

## **HPC4EnergyInnovation Program: Collaborations for U.S. Manufacturers**

The High Performance Computing for Energy Innovation (HPC4EI) Program seeks qualified industry partners to participate in short-term, collaborative projects with the Department of Energy's (DOE's) national laboratories. Through support from the Office of Energy Efficiency and Renewable Energy's (EERE) Advanced Manufacturing Office (AMO), Fuel Cell Technologies (FCTO), and Vehicle Technologies Offices (VTO) and DOE's Office of Fossil Energy (FE), the selected industry partners will be granted access to high performance computing (HPC) facilities and world-class scientists at DOE's national laboratories. HPC4EI is the umbrella program for the HPC4Manufacturing (HPC4Mfg), HPC4Materials (HPC4Mtls), and HPC4Mobility programs.

- The HPC4Mfg Program is interested in establishing collaborations that address key manufacturing challenges by applying modeling, simulation, and data analysis. The program aims to improve energy efficiency, increase productivity, reduce cycle time, enable next-generation technologies, test control system algorithms, investigate intensified processes, lower energy cost, and accelerate innovation.
- The HPC4Mtls Program is interested in collaborations that address key challenges in developing, modifying, and/or qualifying new or modified materials that perform well in severe or complex environments through the application of HPC, modeling, simulation, and data analysis.
- The HPC4Mobility Program is interested in collaborations that address key mobility challenges in developing, modifying, and/or qualifying new or modified software, hardware, and implementation solutions that perform well in complex mobility systems and systems of systems in rural and metropolitan areas on local, regional, state, or national level through the application of HPC, modeling, simulation and data analysis.

Outlined below in the Background Section are topics of interest specific to the offices supporting this solicitation.

Eligibility for the HPC4Mfg and HPC4Mtls programs is limited to entities that manufacture or develop products in the United States for commercial applications and the organizations that support them. Relevant government entities are eligible to receive awards from the HPC4Mobility Program only. Selected demonstration projects will be awarded up to \$300,000 to support compute cycles and work performed by the national lab partners. The industry partner must provide a participant contribution of at least 20% of the DOE funding for the project.

In addition, we will consider follow-on projects to previously awarded, successful demonstration projects in these areas. These projects should focus on the further implementation of the demonstrated HPC application in the industrial setting - taking it closer to operational use and broad national impact. Selected follow-on projects will be awarded up to \$300,000 to support computing cycles and work performed by the national lab partners. The industry partner must provide a participant contribution of at least 50% of the DOE funding for the project; of this, at least half should be in cash to support the national laboratory work.

## Background

DOE maintains world-class HPC expertise and facilities, currently hosting 7 of the top 12 most powerful computers in the world. From detailed atomic-level simulations to massive cosmological studies, researchers use HPC to probe science and technology questions inaccessible by other experimental methods. Scientific insights gained from these computational studies have drastically impacted research and technology across industrial sectors and scientific fields. Examples include additive manufacturing, oil recovery, drug development, climate science, genomics, and exploration of fundamental particles that make up our universe. From industry to academia, the scientific need for advanced computing continues to drive innovation and development for future high performance computers and their capabilities.

There is high potential for U.S. industry to utilize the power of HPC. The HPC4EI Program is intended to provide HPC expertise and resources to industry to lower the risk of HPC adoption and broaden its use to support transformational and early-stage technology development. The HPC4EI Program hopes to provide this HPC expertise and resources by supporting targeted collaborations between industry and DOE's national laboratories.

Successful applicants will work collaboratively with staff from one or more of the DOE laboratories to conduct project activities across the various HPC areas of expertise, including development and optimization of modeling and simulation codes, porting and scaling of applications, application of data analytics, as well as applied research and development of tools or methods.

To make the broadest impact across the industry, the project teams are expected to present their results at workshops associated with the program and at regional and national conferences. Publications in appropriate trade journals are also encouraged.

