of the applicant, the project director/principal investigator(s), the project title, the objectives of the project, a description of the project, including methods to be employed, the potential impact of the project (i.e., benefits, outcomes), and major participants (for collaborative projects). This document must not include any proprietary or sensitive business information as the Department may make it available to the public after the awards are made. The project summary must not exceed 1 page when printed using standard 8.5” by 11” paper with 1” margins (top, bottom, left and right) with font not smaller than 11 point. To attach a Project Summary/Abstract, click “Add Attachment.”

Project Narrative

The project narrative must not exceed **25** pages, **for applications under all Areas of Interest and Subtopic Areas** including cover page, table of contents, charts, graphs, maps, photographs, and other pictorial presentations, when printed using standard 8.5” by 11” paper with 1 inch margins (top, bottom, left, and right). **EVALUATORS WILL ONLY REVIEW THE NUMBER OF PAGES SPECIFIED IN THE PRECEDING SENTENCE.** The font must not be smaller than 11 point. Do not include any Internet addresses (URLs) that provide information necessary to review the application, because the information contained in these sites will not be reviewed. See Part VIII.D for instructions on how to mark proprietary application information. To attach a Project Narrative, click “Add Attachment.” **Applicants must identify the Area of Interest they are applying to in the project narrative and identify the Area of Interest number and Subtopic Area in the file name. For example if an applicant were applying to Area of Interest 1, Subtopic 1A “Project01A.pdf”; if applying to Area of Interest 2, Subtopic 2B “Project02B.pdf”; if applying to Area of Interest 3 “Project03(identify vehicle type here as well).pdf” and so on for each Area of Interest and Subtopic Area.**

The project narrative must include:

Project Objectives: This section should provide a clear, concise statement of the specific objectives/aims of the proposed project.

Merit Review Criterion Discussion The section should be formatted to address each of the merit review criterion and sub-criterion listed in Part V.A. Provide sufficient information so that reviewers will be able to evaluate the application in accordance with these merit review criteria. **DOE WILL EVALUATE AND CONSIDER ONLY THOSE APPLICATIONS THAT ADDRESS SEPARATELY EACH OF THE MERIT REVIEW CRITERION AND SUB-CRITERION.**

Relevance and Outcomes/Impacts: This section should explain the relevance of the effort to the objectives in the program announcement and the expected outcomes and/or impacts.

Roles of Participants: For multi-organizational or multi-investigator projects, describe the roles and the work to be performed by each participant/investigator, business agreements between the applicant and participants, and how the various efforts will be integrated and managed.

Multiple Principal Investigators: The applicant, whether a single organization or team/partnership/consortium, must indicate if the project will include multiple PIs. This decision is solely the responsibility of the applicant. If multiple PIs will be designated, the application must identify the Contact PI/Project Coordinator and provide a “Coordination and Management Plan” that describes the organization structure of the project as it pertains to the designation of multiple PIs. This plan should, at a minimum, include:

Not Specified /Other

- process for making decisions on scientific/technical direction;
- publications;
- intellectual property issues;
- communication plans;
- procedures for resolving conflicts; and
- PIs' roles and administrative, technical, and scientific responsibilities for the project.

Facilities And Other Resources: Identify the facilities (e.g., office, laboratory, computer, etc.) to be used at each performance site listed and, if appropriate, indicate their capacities, pertinent capabilities, relative proximity, and extent of availability to the project. Describe only those resources that are directly applicable to the proposed work. Provide any information describing the other resources available to the project such as machine and electronics shops.

Equipment: List important items of equipment already available for this project and, if appropriate, note the location and pertinent capabilities of each. If you are proposing to acquire equipment, describe comparable equipment, if any, already at your organization and explain why it cannot be used.

Statement Of Project Objectives (SOPO):

The project narrative must contain a single, detailed Statement of Project Objectives that addresses how the project objectives will be met. The Statement of Project Objectives must contain a clear, concise description of all activities to be completed during project performance and follow the structure discussed below. The Statement of Project Objectives may be released to the public by DOE in whole or in part at any time. It is therefore required that it shall not contain proprietary or confidential business information. The Statement of Project Objectives is generally less than 10 pages in total for the proposed work. Applicants shall prepare the Statement of Project Objectives in the following format:

TITLE OF WORK TO BE PERFORMED

(Insert the title of work to be performed. Be concise and descriptive.)

A. OBJECTIVES

Include one paragraph on the overall objective(s) of the work. Also, include objective(s) for each phase of the work.

B. SCOPE OF WORK

This section should not exceed one-half page and should summarize the effort and approach to achieve the objective(s) of the work for each Phase.

C. TASKS TO BE PERFORMED

Tasks, concisely written, should be provided in a logical sequence and should be divided into the phases of the project, as appropriate. This section provides a brief summary of the planned approach to this project. An outline of the Project Management Plan (referenced in Task 1.0 below and required to be submitted with your application) is provided later in this Part.

PHASE I

NOTE: For Area of Interest 8 ONLY. Please refer back to Part I, AOI 8 for the tasks that must be included at a minimum as the tasks to be performed in the SOPO under this AOI.

