



[Division of Chemical, Bioengineering, Environmental, and Transport Systems](#)

Energy for Sustainability

CONTACTS

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PROGRAM GUIDELINES

Apply to PD 11-7644 as follows:

For full proposals submitted via FastLane: standard [Grant Proposal Guidelines](#) apply.

For full proposals submitted via Grants.gov: NSF Grants.gov Application Guide; A Guide for the Preparation and Submission of NSF Applications via Grants.gov Guidelines apply (Note: The NSF Grants.gov Application Guide is available on the Grants.gov website and on the NSF website at: http://www.nsf.gov/publications/pub_summ.jsp?ods_key=grantsgovguide)

Please be advised that the NSF Proposal & Award Policies & Procedures Guide (PAPPG) includes guidelines implementing the mentoring provisions of the America COMPETES Act (ACA) (Pub. L. No. 110-69, Aug. 9, 2007.) As specified in the ACA, each proposal that requests funding to support postdoctoral researchers must include a description of the mentoring activities that will be provided for such individuals. Proposals that do not comply with this requirement will be returned without review (see the PAPP Guide Part I: Grant Proposal Guide Chapter II for further information about the implementation of this requirement).

DUE DATES

Full Proposal Window: August 15, 2011 - September 15, 2011

SYNOPSIS

The **Energy for Sustainability** program supports fundamental research and education that will enable innovative processes for the sustainable production of electricity and transportation fuels. Processes for sustainable energy production must be environmentally benign, reduce greenhouse gas production, and utilize renewable or bio-based resources that are abundant in the United States.

The most abundant and sustainable source of renewable energy is the sun. The Energy for Sustainability program emphasizes two themes which harness solar energy to make fuels and electrical power: biofuels, & bioenergy, and photovoltaic solar energy. In addition, this program also supports research in wind and wave energy, sustainable energy technology assessment, and fuel cells. Current interest areas in these sustainable energy technologies are highlighted below.

Biomass Conversion, Biofuels & Bioenergy. (Gregory Rorrer) Photosynthetic processes used by plants or algae use sunlight to convert atmospheric CO₂ to carbohydrates, lipids, or hydrocarbons which can be processed into transportation fuels. Innovative approaches for the conversion of lignocellulosic biomass to fuels is an interest area of this program, particularly for "third generation" biofuels beyond cellulosic ethanol. Many biological processes for energy production have low volumetric productivity.

Engineering approaches for intensification of bioenergy processes is an interest area of this program. Specific areas of interest include: microbial fuel cells for direct production of electricity from renewable carbon sources; process-based, scalable approaches for the biological or bio-mimetic generation of electricity directly from sunlight; hydrogen production from autotrophic and heterotrophic microorganisms; hydrocarbons and lipids from autotrophic or heterotrophic microorganisms.

Photovoltaic Solar Energy. (Gregory Rorrer) Solar photovoltaic (PV) devices harvest and convert sunlight directly to electricity. Future PV materials, such as nanostructured semiconductors, plasmonic or photonic materials, and photoconducting polymers, when integrated into a solar PV device stack, have considerable promise for enhancing solar energy conversion efficiency and reducing unit cost. Many photovoltaic devices are fabricated from toxic and non-recyclable materials. Fundamental research on environmentally-benign materials and processes for photovoltaic devices is a strong interest area of this program. The photocatalytic splitting of water into H₂ gas and the chemical reduction of CO₂ to liquid or gaseous fuels is also an interest area of this program. The generation of thermal energy by solar radiation is not an area supported by this program, but is an area supported by the Thermal Transport Processes program within CBET.

Wind and Wave Energy. (Geoffrey Prentice) The United States also has considerable natural sources of energy for the production of electricity, including wind, geothermal, and wave/tidal energy. Fundamental engineering research, supported by modeling and simulation studies, that leads to new processes to efficiently harness these natural sources of energy, particularly wind, wave or tidal energy, for the production of electrical power, is an interest area of this program. Research that focuses exclusively on materials science issues associated with these processes is not an area supported by this program.

Energy Technology Assessment. (Geoffrey Prentice) Interdisciplinary approaches for sustainable energy technology assessment which include a fundamental engineering analysis component will be considered by this program.

Fuel Cells. (Geoffrey Prentice) Polymer electrolyte membrane (PEM) and solid oxide fuel cells convert H₂, alcohols, or hydrocarbons to electricity through electrochemical processes. Fundamental research on use of renewable, biomass-derived materials or bio-based materials as feedstocks for fuel cell devices is a particular interest area of this program. Within CBET, fuel cell related research will also be considered for support by the Biocatalysis and Catalysis program, and by the Process and Reaction Engineering program.

Proposals should address the novelty of the concept being proposed, compared to previous work in the field. Also, it is important to address why the novelty might be important in terms of engineering science, as well as to also project the potential impact on society and /or industry of success in the research. The information requested in this paragraph should be included, as a minimum, in the Project Summary of each proposal.

The duration of unsolicited awards is typically three years. The average annual award size for the program is \$100,000.

*The duration of **Faculty Early Career Development (CAREER) Program** awards is five years. The submission deadline for Engineering CAREER proposals is in July every year. Please see the following URL for more information:*

http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=503214

Proposals for Conferences, Workshops, and Supplements may be submitted at any time, but must be discussed with the program director before submission.

*Grants for **Rapid Response Research (RAPID)** and **EARly-concept Grants for Exploratory Research (EAGER)** replace the SGER program. Please note that proposals of these types must be discussed with the program director before submission. Further details are available in the PAPPG download.*

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Last Updated: November 29, 2010