

Notice of Intent No. DE-FOA-0003382

Notice of Intent to Issue Funding Opportunity Announcement No. DE-FOA-0003383

The Office of Energy Efficiency and Renewable Energy (EERE) intends to issue, on behalf of the Vehicle Technologies Office, a Funding Opportunity Announcement (FOA) entitled “Fiscal Year 2024 Vehicle Technologies Office Batteries & Electrification Funding Opportunity Announcement”.

This FOA supports building a clean and equitable energy economy and addressing the climate crisis as a top priority of the Biden Administration. This anticipated FOA advances the Biden Administration’s goals to achieve carbon pollution-free electricity by 2035 and to “deliver an equitable, clean energy future, and put the United States on a path to achieve net-zero emissions, economy-wide, by no later than 2050 to the benefit of all Americans.” The Department of Energy is committed to pushing the frontiers of science and engineering, catalyzing clean energy jobs through research, development, demonstration, and deployment (RDD&D), and ensuring environmental justice and inclusion of underserved communities.

The RDD&D activities to be funded under this FOA support the government-wide approach to the climate crisis by driving the innovation that can lead to the deployment of clean energy technologies, which are critical for climate protection. Specifically, this FOA advances RDD&D in several areas critical to achieving net-zero greenhouse gas (GHG) emissions by 2050, including: demonstration of smart charge management of electric vehicles (EVs), development of innovative battery chemistries and component materials, reduction of cascading battery fires, and battery electrode, cell, and pack manufacturing cost reduction.

As part of the whole-of-government approach to advance equity across the Federal Government, it is the policy of the Biden Administration that:

The Federal Government should pursue a comprehensive approach to advancing equity for all, including people of color and others who have been historically underserved, marginalized, and adversely affected by persistent poverty and inequality. Affirmatively advancing equity, civil rights, racial justice, and equal opportunity is the responsibility of the whole of our government. Because advancing equity requires a systematic approach to embedding fairness in decision-making processes, executive departments, and agencies (agencies) must recognize and work to redress inequities in their policies and programs that serve as barriers to equal opportunity.

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By advancing equity across the Federal Government, we can create opportunities for the improvement of historically underserved communities, benefitting everyone.

As part of this approach, this anticipated FOA will encourage the participation of underserved communities and underrepresented groups. Applicants are highly encouraged to include individuals from groups historically underrepresented in science, technology, engineering, and mathematics (STEM) on their project teams.

It is anticipated the FOA may include the following Areas of Interest:

Area of Interest 1: Demonstration of Smart Charge Management for Electric Vehicles

The objective of this area of interest is to conduct wide-scale demonstrations of Smart Charge Management (SCM), creating confidence in the technology while effectively utilizing the flexibility of EVs to improve the utilization of the grid. SCM entails communication between the vehicles and the charging infrastructure balancing the charging needs of multiple electric vehicles with the ability of the grid to supply the requested energy at a single connection point, site, multiple sites, or a larger area. SCM can be used to maximize the rate benefits created by the EV transition, ensuring effective use of grid assets. Successful demonstrations of SCM should show how it can support load shaping, load shifting, and load shedding to provide resiliency, maximize the use of generation from renewables, and support additional flexibility services that alleviate distribution system constraints. Demonstrations are encouraged to include use-cases receiving less attention, such as enhancing capacity for charging for multifamily housing, curbside charging, and charging for rural customers with longer travel distances. Approaches used in these demonstrations must be scalable and interoperable, leveraging vehicles and/or electric-vehicle supply equipment (EVSE) from many manufacturers. Demonstrations should collect data to show the economic value created for all stakeholders with their approach, striving for a widely replicable model. Data should also be collected to better understand customer behavior, such as reasons for participating, opting out, or exiting a program. Applicant teams must include one or more electric utilities as active participants and are also encouraged to include EV Original Equipment Manufacturers (OEMs), charging equipment manufacturers, charging network operators, and DOE national laboratories. This area of interest supports DOE's efforts to conduct research, development and field validations that seek to understand new and more dynamic grid loads, to integrate them with the electric grid and to modernize the grid edge while ensuring this transition occurs in an equitable way.

Area of Interest 2: Improved 12 Volt Lead Acid Batteries for Safety-Critical Electric Vehicle Applications

The lead acid battery is a mature technology and has been used in many power applications for over 100 years. Although lead acid batteries are not suitable for present EVs for propulsion due to their low specific energy and limited cycle life, a 12V (typically rated at 70 Ah) lead acid

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battery can still be employed in EVs. In this application, the 12V battery serves as a critical safety feature to engage and disengage the high-voltage propulsion battery (typically a lithium-ion battery rated between 400-800V and 60-100 kWh). Additionally, EVs utilizing a lithium battery for propulsion requires an auxiliary battery for safety critical features such as automated driving assistance, adaptive cruise control, street sign recognition, lane centering, steer-by-wire systems, brake-by-wire systems, and evasion assistance. Today's EVs use either lead acid or lithium-ion batteries for this 12V auxiliary (AUX) battery application. For lead acid batteries, either the enhanced flooded battery (EFB) type (also referred to maintenance free lead acid battery) or the absorbed glass mat (AGM) battery can perform this critical safety function. The main objective is to improve the service life and performance requirements, meeting these critical safety features while reducing the cost of the EFB and AGM lead acid battery. Improvements in 12V lead battery performance and cost can be achieved through development of more robust product designs and manufacturing processes.