### Area 1: HPC4Mfg

DOE's [AMO](#) within [EERE](#) is the primary sponsor of the HPC4Mfg Program. FE and EERE's VTO and Building Technologies Office (BTO) also sponsor select projects in this portfolio. AMO partners with private and public stakeholders to support the research, development, and deployment of innovative technologies that can improve U.S. competitiveness, save energy, and ensure global leadership in advanced manufacturing. AMO supports cost-shared research, development, and demonstration activities in support of crosscutting next-generation technologies and processes that hold high potential to significantly improve energy efficiency and reduce energy-related emissions, industrial waste, and the life-cycle energy consumption of manufactured products.

Improved energy efficiency across the manufacturing industry is one of the primary goals of the HPC4Mfg Program. We solicit proposals that require HPC modeling and simulation to overcome impactful manufacturing process challenges resulting in reduced energy consumption and/or increased productivity. Proposals should provide a realistic assessment of the energy impact, the improvement in U.S. manufacturing competitiveness, and the increase in U.S. manufacturing jobs that a successful outcome of the project could have across the industrial sector.'

Of particular interest to AMO are:

1. Proposals that require HPC modeling and simulation to overcome impactful manufacturing process challenges resulting in reduced energy consumption and/or increased productivity
2. Proposals that uniquely exploit HPC modeling and simulation to significantly reduce national energy consumption through improved product design.

## **Area 2: HPC4Mtls**

The HPC4Mtls Program is sponsored by EERE's FCTO and VTO to enhance the U.S. materials-development, fabrication, and manufacturing industry to investigate, improve, and scale methods that will accelerate the development and deployment of materials that perform well in severe and complex energy application environments. This solicitation is aimed at demonstrating the benefit of HPC toward these goals within one year.

The program seeks proposals that will address key challenges in developing, modifying, and/or qualifying new or modified materials that perform well in severe and complex energy application environments through the use of HPC modeling, simulation, and data analysis. For each of the program offices supporting this solicitation, we provide a brief description of their mission and the topics of interest to them.

### The Fuel Cell Technologies Office

[FCTO](#) focuses on early-stage research and development (R&D) to advance hydrogen and fuel cells for transportation and diverse applications that contribute to U.S. energy independence, security, and resiliency and that add to a strong domestic economy. FCTO addresses challenges facing the development of hydrogen and fuel cell technologies by integrating basic and applied research and technology-development activities. These include cost-shared R&D efforts to address key technological barriers in the areas of fuel cell cost and durability, hydrogen production cost, and hydrogen storage capacity. Three FCTO-supported consortia within the [Energy Materials Network](#), ElectroCat, HydroGEN and HyMARC, directly address these R&D areas.

Specific topics of interest to FCTO in this solicitation include:

- Improving performance and durability of electrocatalysts, such as Platinum Group Metals (PGM) free catalysts in fuel cells and electrolyzers
- Improving materials and interfaces for advanced water-splitting technologies, including electrochemical, thermochemical, and photoelectrochemical approaches
- Developing machine learning capabilities to predict new materials, such as for hydrogen storage, PGM-free electrocatalysts, membrane separators, and energy converters (e.g., semiconductors for photoelectrochemical hydrogen and redox materials for thermochemical hydrogen)
- Improving understanding and modeling of interactions in complex systems (e.g., coupling of changes in material properties, mass transport, and thermal management during hydrogen-release reactions in materials-based hydrogen storage systems and in materials-based water-splitting systems with additional requirements on modeling the oxygen release reactions).

## The Vehicle Technologies Office

[VTO](#) funds early-stage, high-risk research on innovative vehicle and transportation technologies to strengthen national security, enable future economic growth, and increase transportation energy efficiency. VTO leverages the unique capabilities and world-class expertise of the national laboratory system to develop innovations in electrification, advanced combustion engines and fuels, advanced materials, and energy-efficient mobility systems. As part of VTO, the Materials Technology Program supports vehicle [lightweighting](#) and improved propulsion (powertrain) efficiency focused on the following cost and [performance targets](#):

- Enable a 25% weight reduction for light-duty vehicles including body, chassis, and interior as compared to a 2012 baseline at no more than a \$5/lb.-saved increase in cost by 2030
- Validate a 25% improvement in high-temperature (300° C) component strength relative to components made with 2010 baseline cast aluminum alloys (A319 or A356) for improved efficiency light-duty engines by 2025.

