

Overview and Purpose

EERE National Laboratory Guiding Principles require all offices to pursue a merit review of direct-funded national laboratory work. In line with these Principles, the Vehicle Technologies Office (VTO) is issuing this lab call for Fiscal Year 2020 (FY 2020). VTO will award only a portion of its total planned FY 2020 lab funding through this lab call process. Labs are also selected through the standard Financial Opportunity Announcement (FOA) process and are not restricted from applying to any FOAs.

Some labs also have continuing multi-year projects that have already gone through the merit review process. These will continue to be reviewed through the annual peer review process and labs should work with VTO project and program managers to ensure that ongoing projects are appropriately included in the AOPs to meet AOP deadlines. This lab call will only pertain to the new AOs below.

Timeline and Process Logistics

Timeline:

- **LAB CALL RELEASE DATE: 2/24/2020**
- **PROPOSAL DEADLINE AND DECISION TIMETABLES:**
 - **Submission Deadline: 3/27/2020 at 11:59 PM Eastern.**
 - **Decision Deadline:** VTO currently plans to make decisions **by the end of May 2020 (subject to change).**

Process Logistics:

All communication to VTO regarding this lab call must use VTOLabCall@ee.doe.gov.

- **PROPOSAL SUBMISSIONS:** To apply to this Lab Call, lab personnel must register (and sign in) with their lab email address and submit application materials through EERE Exchange. Application materials must be submitted through EERE Exchange at <https://eere-Exchange.energy.gov>, EERE's online application portal. Frequently asked questions for this Lab Call and the EERE Application process can be found at <https://eere-exchange.energy.gov/FAQ.aspx>.
- **QUESTIONS DURING OPEN LAB CALL PERIOD:** Specific questions about this lab call should be submitted via e-mail to VTOLabCall@ee.doe.gov. VTO will provide answers related to this Lab Call via email or on EERE Exchange at: <https://eere-exchange.energy.gov>. Please note that you must first select the specific opportunity number for this Lab Call in order to view the questions and answers specific to this Lab Call. EERE will attempt to respond to a question within 3 business days, unless a similar question and answer have already been posted on the website. Questions related to the registration process and use of the EERE Exchange website should be submitted to: EERE-ExchangeSupport@hq.doe.gov. To ensure fairness for all lab participants, please do not ask individual VTO staff questions directly.
- **NOTIFICATION OF SELECTION:** When selections are finalized, lab leads will receive an email from VTOLabCall@ee.doe.gov.

Lab Call Description – Key Considerations and AOIs

Key Considerations

AVAILABLE FUNDING: There is approximately **\$16.5 million in annual funding** to fund **all** projects with the potential for future year funding pending appropriations, Program direction, and go/no-go decision points.

CRADAS AND FOA AWARDS: The call for proposals below should **NOT** be construed as requiring the renegotiation of an existing Cooperative Research and Development Agreement (CRADA) or previously-competed FOA award in which the lab is a prime or sub-recipient. Labs with CRADAs or FOA awards addressing any of the AOIs below may incorporate that work in proposals they submit in response to the lab call to demonstrate existing capability and leverage existing partnerships with industry and other partners. If the proposal is not selected for funding under this lab call, the work under the CRADA or FOA award will continue – there is no additional risk to the provision of DOE funding.

ELIGIBILITY: Applicants should pay close attention to eligibility restrictions listed in each AOI as they vary by AOI. For more information about VTO goals and targets, please see the Vehicle Technologies Office FY 2020 budget request, VTO web site, and/or U.S. DRIVE technology roadmaps.

EERE NATIONAL LABORATORY GUIDING PRINCIPLES: To ensure continued alignment with EERE Lab Engagement Principles, applicants should consider the following when developing their proposals:

- VTO strongly encourages projects that bring together multiple labs in a consortia-based approach to meet a high-level strategic goal, leveraging multiple lab capabilities with strong, centralized leadership.
- To the extent possible and appropriate, VTO seeks lab projects that involve industry engagement or industry partners.

