National Laboratories Partner with U.S. Manufacturers to Increase Innovation and Energy Efficiency

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Acting HPC4EI Director

Lawrence Livermore National Laboratory is operated by Lawrence Livermore National Security, LLC, for the U.S. Department of Energy, National Nuclear Security Administration under Contract DE-AC52-07NA27344
LLNL-PRES-829319

HPC4EnergyInnovation umbrella

Summary – What is new this solicitation?

- This solicitation will include HPC4Mfg and HPC4Mtls
- Unique Entity ID (UEI) Number: The former DUNS number is now the UEI number. Companies register for UEI through the Sam.gov website. If your company's number is applying or renewing a UEI, allow time for processing. We recommend ensuring your UEI number is active before full proposal submission.
- Please review topic areas as there are additional topics aligned with the carbon initiatives of the Biden Administration (electrification of processes, hydrogen fuel blends …)
- Company units cannot submit more than one proposal to HPC4Mfg and one to HPC4Mtls (2 proposals total)
  - If you do submit more than one proposal per area, then the review team will select at most one proposal to go forward to the full proposal stage
- PLEASE review the budget requirements in the solicitation. For a $300K DOE contribution, the industry contribution (cash and/or in-kind) should be $75K (total project funding $375K) for projects (more for follow-ons). Follow-on projects need to have a cash contribution which goes to a collaborator (DOE laboratory, university, non-profit) in addition to the in-kind funding.

Updated Budget Table on full proposal template

Example for initial project:

Cost Category	DOE Funds	Industry Partner Cash Contribution	Industry Partner In-kind	Total Project Funding
National Lab Labor	268,000			
National Lab Travel	2,000			
National Lab HPC (include platform and #core hours)				
National Lab Procurements (include licenses)		30,000		
University and/or Non-profit Funding (optional)	30,000			
Industry Partner Labor			43,000	
Industry Partner Travel			2,000	
Industry Partner Procurements (include licenses or subcontracts)				
Totals	300,000	30,000	45,000	375,000

- Sum of Cash and In-kind must be 20% of total project funding (30,000 + 45,000)/375,000 = 0.2
- For initial projects cash contributions are not a requirement

Updated Budget Table on full proposal template

Example for a follow-on project:

Cost Category	DOE Funds	Industry Partner Cash Contribution	Industry Partner In-kind	Total Project Funding
National Lab Labor	268,000	75,000		
National Lab Travel	2,000			
National Lab HPC (include platform and #core hours)				
National Lab Procurements (include licenses)				
University and/or Non-profit Funding (optional)	30,000			
Industry Partner Labor			43,000	
Industry Partner Travel			2,000	
Industry Partner Procurements (include licenses or subcontracts)			30,000	
Totals	300,000	75,000	75,000	450,000

- Sum of Cash and In-kind must be 1/3rd of total project funding (75,000 + 75,000)/450,000 = 0.333
- Cash amount must be 1/6th of total project funding 75,000/450,000 = 0.1667

The DOE National Laboratories have some of the largest computers in the world and significant technical expertise offering the benefits of HPC to U.S. Industry

- Accelerate innovation
- Optimize design
- Reduce testing cycles
- Shorten the time to market
- Quality processes
- Reduce waste/reduce rejected parts
- Lower energy costs
- Reduced carbon emissions

The HPC4 Program is building an ecosystem to support HPC adoption by industry/government

- Showing what is possible with HPC through **initial projects**
  - DOE program office funds < $300K to laboratories
  - Industry funds at least **20% of total project funding**; either in-kind support or optional cash contribution
  - Project duration < one year
- Building the HPC4 community
  - Student intern programs
  - Virtual events

Program Approach – Companies apply to program through a solicitation process

HPC4 ENERGYINNOVATION

SAM.GOV®

Engage industry

Industry submits challenges

Match challenge to PI

DOE sponsor approval; Feedback to industry

Sign agreements

Concept paper → Full proposal → Award

Technical Review Committee

Inform industry

Technical Merit Review Committee

- Partner labs and DOE representatives
- Heavy focus on **nation-wide** impact to energy efficiency and clean energy technology industry-wide
- $300K DOE funds Laboratory PIs
- 20% in-kind from industry partner

Program Details: Eligibility and Funding

- Eligibility for call
  - Companies manufacturing or developing materials in the U.S.
- Who can be funded from the program
  - DOE National Laboratories
  - **University collaborators can be funded by the industry partner or DOE National Laboratory**
  - Encourage partnerships with universities and non-profit organizations located in federally-designated Opportunity Zones and or/Historically Black Colleges and Universities (HBCU)
- Industry participant cost share
  - At least 20% of **total** project funding for new projects
  - At least 33.3% of **total** project funding for follow-on projects
  - Can be used to support internal staff
  - ***Source can not be other federal funding***

Program Details: If Awarded DOE Model Short Form CRADA

- Used for accelerated placement and execution
- Scope and IP protection defined
- Industry awardees required to sign DOE Model Short Form CRADA
- Standard DOE Model Short Form CRADA available on the web site
  - Individual labs may have some variances
  - If concept paper is selected to go forward; you can ask your laboratory partner for a copy of the specific CRADA

Required!

DOE O 483.1A
11-6-2013

Attachment 5
Page 1

ATTACHMENT 5

This Attachment provides information and/or requirements associated with DOE O 483.1A as well as information and/or requirements applicable to contracts in which the associated CRD (Attachment 1 to DOE O 483.1A) is inserted.

MODEL SHORT FORM CRADA

This Model Short form CRADA is designed to be offered to entities as means for streamlining and simplifying the CRADA process for certain circumstances. In order to ensure expedited CRADA development and approval, this document must be adopted in its entirety, as written, by both/all parties with no exceptions. The language of this document is pre-approved by DOE; however, the DOE Field Office can approve minor changes specific to a Laboratory or other facility. The goal is for uniformity across the DOE complex with this CRADA with limited differences between Laboratories and other facilities.