Task 1.0 – Project Management and Planning

(Description includes work elements required to revise and maintain the Project Management Plan and to manage and report on activities in accordance with the plan)

Subtask 1.1 (Description)

Not Specified /Other

Task 2.0 - (Title)

PHASE II (Optional)

Task 3.0 - (Title)

D. DELIVERABLES

The periodic, topical, and final reports shall be submitted in accordance with the attached "Federal Assistance Reporting Checklist" and the instructions accompanying the checklist.

[Note: The Recipient shall provide a list of deliverables other than those identified on the "Federal Assistance Reporting Checklist" that will be delivered. At a minimum the following specific deliverables shall be included:

1. Summary of accomplishments and project work report shall be prepared for inclusion in the annual Vehicle Technologies programmatic progress report. Report shall be due by October 31 of each year.
2. Upon completion of a milestone, a brief milestone report shall be provided to verify and document the completion of the milestone.
3. The Project Management Plan shall be updated quarterly.

In addition to the above specific deliverables, additional reports shall be identified in this section and also identified within the text of the Statement of Project Objectives. See the following examples:

1. Task 1.1 - (Report Description)
2. Task 2.2 - (Report Description)

NOTE: Please refer back to PART I of the announcement for other specific deliverables that may be required as outlined in the AOI or Subtopic Area to which you are applying for.

E. BRIEFINGS AND PRESENTATIONS

The Recipient shall prepare detailed briefings for presentation to the Project Officer at the Project Officer's facility located in Pittsburgh, PA or Morgantown, WV or Washington, DC. Briefings shall be given by the Recipient to explain the plans, progress, and results of the technical effort approximately twice a year. The Recipient shall provide and present a technical paper(s) at the DOE/NETL Annual Contractor's Review Meeting to be held at the NETL facility located in Pittsburgh, PA or Morgantown, WV or DOE Headquarters in Washington, DC.

Bibliography & References Cited Appendix:

Provide a bibliography of any references cited in the Project Narrative. Each reference must include the names of all authors (in the same sequence in which they appear in the publication), the article and journal title, book title, volume number, page numbers, and year of publication. Include only bibliographic citations. Applicants should be especially careful to follow scholarly practices in providing citations for source materials relied upon when preparing any section of the application. In order to reduce the number of files attached to your application, please provide the Bibliography and References Cited information as an appendix to your project narrative. Do not attach a file in field 8. This appendix will not count in the project narrative page limitation.

Other Attachments:

If you need to elaborate on your responses to questions 1-6 on the “Other Project Information” document, attach a file in field 12.

Also, attach the following files:

Project Management Plan:

This plan should be formatted to include the following sections with each section to include the information as described below:

A. Executive Summary: Provide a description of the project that includes the objective, project goals, and expected results. The description should include a high level description of the technology, potential use or benefit of the technology, location of work sites and a brief discussion of work performed at each site, along with a description of project phases (if the project includes phases). For purposes of the application, this information is included in the Project Narrative (Field 7) and should be simply copied to this document for completeness, so that the Project Management Plan is a stand-alone document.

B. Risk Management: Provide a summary description of the proposed approach to identify, analyze, and respond to perceived risks associated with the proposed project. Project risk events are uncertain future events that, if realized, impact the success of the project. As a minimum, include the initial identification of significant technical, resource, and management issues that have the potential to impede project progress and strategies to minimize impacts from those issues.

C. Milestone Log: Provide milestones for each budget period (or phase) of the project. Each milestone should include a title and planned completion date. Milestones should be quantitative and show progress toward budget period and/or project goals.

The following are examples of the type of milestones that should be included in the Project Management Plan. These should be tailored to meet the specific work tasks of the project (some may be deleted if not applicable):

- Initial Simulation and Modeling Complete
- Initial (Material, Component, or Process) Specifications Complete
- Initial (Material, Component, or Process) Design Complete
- Commercialization Plan Complete
- Initial (Material, Component, or Process) Development & Testing Complete
- (Material, Component, or Process) Downselection Complete
- Test Cell (Material, Component, or Process) and Systems Demonstrations Initiated
- Test Cell (Material, Component, or Process) and Systems Demonstrations Completed
- Delivery of Technology or Material for Government Confirmatory Testing Completed (AOIs 4 and 5 only)
- Systems Integration Design Complete
- Vehicle Integration and Demonstration Initiated
- Vehicle Integration and Demonstration 50% Completed
- Vehicle Integration and Demonstration 100% Completed

Not Specified /Other

[Note: During project performance, the Recipient will report the Milestone Status as part of the required quarterly Progress Report as prescribed in the award document under Attachment 4, Reporting Requirements Checklist. The Milestone Status will present actual performance in comparison with Milestone Log, and include:

- (1) the **actual** status and progress of the project,
- (2) specific progress made toward achieving the project's milestones, and,
- (3) any proposed changes in the project's schedule required to complete milestones.]

D. Funding and Costing Profile: Provide a table (the Project Funding Profile) that shows, by budget period, the amount of government funding going to each project team member. The table should also include total project information (DOE share and recipient share) and cost share percentages. Provide a second table (the Project Government Payment Profile) that projects, by month, the government payments or disbursements planned for the first budget period, at a minimum. The "Project Government Payment Profile" should account for billing delays associated with the recipient billing process prior to requested reimbursement by the DOE.