Summary of AOIs

- AOI 1: SMART Mobility Lab Consortium
 - AOI 1A: Tools: Improving and refining existing Modeling Workflow capabilities
 - AOI 1B: Tools: Adding new capabilities and tools to the Modeling Workflow
 - AOI 1C: Mobility Data and Research
- AOI 2: Composite Materials and Structures R&D
- AOI 3: Medium and Heavy-Duty Truck R&D

AOI Descriptions

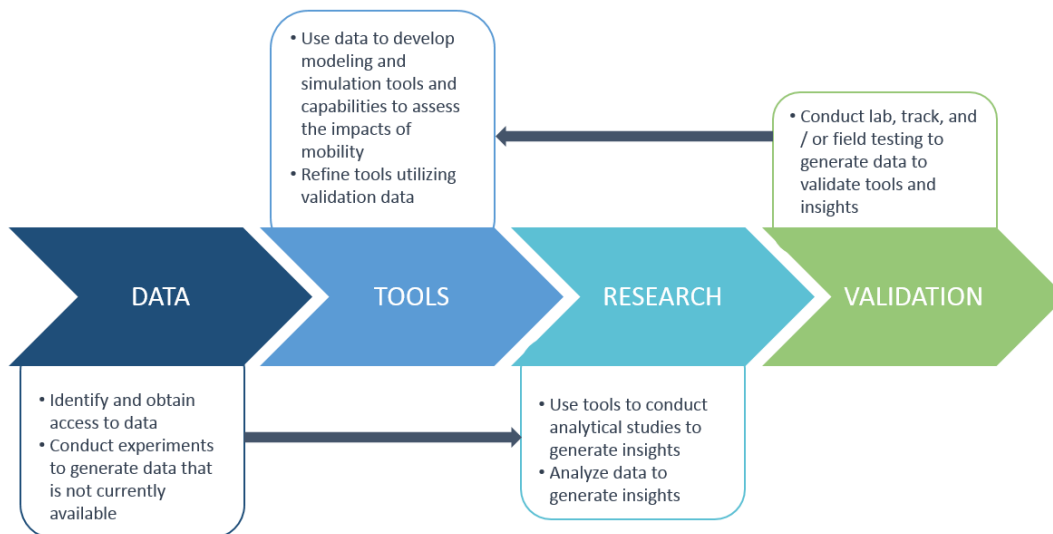
AOI 1: SMART Mobility Lab Consortium

- Eligibility: AOI 1A – RESTRICTED (ANL & LBNL); AOI 1B – OPEN ELIGIBILITY; AOI 1C – OPEN ELIGIBILITY
- Estimated DOE Funding Available: Up to \$13 million per year total, annually, across all projects selected
- Estimated Number of Projects Expected: 5 to 15 projects – fewer, larger projects are encouraged

- Estimated Project Duration(s): 12-36 months (project are not required to span all three years)

The Energy Efficient Mobility Systems (EEMS) Program seeks concept papers for a multi-lab effort to develop knowledge, insights, and understanding of the energy efficiency and mobility opportunities from emerging transportation technologies and applications. Concept papers should be at the project level, not full consortium proposals. Concept papers can be from a single lab or for multi-lab collaboration on a project. After concept papers are merit reviewed and selected, a workshop will be held with the selected labs to scope the final projects within the consortium. Projects will conduct research and development of mobility solutions that benefit the U.S. economy and improve American competitiveness in the transportation sector. This includes the development of tools, techniques, processes, and capabilities to understand and identify the most important levers to improve the mobility energy productivity of integrated mobility systems. This research is critical to expanding U.S. energy security, economic vitality, and quality of life and allows the U.S. to continue its leadership in advancing state-of-the-art transportation solutions. Proposed activities should build on key research findings and lessons learned from the first phase of DOE’s SMART (Systems and Modeling for Accelerated Research in Transportation) Mobility National Laboratory Consortium and include new areas of research that have emerged in recent years.

The EEMS Program identifies **key research questions** about the energy and mobility impacts of emerging and potentially disruptive technologies and services. The EEMS Program Strategy to answer these questions is iterative and reinforcing and focuses on data, tools, research, and validation (see figure).



- **Data Identification / Generation:** Data is critical to answering the key research questions. Data can either be obtained from existing data sources or generated data through proposed work.
- **Developing Models and Tools:** Data is used to develop models and simulation tools that can be used to conduct analysis and evaluate the outcomes of transportation scenarios across multiple dimensions.
- **Research Insights:** Research is conducted utilizing the models, tools, and / or data to provide new insights that answer the key research questions and inform the design and operation of future mobility systems to increase their efficiency, reduce their cost, and improve their

effectiveness. The insights also expose technology gaps, guiding targeted research and development actions across the VTO portfolio that result in technologies that provide energy and mobility benefits for moving goods and people.