Specific topics of interest to VTO include the following areas:

- Predicting microstructure of cast metals based on composition, cooling rates, and heat treatment
- Improving mechanical performance of alloys at elevated temperatures (alloys meeting automotive performance and cost targets operating between 330°C and 1100°C)
- Using machine learning and data analytics to identify promising new material compositions (e.g., for high-temperature and for lightweight structural materials relevant to automotive use and cost constraints)
- Developing process structure models for dissimilar material joints (e.g., between advanced high-strength steels, aluminum, magnesium, and carbon fiber composite combinations relevant to high-volume automotive assembly)
- Establishing integrated computational materials engineering (ICME) tools for metal additive manufacturing (AM) to predict microstructure, residual stresses, and dimensional stability in AM parts
- Multi-scale crash and/or fatigue simulation for carbon fiber-reinforced polymer (CFRP) composite components with the capability of predicting the evolution of microstructure and damage concurrently in macroscale CAE computer-aided engineering (CAE)
- Linked atomic/meso/macro-scale models for magnesium, capable of predicting material behavior based on alloy composition, processing, and fabrication techniques.
- Models that illuminate atomic-level understanding of the deformation properties of wrought magnesium (non-basal slip, twinning, etc.)
- Artificial Intelligence enabled models that allow for use of non-destructive evaluation methods for in-line process control to assure quality of dissimilar material joints.
- Characterization and modeling of materials in harsh high temperature environments to establish design tools for new high performance materials

### **Area 3: HPC4Mobility**

The HPC4Mobility Program is sponsored by the Vehicle Technologies Office's Energy Efficient Mobility Systems (EEMS) Program. The mission of EEMS is to conduct early stage R&D at the vehicle, traveler, and system level, to create new knowledge, tools, and insights and technology solutions that increase mobility energy productivity for individuals and businesses. As mobility technologies continuously evolve, EEMS operates within the interface of vehicle systems and transportation systems. The HPC4Mobility Program seeks proposals that apply national lab expertise in high performance computing, machine-learning, and big data science to find solutions to real-world transportation energy challenges.

Specific topics of interest to EEMS for this solicitation include:

- Discovery and/or development and/or integration of algorithms for vehicle control and guidance (with emphasis on connected and automated vehicles)
- Transportation network problem solutions that are enabled by HPC. Examples include but are not limited to:
  - Novel traffic management control strategies based on real-time data that can improve safety, congestion, and energy efficiency of the system while maintaining and improving mobility and accessibility
  - Novel methods to collect, integrate and analyze disparate data sets from transportation systems.

Within Area 3 (HPC4Mobility), EEMS encourages proposals from two sub-areas: Area 3.1 for public entities and non-profit organizations and Area 3.2 for private sector industry partners.

Public entities likely include local, state, and regional governments, including metropolitan planning organizations (MPOs) and not-for-profit entities developing or supporting development of cities, regions, and states and their transportation systems. Industry partners would likely be for-profit manufacturers, distributors, and vendors of software and hardware systems to be implemented in roadside infrastructure, traffic control and management systems, or vehicles operating therein.

#### **Eligibility**

HPC4Mfg, HPC4Mtls, and HPC4Mobility Area 3.2: Eligibility is limited to U.S. manufacturers, defined as entities that are incorporated (or otherwise formed) under the laws of a particular state or territory of the United States, and that manufacture products in the United States (HPC4Mfg), that develop and/or manufacture new or modified materials in the United States (HPC4Mtls), or that manufacture, distribute or otherwise deploy software and hardware systems as described above. U.S. universities, institutes, and other non-profit organizations are also eligible to participate as collaborators. Funding for university participants must be provided by the industrial partner and can be considered a component of the industrial partner's in-kind funding contribution.

HPC4Mobility Area 3.1: Eligibility is limited to U.S. based public entities including local, state, and regional governments, metropolitan planning organizations (MPOs), and not-for-profit entities developing or supporting development of cities, regions, and states. Universities,

institutes, and other non-profit organizations are eligible in Area 3.1 as well as collaborators in Area 3.2

Funding for university participants must be provided by the industrial partner and can be considered a component of the industrial partner's in-kind funding contribution.