E. Project Timeline: Provide a timeline of the project (similar to a Gantt chart) broken down by each task and subtask, as described in the Statement of Project Objectives. The timeline should include for each task, a start date, and end date. The timeline should show interdependencies between tasks and include the milestones that are identified in the Milestone Log (Section C).

F. Success Criteria at Decision Points: Provide success criteria for each decision point in the project, including go/no-go decision points and the conclusions of budget periods and the entire project. The success criteria should be objective and stated in terms of specific, measurable, and repeatable data. Usually, the success criteria pertain to desirable outcomes, results, and observations from the project.

G. Key Partnerships or Teaming Arrangements: Provide a list of key team members in the project as well as the role of each team member. A hierarchical project organization and structure chart should be provided along with a description of the role and responsibilities of each team member in terms of contribution to project scope. The section should also include key team members who fulfill single or multiple roles within a project as well as the contact information for each.

H. Facilities and Resources: Provide a list of project locations along with a discussion of capabilities and activities performed at each site in terms of contribution to project scope. The address of each work site should be provided.

I. Technology Readiness Levels (TRLs): **(Applies to AOIs 1-7 Only)** Identify the readiness level of the technology associated with the project as well as the planned progression during the course of project execution. A detailed explanation of the rationale for the estimated technology readiness level should be provided. Specific entry criteria for the next higher technology readiness level should be identified. The following definitions apply:

TRL-1. Basic principles observed and reported: Scientific problem or phenomenon identified. Essential characteristics and behaviors of systems and architectures are identified using mathematical formulations or algorithms. The observation of basic scientific principles or phenomena has been validated through peer-reviewed research. Technology is ready to transition from scientific research to applied research.

TRL-2. Technology concept and/or application formulated: Applied research activity. Theory and scientific principles are focused on specific application areas to define the concept. Characteristics of the application are described. Analytical tools are developed for simulation or analysis of the application.

Not Specified /Other

TRL-3. Analytical and experimental critical function and/or characteristic proof of concept: Proof of concept validation has been achieved at this level. Experimental research and development is initiated with analytical and laboratory studies. System/integrated process requirements for the overall system application are well known. Demonstration of technical feasibility using immature prototype implementations are exercised with representative interface inputs to include electrical, mechanical, or controlling elements to validate predictions.

TRL-4. Component and/or process validation in laboratory environment- Alpha prototype (component) Standalone prototyping implementation and testing in laboratory environment demonstrates the concept. Integration and testing of component technology elements are sufficient to validate feasibility.

TRL-5. Component and/or process validation in relevant environment- Beta prototype (component): Thorough prototype testing of the component/process in relevant environment to the end user is performed. Basic technology elements are integrated with reasonably realistic supporting elements based on available technologies. Prototyping implementations conform to the target environment and interfaces.

TRL 6. System/process model or prototype demonstration in a relevant environment- Beta prototype (system): Prototyping implementations are partially integrated with existing systems. Engineering feasibility fully demonstrated in actual or high fidelity system applications in an environment relevant to the end user.

TRL-7. System/process prototype demonstration in an operational environment- Integrated pilot (system): System prototyping demonstration in operational environment. System is at or near full scale (pilot or engineering scale) of the operational system, with most functions available for demonstration and test. The system, component, or process is integrated with collateral and ancillary systems in a near production quality prototype.

TRL-8. Actual system/process completed and qualified through test and demonstration- Pre-commercial demonstration: End of system development. Full-scale system is fully integrated into operational environment with fully operational hardware and software systems. All functionality is tested in simulated and operational scenarios with demonstrated achievement of end-user specifications. Technology is ready to move from development to commercialization.

[Note: As the first task in the Statement of Project Objectives, successful applicants will revise the version of the Project Management Plan that is submitted with their applications by including details from the negotiation process. This Project Management Plan will be updated by the Recipient Quarterly, and the Recipient must use this plan to report schedule and budget variances. The completed Project Management Plan will represent plans for the entire project duration.]

Save this plan in a single file named “pmp.pdf” and click on “Add Attachments” in Field 12 to attach.

Commitment Letters from Third Parties Contributing to Cost Sharing

If a third party, (i.e., a party other than the organization submitting the application) proposes to provide all or part of the required cost sharing, the applicant must include a letter from the third party stating that it is committed to providing a specific minimum dollar amount of cost sharing. Letters must be signed by the person authorized to commit the expenditure of funds by the entity and be provided in a PDF format. Save this information in a single file named “CLTP.pdf” and click on “Add Attachments” in Field 12 to attach.

Not Specified /Other

Budget for DOE 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 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. Use the FFRDC name as the file name (up to 10 letters) and attach to the R&R Other Project Information form in Field 12 – Add Attachments.

Environmental Questionnaire

You must complete the environmental questionnaire at <http://www.netl.doe.gov/business/forms.html>. Save the questionnaire in a single file named “Env.pdf” and click on “Add Attachments” in Field 12 to attach.

Class Advance Patent Waiver

The government will have certain statutory rights in any invention that is conceived or first actually reduced to practice under a DOE award. 42 U.S.C. 5908 provides that title to such inventions vests in the United States, except where 35 U.S.C. 202 provides otherwise for domestic nonprofit organizations or domestic small business firms. However, for other types of entities, the Secretary of Energy may waive all or any part of the rights of the United States subject to certain conditions. (See "Notice of Right to Request Patent Waiver" in paragraph G on page 53.)

