

FES-GRI SUSTAINABLE ENERGY SYSTEMS GRAND CHALLENGE 2021

CALL FOR PROPOSALS

INTRODUCTION

The Canada First Research Excellence Fund (CFREF) research programs, Future Energy Systems (FES) at the University of Alberta and Global Research Initiative in Sustainable Low Carbon Unconventional Resources (GRI) at the University of Calgary, are continuing their energy research collaborations with a new and final call for proposals.

Research funded through this joint program should yield scientific publications, patents, commercialization, and HQP training, and can potentially seed new funding after the current CFREF funding for FES and GRI has ended. The teams developed can form the basis for a sustainable inter-institutional legacy of the FES and GRI programs.

CHALLENGE

In its recent Net Zero by 2050 report, the International Energy Agency (IEA) outlined over 400 milestones spanning all sectors and technologies for the world to achieve a net zero global energy system by 2050. The agency's scope is global, stating each country and province will need to design its own strategy, accounting for its specific circumstances. As Canada's leading energy research institutions, the University of Alberta and the University of Calgary must help lead Canada's, and specifically Alberta's, efforts in developing and adapting a sustainable energy system that addresses, for example climate change and greenhouse gas emissions, while ensuring economic, social, and environmental impacts are implementable and understood within our energy system.

To address this challenge, interdisciplinary teams of researchers from both institutions will form with the objective of making important contributions towards a sustainable energy system. Simply elevating a new technology to pilot or commercial stages is not enough. Thus, potential societal, economic, and environmental implications of a technology or a policy adoption must be critically and comprehensively studied, to enable strategies to mitigate unintended consequences, and to ensure the technology receives sufficient public and political support to be implemented.

This challenge requires team research. Research teams are expected to work with partners from government, industry, and/or other sectors to further technology, policy, mitigation and implementation approaches that can impact our energy system within the timeframe set out in Bill C-12, the Canadian Net-Zero Emissions Accountability Act.

For a research proposal to be considered, confirmation is required of a combined total of at least \$500,000 (cash, including university overhead) of research funding committed to the research team by external partners. This cash requirement does not include NSERC Discovery, SSHRC Insight, or any other currently held grants. The proposed projects must be new, not a continuation of previously or currently funded projects from FES and/or GRI. However, the proposed projects may build on, or emanate from, previously funded projects from FES and/or GRI. For example, the proposed project may follow a specific success, development, or insight, with the proposal taking this beyond the original project's objectives and applications.

PRIZE

The total CFREF funds for this grand challenge are approximately \$4 million, funded jointly by FES and GRI. This funding may be awarded to a single project or divided among multiple projects on a first come, first served basis, depending on the budgets submitted by successful teams.

All budgets will be carefully assessed to ensure expenses are justified relevant to the challenge. Budgets that are considered padded or inflated will be sent back for revision, or rejected. Ensure your budget clearly explains its proposed costs, and be ready to provide justification if clarification is sought.

TOPICS

Long term emissions goals and pathways to achieve them are usually aspirational. Research is needed to move from aspirational goals to critical analysis of steps required to achieve them within the energy system (emphasis on system). Thus proposals require a systems approach that is, by definition, interdisciplinary and multidisciplinary.

This grand challenge promotes research into technologies and policies that enable an environmentally sustainable energy system. Researchers are required to build a multidisciplinary team that addresses the transition to, and implementation and adoption of, this sustainable energy system. Approaches will include at least one of the following.

- Through development and/or demonstration of technologies that reduce environmental impacts, including greenhouse gas emissions, from energy generation, transmission, and distribution; and/or accelerates interim and/or final reclamation of environmental impacts on land and water; regardless of their source (hydrocarbon based or renewable), in a manner that is effective and can be practically implemented in an appropriate timeframe.
- Through development and/or demonstration of technology that can generate low environmental impact, utility scale energy systems.
- Through development and/or demonstration of enabling technologies, such as energy storage, that help the core technologies.
- Through techniques and technologies that accelerate energy end use efficiency, and policies and programs to ensure their deployment.

Teams must propose high potential solutions that can be commercially integrated into the energy system in short to medium term, and build a research team with expertise to address the following key elements.

- Make meaningful technical contributions to development of the technology through revolutionary fundamental research and/or innovative applied research.
- Apply advanced methods such as machine learning and artificial intelligence to accelerate development and/or deployment of the technology.
- Examine market conditions and develop compelling and credible strategies for facilitation of the technology's adoption by relevant users (industry, government, and/or consumers), including economic analyses, policy analyses, business cases, and market surveys.
- Identify environmental benefits and challenges related to adoption of this technology, and develop credible methods and strategies that may be used as the basis for new regulations when the technology is adopted for widespread use.
- Explore the societal implications of the technology, including the impact its adoption would have on energy end-use sectors, socioeconomic groups, and communities and populations.

