Notice of Intent No. DE-FOA-0002222

Notice of Intent to Issue
Funding Opportunity Announcement No. DE-FOA-0002197

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 "Fiscal Year 2020 Advanced Vehicle Technologies Funding Opportunity Announcement (FOA)."

Vehicles move our national economy. Annually, vehicles transport 11 billion tons of freight – about $35 billion worth of goods each day[1] – and move people more than 3 trillion vehicle-miles.[2]

Growing our economy requires transportation, and transportation requires energy. The transportation sector accounts for about 70 percent of U.S. petroleum consumption.[3] With 11 percent (net) of U.S. petroleum consumption being imported, the U.S. annually sends over $50 billion dollars abroad for crude oil.[4] Oil price volatility affects not only our national economy but also American household budgets, as transportation is the second most expensive spending category, after housing.[5]

VTO supports a broad portfolio of advanced vehicle technologies that can strengthen national security, enable future economic growth, support American energy dominance, and increase transportation affordability for all Americans. This portfolio includes advanced batteries, electric drive systems; smart charging technologies; energy efficient mobility technologies and systems; advanced combustion engines and fuels; materials for vehicle light-weighting; technology integration, which includes work with the national network of Clean Cities coalitions; and transportation and energy analysis.

[1] Bureau of Transportation Statistics, DOT, Transportation Statistics Annual Report 2018, Table 4-1. https://www.bts.gov/tsar
[2] Transportation Energy Data Book 37th Edition, ORNL, 2019. Table 3.8 Shares of Highway Vehicle-Miles Traveled by Vehicle Type, 1970-2017.
[3] Transportation Energy Data Book Edition 37, ORNL, Table 1.12.
[4] Transportation Energy Data Book Edition 37, ORNL, Table 1.6, Table 1.13 and Table 10.5.
[5] Transportation Energy Data Book Edition 37, ORNL, Table 10.1.

EERE anticipates the FOA may include the following Areas of Interest (subject to change):

1) Lithium-Ion Batteries using Silicon-Based Anode

The objective of this potential area of interest is to research, fabricate, and test lithium battery cells that have potential to achieve electric vehicle battery performance requirements and that implement silicon electrodes and current cathode technology minimally capable of either (a) 1,000 cycles and 10-year calendar life, or (b) 3,000 cycles and 5-year calendar life. The potential area of interest addresses fundamental materials research as well as cell optimization and development.

2.) Low Cost Electric Traction Drive Systems Using No Heavy Rare Earth Materials

The objective of this potential area of interest is to research, develop, and test a heavy rare earth mineral free advanced motor and inverter drive system that costs ≤$7/kilo-Watt (kW) capable of improved performance when compared to a current baseline system and utilizes recycled materials to the maximum extent possible.

3.) Utility Managed Smart Charging

The objective of this area of interest is to research, develop, and conduct a wide-scale demonstration of Smart Charge Management (SCM) systems that will enable cost-effective large scale charging through smart charging, including potential grid services from plug-in electric vehicles (PEV) that provide benefit to electricity grid operators, energy services providers, charging network operators, and PEV owners. Proposed projects should include SCM technology R&D, including cybersecurity, and culminate with a SCM system wide demonstration that includes a significant number of PEVs. Project teams must meet EISA 2007, Section 131 (b)(1) partnering criteria for the demonstration period and include active participation by an electric utility.

4.) Platinum Group Metals (PGM) Content Reduction to Enable Cost-Effective Aftertreatment for Gasoline and Diesel Engines

The objective of this potential area of interest is to research, develop, and validate technologies for reduction and/or substitution of platinum, palladium and rhodium content in three-way catalytic converters used to control hydrocarbon, carbon monoxide and oxides of nitrogen emissions from stoichiometric gasoline and natural gas engines, and oxidation catalysts for lean-burn aftertreatment systems.

5.) Improved Efficiency of Medium- and Heavy-Duty Natural Gas and Propane (LPG) Engines

The objective of this potential area of interest is to research, develop, and validate engine enabling technologies that can deliver near diesel efficiencies in natural gas or

LPG engines, while meeting future emission levels. Technologies of interest include, but are not limited to, the following: advanced ignition systems, improved fuel injectors, systems enabling lean-burn and multi-mode SI/advanced compression ignition combustion, novel technologies enabling low temperature combustion, advanced sensors and controls, application of thermal barrier coatings to improve efficiency, improvements to catalyst manufacturing which improve utilization of platinum group metals (PGMs) or technologies to reduce the need for PGMs in three-way catalysts, low temperature methane oxidation, and lean-NOx emission control.

6.) Energy-Efficient Off-Road Technologies Directly Applicable to Agriculture and/or Other Off-Road Vehicles

The objective of this potential area of interest is to research, develop, and validate technologies capable of increasing work specific energy efficiency of commercial off-road vehicles that are directly applicable to the agricultural sector and/or other commercial off-road vehicles (e.g. construction, mining, forestry, etc.). Technologies of interest include, but are not limited to, advanced combustion and emission control research, thermal management (coatings, waste energy recovery, frictions reduction and lubricants), efficient fluid power, new system architectures, energy recovery, electrification and hybridization, and connectivity and automation of vehicles and/or work implements that demonstrate greater energy efficiency.