Pursuant to 10 CFR Part 784, DOE intends to execute a class patent waiver for Areas of Interest 1-7 of this announcement. Any entity other than a domestic small business or domestic nonprofit organization can elect to participate in the class waiver if they meet the requirements set forth in the waiver determination. In that event, it will not be necessary for that entity to apply for an advance patent waiver. Eligible applicants must include a letter stating their intention to participate or not to participate in the class waiver and agree to the standard waiver terms and conditions, including US competitiveness. Letters must be signed by the person authorized to commit the expenditure of funds by the entity and be provided in a PDF format. Save this letter in a single file named “WVR.pdf”

75% Performance of Work in the United States

Eligible applicants must include a letter stating their intention to perform 75% of the direct labor effort in the United States as outlined in the announcement. Letters must be signed by the person authorized to commit the expenditure of funds by the entity and be provided in a PDF format. Save this letter in a single file named “75percentWork.pdf”. **This requirement applies to all AOIs except AOI 3. For AOI 3, 100% of direct labor cost for the project must be incurred in the United States.**

Area of Interest 3 Applicants Only

Eligible applicants under Area of Interest 3 only, shall include a letter of intent from a Canadian government entity indicating that certain tasks included in the project proposed under this AOI are being funded by that entity under the Clean Energy Dialogue. Letters must be signed by the person authorized to commit the expenditure of funds by the entity and be provided in a PDF format. Save this letter in a single file named “AOI 3 Intent.pdf”

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 and this authorization must be submitted with the application. 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 complimentary to the missions of the Laboratory, will not adversely impact execution of the DOE/NNSA assigned programs at the Laboratory." Save this letter in a single file named “LabAuthorization.pdf”

4. **RESEARCH AND RELATED Senior/Key Person**

Complete this form before the Budget form to populate data on the Budget form. Beginning with the PD/PI, provide a profile for each senior/key person proposed. A senior/key person is any individual who contributes in a substantive, measurable way to the scientific/technical development or execution of the project, whether or not a salary is proposed for this individual. Subawardees and consultants must be included if they meet this definition. For each senior/key person provide:

Biographical Sketch.

Complete a biographical sketch for each senior/key person and attach to the “Attach Biographical Sketch” field in each profile. The biographical information for each person must not exceed 2 pages when printed on 8.5” by 11” paper with 1 inch margins (top, bottom, left, and right) with font not smaller than 11 point and must include:

Education and Training. Undergraduate, graduate and postdoctoral training, provide institution, major/area, degree and year.

Research and Professional Experience: Beginning with the current position list, in chronological order, professional/academic positions with a brief description.

Publications. Provide a list of up to 10 publications most closely related to the proposed project. For each publication, identify the names of all authors (in the same sequence in which they appear in the publication), the article title, book or journal title, volume number, page numbers, year of publication, and website address if available electronically.

Patents, copyrights, and software systems developed may be provided in addition to or substituted for publications.

Synergistic Activities. List no more than 5 professional and scholarly activities related to the effort proposed.

Current and Pending Support

Provide a list of all current and pending support (both Federal and non-Federal) for the Project Director/Principal Investigator(s) (PD/PI) and senior/key persons, including subawardees, for ongoing projects and pending applications. For each organization providing support, show the total award amount for the entire award period (including indirect costs) and the number of person-months per year to be devoted to the project by the senior/key person. Concurrent submission of an application to other organizations for simultaneous consideration will not prejudice its review. Save the information in a separate file and attach to the “Attach Current and Pending Support” field in each profile.

5. **RESEARCH AND RELATED BUDGET (TOTAL FED + NON-FED)**

Complete the Research and Related Budget (Total Fed & Non-Fed) form in accordance with the instructions on the form and the following instructions. You must complete a separate budget for each year of support requested. The form will generate a cumulative budget for the total project period. You must complete all the mandatory information on the form before the NEXT PERIOD button is activated. You may request funds under any of the categories listed 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 (See PART IV. G).

Not Specified /Other

Budget Justification (Field K on the form).

Provide the required supporting information for the following costs (See R&R instructions): equipment; domestic and foreign travel; participant/trainees; material and supplies; publication; consultant services; ADP/computer services; subaward/consortium/contractual; equipment or facility rental/user fees; alterations and renovations; and indirect cost type. Provide any other information you wish to submit to justify your budget request. If cost sharing is required, provide an explanation of the source, nature, amount, and availability of any proposed cost sharing. Attach a single budget justification file for the entire project period in Field K. The file automatically carries over to each budget year.

6. R&R SUBAWARD (Total Fed + Non-Fed) FORM

Budgets for Subawardees, other than DOE FFRDC Contractors. You must provide a separate cumulative R&R budget for each subawardee that is expected to perform work estimated to be more than \$100,000 or 50 percent of the total work effort (whichever is less). Download the R&R Budget Attachment from the R&R SUBAWARD BUDGET (Total Fed + Non-Fed) FORM and e-mail it to each subawardee that is required to submit a separate budget. After the Subawardee has e-mailed its completed budget back to you, attach it to one of the blocks provided on the form. Use up to 10 letters of the subawardee's name as the file name.