- **Validating Results:** To the extent possible, the models created and insights generated are validated under real world conditions through focused lab, track, and field test activities. The validation data are used to improve future modeling and simulation results.

The EEMS Program seeks **concept papers** within three broad sub-topic areas. Concept papers should align with the EEMS Program Strategy outlined above.

AOI 1A: Tools: Improving and refining existing Modeling Workflow capabilities

The EEMS Program recognizes the considerable effort that has previously been taken to create an integrated modeling workflow to conduct comprehensive large-scale simulation studies of mobility scenarios. This capability represents an important and unique enabler for a variety of studies to answer key mobility questions.

EEMS seeks concept papers to improve and refine the current capabilities of the models within the modeling workflow and to improve the overall effectiveness of the workflow itself.

Concept papers for modeling workflow refinement are encouraged in, but not limited to, the following areas:

- Refining current capabilities
- Validating current capabilities
- Modeling workflow process refinement
- Modeling workflow process automation

Concept papers should detail how they will automate, exercise, and deploy the modeling workflow to transportation and mobility stakeholders. Concept papers to improve and refine capabilities must be linked to research proposed under Subtopic C to utilize the improved capabilities. Concepts papers in each Subtopic should reference the corresponding concept paper.

AOI 1B: Tools: Adding new capabilities and tools to the Modeling Workflow

EEMS seeks concept papers to add new capabilities and tools to the modeling workflow to improve the overall effectiveness of the workflow itself.

Concept papers must clearly describe how the proposed effort will move the state-of-the-art forward in transportation modeling and simulation and how it will benefit the EEMS Program.

Concept papers for adding new tools and capabilities are encouraged in, but not limited to, the following areas:

- Vehicle-to-X connectivity
- Traffic signal coordination
- Transit route and schedule optimization
- Micro transit / on-demand transit
- Optimization of TNC-transit integration
- Curb space management
- Eco-approach/departure/routing
- Freight population synthesis

Concept papers to develop new tools and capabilities must be linked to research proposed under Subtopic C to utilize the new capabilities. Concepts papers in each Subtopic should reference the corresponding concept paper.

AOI 1C: Mobility Data and Research

The EEMS Program seeks concept papers to answer key research questions in, but not limited to, the following research thrusts and deliver insights about the mobility of passengers and goods.

- Public transit systems
- Vehicle-to-X connectivity
- Vehicle automation
- Induced demand
- Freight/goods movement
- PEV charging and electric grid impacts
- Impact of future mobility technologies and services on VTO's research portfolio
- Mobility as a service
- Land use, infrastructure, and the urban built environment

Concept papers must explicitly articulate the research question(s) to be answered and the strategy taken to address it (e.g., data identification/generation, research using modeling/simulation/analysis, validation). Concept papers are not required to encompass every element of the previously described strategy; however, concepts that only cover a subset of the strategy elements should address the previous and subsequent steps (e.g., if the proposal is focused on "research", it should clearly identify what data and tools are being utilized and how the insights that will be generated could be validated). While stand-alone projects will be considered, concept papers that link several projects comprehensively and iteratively to execute the EEMS Strategy are highly encouraged.

Concept papers should describe in detail the models, tools, capabilities (e.g. high performance computing), and / or methods to be used in answering each research question. Projects should leverage existing data sources and current federally-funded projects where applicable (e.g., Living Labs projects managed by VTO's Technology Integration program, track-testing at the American Center for Mobility, DOT's Automated Driving Systems Demonstration projects).

Projects may utilize the Modeling Workflow to conduct analysis, however it is not required. Projects that propose refinements and / or additions to the Modeling workflow under subtopics A and B should be linked to a corresponding research / analysis project under subtopic C to exercise the new or refined capability. Concepts papers in each Subtopic should reference the corresponding concept paper.

All concept papers should consider how the **validated insights** and technology solutions will be shared with the transportation stakeholder community. Stakeholders should be identified that can use the insights generated and lessons learned by the EEMS Program to inform transportation decision making. Concept papers that include strong partnerships with relevant stakeholders are encouraged.