### **Funding Requirements**

The DOE monetary contribution for each project will not exceed \$300,000. An industry partner must provide a participant contribution of at least 20% of the DOE funding for the project to support industry expertise to the project. The participant contribution can take the form of monetary funds-in or "in-kind" contributions and must come from non-federal sources unless otherwise allowed by law. Total project size cannot exceed \$500,000. The DOE funding will be provided to the national laboratory (or laboratories) in support of their work under the HPC4EI Program.

Note: THIS IS NOT A PROCUREMENT REQUEST.

### **Solicitation Process and Timeline**

This solicitation comprises a two-stage process consisting of the submission and evaluation of a two-page concept paper submitted by the industrial principal investigator (PI). These will be evaluated by a technical review committee on the technical challenge to overcome; how this advances the state of the art for the industrial sector; how HPC can uniquely contribute to the solution of the technical challenge; and the impact that a successful project can have. To the extent known, the technical plan should be articulated, as well. The program recognizes that those industrial PIs who have not yet identified a national laboratory partner to work with will not necessarily have a complete picture of the technical solution techniques that are possible.

Successful concept papers will be paired with a national laboratory partner for the development of the full proposal. Full proposals will be reviewed by a technical committee against the criteria given below. The portfolio of proposals recommended by the committee will be submitted to DOE senior managers for final selection, subject to the availability of funding. All DOE funding decisions shall be final.

Upon approval of funding selections by DOE, the HPC4EI Program will issue a written response to each applicant. Applicants selected for funding will subsequently engage in a formal agreement with the partnered laboratory before work may begin.

Private sector applicants will engage in a cooperative research and development agreement (CRADA) for the successful proposal. Once both parties approve the CRADA, project execution may begin. Failure to engage promptly in CRADA negotiations can result in rejection of the project.

Public sector applicants are not required to complete a CRADA. A partnership with a public entity as described in the eligibility criteria can be demonstrated through a Memorandum of Understanding (MOU) or a Data Transfer Agreement (DTA) as appropriate.

The portfolio of projects will be posted on the program websites: [www.hpc4energyinnovation.org](http://www.hpc4energyinnovation.org); [www.hpc4mfg.org](http://www.hpc4mfg.org); and [www.hpc4mtls.org](http://www.hpc4mtls.org). The HPC4EI Program reserves the right to select all, a portion, or none of the submissions.

If a concept paper or full proposal is technically strong, but is not selected for funding, the program management team may share them with other DOE program offices for consideration for possible funding through those offices.

## Timeline

Event	Date (2019)
Call for Proposal	April 1, 2019
Concept paper due	May 6, 2019
Request for full proposal	End of June 2019
Full proposal due	End of July 2019
Finalists notified	October 2019
Expected project start	November 2019

## Concept Paper Guidelines

Interested parties will submit a concept paper describing the project objectives by the due date provided below. The concept paper will be evaluated against the documented criteria. Successful concept papers will be invited to submit a full proposal.

**The concept paper template can be downloaded** from the website and should be used to prepare your submission. The concept paper should not exceed two (2) single-spaced pages using 12-point font (Times New Roman preferred), formatted in a PDF file, and it **must include** the following components under the corresponding headings below. A concept paper that does not meet the guidelines may be rejected. A concept paper template is provided.

- **Title Page: (not included in page limit)** *Include the project title; company name, description, and U.S. manufacturing location(s); and company PI(s)'s contact information. Include the DOE office and topic area listed above that your concept paper best fits, and the national lab PI contact information, if known. Acknowledge the required 20% cost-share and that the use of the DOE Model Short Form CRADA for industrial partners is acceptable. Indicate the business sector, process category, and discipline needed (lists provided).*
- **Abstract: (150 words or less):** *Provide a **non-proprietary, publishable** summary of the problem being addressed, why the problem is important to the energy future of the United States, a plan to address the problem, and the impact the solution will have.*
- **Background:** *Explain the technical challenge to be addressed; the state of the art in this area and how this work advances the state of the art; how solving this problem will meet the goals of the HPC4EI Program as defined by the list of topics of interest; the relevant expertise of the industry partners; what national laboratory expertise is needed; and why*