7. Disclosure of Lobbying Activities (SF-LLL)

If applicable, complete SF- LLL. Applicability: If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the grant/cooperative agreement, you must complete and submit Standard Form - LLL, "Disclosure Form to Report Lobbying."

Summary of Required Forms/Files

Name of Document	Format	Attach to
1. SF 424 (R&R)	Form	N/A
2. Project/Performance Site Location(s)	Form	N/A
3. RESEARCH AND RELATED Other Project Information	Form	N/A
Project Summary/Abstract	PDF	Field 6
Project Narrative, including required appendices	PDF	Field 7
Project Management Plan	PDF	Field 12
Commitment Letters from Third Parties	PDF	Field 12
Budget for DOE FFRDC, if applicable	PDF	Field 12
Environmental Questionnaire	PDF	Field 12
Class Advanced Patent Waiver (AOI(s) 1-7 Only)	PDF	Field 12
75% Work in the United States	PDF	Field 12
Area of Interest 3 Applicants Only – Letter of intent from a Canadian government entity indicating that certain tasks included in the project proposed under this AOI are being funded by that entity under the Clean Energy Dialogue.	PDF	Field 12
Authorization for DOE/NNSA FFRDCs.	PDF	Field 12
4. RESEARCH & RELATED SENIOR/KEY PERSON	Form	N/A
Biographical Sketch	PDF	Attach to appropriate block
Current and Pending Support	PDF	Attach to appropriate block
5. RESEARCH AND RELATED BUDGET (Total Fed + Non-Fed)	Form	N/A
Budget Justification	PDF	Field K
6. R&R SUBAWARD BUDGET (Total Fed + Non-Fed) ATTACHMENT(S) FORM, if applicable	Form	N/A
7. SF-LLL Disclosure of Lobbying Activities, if applicable	Form	N/A

D. SUBMISSIONS FROM SUCCESSFUL APPLICANTS

If selected for award, DOE/NNSA reserves the right to request additional or clarifying information for any reason deemed necessary, including, but not limited to:

- 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);
- Representation of Limited Rights Data and Restricted Software, if applicable;
- Commitment Letter from Third Parties Contributing to Cost Sharing, if applicable;

E. SUBMISSION DATES AND TIMES

1. Pre-application Due Date

Pre-applications are not required.

2. Application Due Date

Applications for ALL Areas of Interest and Subtopic Areas shall be received by **February 28, 2011** no later than 8:00 Eastern Time. You are encouraged to transmit your application well before the deadline. **APPLICATIONS RECEIVED AFTER THE DEADLINE WILL NOT BE REVIEWED OR CONSIDERED FOR AWARD.**

F. INTERGOVERNMENTAL REVIEW

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

G. FUNDING RESTRICTIONS

Cost Principles: Costs must be allowable, allocable and reasonable in accordance with the applicable Federal cost principles referenced in 10 CFR 600. The cost principles for commercial organization are in FAR Part 31.

Pre-award Costs: Recipients may charge to an award resulting from this announcement pre-award costs that were incurred within the ninety (90) calendar day period immediately preceding the effective date of the award, if the costs are allowable in accordance with the applicable Federal cost principles referenced in 10 CFR 600. Recipients must obtain the prior approval of the contracting officer for any pre-award costs that are for periods greater than this 90 day calendar period.

Pre-award costs are incurred at the applicant's risk. DOE is under no obligation to reimburse such costs if for any reason the applicant does not receive an award or if the award is made for a lesser amount than the applicant expected.

Property Management: Consistent with 10 CFR 600.134 (Non-Profits), 10 CFR 600.232 (States and Local Governments), and 10 CFR 600.321 (For Profits), title to all real property, equipment and supplies (excluding Government-furnished property) acquired by or on behalf of the Recipient in connection with performance of the project will not vest in the Recipient. The Government retains its equitable interest in the property purchased by the Recipient in connection with performance of the project. During the term of the award, the Recipient may, with the DOE Contracting Officer's prior approval, encumber its title to or

dispose of such property. If the property is sold or Recipient otherwise receives financial benefit from the property disposition, during the term of the award, the Recipient shall share the financial benefit with the Government in the same share ratio as the total project cost sharing

H. OTHER SUBMISSION AND REGISTRATION REQUIREMENTS

1. Where to Submit

APPLICATIONS MUST BE SUBMITTED THROUGH GRANTS.GOV TO BE CONSIDERED FOR AWARD, NO EXCEPTIONS. Submit electronic applications through the “Apply for Grants” function at www.grants.gov. If you have problems completing the registration process or submitting your application, call grants.gov at 1-800-518-4726 or send an email message to support@grants.gov

Further, it is the responsibility of the applicant, prior to the application due date and time, to verify successful transmission.

