

Emerging Frontiers in Research and Innovation 2010 (EFRI-2010)

1. Renewable Energy Storage (RESTOR)

2. Science in Energy and Environmental Design (SEED): Engineering Sustainable Buildings

Program Solicitation

09-606

Replaces Document(s):
NSF 08-599



National Science Foundation

Directorate for Engineering
Emerging Frontiers in Research and Innovation

Directorate for Mathematical & Physical Sciences

Directorate for Social, Behavioral & Economic Sciences

Directorate for Computer & Information Science & Engineering



U.S. Dept. of Energy



Environmental Protection Agency

Letter of Intent Due Date(s) (required) (due by 5 p.m. proposer's local time):

October 09, 2009

Preliminary Proposal Due Date(s) (required) (due by 5 p.m. proposer's local time):

November 13, 2009

Full Proposal Deadline(s) (due by 5 p.m. proposer's local time):

March 31, 2010

REVISION NOTES

Please be advised that the *NSF Proposal & Award Policies & Procedures Guide* (PAPPG) includes revised guidelines to implement 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 new requirement).

As announced on May 21st, proposers must prepare and submit proposals to the National Science Foundation (NSF) using the NSF FastLane system at <http://www.fastlane.nsf.gov/>. This approach is being taken to support efficient Grants.gov operations during this busy workload period and in response to OMB direction guidance issued March 9, 2009. NSF will continue to post information about available funding opportunities to Grants.gov FIND and will continue to collaborate with institutions who have invested in system-to-system submission functionality as their preferred proposal submission method. NSF remains committed to the long-standing goal of streamlined grants processing and plans to provide a web services

interface for those institutions that want to use their existing grants management systems to directly submit proposals to NSF.

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

Emerging Frontiers in Research and Innovation (EFRI)

1. Renewable Energy Storage (RESTOR)
2. Science in Energy and Environmental Design (SEED): Engineering Sustainable Buildings

Synopsis of Program:

The Directorate for Engineering at the National Science Foundation has established the Office of Emerging Frontiers in Research and Innovation (EFRI) to serve a critical role in focusing on important emerging areas in a timely manner. The EFRI Office is launching a new funding opportunity for interdisciplinary teams of researchers to embark on rapidly advancing frontiers of fundamental engineering research. For this solicitation, we will consider proposals that aim to investigate emerging frontiers in the following two specific research areas: (1) Renewable Energy Storage (RESTOR), and (2) Science in Energy and Environmental Design (SEED): Engineering Sustainable Buildings. This solicitation will be coordinated with NSF Directorates listed above, the Department of Energy (DOE), and the Environmental Protection Agency (EPA). EFRI seeks proposals with transformative ideas that represent an opportunity for a significant shift in fundamental engineering knowledge with a strong potential for long term impact on national needs or a grand challenge. The proposals must also meet the detailed requirements delineated in this solicitation.

INFORMATION WEBCAST: The EFRI Office plans to hold an information workshop on September 17, 2009, to answer any questions about the EFRI Office and this solicitation. Details will be posted on the EFRI website (www.nsf.gov/eng/efri) as they become available.

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Applicable Catalog of Federal Domestic Assistance (CFDA) Number(s):

- 47.041 --- Engineering
- 47.049 --- Mathematical and Physical Sciences
- 47.070 --- Computer and Information Science and Engineering
- 47.075 --- Social Behavioral and Economic Sciences
- 66.509 --- Environmental Protection Agency
- 81.049 --- Office of Science, Office of Fusion Energy Sciences

Award Information

Anticipated Type of Award: Standard Grant

Estimated Number of Awards: 14 (4-year awards)

Anticipated Funding Amount: \$29,000,000 in FY 2010, pending the availability of funds.