The Short Form CRADA may be offered to entities that meet the following criteria:

a) The Participant should be clearly advised that this CRADA must be adopted in its entirety, as written, by both/all parties and, at the same time, advised of the alternative to use the DOE Model CRADA if the total terms of the Short Form CRADA are not agreeable.

b) The dollar value of the entire project (including amendments) does not exceed $500,000. This dollar value may be periodically adjusted by the HQ Office of Procurement Policy (MA).

The Short Form CRADA package will be subject to the same process used for DOE Model CRADA package review and approval at the local DOE Field Offices.

Guidance for the DOE Model CRADA applies to clauses unchanged in the Short Form CRADA.

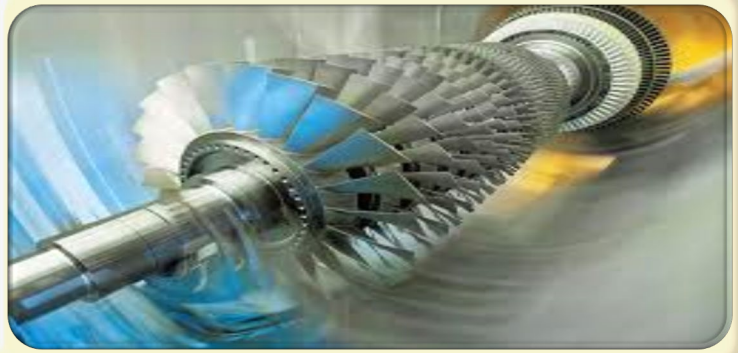
For each project, a Statement of Work (SOW) is required that details the nature, scope, roles, responsibilities, and costs of activities to be conducted by both parties together with an estimated timeline for completion of identified tasks. The SOW will be incorporated into the CRADA as Annex A.

HPC4Manufacturing solicitation topics directly align with DOE's Advanced Manufacturing Office goals to save energy and to reduce green house gases

Broad impact on energy efficiency and/or carbon reduction:

- Use HPC to overcome a key technical challenge
- Process optimization
- Electrification, carbon reduction
- Recycling, semiconductors, critical material processes

HPC4Materials focuses on topic areas of interest to DOE's Office of Fossil Energy and Carbon Management



Fossil Energy Technologies:

- Materials, coatings for severe thermal and corrosive environments
- Materials to accommodate mixed fuels and especially hydrogen
- Reforming natural gas
- Electrocatalysts
- Non battery energy storage

Projects should address one or more of the topic areas listed in the solicitation (download available at www.hpc4energyinnovation.org)

Concept papers are the first step:

- Two-pages; single spaced; 12 pt. font – **Use the template provided on HPC4EI website and HPC4EI Proposal System**
- **Key Elements**
  - **Title page**
  - **Abstract** (150 words or less) - must be a **non-proprietary, publishable** summary
  - **Background**
    - Technical challenge to be addressed
    - State of the art in manufacturing and how this work advances the state of the art
    - Why national laboratory expertise and HPC resources are needed
  - **Project Plan and Objectives**
    - Technical scope of the work and how this project fits into the overall solution strategy
    - How results will be validated including availability of data
    - Specific simulation codes that will be used if known
  - **Impact**
    - How this effort results in long-term energy savings or
    - Ability to accelerate innovative energy-efficient manufacturing
    - Metrics include cost savings, energy savings, and improvement in energy intensity

You do not need to identify a laboratory partner up front!
Just an interesting and difficult problem that HPC can help address!

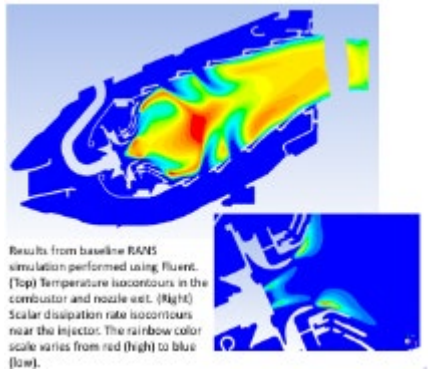
Full proposals provide much more detail

- Six-pages; single spaced; 12 pt. font – **Template will be available in the HPC4EI Proposal System after Concept Paper review notifications are sent.**
- **Key Elements**
  - **Title page**
  - **Abstract** (150 words or less) - must be non-proprietary, publishable summary
  - **Background**
    - Similar to concept paper
  - **Project Plan and Objectives**
    - Similar to but more detailed than concept paper with specific tasks; specific simulation codes; modifications to the software needed etc.
  - **Tasks, Milestones, Deliverables and Schedules**
    - Goals, timelines and due dates of milestones and deliverables from all partners, including who is the responsible party for each deliverable and what will be communicated between the partners
  - **Verification and Validation Plan**
    - How do you intend to validate the findings of the model
  - **Impact**
    - Similar to concept paper but more detailed; is this transformational for an industrial sector and how; what is the enduring impact; how will results be disseminated
  - **Implementation**
    - How will this be incorporated into company and industry-wide operations; and follow-on activities to extend this effort to solve the broader problem being addressed
  - Various appendices (see next slide)

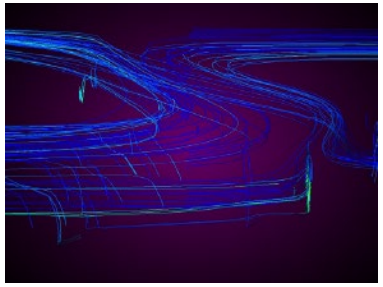
Appendices provide additional information

- Used in the review process; CRADA development process; compute resource determination, etc.
- Not included in the six-page limit
- **Appendix A**: References (not included in page count)
- **Appendix B:** Project summary of tasks and schedule (similar to project tasks in main proposal, but used for CRADA development)
- **Appendix C**: Project budget: costs, amount and source for participants, cost share (in-kind or cash); how funding makes a difference relative to existing funding
- **Appendix D**: Computational resources: computational approach, performance of the codes, resources requested (platform and core/node hours)
- **Appendix E**: Pictures for publication (Photos are used for program announcements)
- **Appendix F**: How the work benefits the laboratory
- **Appendix G**: Paragraph biographies of industry and lab lead PIs
- **Appendix H**: Resumes of key participants