2. Registration Process

You must COMPLETE the one-time registration process (all steps) before you can submit your first application through Grants.gov (See www.grants.gov/GetStarted) . We recommend that you start this process at least three weeks before the application due date. It may take 21 days or more to complete the entire process. Use the Grants.gov Organizational Registration Checklists at <http://www.grants.gov/assets/OrganizationRegCheck.pdf> to guide you through the process. IMPORTANT: During the CCR registration process, you will be asked to designate an E-Business Point of Contact (EBIZ POC). The EBIZ POC must obtain a special password called "Marketing Partner Identification Number" (MPIN). When you have completed the process, you should call the Grants.gov Helpdesk at 1-800-518-4726 to verify that you have completed the final step (i.e., Grants.gov registration).

3. Application Receipt Notices

After an application is submitted, the Authorized Organization Representative (AOR) will receive a series of four e-mails. It is extremely important that the AOR watch for and save each of the emails. It may take up to two (2) business days from application submission to receipt of email Number 2. The titles of the four e-mails are:

Number 1 - Grants.gov Submission Receipt Number

Number 2 - Grants.gov Submission Validation Receipt for Application Number

Number 3 - Grants.gov Grantor Agency Retrieval Receipt for Application Number

Number 4 - Grants.gov Agency Tracking Number Assignment for Application Number

PART V- APPLICATION REVIEW INFORMATION

A. CRITERIA

1. Initial Review Criteria

Prior to a comprehensive merit evaluation, DOE will perform an initial review to determine that (1) the applicant is eligible for an award; (2) the information required by the funding opportunity announcement has been submitted; and (3) the proposed project is responsive to the objectives of the funding opportunity announcement. Applications that fail to pass the initial review will not be forwarded for merit review and will be eliminated from further consideration.

2. Merit Review Criteria

A) The following criteria are to be used to evaluate applications received under this Funding Opportunity Announcement for AOIs 1 through 7 ONLY.

SELECTION CRITERIA FOR AREAS OF INTEREST AND SUBTOPIC AREAS 1-7 ONLY

Criterion 1: Technical Merit of Technology (50%)

- Responsiveness and relevance of the application to the goals and requirements identified in this announcement;
- Knowledge and understanding of past and current work in the technology area proposed and how the proposed effort builds on or expands from these prior efforts;
- Degree and nature of the identified risk in developing and demonstrating the proposed technology, including definition of potential technology deficiencies and proposed solutions to mitigate risk;
- Innovativeness of the proposed technology;
- Scientific soundness and technical feasibility of the proposed technology and adequacy of the current and projected technology readiness levels to support the goals identified in this announcement;
- Realism of technology state of development claims as supported by modeling, simulation, analysis, laboratory tests, etc.
- Adequacy and alignment of the proposed tasks and products with the scope of the project;
- Potential of the proposed technology to reduce or support the reduction of transportation sector petroleum consumption;
- Potential for the proposed technology to reduce or support the reduction of the environmental impacts of the transportation sector;
- Potential to provide or support economic benefits to end-use consumers; and
- General applicability, timeliness, and economic viability of the proposed technology and potential to improve competitiveness of the transportation sector.

Criterion 2: Project Approach (30%)

- Adequacy and thoroughness of the approach to meet the project objectives, including plans to comprehensively address key problems and hurdles to the viability of the technology;
- Adequacy of the planned testing to address key operational and performance aspects of the technology, including the level of detail for proposed test matrices, data acquisition, and sampling and analysis protocols;
- Demonstration of prior success in conducting research and development, similar to the project being proposed through the FOA and the successful commercialization of new technologies;

Not Specified /Other

- Adequacy and appropriateness of the schedule including the duration and sequencing of tasks and the scheduling of project milestones and decision points;
- Clarity, completeness, and adequacy of the SOPO;
- Adequacy and clarity of the path to commercialization to positively impact the reduction of greenhouse gasses;
- Adequacy and appropriateness of the proposed plan for coordinating, directing, and performing the proposed work; and
- Evidence of commitment to conduct a minimum percentage % of work in the United States as required per AOI. (Minimum 75% direct labor cost for AOI's 1,2, and 4 thru 8 to be performed in the US; 100% of work to be done in the US for AOI 3)
- Adequacy, reasonableness and soundness of the proposed project management plan, including , go/no-go decisions, interim milestones, and success/failure metrics
-

Criterion 3: Applicant and Team Member Roles, Capabilities, and Facilities (20%)

- Appropriateness and depth of qualifications and capabilities of key personnel;
- Appropriateness of the team, and the degree of their commitment to the project;
- Availability and adequacy of equipment, facilities, and other support necessary for the successful performance of the proposed work;
- Appropriateness of the planned organizational structure alignment with required tasks and appropriateness of responsibilities among individuals and team members;

B) The following criteria to be used to evaluate applications received under this Funding Opportunity Announcement for AOI 8 ONLY.