Eligibility Information

Organization Limit:

Proposals may only be submitted by the following:

- EFRI proposals may be submitted by a single organization or a group of organizations consisting of a lead organization in partnership with one or more partner organizations. Only U.S. academic institutions which perform research and with degree-granting education programs in disciplines normally supported by NSF are eligible to be the lead organization. Academic institutions are defined as universities and two- and four-year colleges (including community colleges) accredited in, and having a campus located in the United States, acting on behalf of their faculty members. Principal investigators are encouraged to form synergistic collaborations with government laboratories, industrial researchers, and scientists and engineers at foreign organizations where appropriate, though no NSF funds will be provided to government labs, industry, or foreign organizations. For interaction with industry, when appropriate for the proposed research, the GOALI mechanism (Grant Opportunities for Academic Liaison with Industry http://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf09516) may be used.

PI Limit:

Principal Investigators (PI) must be at the faculty level as determined by the submitting organization. A minimum of one PI and two co-PIs must participate. For EFRI-SEED, at least one co-PI must be an engineer and at least one co-PI must be an architect.

Limit on Number of Proposals per Organization:

None Specified

Limit on Number of Proposals per PI:1

The principal investigator and co-principal investigators may participate in only one proposal submitted to this solicitation. It is the responsibility of the submitting institution to insure that the PI and all co-PIs are participating in only one proposal submitted to this solicitation.

Proposal Preparation and Submission Instructions

A. Proposal Preparation Instructions

- **Letters of Intent:** Submission of Letters of Intent is required. Please see the full text of this solicitation for further information.
- **Preliminary Proposals:** Submission of Preliminary Proposals is required. Please see the full text of this solicitation for further information.
- **Full Proposal Preparation Instructions:** This solicitation contains information that deviates from the standard NSF Proposal and Award Policies and Procedures Guide, Part I: Grant Proposal Guide (GPG) proposal preparation guidelines. Please see the full text of this solicitation for further information.

B. Budgetary Information

- **Cost Sharing Requirements:** Cost Sharing is not required under this solicitation.
- **Indirect Cost (F&A) Limitations:** Not Applicable
- **Other Budgetary Limitations:** Not Applicable

C. Due Dates

- **Letter of Intent Due Date(s) (required)** (due by 5 p.m. proposer's local time):

October 09, 2009

- **Preliminary Proposal Due Date(s) (required)** (due by 5 p.m. proposer's local time):

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March 31, 2010

Proposal Review Information Criteria

Merit Review Criteria: National Science Board approved criteria. Additional merit review considerations apply. Please see the full text of this solicitation for further information.

Award Administration Information

Award Conditions: Additional award conditions apply. Please see the full text of this solicitation for further information.

Reporting Requirements: Additional reporting requirements apply. Please see the full text of this solicitation for further information.

TABLE OF CONTENTS

Summary of Program Requirements

- I. **Introduction**
- II. **Program Description**
- III. **Award Information**
- IV. **Eligibility Information**
- V. **Proposal Preparation and Submission Instructions**
 - A. Proposal Preparation Instructions
 - B. Budgetary Information
 - C. Due Dates
 - D. FastLane Requirements
- VI. **NSF Proposal Processing and Review Procedures**
 - A. NSF Merit Review Criteria
 - B. Review and Selection Process
- VII. **Award Administration Information**
 - A. Notification of the Award
 - B. Award Conditions
 - C. Reporting Requirements
- VIII. **Agency Contacts**
- IX. **Other Information**

I. INTRODUCTION

Introduction

The Office of Emerging Frontiers in Research and Innovation (EFRI) provides funding opportunity for interdisciplinary teams of researchers to embark on rapidly advancing frontiers of fundamental engineering research. EFRI seeks proposals with potentially transformative ideas that represent an opportunity for a significant shift in fundamental engineering knowledge with a strong potential for long term impact on national needs or a grand challenge. For this solicitation, EFRI will consider proposals that aim to investigate emerging frontiers in the following two specific research areas: (1) Renewable Energy Storage (RESTOR), and (2) Science in Energy and Environmental Design (SEED): Engineering Sustainable Buildings. NSF will coordinate the review of proposals submitted to this solicitation with the Department of Energy (DOE) and the Environmental Protection Agency (EPA). DOE and EPA may contribute to the funding of individual proposals as they deem relevant to their missions and interests. The proposals must meet the detailed requirements delineated in this solicitation.