Success Stories

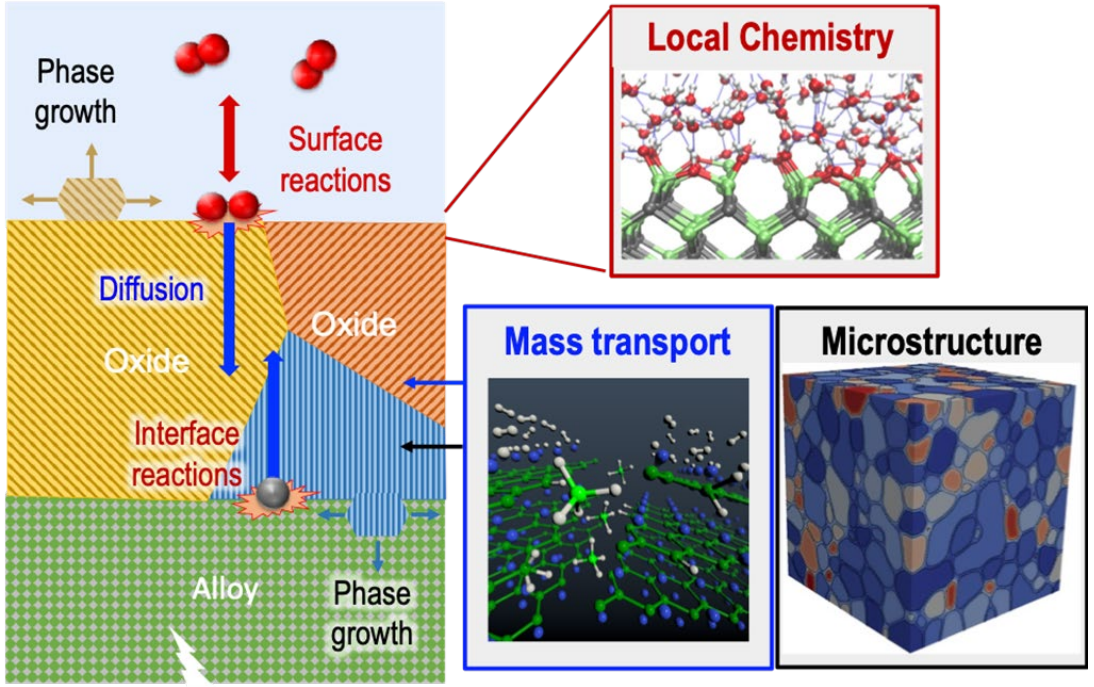


GE: larger, higher fidelity turbine design using advanced turbulence models



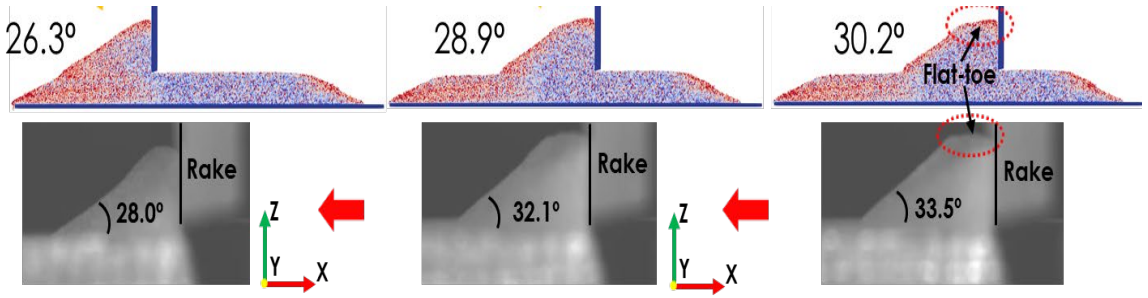
Vitro Glass: Faster, cheaper computation using deep-learning tools

Hot corrosion involves a complex interplay between multiple physical factors

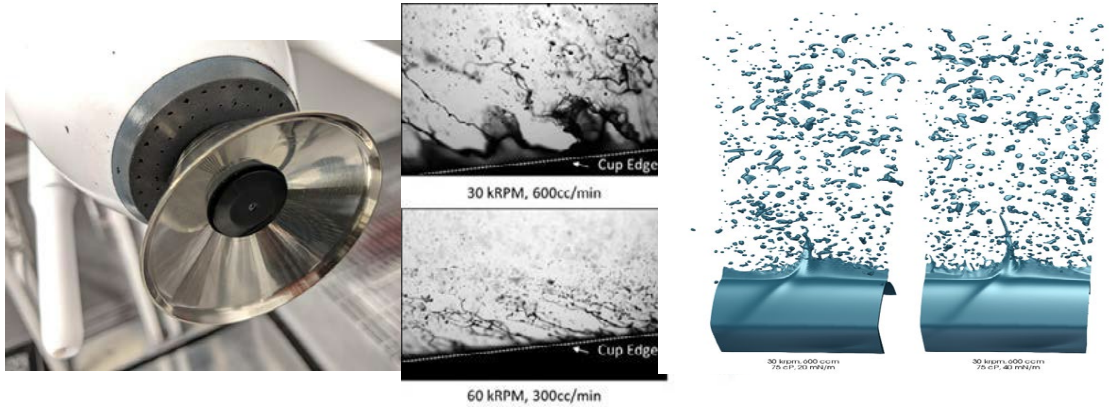


RTRC: Understating corrosion for new materials design in challenging environments