7.) Lightweight and High-Performance Fiber-Reinforced Polymer Composites for Vehicle Applications

This topic seeks applications from multi-discipline R&D teams focused on significantly reducing the cost and weight of selected structural and non-structural vehicle components through the development and application of novel polymer composite materials, composites preforms and intermediates, innovative processing technologies and manufacturing techniques. Applications should address and mitigate technical barriers such as materials and structural performance, manufactured part cost, and high volume fabrication techniques and processes relevant to vehicle component manufacturing.

Energy Efficient Mobility Systems – The next three topics support VTO's objective to improve system-level transportation efficiency, effectiveness and affordability

8.) Improving Transportation System Efficiency through Better Utilization

The objective of this potential area of interest is to research and develop innovative solutions to address key technical barriers and human factors-related issues related to transportation system efficiency, such as increasing vehicle occupancy; improving repositioning to reduce deadheading (miles driven with no passenger or payload) for

taxi, freight, and transportation network companies; and improved vehicle routing for energy efficiency.

9.) Enabling Vehicle and Infrastructure Connectivity

The objective of this potential area of interest is to research, develop, and validate solutions that exploit vehicle connectivity (Vehicle to infrastructure (V2I) and/or Vehicle to Vehicle (V2V)) to reduce transportation system energy use, emissions, and improve mobility at multiple scales (e.g. intersection, corridor, and/or region) while considering full and partial penetration of connected vehicles.

10.) Improving Mobility, Affordability, and Energy Efficiency through Transit

The objective of this potential area of interest is to research, develop, and validate technology and/or data solutions to overcome the barriers to transit use, and improve transit system effectiveness and efficiency through increased system utilization, improved system operations, and easier access to the transit system.

Technology Integration - The following four topics support VTO's demonstration of new advance vehicle and mobility technologies

11.) Gaseous Fuels Technology Demonstration Projects

The goal of this area of interest is to develop and demonstrate technologies that can help to reduce costs and advance the commercialization of medium and heavy-duty gaseous fuel (H2, NG, and LPG) vehicles and refueling infrastructure. Topics of interest include, but are not limited to; energy efficiency improvements, emissions, refueling, maintenance cost, operating cost and new engine demonstrations. Vehicle platforms can include medium and heavy-duty on-road vehicles. In addition, rail or marine projects that demonstrate or validate the use of compressed/liquefied natural gas or propane are also encouraged. Infrastructure projects that develop and demonstrate cost-effective, reliable, and replicable bio-gas cleanup systems to enable more widespread use of renewable natural gas (RNG) in vehicles are also of interest.

12.) Alternative Fuel Proof-of-Concept in New Communities and Fleets

The objective of this potential area of interest is to demonstrate small-scale, alternative fuel or advanced technology vehicle fleet projects (five or less vehicles and supporting infrastructure) in communities, fleets, or geographic areas with little or no experience with these technologies.

13.) Electric Vehicle and Charging Community Partner Projects

The objective of this potential area of interest is to accelerate the adoption of commercially-available plug-in electric vehicles and supporting infrastructure through community-based public-private partnerships that demonstrate plug-in electric vehicle technologies and infrastructure in various innovative applications and share resulting data, lessons learned, and best practices to a broader audience.

14.) Technology Integration Open Topic

The objective of this potential area of interest is to develop and demonstrate innovative solutions to current transportation challenges that impact efficiency and affordability and that are broadly replicable. Potential focus areas include, but are not limited to:

- Level-2 EVSE demonstration/deployment projects
- Auxiliary school/transit bus heating systems for electric vehicles
- Innovative CNG fuel tank business models
- Alternative fuel maintenance cost studies

15.) Transportation and Energy Analysis

This topic will focus on novel analytical methods and illustrative applications that identify future transportation technology energy opportunities. This area of this potential area of interest may include multiple areas of focus:

- Develop and validate market segmentation, agent-based, or other modeling approaches capable of estimating the potential energy impacts of emerging potential mobility modes (e.g., bike share, scooters, etc.);
- Develop, integrate, and validate a combination of commodity flow, vehicle travel, and infrastructure scenario analysis, in conjunction with techno-economic analysis and other novel approaches to identify optimal medium- and heavy-duty vehicle electrification routes;
- Develop, integrate, and validate models, simulations or analysis for various combinations of light-, medium-, and heavy-duty vehicles; excess intermittent renewable power; fast-charging; battery second-use; and battery recycling considerations to quantify the potential economic benefits of grid-connected vehicles; and
- An open sub-topic to develop and validate novel methods and other innovative ideas for transportation energy analysis. Recommended focus areas include modeling of and/or predictive estimation of energy consumption for light vehicles, medium trucks, heavy trucks, other on-road passenger or freight modes, and/or combinations of these modes.

EERE envisions selecting multiple financial assistance awards in the form of cooperative agreements.

This Notice is issued so that interested parties are aware of 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-0002222) number and FOA number (DE-FOA-0002197) 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 January/February 2020 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 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 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/Marketing/Documents/FedConnect_Ready_Set_Go.pdf
- Register in Grants.gov to receive automatic updates when Amendments to a FOA are posted. However, please note that EERE will not accept applications through Grants.gov. http://www.grants.gov/. All applications must be submitted through EERE Exchange.