Renewable Energy Storage (RESTOR)

The projected doubling of world energy consumption within the next few decades, coupled with the growing demand for low emission sources of energy to protect the environment, creates an urgent need for efficient, clean, and renewable energy sources. Electricity generated from clean renewable sources, such as solar or wind, offer great promise for meeting these future energy and environmental demands. However, the efficient use of electricity generated from these intermittent, geographically-restricted sources requires efficient and economical electrical energy storage solutions. Electricity storage is the Achilles' heel of renewable energy. Solving the massive storage impediment for solar and wind energy would be transformative and have a significant impact on global warming and on reducing U.S. dependence on foreign imports, and fossil fuels.

There are many fundamental gaps in understanding the atomic and molecular-level mechanisms that govern the efficient utilization of energy storage systems. Fundamental experimental and theoretical research is urgently needed to develop a transformative understanding of transport and reaction mechanisms and to uncover the underlying principles that govern the complex and interrelated mechanisms of electron and ion transfers, material decomposition, and energy conversion processes for large scale storage. Recent advances in computational tools and intelligent systems will open up new paths for designing novel multifunctional materials with the desired physical and chemical properties. The rapid advances in nanotechnology offer the potential for the development of new nanostructured form factors (high surface area nanowires, quantum dots, and hybrid architectures). Grid and transportation applications require advances in power conditioning, the development of electronics to couple the harvesting devices with the energy storage devices, and improved systems integration strategies. In addition, modeling and scale-up analysis for cost-effective manufacturing processes are essential components for realization of optimized energy storage systems.

Science in Energy and Environmental Design (SEED): Engineering Sustainable Buildings

Commercial and residential buildings are the basis of our social and economic infrastructure. In the US, buildings are responsible for 38 percent of carbon dioxide emissions, 71 percent of electricity consumption, 39 percent of energy use, 12 percent of water consumption, and 40 percent of non-industrial waste. We spend 90 percent of our time indoors and the indoor environment affects our physical and mental health and our productivity. At present, the green building movement is focused on producing much needed efficiencies using existing technologies and qualitative ratings. However, these methods ignore many critical factors and do not provide a methodology to choose between competing alternatives in a reliable scientific manner.