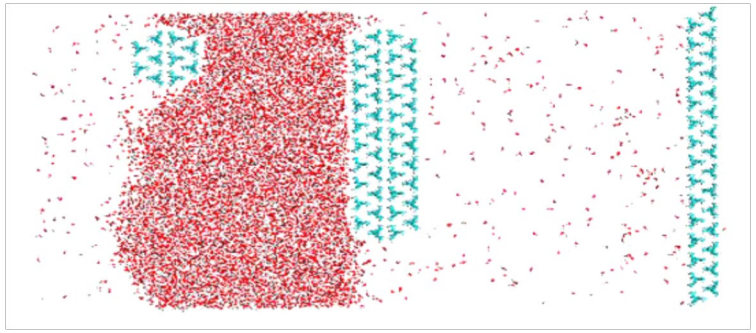
Success Stories



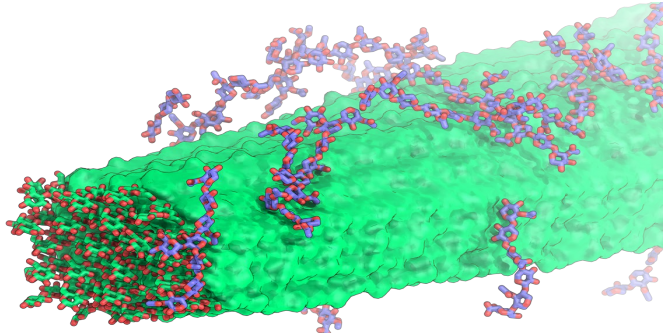
GE: Powder spreading simulations for higher quality metal additive manufacturing



PPG: Optimizing paint rotary bell sprayers for higher flow rates and more energy efficient drying.

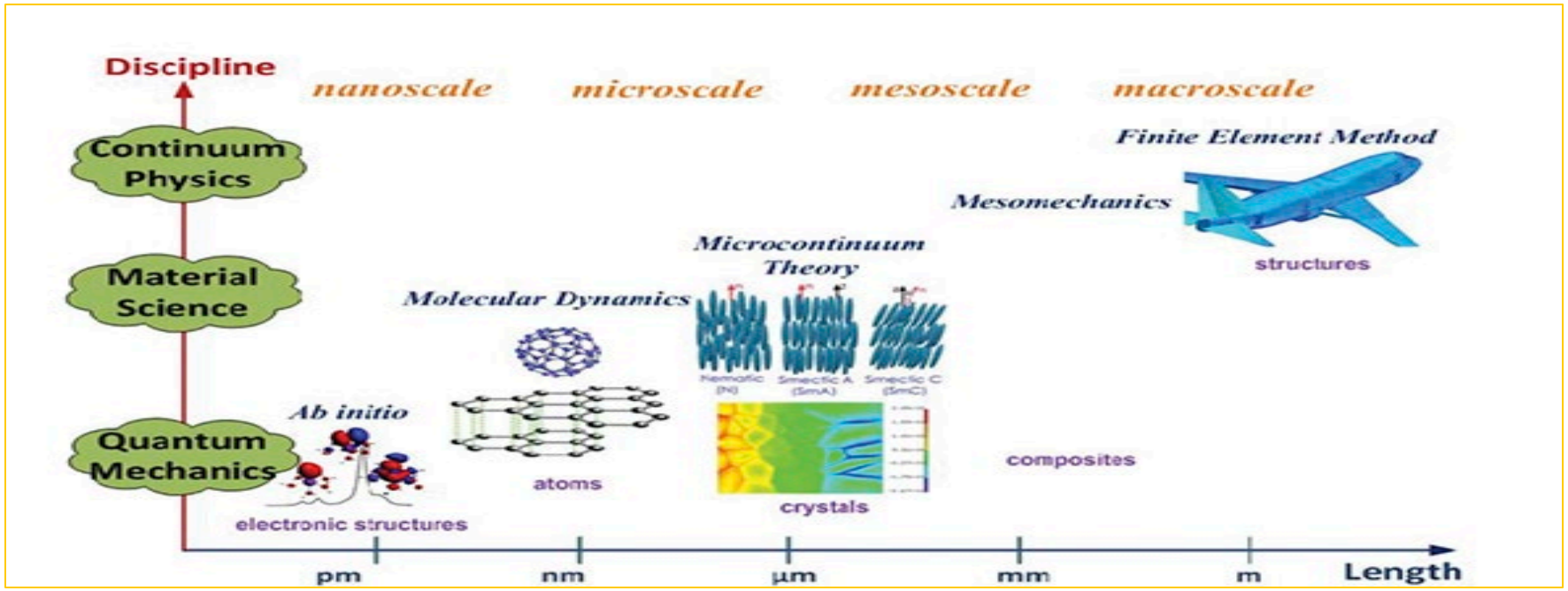


7AC Tech: Molecular simulations of porous membrane dessicant systems for efficient humidity control in air conditioners.



Alliance for Pulp and Paper Tech: Molecular simulations of the chemistry of the Kraft pulp process to improve paper yields.

Industry interested in simulations at many levels



- New alloy design: **Alcoa, Arconic, Carpenter**
- Junction design: **Samsung**
- Membrane design for de-humidification air-conditioning: **7AC Technologies**
- Catalyst design for lignin denature: **APPTI (paper manufacture consortium)**

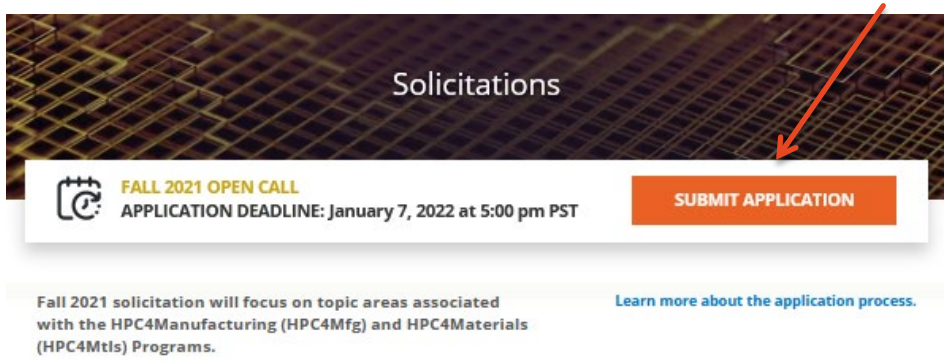
- Microstructure for additive manufacture, casting, welding: **GE, Eaton, UTRC, GM, Arconic, Flash Bainite, US AK Steel, ArcelorMittal**
- Predict stress-strain curves for new material**: LIFT**

- Engine/turbine tolerancing: **Ford, GE**
- Turbine CFD: **GE, Rolls Royce**
- Semiconductor deposition: **Applied Materials, SORAA**
- Furnace design: **Vitro Glass, ArcelorMittal, Owens Corning**

