

Fund for Innovative Climate and Energy Research

Purpose

The Fund for Innovative Climate and Energy Research (FICER) exists to accelerate the innovative development and evaluation of science and technology to address carbon dioxide and other greenhouse gas emissions and their environmental consequences. The non-profit research fund focuses on early-stage innovative research where relatively small and timely grants can significantly advance understanding, especially of the viability and scalability of proposals to address global warming.

Funded research projects are intended to produce peer-reviewed scholarly articles in recognized professional scientific and technical journals. Any intellectual property that may be generated in the course of such research resides with the researchers or their institutions.

Grants for research are provided to the University of Calgary from gifts made by Mr. Bill Gates from his personal funds. The activities of the Fund for Innovative Climate and Energy Research fall outside the scope of activities of the Bill & Melinda Gates Foundation. FICER is not a Foundation project and has no relationship with it.

The fund has supported research in a wide range of areas. Some examples include:

- understanding carbon dioxide emissions associated with international trade in goods and services;
- developing technologies to capture carbon dioxide out of the air; and
- climate modeling to understand possible environmental consequences of solar radiation management.

Answers to Frequently Asked Questions

Q. What is the source and size of the fund? Who administers the fund?

A. Since its inception in 2007, FICER has given out grants to 13 research projects and various scientific meetings totaling \$4.6 million. Internationally known climate scientists Dr. David Keith of University of Calgary and Dr. Ken Caldeira of the Carnegie Institution select projects that receive support from the fund. While Mr. Gates provides input from time to time on the fund, Drs. Keith and Caldera make final decisions on projects.

Q. Who and what research does the fund support?

A. The fund supports a wide range of projects such as:

- climate related technology and policy analysis;

- modeling the climate system;
- developing technologies for removing carbon dioxide from the atmosphere;
- researching approaches to reduce planetary absorption of solar radiation; and
- holding international workshops to discuss governance for climate intervention technology.

Some of the funding supports research projects of Drs. Keith and Caldeira and some supports projects outside their institutions.

Q. Is all of the research open and unclassified? Does Mr. Gates or the fund own any resulting intellectual property?

A. All funded research projects are intended to produce peer-reviewed scholarly articles in recognized professional scientific and technical journals. None of the research funded by FICER is classified. Neither Mr. Gates nor FICER retain any propriety information or intellectual property developed during the course of the research. Some researchers or their institutions may patent some of the research, but the results are to be made public as quickly as possible.

Q. Does the fund support research into geoengineering? Does the fund support research into “clean energy”?

A. Yes, the fund supports research into both geoengineering and clean energy, as well as basic climate science research. The directors of the fund believe that society should be spending many tens-of-billions of dollars per year developing and deploying affordable, scalable, near zero-carbon energy sources.

“Geoengineering” is a term that different people use in different ways. Some proposed technologies, for example capturing and sequestering excess carbon dioxide from the atmosphere, attempt to address the root causes of climate change. These approaches are relatively uncontroversial. Other proposed technologies, for example solar radiation management (SRM) attempt to reduce the effects of climate change but don’t address the root causes. SRM aims to cool the planet, for example by adding reflective aerosols (small particles suspended in air) to the stratosphere where they will reflect some incoming sunlight, cooling the planet. These approaches, which would be a human intervention in the climate system with potential environmental risks, are more controversial.

However, much important research into these approaches, such as computer modeling, laboratory experiments, or passive observations of nature, can be done without any interference in the climate system. This research is as important in determining which geoengineering technologies have limited efficacy, scalability or unacceptable environmental risks as it is in finding viable solutions, and the fund supports these kinds

of projects. Further, research will help inform the development of much needed international conventions for any geoengineering field tests.