*national laboratory HPC resources are required and how they will be used.*

- **Project Plan and Objectives:** *Describe the technical scope of work to be performed and how this project fits into an overall solution strategy for the challenges being addressed. Describe how the results of the project will be validated, including availability of data. If possible, identify specific simulation codes to be used in this effort.*
- **Impact:** *Estimate how this specific HPC effort will result in national-scale, long-term energy savings across the industry; the performance improvements that are expected over existing technologies; and the ability of industry to accelerate the adoption of energy-efficient technologies. Describe how this specific HPC work contributes to a transformational change in the energy sector and enduring economic impact. Describe how this effort will result in changes in the way your company operates. Describe the alternative actions if this effort is not funded including reliance on experimental technologies or other courses of action. Include metrics for energy improvements, performance increases, cost savings, and/or time reductions.*
- **Changes from Previous Submissions:** *For proposals that have been re-submitted from a previous solicitation, briefly describe how you have incorporated changes based on reviewer comments from the previous submission.*

For follow-on projects, the concept paper should not exceed three (3) single-spaced pages using 12-point font (Times New Roman preferred), should be in PDF file format, and should include all of the components described above. In addition, the following component is required:

- **Results from the prior funded project (one page maximum with figures):** *Review the results and knowledge gained from the Demonstration project. Explain how these results will be used to address the objectives of this proposal. If you believe that the current proposal is distinctly different from the previous project and should not be considered as a follow-on project, please articulate the differences.*

**Completed concept papers, derived from the provided template, must be submitted in PDF file format by email to [hpc4ei-submissions@llnl.gov](mailto:hpc4ei-submissions@llnl.gov) by 11:59 p.m. PDT on the deadline indicated on the submission website. The subject line should include: HPC4EI Concept Submission.** Receipt of concept papers will be confirmed within one week of submission. Concept papers will be evaluated against the criteria listed in the Evaluation Criteria Section.

### **Full Proposal Guidelines**

Successful concept paper submissions will be notified and paired with a PI from one or a combination of the following laboratories:

- Argonne National Laboratory
- Los Alamos National Laboratory
- Lawrence Berkeley National Laboratory
- Lawrence Livermore National Laboratory
- National Energy Technology Laboratory
- National Renewable Energy Laboratory



- Oak Ridge National Laboratory
- Pacific Northwest National Laboratory
- Sandia National Laboratory
- Other participating laboratories.

Partners will then collaborate on the development of a full proposal. Full proposals will be evaluated against the criteria described in the Evaluation Criteria Section.

**The full proposal template can be downloaded** from the website and should be used to prepare your submission. Proposals should not exceed six (6) single-spaced pages using 12-point font (Times New Roman preferred), formatted in a PDF file, and they **must include** the following components under the corresponding headings below. Proposals that do not meet the guidelines may be rejected.

- **Title Page: (not included in page limit)** *Include the project title; company name, description, and U.S. manufacturing location(s); and company PI(s)'s contact information. Include the DOE office and topic area listed above that your concept paper best fits and the national laboratory PI's contact information. Acknowledge the need to provide 20% cost-share and the agreement to enter into the DOE Model Short Form CRADA for industrial partners.*
- **Abstract: (150 words or less):** *Provide a **non-proprietary, publishable** summary of the problem being addressed, why the problem is important to the energy future of the United States, a plan to address the problem, and the impact of the solution. If selected for the HPC4EI Program, this abstract will appear on award announcements sent to the press.*
- **Background:** *Describe the technical challenge to be addressed; the state of the art in this area and how this work advances the state of the art; how solving this problem will meet the goals of the HPC4EI Program as defined by the list of topics of interest; the relevant expertise of the industry partners; what national laboratory expertise is needed; and why national laboratory HPC resources are required and how they will be used. Indicate if the proposed project will accelerate transformational technological advances in areas that industry by itself is not likely to undertake because of technical and financial uncertainty.*
- **Project Plan and Objectives:** *Describe the technical scope of work to be performed and how this scope will fit into the broader solution for the challenges being addressed, including, for example, relevant experimental work. Outline a set of tasks to be performed and state what work industry partners will perform and what work laboratory partners will perform. Describe how the results of the project will be validated, including availability of data. If possible, identify simulation codes to be used in this effort and any modifications to the software that are needed to solve the proposed problem.*
- **Tasks, Milestones, Deliverables, and Schedules:** *Include goals, timelines, and due dates throughout the life of the project. Not every milestone needs to have a deliverable. Include deliverables from all partners, not just the national lab partner(s). Indicate responsible party(ies) for each deliverable. Include deliverables from one partner to another, as well as those to the DOE program sponsors.*