AOI 2: Composite Materials and Structures R&D

- Eligibility: OPEN ELIGIBILITY

- Estimated DOE Funding Available: Up to \$500,000 in FY 2020 AOP funds (\$3.5 million total)
- Estimated Number of Projects Expected: 7-10 projects
- Estimated Project Duration: 36 months

The *Composites Materials and Structures R&D* activity aims to achieve significant weight reduction through the development of novel materials, advanced materials and component fabrication processes, and innovative manufacturing techniques for high-volume, high-performance, and affordable polymer composites for vehicle applications.

This topic seeks proposals for core innovation early-stage research projects solely focused on **polymeric matrix composites** research to address fundamental-crosscutting issues and/or incubate novel concepts. Applicants should show how their early-stage research concepts, if successful, are applicable to at least one of the following research thrust areas: Thrust Area 1: *Low cost, high volume components* (e.g., semi-structures, interiors, and door inner panels) and Thrust Area 2: *Cost-competitive, high performance components* (e.g., primary structures, crash worthiness, and under hood).

Specific topics of interest include (not intended as a prioritized list):

- Reinforced Fiber Innovations
 - Carbon fiber
 - Cost reduction
 - Enhancement of fiber-matrix interfacial adhesion in thermoset/thermoplastic composites, nano-composites, and hybrid composites for achieving higher load transfer efficiency
 - “Beyond carbon fiber” as strengtheners
 - Graphene, carbon nanotubes, bio-based nano-cellulose materials (natural fiber), PBO, UHMWPE, basalt, Kevlar, glass fibers, or hybrid materials, etc.
- Next generation Resins
 - Advanced thermoplastics, hybrid thermoplastic/thermoset, vitrimers, self-healing resins, fast cure resins, or corrosion-counteracting functional resins
- Manufacturing Innovation
 - Lower cost, high rate manufacturing
 - Additive manufacturing for property optimization
 - Integration of part design with simplified assembly via additive manufacturing
 - Integrated in-line monitored manufacturing parameters for process-structure-property relationship that go beyond current state-of-art technologies and have the potential to inspire end-user confidence of lifetime component performance
- Composites Recycling and/or Re-Use
 - Recycled or reclaimed fibers and resins during the manufacturing process or at end of life.
- Other
 - Integrated Computational Materials Engineering (ICME)-enabled composite components design and processing that offers simultaneously improvements in lightweighting, damping, stiffness, and crashworthiness
 - Embedded sensors for *in-situ* monitoring of process parameters including big data analytics for vehicle structural health monitoring.

Applications must:

- To be competitive, the proposal must convince expert reviewers that the proposed research project itself is novel and significantly advance the state-of-the-art if successful.
- The proposal should provide a credible case that the research result(s) has the potential to address the technical needs/barriers associated with the major vehicle challenges.
- A competitive proposal will demonstrate that the proposed research meets the high-risk, high-impact nature of the research approach and potential outcomes.
- A scientifically sound technical plan with milestones and associated metrics and access to adequate resources (e.g., personnel with appropriate scientific and technical expertise, equipment, and facilities) is necessary for a proposal to be competitive.

AOI 3: Medium and Heavy-Duty Truck R&D

- Eligibility: OPEN ELIGIBILITY
- Estimated DOE Funding Available: FY20: \$0; FY21: TBD
- Estimated Number of Projects Expected: TBD
- Estimated Project Duration: TBD

This topic is a request for information. Funding may not be provided for information submitted in response to this topic.

The Vehicle Technologies Office seeks information on innovative research concepts and novel technology solutions to support the development of VTO's long-term R&D strategy for medium and heavy duty (MD/HD) trucks. Trucks are a dominant factor in energy independence and energy security, being the fastest growing fuel users in the United States and globally. The resulting VTO MD/HD strategy will support VTO's efforts to improve energy productivity in the transportation sector.

Responses should describe research pathways to significantly improve freight efficiency, enable electrification, and reduce emissions and operational costs in the MD/HD sector. Research areas of interest include but not limited to: optimizing internal combustion engine and emission controls; enabling freight operational efficiency technologies by advances in connectivity and automation; lightweight structural materials; and increasing truck and fleet electrification. Research will be conducted at the powertrain and vehicle (truck) level, as well as at the fleet/operational level. Additional areas of interest include: data, data analytics and visualization capabilities to assist VTO, industry, and other research partners with efforts to investigate MD/HD usage and operations to support truck R&D activities.