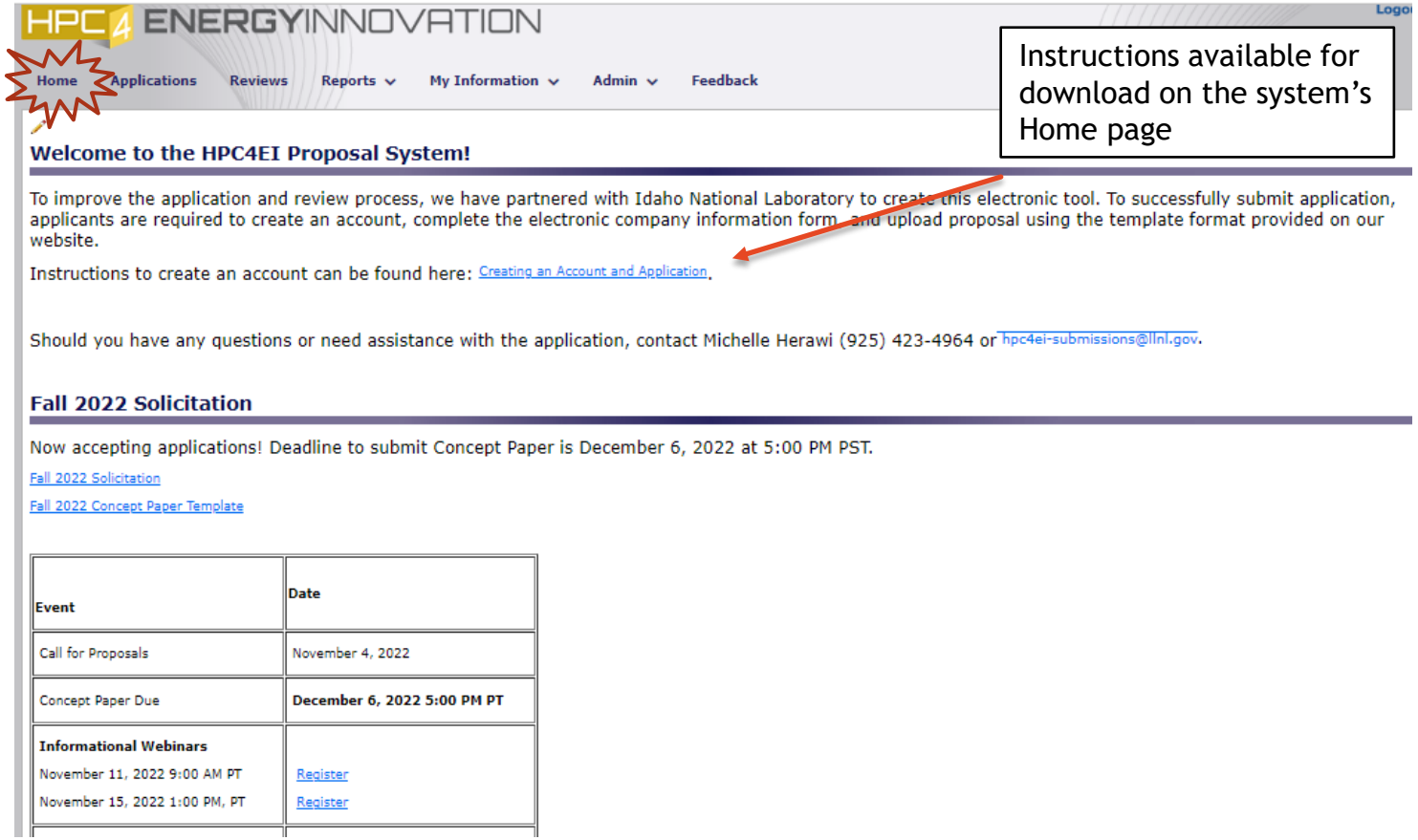
Proposal Application – Submit Paper Electronically!

Access the electronic proposal system at proposalshpc4.inl.gov or HPC4EI Solicitation website

Log on here



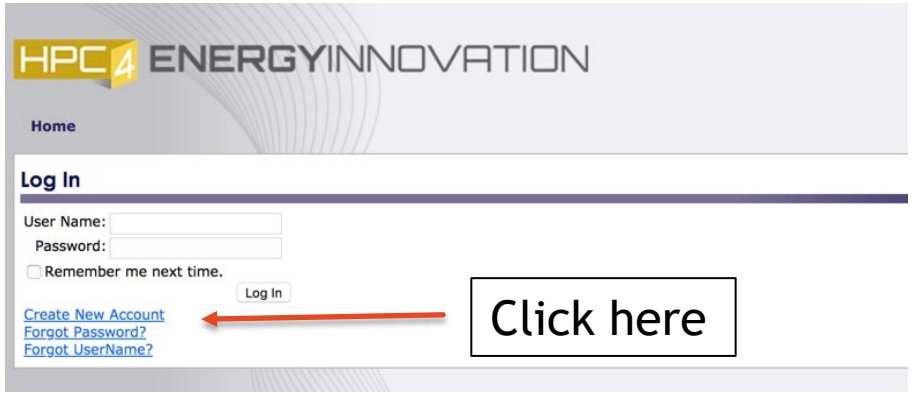
Instructions available for download on the system's Home page