FICER is not alone in recognizing the importance of research into methods that can limit the impacts of carbon dioxide emissions. A recent report of the National Research Council, the most prestigious scientific advisory body in the United States, concluded that “various SRM proposals and their consequences need to be examined, as long as such research does not replace or reduce research on fundamental understanding of climate change or other approaches to limiting climate change or adapting to its impacts (NRC, 2010).” A 2009 report from the Royal Society of London came to similar conclusions. Because neither a US nor Canadian Federal research program exists yet to evaluate such proposals, philanthropic resources are important at this time to help fill this recognized research gap.

Q. What kinds of geoengineering projects have been supported?

A. A full list of all funded projects can be found at the end of this page. Among geoengineering projects, the fund has supported:

- climate science and modeling to understand the efficacy of proposed geoengineering technologies and assess their environmental risks;
- engineering studies to assess the technical feasibility of proposed geoengineering technologies; and,
- international workshops to discuss governance of, and studies on the potential and risks of climate intervention technology.

Q. Does the fund support field testing of geoengineering?

A. FICER has not supported and will not support any field tests of methods that introduce new kinds of interference into the climate system (e.g., solar radiation management, ocean fertilization). We are in favor of field testing industrial processes that can remove excess carbon dioxide from the atmosphere.

All researchers supported by the fund have other projects that they work on that are not supported by the fund, and are free to make statements or engage in activities of which we may or may not approve. The fund has supported laboratory research and feasibility testing of a critical technological component of the Latham cloud-whitening proposal. The researcher leading that project has been associated with a separate research effort to field test cloud-whitening. Mr. Gates’ funding of FICER and our support for this researcher’s work and predated the inception this effort. FICER provides no financial support to any broader activities related to field testing these technologies.

Q. Does the fund accept research proposals?

A. No, not at this time.

Q. Who do I contact for more information?

A. Contact either:

- Ken Caldeira

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Funded Projects

Development of technologies for removal of carbon dioxide from the atmosphere; technology and policy analysis of solar radiation management and of the land-use footprint of energy technologies; and, development and modeling of methods for solar radiation management.

David Keith, University of Calgary (\$1.1 M)

Analyses of carbon dioxide emissions associated with global patterns of energy use, and climate model investigations of environmental consequences of both inadvertent and proposed intentional interferences in the climate system (e.g., greenhouse gas emissions and solar radiation management).

Ken Caldeira, Carnegie Institution (\$1.1 M)

Climate model investigations of environmental consequences of interference in the climate system.

Phil Rasch, National Center for Atmospheric Research and DOE's Pacific Northwest National Laboratory (\$0.6 M)

Task Force on Geoengineering

National Commission on Energy Policy (\$0.1 M)

Laboratory experiments to evaluate whether it would be feasible to produce a sprayer that would make fine seawater droplets.

Armand Neukermans [no institutional association; formerly Hewlett-Packard] (\$0.3 M)

Modeling studies applying control theory to the climate system.

Doug MacMynowski, California Institute of Technology (\$0.3 M)

A community-based approach to evaluating options to diminish carbon dioxide emissions.

Steven Davis, Carnegie Institution (\$0.25 M)

Studies on potential climate metastabilities associated with Arctic sea ice loss.

Cecilia Bitz, University of Washington; Shawn Marshall, University of Calgary (\$0.2 M)

Study of environmental consequences of fish farming as an analog for effects of intentional ocean fertilization.

Jonathan Erez, Hebrew University (\$0.15 M)

Analysis of VOCALS observations of clouds.

Alan Gadian, University of Leeds (\$0.15 M)

Analysis of historical temperature data.

Michael Ditmore, Novim (\$0.1 M)

Support for the Solar Radiation Management Governance Initiative.

A joint project of the Royal Society of London, the Environmental Defense Fund and TWAS, the Academy of Sciences for the Developing World (\$0.1 M)

Paper study evaluating cost of delivering aerosols to the stratosphere.

Jay Apt, Carnegie Mellon and Aurora Flight Sciences (\$0.1 M)

In addition, approximately \$0.24 M was used to support participation in meetings, workshops, and summer schools including those occurring at Harvard University, University of Edinburgh, and University of Heidelberg.