SELECTION CRITERIA FOR AREA OF INTEREST 8 ONLY

Criterion 1: Facilities (40%)

- The adequacy and availability of the testing facilities, including facilities for closed track testing, battery testing, and vehicle support infrastructure at or near the test locations to support the testing program;
- The adequacy of the project team's existing and available alternative fuel vehicle fueling (hydrogen, compressed natural gas, etc.) infrastructure to support advanced powertrain vehicles;
- The adequacy of the project team's existing and available infrastructure to support fleet testing of electric vehicles, including availability of both Level II and Level III chargers;
- Adequacy of the capability of the project team to fully test the entire variety of vehicles addressed in this area of interest;
- Availability of one or more fleets with operations in diverse geographic and climatic environments within the United States for consistent fleet testing of the vehicles over the course of the project; and
- The availability of the facilities to perform the baseline testing throughout the calendar year, including the ability to perform testing within the required test specifications;

Criterion 2: Applicant and Team Member Roles and Capabilities (30%)

- Qualifications and capabilities of key personnel related to advanced vehicle technology and vehicle evaluation;
- Prior success in conventional and advanced vehicle testing;
- Demonstrated knowledge and understanding of vehicle testing, including related past and current

Not Specified /Other

- work;
- Demonstrated knowledge and understanding of advanced vehicle powertrains and energy storage systems;
- Demonstrated knowledge and understanding of advanced vehicle infrastructure,
- Ability to assemble a team necessary for the successful execution of the project;
- Adequacy and appropriateness of the planned assignment of the team roles and responsibilities; and
- Organizational experience and the experience of the applicant's team in successfully developing and implementing advanced technology vehicle test procedures;

Criterion 3: Project Management and Testing Plans (30%)

- The adequacy and completeness of the proposed testing plan to execute tasks required for complete testing of the vehicle;
- Adequacy and appropriateness of the proposed plan for coordinating, directing, and performing the proposed work;
- Adequacy of the methods of data collection, quality assurance, description of reports to be provided, schedule of delivery, and timeliness of report delivery;
- Completeness and adequacy of the SOPO;
- The thoroughness of the operation and maintenance plans for the vehicles;
- The degree to which the testing plan incorporates the required elements of industry testing standards including a clear, concise description of testing methodology, philosophy, and goals;
- The adequacy of the planned data acquisition, storage and transmittal mechanisms; and
- Adequacy of the plan to work with manufactures to acquire test vehicles on an accelerated schedule

3. Other Selection Factors

The selection official may consider the following program policy factors in the selection process for all Areas of Interest and Subtopics Areas under in this FOA.

1. Optimization of Federal Funds - It may be desirable to select projects for award of less technical merit than other projects, if such a selection will optimize use of available funds by allowing more projects to be supported while not being detrimental to the overall objectives of the program.

2. Diversity of Organizations - It may be desirable to select projects that collectively represent diverse types and sizes of applicant organizations.

3. Diversity of Technologies - It may be desirable to select projects for award that represent a diversity of technology concepts and applications, as well as technical approaches.

4. Federal Investment-It may be desirable to select project(s) that reduce Federal investment and maximize corporate commitment as demonstrated by cost share levels that exceed the minimum required.

B. REVIEW AND SELECTION PROCESS

1. Merit Review

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

2. Selection

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

3. Discussions and Award

The Government 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) the Government needs additional information to determine that the recipient is capable of complying with the requirements in 10 CFR 600; and/or (4) special terms and conditions are required. Failure to resolve satisfactorily the issues identified by the Government will preclude award to the applicant.

C. ANTICIPATED NOTICE OF SELECTION AND AWARD DATES

DOE anticipates notifying applicants selected for award prior to the end of **June 2011**. DOE anticipates making several awards no later than **September 30, 2011**. *However, the Government is contemplating multiple selections for the various Areas of Interest (AOI) contingent upon the number of applications received in a particular AOI and the availability of funds. Therefore, DOE may elect to notify selected applicants for award in a given AOI(s) rather than notifying all of the applicants selected for award from the entire FOA. Essentially, DOE may elect to stagger the selection dates per AOI.*

PART VI- AWARD ADMINISTRATION INFORMATION

A. AWARD NOTICES

1. Notice of Selection

DOE will notify applicants selected for award. This notice of selection is not an authorization to begin performance. (See Section IV.G with respect to the allowability of pre-award costs.)

Non-selected Notification

Organizations whose applications have not been selected will be advised as promptly as possible. This notice will contain the strengths and weaknesses of the application as determined by the Merit Review Committee.

2. Notice of Award

An 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 DOE.; (4) DOE assistance regulations at 10 CFR 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.

For grants and cooperative agreements made to universities, non-profits and other entities subject to OMB Circular A-110 the Award also includes the Research Terms and Conditions located at <http://www.nsf.gov/bfa/dias/policy/rct/index.jsp>.

B. ADMINISTRATIVE AND NATIONAL POLICY REQUIREMENTS

1. Administrative Requirements

The administrative requirements for DOE grants and cooperative agreements are contained in 10 CFR 600 (See: <http://ecfr.gpoaccess.gov>). Grants and cooperative agreements made to universities, non-profits and other entities subject to Title 2 CFR are subject to the Research Terms and Conditions located on the National Science Foundation web site at <http://www.nsf.gov/bfa/dias/policy/rct/index.jsp>.

DUNS AND CCR REQUIREMENTS

Additional administrative requirements for DOE grants and cooperative agreements are contained in 2 CFR, Part 25 (See: <http://ecfr.gpoaccess.gov>). Prime awardees must keep their data at CCR current. Subawardees at all tiers must obtain DUNS numbers and provide the DUNS to the prime awardee before the subaward can be issued.