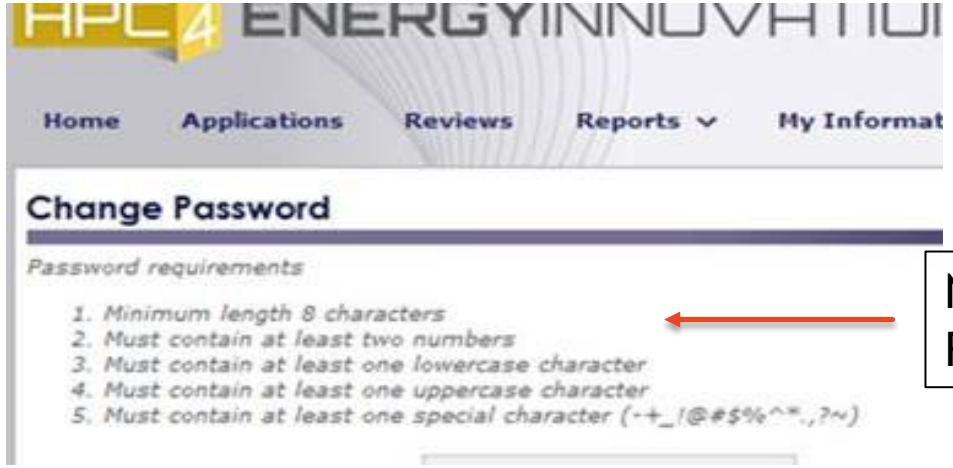
Idaho National Laboratory

Electronic Proposal Application

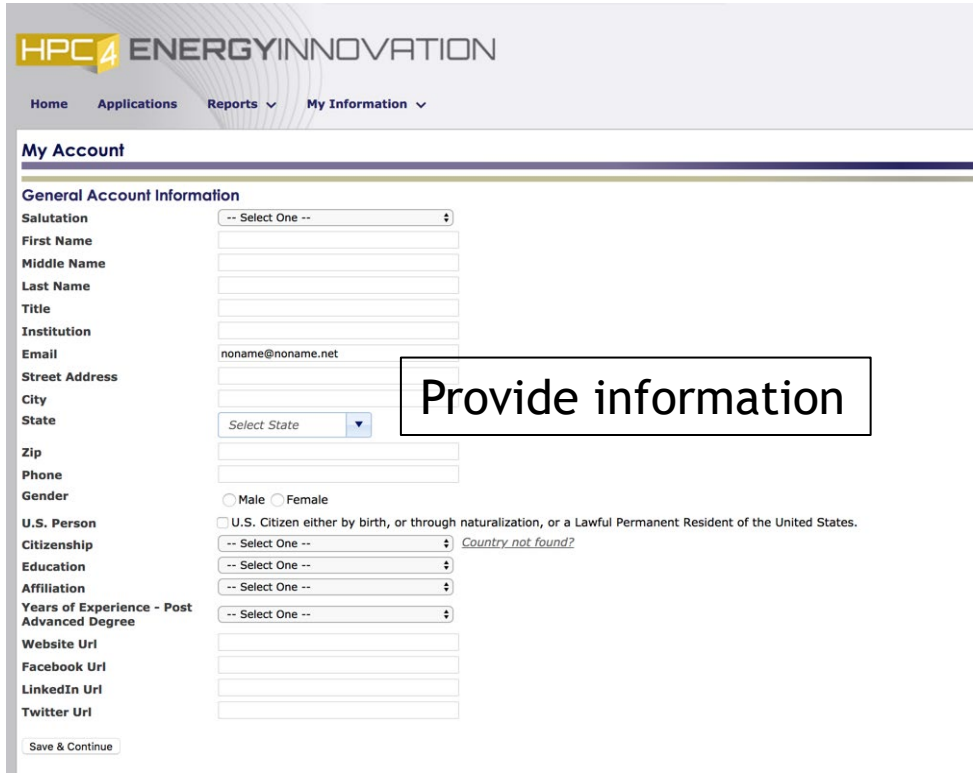
Create account and complete general account information