TEAMS

An explicit goal of this challenge is to develop strong, interdisciplinary research teams with the potential to continue impactful collaborations after conclusion of the research project. Each research team must be led jointly by a University of Alberta and University of Calgary faculty member. Each team must include investigators from both institutions, although equal representation is not required. Investigators and participants from other academic institutions are welcome, as are collaborators from outside academia. Research teams must be constructed to clearly demonstrate team member collaborations. This includes co-supervision of graduate students and other research personnel, with clearly defined complementary and necessary roles for each team member.

As teams form, the FES-GRI challenge administrators can provide matchmaking support. If a team cannot identify a researcher with the experience required to address one of the core elements of the project, such as its environmental implications or its impact on society, administrators can facilitate introductions with potential collaborators. Teams can be expanded as research evolves and gaps are identified, or funding opportunities for leveraging emerge.

Teams that are not deemed to have the expertise to address all of the core elements of a topic will not receive funding. Thus, developing a strong team, and ensuring the role of each team member is clearly defined, are essential.

We anticipate these collaborations will contribute to building new and dynamic inter-institutional research teams from the University of Alberta and the University of Calgary. These teams will be further developed and positioned for long term success in competing for large challenge grants, and other multidisciplinary and interdisciplinary funding opportunities locally, nationally, and internationally.

APPLICATION PROCESS

This is not a standard call for proposals, in which applications will be received by a deadline, assessed, and funds granted. Due to complexity of the topic and the need to develop strong teams that are multidisciplinary, interdisciplinary, and transdisciplinary, the process will include a flexible timeline, with regular feedback from FES and GRI administration, and a first come, first served approach to funding awards. These funds will be awarded to a research team that presents a compelling case for their technology, and backs that case with a team of investigators with the experience and expertise to facilitate its adoption.

While fundamental research is vitally important, and one of the greatest contributions university based researchers can make to society, it is not the focus of this challenge. For each proposal put forward through this process, the question will be asked: is it likely that the technology can be implemented at a meaningful scale and time. Teams must make a compelling case that this is possible.

Leverage funding is essential to a successful application. At least \$500,000 (cash, including university overhead) must be committed from other sources (not including NSERC Discovery or SSHRC Insight grants) to demonstrate that there is broader interest in a technology from government, industry, or other sectors. These committed funds can be from multiple sources to total \$500,000. Committed funding above \$500,000 will be considered an asset. Funds can be new, or committed, or already procured for a project that has not yet started.

If multiple teams are simultaneously working with the administrators on applications, common deadlines will be established to ensure all have opportunity to compete for the funds and teams will be alerted to potential merger opportunities to strengthen their proposals. Thus, it is essential that all teams planning to make an application communicate their intentions to the challenge administrators as early as possible.

Applications will go through three stages.

- Announcement of interest and scoping. At this stage, partial or complete teams will identify themselves to the FES-GRI administration as planning to compete in the challenge, and will identify their topic and proposed funders. At some point in this stage clear indications of secured cash commitment of \$500,000 will be required, and the complete team developed. A preliminary assessment will be made of the appropriateness of the technology, concerns identified, and efforts made to facilitate formation of a strong team and other potential leveraged funding. Note that this stage may include various discussions with FES-GRI administration as the application is developed.
- Application and assessment. In this stage, full teams will generate an application (details below) and submit it for assessment. Formal letter(s) of secured cash commitment of \$500,000 will be required. If further work is needed the FES-GRI administration will refer the application back to the applicants. Once the application is complete, a decision will be made.

- Award and launch. Applicants will be informed of the decision, and if successful, funding will be offered with conditions specifically relevant to the project.

The adjudicators will comprise members of the FES and GRI administration teams and research advisory committees, with advice from senior energy leadership at both institutions. Advice will be sought related to specific topics from relevant government, industry, other user personnel, and community and Indigenous leaders where appropriate.

READY TO BEGIN

If you want to participate in this challenge, contact FES Director Anne Naeth (anaeth@ualberta.ca) and GRI Director Ian Gates (ian.gates@ucalgary.ca) to express interest as soon as possible. An introductory meeting or other line of communication will be scheduled to discuss ideas and launch the next phase of scoping. Please copy both Sam Ferraz (ferraz@ualberta.ca) and Jessica Tink (jctink@ucalgary.ca) on your message.

Timeline

Activity	Date
Grand challenge issued	July 20, 2021
Proposal submission deadline, proposal assessment, and results announcement	First come, first served; successful applicants will be allocated funds only after passing all application and feedback steps, including securing \$500,000
Successful projects established and funds allocated	March 2022 (preferred)
Completion of projects	March-September 2024

CONTACTS

FES	GRI
Dr M Anne Naeth, Director; anaeth@ualberta.ca Sam Ferraz, FES Program Coordinator; ferraz@ualberta.ca	Dr Ian Gates, Director; ian.gates@ucalgary.ca Jessica Tink, GRI Manager; jctink@ucalgary.ca