As relevant, responses should describe in detail the models, tools, capabilities (e.g. high performance computing), and/or methods that could be used in pursuing MD/HD R&D. Responses should consider how the results of data acquisition/analysis and technology solutions could be shared with the transportation community. Responses are encouraged to suggest partnerships with relevant stakeholders who could utilize the results from VTO MD/HD R&D.

Additional information for consideration in responses:

- specific challenges that should be addressed and the impact of overcoming these challenges

- suggested technical targets, including current baseline performance
- novelty of the potential research
- potential end-of-project outcomes / new capabilities.

Application and Submission Information

Application Process

Proposals (< 6 pages, **not including information required by the EERE Exchange template**) must be submitted via EERE Exchange by the submission deadline **3/27/2020 at 11:59 PM Eastern**. To apply to this lab call, applicants must register with their lab email address and submit application materials through EERE Exchange at <https://eere-Exchange.energy.gov>, EERE's online application portal.

All submissions must conform to the guidelines for format and length, and be submitted at or prior to the deadline listed.

Applicants will be required to include project information and details in Exchange that will be used to develop and accelerate negotiations of FY2020 AOPs if selected. Appendix A provides a worksheet to guide applicants through this process in Exchange. Please be aware that any information the applicant considers to be of significance for the review process must be included in the proposal as reviewers will not have access to the AOP development information entered in Exchange.

General Proposal Requirements

Individual proposals must be submitted in PDF format as a single file (do not bundle multiple proposals in a single file).

Proposals should be formatted for 8.5 x 11 paper and have 1-inch margins on each side. Typeface size should be 12 point font, except tables and figures which may be in 10-point font. Proposal length is limited to **6 pages or less**, following the outline listed below.

Proposals

Proposal content aligns with content required in the EERE AOP project forms, with additional information to assist reviewers in evaluating technical details. The proposal narrative should build on the information provided as part of the EERE Exchange template. **Applicants must include all content they wish to have reviewed in the proposal (proposal reviewers will not review any information provided in Exchange for AOP development)**. References do not count toward the page limit.

General Information

This section summarizes the basic information about the proposed project: title; VTO program, activity, and sub-activity the project serves; and project principal investigator (with contact information).

Project Overview

This section should contain a concise narrative that captures the problem statement, the major R&D challenges, and any context needed to provide the reader with a complete understanding of the project and how it supports office, program, and activity goals. If this is a multi-performer project, this section should include a description of each performer's role and responsibility.

Project Objectives

This section should describe the project-specific goals, objectives, and expected outcomes. The proposal should include a clearly defined, aggressive and quantitative end-of-project goal that supports larger VTO programmatic goals. Details on the technical aspects of the goals, objectives, and outcomes should be included in this section to explain the specific technical areas to be addressed and the scientific merit of the work as well as specifically how the approach is different from VTO's current portfolio. The proposer should include the technology barriers addressed by the work and how the project addresses them.

Project Management

This section should define the key milestones to be addressed by the project (1 go/no-go at 12 months and quarterly progress measures), with dates and specific descriptions of what should be accomplished to meet the milestones.

Project Approach/Tasks

This section should list the key tasks and provide brief descriptions for each task, including roles and responsibilities of any partners. A cost estimate (total) for each phase should be provided here.

Application Review Information

Merit Review and Selection Process

Upon receipt and review for initial compliance with requirements, all proposals received in Exchange by the deadline will undergo a thorough technical review. VTO will use expert reviewers familiar with the VTO portfolio, goals, and objectives. VTO will collect and collate review scores and comments for use in making final project selections. The VTO Selection Official will consider the merit review results to make the final project selections. For transparency, VTO will provide summaries of the review results to assist labs in understanding how their proposal reviewed and aid in improving future work.

Technical Review Criteria

Below are the specific technical review criteria against which the proposals will be reviewed.

Criterion 1: Technical Merit, Innovation, and Impact (Weight: 50%)

- 1(a) Degree to which the project addresses program barriers, contributes to Office targets/goals, and has potential to advance the state-of-the-art.
- 1(b) Extent to which the proposed project presents an innovative, early stage R&D approach and is different from what VTO is already funding and what the research community is advancing.
- 1(c) Sufficiency of technical detail supporting the proposed work is scientifically meritorious.