Click here

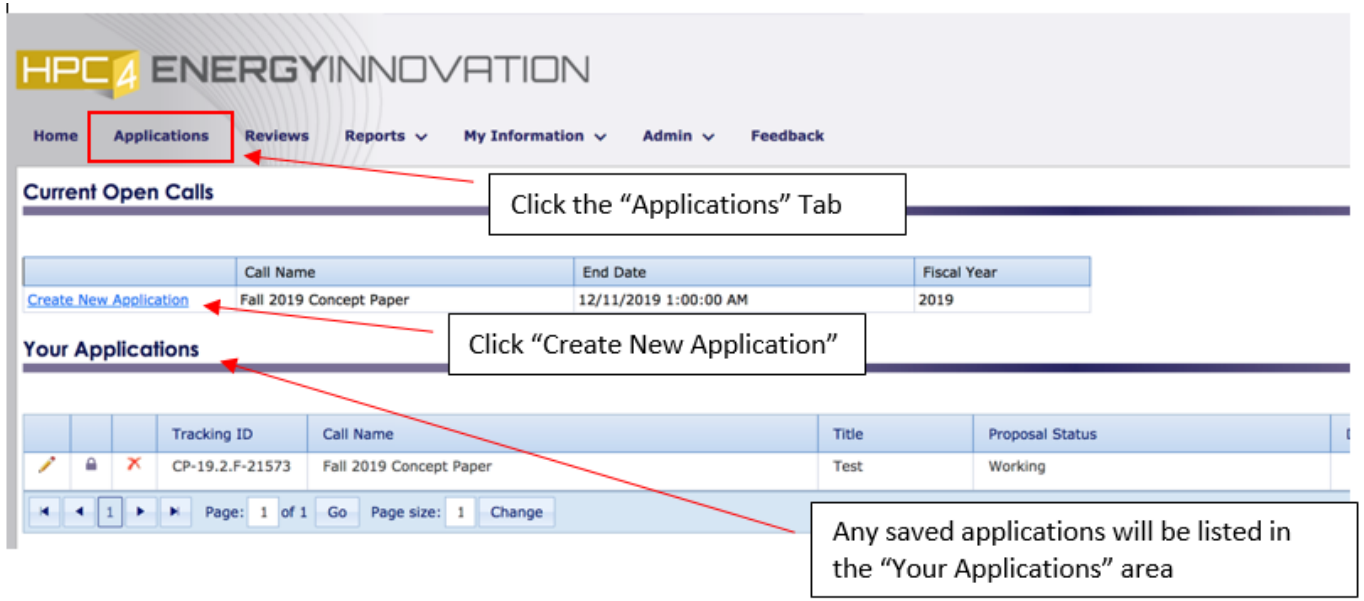


New Password Requirements

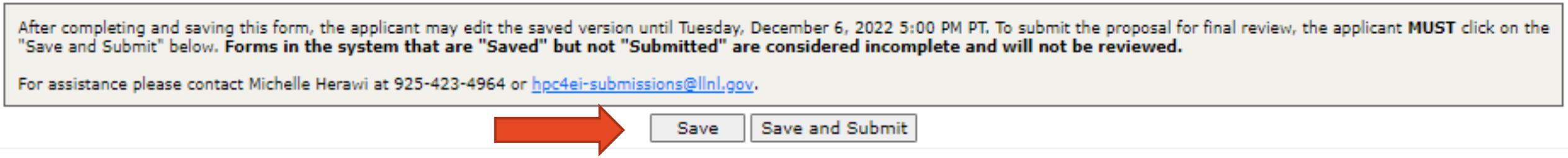


Provide information

Electronic Proposal Application



Proceed to Application tab to view Current Open Calls. Select "Create New Application". Application form will appear in new window. Directions are displayed for each section.



Application must be saved before PI, Co-PIs, Proposal POC, and National Laboratory PIs sections can be populated. **Forms may be saved, revisited, and edited until the deadline.**

New Electronic Proposal Application – Upload Submission and Delegate Access

Concept Paper

Before uploading submission, ensure full proposal is formatted per provided Fall 2022 Concept Paper Template.

Click to download Concept Paper Template

Instructions:

1. Remove all instructional boxes from template.
2. **Cover page:** List only Tracking ID, Project Title, and Company Name.
3. **File name format:** Tracking ID_Company *Example: CP-G-21.2-26421_LLNL*
4. **Submission format:** Single spaced pages using 12-point Times New Roman, 1" margins, and converted to a PDF file. Template instructional boxes should be removed from the document.

A concept paper that does not meet the guidelines may be rejected for review.

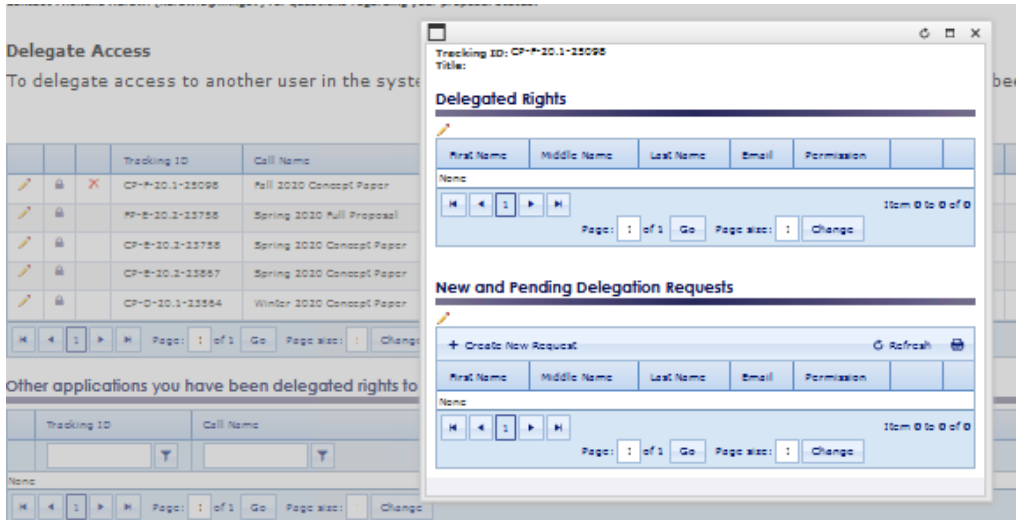
	Attachment Name	File Size	File Upload Date	Content Type
No Concept Paper uploaded.				

Attach File

After completing and saving this form, the applicant may edit the saved version until Tuesday, December 6, 2022 5:00 PM PT. To submit the proposal for final review, the applicant **MUST** click on the "Save and Submit" below. **Forms in the system that are "Saved" but not "Submitted" are considered incomplete and will not be reviewed.**

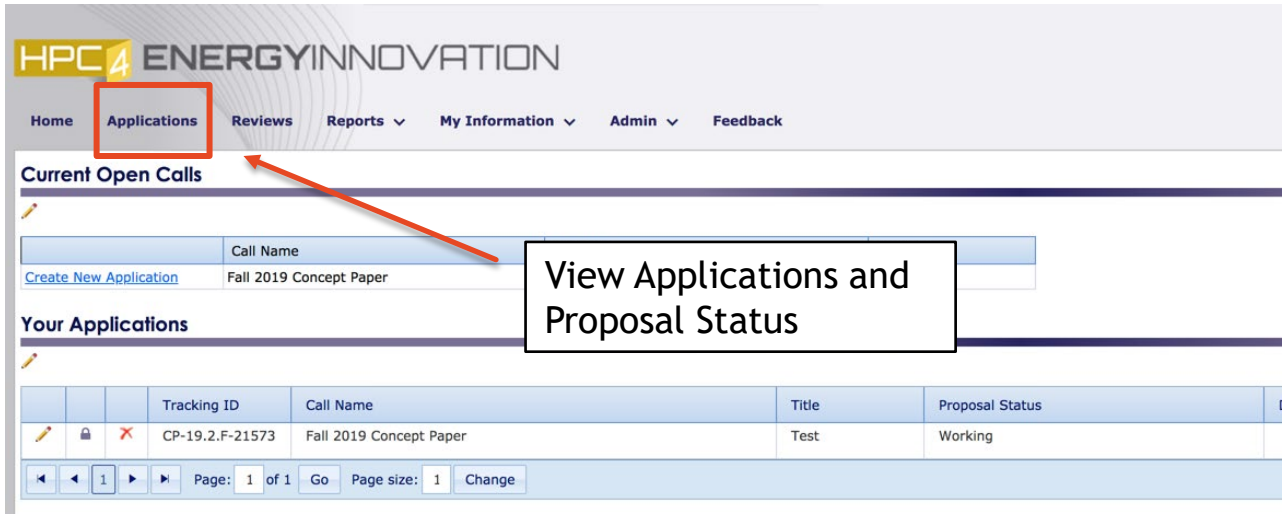
For assistance please contact Michelle Herawi at 925-423-4964 or hpc4ei-submissions@llnl.gov.