- **Validation and Verification Plan:** *Summarize how the model will be validated and the simulations verified. Include information about the experimental data that will be used for verification, its nature and source.*
- **Impact:** *Estimate how this specific HPC effort will result in national-scale, long-term energy savings across the industry; the performance improvements that are expected over existing technologies; and the ability of industry to accelerate the adoption of energy-efficient technologies. Explain how this specific HPC work contributes to a transformational change in the energy sector and enduring economic impact. Describe the alternative actions if this effort is not funded including reliance on experimental technologies or other courses of action. Describe how this effort will specifically impact your company/entity. Include metrics for energy improvements, performance increases, cost savings, and/or time reductions.*
- **Implementation and Adoption:** *Describe how this work will be incorporated into company and industry-wide operations. Describe the follow-on activities to extend this effort to solve the broader problem being addressed. If a new or modified technology is developed, can the team provide a preliminary techno-economic analysis by the close of the project?*
- **Appendix A: Project Summary of Tasks and Schedule (not included in page count):** *Provide a summary of the tasks and subtasks in a table format that includes the milestones, deliverables, and schedule. Include a schedule summary in Gantt chart format.*
- **Appendix B: Project Budget (not included in page count)** *Summarize project costs including amount and source of participant contribution in the table provided. Indicate in-kind and/or cash contribution for industry funding. Include an explanation of how this funding will make a large difference relative to existing funding from other sources, including the private sector and why the government should fund this work.*
- **Appendix C: Computational Resources (not included in page count):** *Describe the computational approach, the performance of the codes, and the resources requested (platform and number of core hours).*
- **Appendix D: Pictures for Publication (not included in page count):** *Include one or two **non-proprietary** pictures/images with a short caption that can be used in a press release and posted on the website should this project be funded.*
- **Appendix E: Discussion of How This Work Benefits the Laboratory (not included in page count):** *Briefly discuss new or enhanced capabilities that will be gained by the partner laboratory. Or, explain how this will help to maintain existing laboratory capabilities.*
- **Appendix F: (not included in page limit):** *Include one paragraph **non-proprietary** biography for both the industrial PI and partnering laboratory PI. These may be posted on the website should this project be funded.*

- **Appendix G: Resumes (not included in page limit):** *Include resumes of participants.*

Follow-on project proposals should not exceed eight (8) single-spaced pages using 12-point font (Times New Roman preferred), should be in PDF file format, and should include all the components described above. In addition, the following component is required:

- **Results from the prior funded project (two pages maximum with figures):** *Review the results and knowledge gained from the Demonstration project. Explain how these results will be used to address the objectives of this proposal. If you believe that the current proposal is distinctly different from the previous project and should not be considered as a follow-on project, please articulate the differences.*

**Completed proposals, derived from the provided template, must be submitted in PDF file format by email to [hpc4ei-submissions@llnl.gov](mailto:hpc4ei-submissions@llnl.gov) by 11:59 p.m. PDT on the deadline indicated on the submission website. This date will be approximately five weeks after the concept paper notifications have been issued. The subject line should include: HPC4EI Proposal Submission.** Receipt of proposals will be confirmed within one week of submission.

### **Evaluation Process and Criteria**

Both concept papers and full proposals will be evaluated by a Technical Merit Review Committee consisting of experts in the application of HPC modeling, simulation, and data analysis from each of the principal DOE national laboratories, and members of the DOE program offices with knowledge of the U.S. industry. Subject Matter Experts will be consulted to verify claims, including the description of current state of the art and estimate of project impact (e.g., cost and energy savings).

Concept papers will be evaluated primarily on the technical challenge and potential impact of using HPC to solve the industrial challenge. Concept papers should articulate, to the extent possible, the technical plan for performing the work. The committee recognizes that those industrial PIs who have not yet identified a national laboratory partner to work with may not have a complete picture of the technical solution techniques that are possible.