Area of Interest 3: Develop Vehicle or Structural Level Strategies to Reduce the Likelihood of the Cascading Effects of Electric Vehicle Fires

Although fires in electric vehicles have been rare, there is still a benefit to continual improvement in safety. Rechargeable battery cells for electric vehicles can go to thermal runaway through a fault, when they are subjected to an internal electrical short, overheated, crushed, or when they are overcharged. Thermal cascading occurs when that first cell going to thermal runaway causes its neighboring cells, neighboring modules, neighboring battery pack or neighboring vehicles to also go into thermal runaway. The objective is for university-led teams to develop cell, module, pack, or vehicle structural level strategies to reduce the likelihood of the cascading effects of electric vehicle fires.

Area of Interest 4: Battery Electrode, Cell, and Pack Manufacturing Cost Reduction

Significant advances in EV battery energy storage technologies have occurred in the last decade, leading to energy density increases and battery pack cost decreases. Despite these advances, domestic growth and onshoring of cell and pack manufacturing needs further performance improvement and cost reduction to increase manufacturing investment and competitiveness and support enhanced adoption of electrical vehicles in the U.S. This topic aims to support R&D reducing the manufacturing cost at the electrode, cell, and pack level by at least 30% compared to the state of the art. This topic does not intend to solve performance issues for battery chemistries that are not currently commercialized through manufacturing improvements.

Technologies of interest could include, but are not limited to the following: i) advanced processing technologies that can boost electrode performance and reduce manufacturing cost; ii) high efficient drying technology which can reduce thermal energy usage during electrode processing, iii) tailored electrode engineering for high-energy and high-power densities, and fast charging capabilities, iv) novel processes to accelerate cell manufacturing, v) cell designs

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that reduce processing time, enable faster cell assembly, and decrease formation costs, vi) charge control optimization technologies to improve safety, extending cycle life, enhance charging speeds including cold weather charging.

Area of Interest 5: Silicon-Based Anodes for Lithium-Ion Batteries

An objective of this area of interest is to research, fabricate, and test silicon-based lithium battery cells meeting electric vehicle battery performance requirements. These cells should implement a majority silicon-based anode paired with a commercially relevant cathode capable of >1,000 cycles and 10-year calendar life. Proposed technologies should have significant focus towards achieving the 10-year calendar life goal while maintaining cycle life and specific energy metrics. The second objective is to address cost reductions for silicon-based anodes. Depending on the technology readiness level (TRL) of the silicon-based anode, proposed projects in this topic area will perform one of two tasks. Mature TRL technologies will propose process improvement strategies to reduce current cell costs. Lower TRL technologies will conduct a technoeconomic analysis of their silicon anode material to help inform potential cost savings and process improvements. Silicon-based anodes involving the use of inexpensive and abundant silicon precursors with a viable domestic supply chain are highly encouraged.

Area of Interest 6: High Energy Density Conversion Cathodes

This targets the development of high energy density cathodes containing metal chalcogenide, oxide, or halide materials which surpass the energy density of state-of-the-art nickel cathodes (i.e. NCA, NMC). Lower cost cathodes with high energy density are achievable by moving away from intercalation chemistry and utilizing conversion chemistry cathodes. Conversion cathodes can utilize multi-electron reactions for higher energy density, but suffer from kinetic limitations, large volume expansion, and catalytic degradation affecting both cycle life and calendar life. The primary objective of this FOA topic is to develop high energy density battery cells containing metal chalcogenide, oxide, or halide cathodes by solving key challenges for the cathode, electrolyte, electrode integrity, or safety. Additionally, the proposed developed material should strive to show improvements in cycling stability, reducing overpotentials, rate limitations, improving mechanical integrity of electrodes, or improving material stability (i.e. gassing or thermal runaway).

Additional Information:

EERE envisions awarding multiple financial assistance awards in the form of cooperative agreements. The estimated period of performance for each award will be approximately 36 months.

This Notice is issued so interested parties are aware of the EERE's intention to issue this FOA in the near term. The information contained in this Notice is subject to change. EERE will not respond to questions concerning this Notice. If or when the FOA is released, EERE will provide an avenue for potential Applicants to submit questions.

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EERE plans to issue the FOA on or about July/August 2024 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 apply to any open EERE FOAs that are currently in EERE eXCHANGE.

To access EERE eXCHANGE, potential applicants will be required to have a [Login.gov](https://login.gov/) account. As part of the eXCHANGE registration process, new users are directed to create an account in [Login.gov](https://login.gov/). Please note the email address associated with Login.gov must match the email address associated with the eXCHANGE account. For more information, refer to the Exchange Multi-Factor Authentication (MFA) Quick Guide in the [Manuals section](#) of eXCHANGE.

It is recommended 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

- 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 a Marketing Partner Identification Number (MPIN) are important steps in SAM registration. Please update your SAM registration annually. Upon registration, SAM will automatically assign a Unique Entity ID (UEI).

NOTE: Due to the high demand of UEI requests and SAM registrations, entity legal business name and address validations are taking longer than expected to process. Entities should start the UEI and SAM registration process as soon as possible.

If entities have technical difficulties with the UEI validation or SAM registration process, they should utilize the HELP feature on SAM.gov. SAM.gov will work entity service tickets in the order in which they are received and asks that entities not create multiple service tickets for the same request or technical issue. Additional entity validation resources can be found here: [GSAFSD Tier 0 Knowledge Base - Validating your Entity](#).

- 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

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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 applications will not be accepted through Grants.gov. <http://www.grants.gov/>. All applications must be submitted through EERE eXCHANGE.

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