Save | Save and Submit



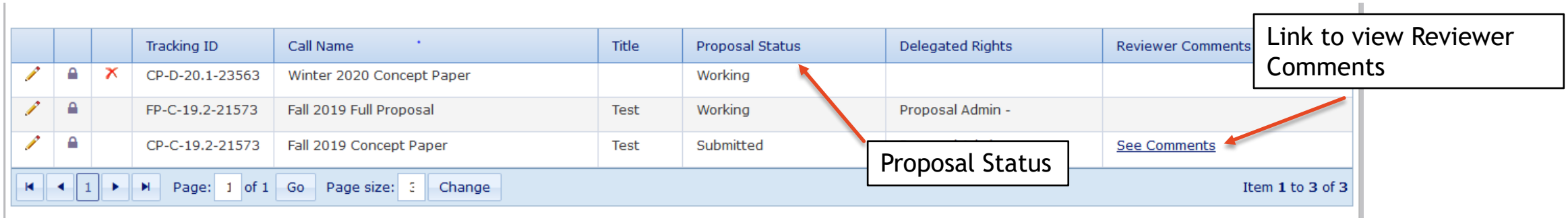
Delegate access to another user in the system, click on the 'lock' icon. Delegated applications that you have been given access to will be displayed in the "Other applications you have been delegated rights to" section.

Electronic Proposal Application – Proposal Status



Notifications of review results are generated from the proposal system and addressed from hpc4ei-submissions@inl.gov. It is highly recommended to add the email address to your contact list to avoid notification directing to spam.

Visit the Applications page to view proposal status and Technical Merit Review Committee comments.



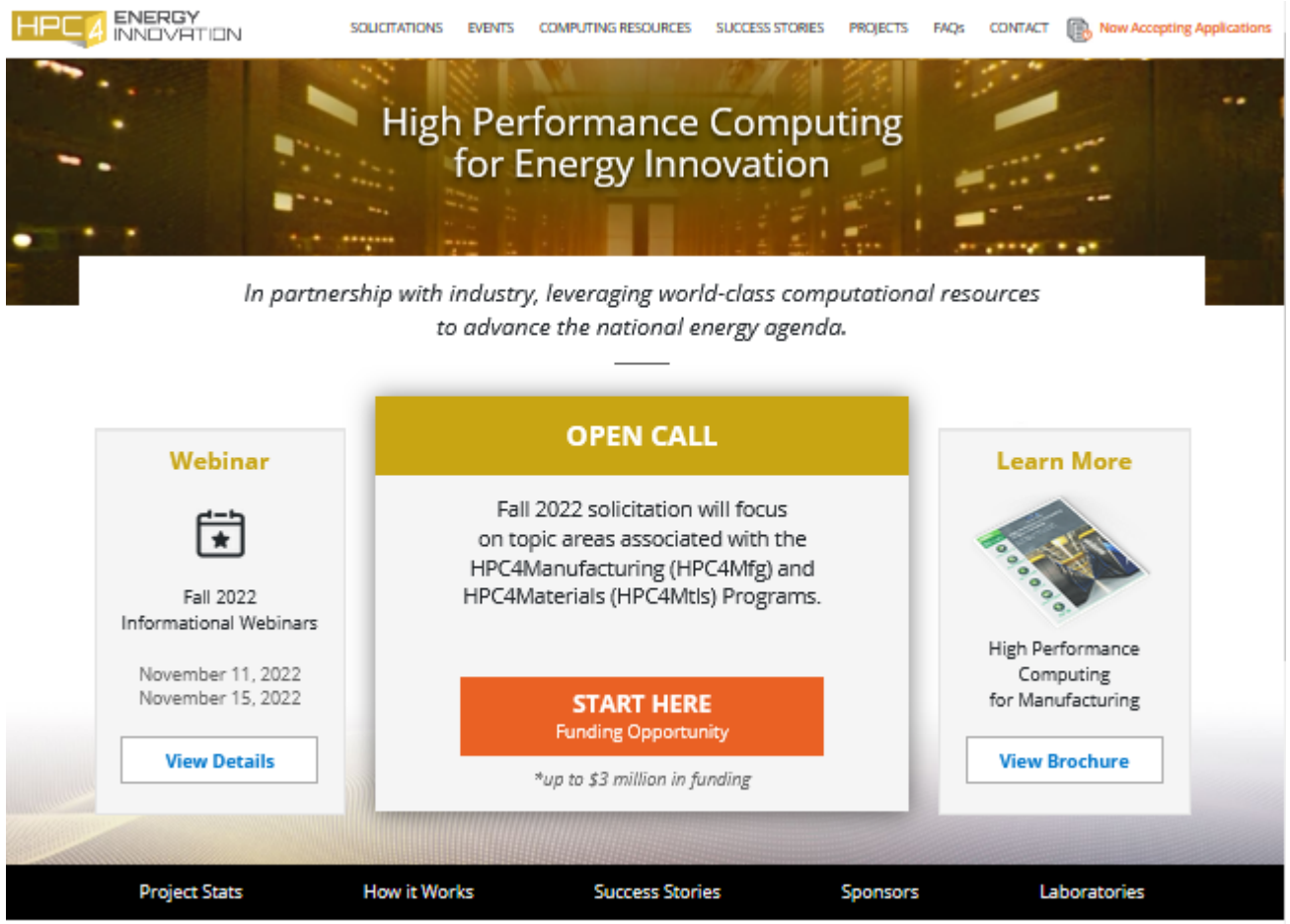
Visit our website for solicitation details

Concept Paper Deadline
December 6, 2022 by 5:00 p.m. PT

www.hpc4energyinnovation.org

Aaron Fisher, Acting HPC4EI Director
fisher47@llnl.gov

Send questions to hpc4ei@llnl.gov

Be the first to receive program announcements by joining the hpc4ei-info@llnl.gov distribution lists. Subscribe on our website!

Proposal Application Portal
https://proposalshpc4.inl.gov