Criterion 2: Project Approach (Weight: 30%)

- 2(a) Relevance and appropriateness of the approach and critical path and description of key tasks, metrics (including baseline), and milestones leading to an impactful outcome.
- 2(b) Degree of likelihood that the work plan will succeed in meeting project goals.

Criterion 3: Team, Resources, and Inter-Lab Collaboration (Recommended Weight: 20%)

- 3(a) Degree to which the project leverages a core or enabling capability.
- 3(b) Capability of the Principal Investigator(s) and team to address all aspects of the work – qualifications, expertise, and time commitment of the team.
- 3(c) Sufficiency of the facilities to support the work.
- 3(d) Reasonableness of budget and spend plan for proposed project and objectives.
- 3(e) Sufficiency of the budget for the innovation proposed.

Selection Notification

VTO anticipates completing the project selection process and notifying labs of selections by the end of **May 2020 (subject to change)**.

VTO will notify lab leads of selection results via email from VTOLabCall@ee.doe.gov and will provide lab leads with summaries of anonymized review comments for each proposal submitted.

Questions/Agency Contacts

Specific questions about this lab call should be submitted via e-mail to VTOLabCall@ee.doe.gov. To ensure fairness across all labs, individual VTO staff cannot answer questions while the lab call remains open. To keep all labs informed, VTO will post all questions and answers on EERE Exchange.

Appendix A: Lab Call Full Application Worksheet for Exchange

Lab Call Full Application Worksheet

IMPORTANT: This document is provided as a courtesy to allow Lab Call applicants to collaborate offline to develop Full Applications for Lab Calls. All information must be entered into the eXCHANGE system and cannot be submitted with this document.

Please contact ITSIHelp@ee.doe.gov with any questions.

Project General Information

[Control Number:](#)

[Applicant \(Name and Email Address\):](#)

[Organization:](#)

[Project Title:](#)

[Topic:](#)

[Project Start Date:](#)

[Project End Date:](#)

[Partner Laboratories:](#)

Partner Laboratory	Email	First Name	Last Name

[Is this a continuation of an existing project?](#)

WBS Number:

Fiscal Year Existing Project:

[Project Overview \(Multi-year\):](#)

[Project Objectives \(Multi-year\):](#)

Contact Information

Lab Lead Point of Contact and Business Contact Information

Name:

Email:

Title:

Address:

Phone:

Fax:

Financials

Please add a separate table for each partner laboratory.

Lead Laboratory Name:

Year	Planned Project Costs	
2020		
2021		
2022		
Subtotal:		

Partner Laboratory (If Applicable) Name:

Year	Planned Project Costs	
2020		
2021		
2022		
Subtotal:		

Total Planned Project Costs:

Performers

Please add a separate table for each partner laboratory.

Lead Laboratory Name:

Subcontractor Name	Sub Type	Start Date	End Date	2020 Planned Costs	2021 Planned Costs	2022 Planned Costs	Total Funding
Subcontractor Subtotal:							

Partner Laboratory (If Applicable) Name:

Subcontractor Name	Sub Type	Start Date	End Date	2020 Planned Costs	2021 Planned Costs	2022 Planned Costs	Total Funding
Subcontractor Subtotal:							

Total Planned Project Costs:

Project Plan

Project Tasks:

Task Number	Title	Description	Team Members	Planned Costs	Start Date	End Date

Project Milestones:

Item Number	Type	Title	Description	End Date	Team Members	Criteria

Risks

Risk Name	Description	Response Plan	Severity	Probability	Response	Source	Classification	Team Members	Target Completion Date

Modalities/TRL

Modalities:

Modality Number	Modality	FY20 Weight (%)	FY20f Planned Costs (\$)
Total:			

Current TRL of the proposed technology (1-9):

Estimated TRL the technology will reach at project end (2-9):

Project Impacts

Deliverable/Product or "Output" Description:

Audience/Customer:

Audience/Customer Use:

Communications/Outreach Strategy:

[Does this project involve significant industry engagement?](#)

Description of Engagement:

[Associated CRADAs?](#)

CRADA Text