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Notice of Funding Opportunity

Title: Vehicle Technologies Office Fiscal Year 2021 Research Funding Opportunity Announcement
Website: <https://www.grants.gov/web/grants/view-opportunity.html?oppld=330301>
Funding: Total: \$60,200,000. Maximum awards: \$300K-\$5.75M, depending on topic.
Dates: Deadline for Concept Papers: February 5, 2021
Application Submission Deadline: April 7, 2021

Summary: The Vehicle Technologies Office (VTO) funds a broad portfolio of research and proof-of-concept deployment to develop new affordable, efficient and clean transportation options to enable industry to accelerate the development and widespread use of a variety of innovative transportation technologies. The research pathways focus on electrification, fuel diversification, vehicle efficiency, energy storage, lightweight materials, and new mobility technologies to improve the overall energy efficiency and affordability of the transportation system. In partnership with industry, VTO has established aggressive targets to focus research on cost-reduction, efficiency, emissions reduction and performance. VTO-funded research has reduced the cost of advanced batteries by 80% since 2008, and nearly every plug-in electric vehicle (PEV) on the road today uses VTO-developed battery technology. However, to enable greater affordability and PEV accessibility for all Americans, VTO seeks new battery chemistries and cell technologies to reduce the cost of electric vehicle battery packs by more than half, to below \$80/kWh, while increasing driving range to 300 miles and decreasing charge time to 15 minutes or less by 2028. In addition, building on prior research, VTO has identified opportunities to significantly increase the power density of electric drive systems. New innovations in motor technology – printable magnets, high-conductivity windings, and novel architectures – could lead to much smaller, very high energy density systems with twice the useful life that can enable more affordable, better performing PEVs. DOE is working to lower the cost of the power electronics and motors in an Electric Vehicle (EV) to \$7/kW by 2022 from \$30/kW in 2012.

Project Topic Areas:

AOI 1a: Next-generation Liquid Electrolytes for Li-ion Cells Under Extreme Conditions

The objective of this area of interest is to research, develop, and test liquid electrolytes for next-generation Li-ion cells (liquid electrolytes against graphite anodes and moderate/high voltage cathodes) with improved performance under an array of extreme conditions. The following four extreme conditions area of focus in this FOA topic: High Voltage Cells, Wide Operating Temperature, Extreme Fast Charging, Under Severe Abuse.

AOI 1b: Liquid Electrolytes for Li-S Cells Introduction

The purpose of this FOA topic is to develop novel electrolytes for Li-S batteries. One of the key barriers for the successful development of Li-S is to mitigate the shuttle mechanisms of polysulfide species during cycling. The formation of these polysulfides consumes lithium, sulfur and worst of all forms a passive layer (Li₂S) at the negative electrode resulting power degradation and short cycle life. While engineers and scientists have primarily focused on the design of composite sulfur cathodes to contain polysulfide species, studies have consistently shown that the electrolyte plays a key role in this mitigation effort. In addition, models and experimental data have confirmed that the short chain polysulfide species are more stable than the long chain ones (Li₂S₈, Li₂S₆).

AOI 2: Development of State-of-the-art Lithium Sulfur and Lithium Air Battery Cells

The objective of this area of interest is to develop lithium sulfur or lithium air battery cells capable of meeting the VTO goals of 500 Wh/kg and \$80/kWh and demonstrate improvements in cycle life, rate capability, safety and affordability.

AOI 3: High Power Density Inverters

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The objective of the area of interest is to research, develop, fabricate and test high power density traction inverters for use in light, medium, or heavy-duty vehicle applications capable of the following: Cost ≤ \$2.7/kW; Power Density of 100kW/liter; Operating Voltage of 650V; Lifetime ≥ 300,000 miles.

AOI 4: Integrated Simulation of Combustion and Aftertreatment - Optimizing for Near-Zero Emissions (ISCA-ONE)

The objective of this area of interest is to research, develop, and validate transient simulation tools that enable virtual coupling of engine combustion with aftertreatment systems so that industry can use them for further optimizing light- or heavy-duty aftertreatment systems for near-zero exhaust emission while maintaining or improving engine efficiency. The integrated tool should combine state-of-the-art simulations to predict emission formation in-cylinder, the evolution of chemical species and from the exhaust valve to aftertreatment system, and the relevant catalytic reactions within the aftertreatment system. Where applicable, research should utilize high-performance computing, balancing increased accuracy of simulations with reduced simulation turnaround time.

AOI 5: Demonstration of Lightweight Multi-Material Glider System

The objective of this area of interest is to demonstrate production of a large-scale multi-material passenger vehicle sub-system that weighs 160 lb less than its 2015 or later baseline at less than a \$5/lb-saved cost penalty. The passenger vehicles of interest for this FOA include class C-D cars and SUVs with unibody construction.

AOI 6: Low-cost Infrastructure-based Enablers for Cooperative Driving Automation

This area of interest seeks to develop and demonstrate technologies that lead to low-cost infrastructure upgrades to reduce on-board compute load and/or improve operational efficiency of CAVs through CDA. This can be accomplished through infrastructure-only upgrades or novel applications of on-vehicle technology paired with infrastructure technology. Proposed innovations must be implementable by local or State DOTs at minimal additional cost to normal transportation infrastructure maintenance and upgrades. Innovations can be implemented through connectivity, sensing, or novel interactions between sensors and infrastructure technologies. Applications that only include on-vehicle sensing technologies (such as LiDAR, radar, and/or cameras) will not be considered. Innovations that utilize on-vehicle sensing technologies must be paired with an infrastructure-based technology to improve performance and efficiency.