Full proposals will be evaluated against all of the criteria listed below. Because the industrial partner will have been assigned a laboratory partner to work with to develop the full proposal, the technical plan and feasibility will be expected to be well articulated. In addition, strong evidence of communication and planned collaborations between the national lab and industrial participants is expected in the full proposals.

### **Evaluation Criteria**

- **Advances the State of the Art in the Industrial Sector:**  
(HPC4Mfg) Does the proposed work take the industrial sector to a new level; provide a wholly new capability; or make an existing, energy-intensive technology obsolete in the manufacturing sector?  
(HPC4Mtls) Does the proposed work take materials performance and behavior to a new level in a specific energy application environment; scale up the production of a new or modified

material; provide a wholly new capability; or dramatically decrease the time required to certify or qualify a new or modified material?

(HPC4Mobility) Does the proposed work improve access to mobility substantially or increase efficiency of mobility significantly?

- **Technical Feasibility:** Does the proposal have a clearly stated technical approach; a description of the software to be used, including any needed modifications; clear roles and responsibilities for the participants (both the industrial partner and national laboratory); realistic time frames for each technical step; and, if necessary, validation data available to the team?
- **Relevance to HPC:** Does the proposed work fully utilize the unique expertise and capabilities at the DOE national laboratories to solve a problem that could not be solved in any other way? Does it demonstrate the ability to use large fractions of the machine to solve a truly large-scale problem and provide clear estimates of the compute cycles necessary for the work to be performed?
- **Impact, Including Life-Cycle Energy Impact:**  
(HPC4Mfg) Does the proposal provide clear, evidence-based energy savings that will *have broad (national-scale) industrial impact* through development and/or improvement of energy-efficient manufacturing technologies, as well as an impact on employment and manufacturing in the United States? Does the proposal have a clearly stated plan for broad deployment of project artifacts or knowledge gained?  
(HPC4Mtls) Does the proposal provide clear, evidence-based improved materials performance, energy savings, or reduced time to market that will *have broad (national-scale) industrial impact, as well as an impact on employment* in the United States? Does the proposal have a clearly stated plan for broad deployment of project artifacts or knowledge gained?  
(HPC4Mobility) Does the proposal provide clear, evidence-based improved mobility opportunities when successful that have clear regional-, state-, or national-scale impact in the United States? Does the proposal have a clearly stated plan for broad deployment of project artifacts or knowledge gained?
- **Project Management and Team:** Does the proposal match team expertise to the problem to be solved; have modeling expertise on both the national laboratory and industry sides, and process experts for the model validation if necessary? Does the proposal clearly state roles and responsibilities for the participants and provide evidence of a strong collaboration between the industrial and national partners through joint milestones and deliverables?

## Point of Contact

During the period of the call for proposals, all questions relating to this announcement should be directed to the HPC4EnergyInnovation Program at [hpc4ei-submissions@llnl.gov](mailto:hpc4ei-submissions@llnl.gov). To avoid compromising the solicitation process, public and private sector partners interested in submitting applications should refrain from contacting national laboratory proposal partners while the call for proposals is open.

## **Intellectual Property and Proprietary Data**

The HPC4EI Program respects the importance of industry's intellectual property and data security.

Industrial partner awardees (all areas except area 3.1) are expected to enter into a DOE Model Short Form CRADA with the national laboratory or laboratories that will be performing the work. This CRADA contains provisions relating to proprietary information and intellectual property. Because of the need for accelerated placement and execution of the projects, terms of the CRADA will not be subject to negotiation. To review the proposed terms that make up the DOE Model Short Form CRADA, please see the example posted on the HPC4Mfg, HPC4Mtls, and HPC4Mobility solicitation websites.

Public entities under area 3.1 are not required to execute a CRADA.

A Non-Disclosure Agreement can be put into place during development and submission of the proposal to facilitate discussions while protecting the partner's proprietary information.

To the extent possible, it is preferred that proprietary information NOT be included in the submitted proposal. If company proprietary information is included in the proposal, the specific information should be marked as such. The HPC4EI Program officials will utilize reasonable efforts to treat the information as business sensitive.

Significant delays by the industry partner to finalize the CRADA could result in rejection of the proposal.