U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

Notice of Intent No. DE-FOA-0001254

Notice of Intent to Issue
Funding Opportunity Announcement No. DE-FOA-0001201

The Office of Energy Efficiency and Renewable Energy (EERE) intends to issue, on behalf of the Vehicle Technologies Office (VTO), a Funding Opportunity Announcement (FOA) entitled "FY 2015 Vehicle Technologies Program Wide Funding Opportunity Announcement".

This FOA supports a broad technology portfolio aimed at developing and deploying cutting-edge advanced highway transportation technologies that reduce petroleum consumption and greenhouse gas emissions, while meeting or exceeding vehicle performance and cost expectations. Research, development, and deployment activities focus on reducing the cost and improving the performance of a mix of near-and-long-term vehicle technologies, which includes advanced batteries, power electronics and electric motors, lightweight and propulsion materials, advanced combustion engines, advanced fuels and lubricants, and other enabling technologies.

These activities support of the President's EV Everywhere Grand Challenge, which seeks to make the United States the first country to produce a wide array of plug-in electric vehicle (PEV) models (PEVs, including plug-in hybrids and all-electric vehicles) by 2022 that are as affordable and convenient as the gasoline powered vehicles we drive today. The activities aim to meet the goals and objectives of the EV Everywhere Grand Challenge by making improvements in vehicle technologies such as powertrains, fuel, tires, and auxiliary systems. The EV Everywhere Blueprint describes the research, development, and deployment needed to meet the overall EV Everywhere goals and other aggressive, technology-specific goals. The technical targets for DOE efforts fall into four areas: battery R&D; electric drive system R&D; vehicle lightweighting; and advanced climate control technologies. Some specific goals include:

- Cutting battery costs from their current $500/kWh to $125/kWh;
- Eliminating almost 30% of vehicle weight through lightweighting; and
- Reducing the cost of electric drive systems from $30/kW to $8/kW.

Collectively, the Vehicle Technologies Program Activities focus on achieving the following goals:

- Save 1.4 million barrels per day of highway petroleum use by 2020 (compared to the Energy Information Agency (EIA) Annual Energy Outlook (AEO) 2012-projected baseline in 2020 of 11.2 million barrels per day); and
- Develop cost-effective technologies to improve new vehicle fuel efficiency and achieve or exceed corporate average fuel economy (CAFE) standards of 144 gCO2/mi (61.6 miles per gallon (mpg)) for cars and 203 gCO2/mi (43.7 mpg) for light trucks by 2025 (54.5 mpg light duty average).

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VTO funds advanced technology research and development (R&D) needed to achieve these goals. Analysis shows that VTO's combined portfolio of technologies could reduce petroleum consumption by nearly 20% from projected 2030 levels in the AEO.

Investment in advanced vehicle technologies, like vehicle electrification, lightweighting, and combustion engines will yield benefits to conventional vehicles, as well as yielding the technologies necessary for alternative fuel vehicles with sufficiently long ranges, sufficiently low costs, and broad consumer appeal to result in significant market penetration potential. It is anticipated that the FOA may include the Areas of Interest described below that target technologies critical to meeting the EV Everywhere Grand Challenge and the development of technologies to reduce petroleum consumption through fuel efficiency improvements.

Critical Technologies to meet the EV Everywhere Grand Challenge

Wide Bandgap (WBG) Power Module R&D – Integrated Power Modules using High-temperature Packaging and Components

The objective of this area of interest is to research, develop, and demonstrate advanced integrated WBG power modules that take advantage of the performance and high-temperature capabilities of WBG semiconductors in order to meet demanding electric vehicle performance requirements and targets while achieving significant cost reduction. The WBG power modules will incorporate innovative heat transfer technologies that utilize advanced high-temperature bonding, joining, and packaging strategies, along with integrated control, monitoring, and reliability functions.

Ultra-Light Door Design, Manufacturing and Demonstration

The objective of this area of interest is to research, develop, and demonstrate a complete front driver's side door assembly (including all components) that weighs at least 40% less than the baseline door while still fitting into the baseline vehicle, meeting relevant safety requirements, and providing comparable functionality. The baseline should be a 2010 model year or newer vehicle. The application should include construction of at least one prototype door and installation into an otherwise unmodified baseline vehicle for performance/crash testing.

Body-in-white (BIW) Joining of Carbon Fiber Composites to Lightweight Metals (Aluminum, Advanced High Strength Steel, or Magnesium) at Prototype Scale for High-Volume Manufacturing

The objective of this area of interest is to research, develop, and demonstrate multi-material joining techniques for carbon fiber composites to structural light weight metals (Aluminum, Advanced High Strength Steel, or Magnesium) for light-duty, medium-duty or heavy-duty vehicle body-in-white (BIW) joints. In addition to applying and validating new techniques at a production-relevant scale, applications will include development of joining process-structure

models capable of joint characterization at a quality suitable for publication in peer reviewed journals.