SUBAWARD AND EXECUTIVE REPORTING

Additional administrative requirements necessary for DOE grants and cooperative agreements to comply with the Federal Funding and Transparency Act of 2006 (FFATA) are contained in 2 CFR, Part 170. (See: <http://ecfr.gpoaccess.gov>). Prime awardees must register with the new FSRS database and report the required data on their first tier subawardees. Prime awardees must report the executive compensation for their own executives as part of their registration profile in the CCR.

2. 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.

The National Policy Assurances To Be Incorporated As Award Terms are located at <http://www.nsf.gov/bfa/dias/policy/rtc/appc.pdf>.

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.

Statement of Substantial Involvement

Cooperative agreements will be awarded under this announcement. The DOE Specialist and DOE Project Officer will negotiate a Statement of Substantial Involvement prior to 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://www.management.energy.gov/documents/DOEF4600pt292009.pdf>.

PART VII- QUESTIONS/AGENCY CONTACTS

A. QUESTIONS

Questions regarding the content of the announcement must be submitted through the FedConnect portal. You must register with FedConnect to respond as an interested party to submit questions, and to view responses to questions. It is recommended that you register as soon after release of the FOA as possible to have the benefit of all responses. DOE will try to respond to a question within 3 business days, unless a similar question and answer have already been posted on the website.

Questions and comments concerning this FOA shall be submitted not later than five (5) calendar days prior to the application due date. Questions submitted after that date may not allow the Government sufficient time to respond.

All questions submitted shall clearly identify the Area of Interest (AOI) and Subtopic Area to insure a timely and accurate response. Failure to identify the AOI/Subtopic area may result in additional time to address the question or require further correspondence for further clarification regarding the submitted questions. Please be as specific as possible when asking questions to insure that questions will be adequately addressed.

Questions relating to the registration process, system requirements, how an application form works, or the submittal process must be directed to Grants.gov at 1-800-518-4726 or support@grants.gov. DOE cannot answer these questions.

B. AGENCY CONTACT

Name: Jeffrey S. Kooser
E-mail: Jeffrey.Kooser@netl.doe.gov
FAX: (304) 285-4683
Telephone (Optional): (304) 285-4253

PART VIII- OTHER INFORMATION

A. MODIFICATIONS

Notices of any modifications to this announcement will be posted on Grants.gov and the FedConnect portal. You can receive an email when a modification or an announcement message is posted by registering with FedConnect as an interested party for this FOA. It is recommended that you register as soon after release of the FOA as possible to ensure you receive timely notice of any modifications or other announcements.

B. GOVERNMENT RIGHT TO REJECT OR NEGOTIATE

DOE 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.

C. COMMITMENT OF PUBLIC FUNDS

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

D. PROPRIETARY APPLICATION INFORMATION

Patentable ideas, trade secrets, proprietary or confidential commercial or financial information, disclosure of which may harm the applicant, should be included in an application only when 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 [*Insert 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 herein 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."

To protect such data, each line or paragraph on the pages containing such data 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."

E. EVALUATION AND ADMINISTRATION BY NON-FEDERAL PERSONNEL

In conducting the merit review evaluation, 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 must sign conflict of interest and non-disclosure agreements prior to reviewing an application. Non-Federal personnel conducting administrative activities must sign a non-disclosure agreement.

F. INTELLECTUAL PROPERTY DEVELOPED UNDER THIS PROGRAM

Patent Rights. The government will have certain statutory rights in an invention that is conceived or first actually reduced to practice under a DOE award. 42 U.S.C. 5908 provides that title to such inventions vests in the United States, except where 35 U.S.C. 202 provides otherwise for nonprofit organizations or small business firms. However, the Secretary of Energy may waive all or any part of the rights of the United States subject to certain conditions. (See "Notice of Right to Request Patent Waiver" in paragraph G below.) **Pursuant to 10 CFR Part 784, DOE intends to execute a class patent waiver for AOIs 1-7 of this announcement. Any entity other than a domestic small business or domestic nonprofit organization, which do not need to request a waiver (see G. below), can elect to participate in the class waiver if they meet the requirements set forth in the waiver determination. In that event, it will not be necessary for that entity to apply for a patent waiver.**

Rights in Technical Data. Normally, the government has unlimited rights in technical data created under a DOE agreement. Delivery or third party licensing of proprietary software or data developed solely at private expense will not normally be required except as specifically negotiated in a particular agreement to satisfy DOE's own needs or to insure the commercialization of technology developed under a DOE agreement.

Program Covered Under Special Protected Data

Special Protected Data Statutes. This program is covered by a special protected data statute. The provisions of the statute provide for the protection from public disclosure, for a period of up to **three (3) 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 CFR 600 Appendix A to Subpart D), would apply to an award made under this announcement. This provision will 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 also identify data that will be recognized by the parties as protected data.

G. NOTICE OF RIGHT TO REQUEST PATENT WAIVER

Applicants may 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 identified inventions, i.e., individual inventions conceived or first actually reduced to practice in performance of the award. Any 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>.

Domestic small businesses and domestic nonprofit organizations will receive the patent rights clause at 37 CFR 401.14, i.e., the implementation of the Bayh-Dole Act. This clause permits domestic small business and domestic nonprofit organizations to retain title to subject inventions. Therefore, small businesses and nonprofit organizations do not need to request a waiver.

H. 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.