

MEMORANDUM OF UNDERSTANDING

for Collaboration on the Use of Renewable Energy and Energy Efficiency in Polar Regions

between

THE NATIONAL SCIENCE FOUNDATION and THE U.S. DEPARTMENT OF ENERGY

I. Purpose

This Memorandum of Understanding (MOU) expresses the intent of the U.S. Department of Energy (DOE), through the Office of Energy Efficiency and Renewable Energy (EERE), and the National Science Foundation (NSF), through the Office of Polar Programs (OPP; together, the 'Parties'), to work together in order to assess the feasibility and facilitate the use of renewable energy and energy efficiency technologies at U.S. facilities in polar regions. The Parties intend to pursue this goal in a way that is environmentally-sound, cost-effective, and logistically-feasible.

II. Background

The world's polar regions are pristine environments that are of great importance to research in many major scientific fields. Many scientists seek out the environments of these regions for study because of their very limited human impact. However, the logistical operations that support scientific research in both Antarctica and the Arctic depend primarily on petroleum combustion for electricity, transport, and heating. Petroleum use not only produces particulate and greenhouse gas emissions, but it also increases vulnerability of operations through its volatile and high prices and potential for supply disruption.

The period March 2007–March 2009 marks the International Polar Year, organized by the International Council for Science and the World Meteorological Organization to focus attention on the expanding human impact on polar regions and bring together international leaders and scientists to address these impacts. Concerns about environmental impacts on polar regions, high fuel prices, the risks of climate change, and the International Polar Year motivate the establishment of this MOU between DOE and NSF to work toward increasing reliance on energy efficiency and renewable energy technologies at NSF's polar region facilities.

NSF

NSF is one of 12 Federal agencies sponsoring or conducting science and engineering research and associated support activities in the Arctic. It provides most of the Federal support for basic research in the region. As mandated by the Arctic Research and Policy Act of 1984, Federal interagency research planning is coordinated by an interagency committee that is chaired by NSF.

By Presidential Memorandum, NSF also budgets for and manages the entire United States national program in Antarctica – the United States Antarctic Program, or the USAP – including operational support activities so that the program may be managed as a single package. NSF is charged with maintaining the USAP at a level providing an active and influential presence in Antarctica designed to support the range of U.S. Antarctic interests. In so doing, NSF is to make every effort to manage the program in a manner that maximizes cost effectiveness and return on investment, and draws upon the capabilities of Government agencies. Within NSF, the Office of Polar Programs (OPP) is responsible for the Arctic and Antarctic research and support programs.

An important aspect of operational support in both polar regions is the provision of reliable and high quality energy for remote bases and research stations that support the critical science that is funded by OPP and other Federal agencies. OPP desires to improve its energy solutions for the polar regions in order to maintain a reliable energy supply for its research and research support activities in remote regions. In this regard and in recognizing DOE's capabilities, NSF enters into this MOU to explore options for energy efficiency and renewable energy technologies.

DOE/EERE

DOE's Office of Energy Efficiency and Renewable Energy, in large part through the National Renewable Energy Laboratory (NREL), has been actively engaged in energy efficiency and renewable energy activities in polar regions for many years. EERE has invested heavily in the research and implementation of power systems incorporating wind, solar, hydrogen, batteries, and improved control of conventional generators, specifically for remote areas. DOE also has clear direction to provide technical and support assistance to other Federal Government organizations to implement technology options that reduce our Nation's dependence on fossil fuels while providing improved efficiency of Federal facilities and implementing the expanded use of renewable energy and energy efficiency technologies. In this regard, DOE enters into this MOU to assist NSF in meeting its energy goals and help OPP transform polar facilities so that they reduce their dependence on fossil fuels for electricity and transportation.

III. Collaborative Objectives

OPP intends to give priority to collaborations that have the potential to provide reliable energy that is cost-competitive with current fossil fuel generation and that further OPP's strategic research and infrastructure goals. EERE intends to give priority to collaborations

that have the potential to advance technology development and deployment, including use of the research stations as technology test-beds where appropriate. The collaboration is expected to advance common goals in technology development. Technologies utilized in the polar regions are expected to simultaneously enhance scientific productivity at remote Arctic and Antarctic research stations while reducing human impact on the environment and the long-term logistical requirements and costs of providing energy to polar stations.

IV. Working Agreement

The Parties intend to share information and expertise regarding renewable energy and energy efficiency deployment and logistical operations in the polar regions.

The Parties will work together to develop mutually agreed-upon project plans that will define the specific roles and responsibilities of each organization as they relate to particular projects. Project plans will become attachments to this MOU as they are concluded.

The following are examples of general areas in which collaborative activities might be undertaken:

- Explore Energy Service Company (ESCO) models as an option for implementing energy efficiency projects;
- Wind turbine and solar technology development and deployment;
- Specification and design of energy needs and facilities at remote stations;
- Design, purchase, and implementation of renewable based power systems and energy efficient structures for small and medium-sized field research locations;
- Power systems management, including variable and distributed resources as well as hybrid power systems; and
- Reducing fossil fuel use in transportation.

Specific projects on which EERE expertise may be brought to bear include:

- Redesigning the Black Island hybrid power system;
- Investigating and implementing renewable energy technologies at the Amundsen-Scott South Pole Station;
- Designing energy-efficient Jamesway Huts that would have the potential to be zero-energy units that produce as much energy as they consume;
- Exploring the feasibility of using hydrogen to power transportation needs at McMurdo Station, with an on-site electrolyzer and hydrogen storage units;
- Designing and building portable, renewable power systems for scientific work in the Antarctic Dry Valleys;
- Developing building design standards for new construction at McMurdo with the potential to expand the standards to all program locations;
- Developing a long-term sustainable energy plan for Antarctica, with specific focus on the primary facilities at McMurdo and South Pole; and
- Investigating, analyzing, and developing new or improved energy technologies, such as hydrogen storage, wind, or concentrating solar thermal, that may be

appropriate for implementation as part of a long-term energy plan for polar regions.

V. General Information


- a. This MOU is strictly for internal management purposes for each of the Parties. It is not legally enforceable and shall not be construed to create any legal obligation on the part of either Party. This MOU shall not be construed to provide a private right or cause of action for or by any person or entity.
- b. This MOU is not a fiscal obligation document, and each party will provide its own resources to meet the outlined objectives in an amount that they deem acceptable.
- c. When the Parties agree to undertake joint projects with defined goals, they will develop a separate written agreement for each project setting out each Party's contribution, deliverables, and responsibilities.
- d. This MOU will be in effect for a period of two years and may be renewed by written agreement of both Parties. It can be terminated by either Party at any time by providing notice in writing to the other Party.
- e. This MOU in no way restricts either of the Parties from participating in any activity with other public or private agencies, organizations, or individuals.
- f. All agreements herein are subject to, and will be carried out in compliance with, all applicable laws, regulations, and other legal requirements.

VI. Authorities

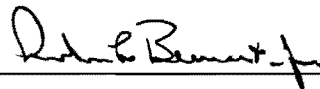
- a. The Department of Energy enters into this MOU under the authority of section 646 of the Department of Energy Organization Act (Pub. L. 95-91, as amended; 42 U.S.C. § 7256).
- b. The National Science Foundation enters into this MOU under the authority of the National Science Foundation Act of 1950, as amended.

U.S. DEPARTMENT OF ENERGY

NATIONAL SCIENCE FOUNDATION



Steven Chu
Secretary of Energy



Arden L. Bement, Jr.
Director, National Science Foundation