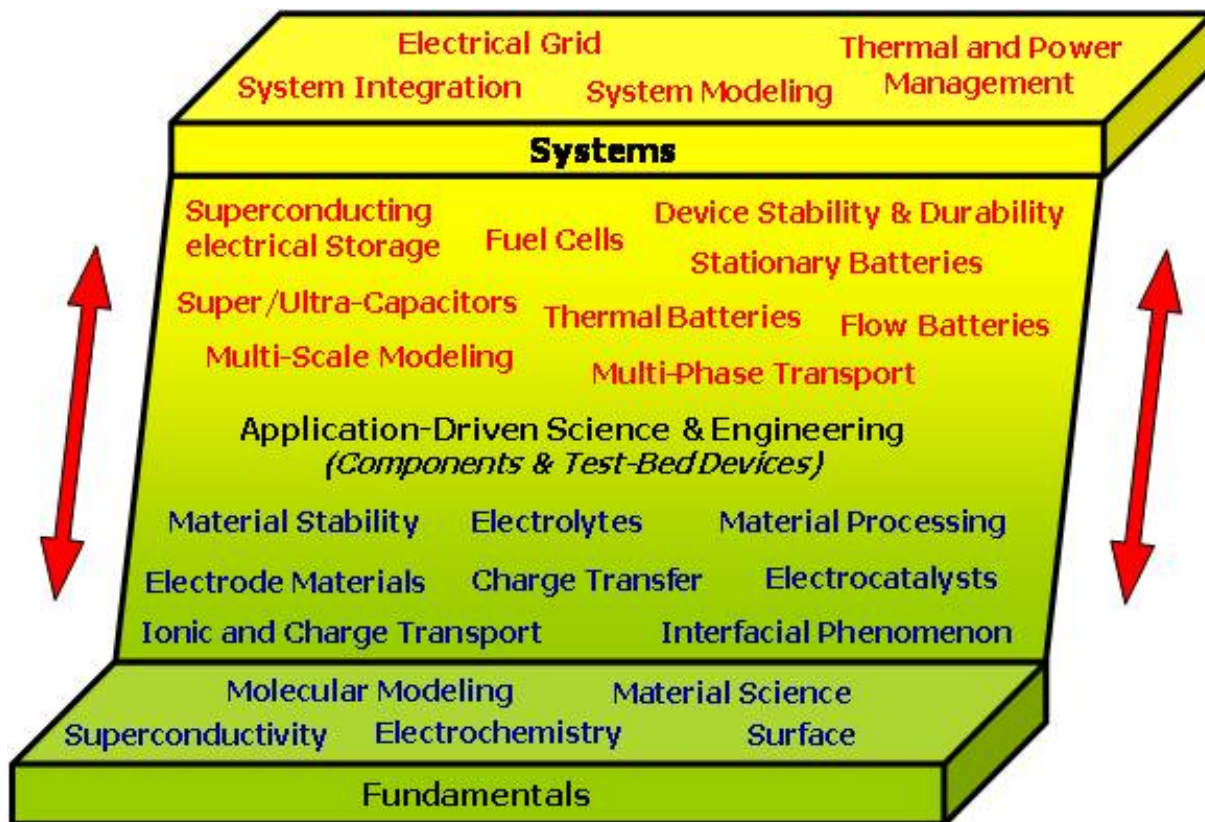
This topic will engage engineers, and architects, as well as physical, biological, and social scientists to develop fundamental concepts to create the breakthrough innovations in building materials, models, and theories that will lay the foundation for the next generation of advanced sustainable building systems. The purpose of this topic is to support dramatic new innovative, multidisciplinary and holistic systems thinking that will result in transformational changes in the industry. To develop these fundamental understandings, breakthrough research is needed to enable integrated multidisciplinary science, engineering, and systems research in areas of (a) Materials and Sensing, (b) Modeling and Simulation, and (c) Concepts for Autonomy and Interdependence. This research will allow us to model and control, in real-time, the critical flows and fluxes of power, heat, water, light, sound, air, and occupants in a building, and create new paradigms for designing, constructing, operating, maintaining, and retiring buildings that will minimize fossil fuel consumption and adverse environmental effects. It will enable us to transform the materials, devices, and control systems used to produce, store, and distribute alternative energy in buildings, and to transform building systems design and management software to solve complex interacting-system problems with interoperable, integrated, and user-friendly computational tools.

II. PROGRAM DESCRIPTION

1. Renewable Energy Storage (RESTOR)

Providing the means to economically store massive amounts of solar- and wind-generated energy would be transformative, and have a significant and positive impact on global warming and reduction of U.S. dependence on foreign imports, and fossil fuels. However, there are many fundamental gaps in, for example, understanding the atomic- and molecular-level mechanisms that govern the efficient utilization of large-scale chemical or electrochemical energy storage systems.

Recent advances in intelligent systems will open new paths for designing novel, multifunctional materials with desirable physical and chemical properties. Rapid advances in nanotechnology offer the potential to develop new nanostructured form factors (high surface area nanowires, quantum dots, and hybrid architectures). High performance computing will enable new system-level designs that will provide high round-trip efficiencies of charging and discharging the storage media. Grid and transportation applications will require advances in power conditioning, the development of electronics to couple the harvesting devices with the energy storage media, and improved systems integration strategies. Modeling and scale-up analysis for cost-effective manufacturing and deployment is an essential component for realizing any optimized energy storage design.