Advances in Existing and Next-Generation Battery Material Manufacturing Processes

The objective of this area of interest is to research, develop, and demonstrate a battery material-manufacturing approach capable of substantial cost savings and improved materials production. It is anticipated that applications will demonstrate technology advancement in areas such as improved control of stoichiometry, morphology, compositional heterogeneity, and impurity level and nature.

Advances in Electrode and Cell Fabrication Manufacturing

The objective of this area of interest is to research, develop, and demonstrate a manufacturing approach to electrodes or cells. The approach will demonstrate major cost savings and improved performance capable of being incorporated into a battery manufacturing plant.

Electric Drive Vehicular Battery Modeling for Commercially Available Software
The objective of this area of interest is to expand upon the current state of electric drive vehicular battery modeling using the Computer Aided Engineering for Electric Drive Batteries (CAEBAT) open architecture or using other commercially available battery software tools. Example modeling areas include but are not limited to the following:

- Improving the computation efficiency of current electrochemical and thermally coupled material, cell, module and battery pack models;
- Developing models capable of predicting the combined structural, electrical, and thermal responses to abusive conditions, such as crash-induced-crush, overcharge/overdischarge, thermal ramp, and short circuits; and
- Developing a simulation model database of commercially available cells to enable wider evaluation and adoption of computer-aided engineering tools for the design of battery packs and cells. It is envisioned that the battery models for each of the commercially available cells will be available to the public at no charge.

Technology Development to Reduce Petroluem Consumption Through Fuel Efficiency Improvements

Enabling Technologies for Heavy-Duty Vehicles

The objective of this area of interest is to research, develop, and demonstrate cost-competitive-engine-and-powertrain-system enabling technologies for heavy-duty vehicles that are capable of attaining efficiencies of at least 55% Brake Thermal Efficiency (BTE) while meeting future emissions standards (http://www.epa.gov/otaq/standards/heavy-duty/hdci-exhaust.htm). Examples of enabling technologies include but are not limited to the following:

- technologies capable of modifying in-cylinder charge motion;
- new advanced combustion regimes;
- waste heat recovery devices and systems;
- variable valve actuation and timing mechanisms;
- lightweight components; reduced friction approaches;
- low heat rejection and thermal management approaches;
- low energy penalty emission controls; advanced fuel injectors;
- ignition systems, intake air management systems; and
- turbomachinery.

Physics-Based Computational Fluid Dynamics (CFD) Sub-Model Development and Validation

The objective of this area of interest is to research, develop, and demonstrate increased-accuracy CFD techniques capable of accelerating the internal combustion engine development process in order to enable rapid design and commercialization of more fuel efficient engines and vehicles capable of meeting future emission standards.

High-Efficiency, Medium and Heavy-Duty Natural Gas (Dedicated or Dual-Fuel) Engine Technologies

The objective of this area of interest is to research, develop, and demonstrate cost-effective and highly efficient medium and heavy-duty natural gas engine technologies capable of meeting future emissions standards, only technologies supporting dedicated and/or dual fuel natural gas engine systems will be considered.

This notice is issued so that interested parties are aware of the EERE's intention to issue a FOA in the near term. All of the information contained in this notice is subject to change. It should be noted that the NOI (DE-FOA-0001254) number and FOA number (DE-FOA-0001201) are different, as outlined in the heading on the cover page of this notice. EERE will neither respond to questions nor accept applications under this notice. Once the FOA has been released, EERE will provide an avenue for potential Applicants to submit questions.

EERE plans to issue the FOA in the January 2015 – February 2015 timeframe via the EERE Exchange website (https://eere-exchange.energy.gov/). If Applicants wish to receive official notifications and information from EERE regarding this FOA, they should register in EERE Exchange. When the FOA is released, applications will be accepted only through EERE Exchange.

In anticipation of the FOA being released, Applicants are advised to complete the following steps, which are **required** for application submission:

- Register and create an account in EERE Exchange at https://eere-exchange.energy.gov/. This account will allow the user to register for any open EERE FOAs that are currently in EERE Exchange. It is recommended that each organization or business unit, whether acting as a team or a single entity, use only one account as the contact point for each submission. Questions related to the registration process and use of the EERE Exchange website should be submitted to: EERE-ExchangeSupport@hq.doe.gov;

- Obtain a Dun and Bradstreet Data Universal Numbering System (DUNS) number (including the plus 4 extension, if applicable) at http://fedgov.dnb.com/webform;

- Register with the System for Award Management (SAM) at https://www.sam.gov. Designating an Electronic Business Point of Contact (EBiz POC) and obtaining a special password called an MPIN are important steps in SAM registration. Please update your SAM registration annually;

- Register in FedConnect at https://www.fedconnect.net/. To create an organization account, your organization's SAM MPIN is required. For more information about the SAM MPIN or other registration requirements, review the FedConnect Ready, Set, Go! Guide at https://www.fedconnect.net/FedConnect/PublicPages/FedConnect_Ready_Set_Go.pdf; and

- Register in Grants.gov to receive automatic updates when Amendments to a FOA are posted. However, please note that applications will not be accepted through Grants.gov. http://www.grants.gov/. All applications must be submitted through EERE Exchange.

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