AOI 7: Implementation of Energy Efficient Mobility Systems Technologies into Real-World System Applications

The objective of this area of interest is to conduct research demonstration pilots of novel and innovative energy efficient mobility technologies or practices in real-world transportation systems as “living labs.” Research and Demonstration pilots under this area of interest should assess the impacts of these technologies on energy efficiency, time, cost, and accessibility to transportation resources. These real-world results will be fed back to EEMS researchers and to the Clean Cities/Technology Integration network to inform future activities. In all cases, applicants must explain the scope of the demonstration, the potential avenues for scale-up of the demo, and the benefits that would result from the scale-up of the project beyond the demo.

AOI 8: Transportation and Energy Analysis

The objectives of this area of interest is to use real-world data (or representative synthetic data) to develop and/or apply either new analytical models and tools or a novel approach to or using existing model(s) to estimate energy use and associated environmental and cost impacts (compared to incumbent vehicle technologies). Illustrative application(s) of that new or existing model/tool should identify novel transportation technology opportunities and insights, especially in terms of potential energy, environmental, and cost impacts.

Funding:

EERE expects to make a total of approximately \$60,200,000 of federal funding available for new awards under this FOA, subject to the availability of appropriated funds. EERE anticipates making approximately



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20 to 32 awards under this FOA. EERE may issue one, multiple, or no awards. Individual awards may vary between \$300,000 and \$5,750,000.

Area of Interest Number	Anticipated Number of Awards	Anticipated Minimum Award Size for Any One Individual Award (Fed Share)	Anticipated Maximum Award Size for Any One Individual Award (Fed Share)	Approximate Total Federal Funding Available for All Awards	Anticipated Period of Performance (months)	Cost Share Requirement
1a	2-3	\$1,666,667	\$2,500,000	\$5,000,000	39	20%
1b	2-3	\$1,666,667	\$2,500,000	\$5,000,000	39	20%
2	4-5	\$1,000,000	\$1,250,000	\$5,000,000	39	20%
3	2-4	\$2,500,000	\$5,000,000	\$10,000,000	39	20%
4	1-2	\$2,500,000	\$5,000,000	\$5,000,000	27-39	20%
5	2-3	\$3,833,333	\$5,750,000	\$11,500,000	39	50%
6	1-3	\$1,500,000	\$4,500,000	\$4,500,000	39	20%
7	3-5	\$2,600,000	\$4,333,333	\$13,000,000	39	50%
8	3-4	\$300,000	\$400,000	\$1,200,000	27-39	10%

Project Requirements:

In addition to the deliverables required in the Federal Assistance Reporting Requirements Checklist and topic specific requirements, the following deliverables are required: Participation in the Annual Merit Review held in Washington DC; Summary of accomplishments and project work report will be prepared for inclusion in the Vehicle Technologies Office annual programmatic progress report.

Eligible Applicants:

The following are eligible to apply for funding as a prime recipient or subrecipient: U.S. citizens and lawful permanent residents; For-profit entities, educational institutions, and nonprofits that are incorporated (or otherwise formed) under the laws of a particular state or territory of the United States and have a physical location for business operations in the United States; State, local, and tribal government entities; and Incorporated and Unincorporated Consortia, which may include domestic and/or foreign entities. Unincorporated Consortia must designate one member of the consortium to serve as the prime recipient/consortium representative. The prime recipient/consortium representative must be incorporated (or otherwise formed) under the laws of a state or territory of the United States. Each incorporated consortium must have an internal governance structure and a written set of internal rules. Upon request, the consortium must provide a written description of its internal governance structure and its internal rules to the EERE Contracting Officer. If a foreign entity applies for funding as a prime recipient, it must designate in the Full Application a subsidiary or affiliate incorporated (or otherwise formed) under the laws of a State or territory of the United States to be the prime recipient. The Full Application must state the nature of the corporate relationship between the foreign entity and domestic subsidiary or affiliate. A foreign entity may receive funding as a subrecipient. The following are eligible to apply for funding as a subrecipient, but are not eligible to apply as a prime recipient: Area of Interest 1a, 1b, 3, 4, 5, 6, 7, and 8: DOE/NNSA FFRDCs; Area of Interest 2: DOE/NNSA FFRDCs are not eligible to apply for funding as a either a prime recipient or subrecipient; For all Areas of Interest, non-DOE/NNSA FFRDCs; and Federal agencies and instrumentalities (other than DOE). The National Energy Technology Laboratory is ineligible to participate as a prime applicant or as a team member/sub-recipient on any application because of its role in developing the requirements for this announcement. The National Science Foundation (NSF) is ineligible to apply to AOI 4 due to its role in developing the requirements for that topic. Nonprofit organizations described in section 501(c)(4) of the Internal Revenue Code of 1986 that engaged in lobbying activities after December 31, 1995 are not eligible to apply for funding.