As shown in the Figure, we envision that the most productive approach will involve two-way feedback, collaborations, and interactions to generate new discoveries and understandings that can be used to develop solutions to the electrical energy storage area. These interactions will be between researchers with knowledge of the processes, issues and requirements at the device and system level and those with knowledge at the fundamental basic science level.

This will require a strategic approach where the research community associated with application will identify the problems at the device and system level and work with researchers at the basic science level to develop solutions to address the key barriers and issues.

The RESTOR program seeks multidisciplinary approaches to develop groundbreaking energy storage schemes using new materials, novel manufacturing approaches, and innovative designs. Furthermore, the RESTOR program will spawn a diverse pool of students who will ultimately design and deploy the large-scale energy storage systems of the near future. An essential element of any successful proposal is that the energy storage concept must have the potential to store very large amounts of energy, in either a concentrated or distributed setting, in a cost-effective and environmentally-benign manner in order to maximize the potential for ultimate widespread, large-scale deployment.

Required RESTOR Elements:

To advance the frontier within the proposed EFRI topic, proposals must address the following five elements:

R1) Cost effectiveness and technical feasibility of a large scale (10 megawatt minimum) energy storage capability of a solar and/or wind energy conversion site;

R2) Identification of key existing barriers in achieving the goals in R1;

R3) Multidisciplinary approaches needed to overcome the barriers identified in the R2 in order to achieve the goals in the R1, including alternative/contingency plans when the main proposed approaches fail. Interdisciplinary synergies in the form of well-integrated "systems' approach to research is vital;

R4) Outcomes and impacts the proposed work will have on the EFRI topic as well as other applications; and

R5) The potential impact of the proposed work to address major societal needs, to revolutionize the area of large-scale energy storage/generation, as well as to improve US competitiveness in the global economy through advanced technology development.

Proposals will be judged based on the potential success of the engineering approach achieving the goals of cost-effective large scale energy storage/generation capability. A proposed study targeting incremental improvements or a proposed study along single disciplinary or traditional lines will not make a competitive proposal. The synthesis of diverse disciplinary

knowledge, concepts, methodologies, and technologies must be clearly described as well as the quality and large scale energy storage/generation capability of the proposed solution for a typical wind and solar energy generation site.

Future Collaborations:

In addition to the base amount awarded through this EFRI 2010 competition, this EFRI topic will be eligible for supplementary awards in years 2, 3, and 4 that will be considered for funding by the Directorate of Mathematical and Physical Sciences (MPS) based on needs identified in the pursuit of the originally proposed research. In order to receive these supplements the PIs will need to make a convincing case that inclusion of scientists supported by MPS will significantly benefit the science of renewable energy storage.

2. Science in Energy and Environmental Design (SEED): Engineering Sustainable Buildings

Advances in material sciences, information technologies, and behavioral sciences, and a universal recognition that our buildings have an enormous impact on the consumption of our natural resources have provided new incentives and opportunities to make fundamental advances in the design, construction, and operation of residential and commercial buildings for future generations. These advances could lead to the development of sustainable buildings that will address a number of national needs including reducing the amount of materials needed to construct our buildings, reducing the amount of fossil fuels needed to operate our buildings, reducing the public health risks associated with poor indoor air quality, and enabling more productive and user-friendly working and living environments. SEED provides an opportunity for partnerships among engineers, architects, material scientists, mathematicians, physical and biological scientists, computer scientists, and social scientists to address the key elements of the fundamental research needed to understand how buildings and their occupants use materials, water, and energy resources throughout their lifetimes. It is expected that research proposals submitted to this solicitation will contribute to the development of a rigorous engineering framework for the design and realization of topically-relevant engineered systems and provide an intellectual framework for education in this emerging area. Proposals to develop devices or systems outside the context of such a fundamental framework will be considered unresponsive to this topic area.

The focus of this cross-disciplinary program is to promote nontraditional research interactions to provide the new knowledge, discoveries, and understanding needed to accelerate the advancement of science in energy and environmental design for buildings. While the green building movement has motivated research in materials, sensing and control, and occupant behavior, it has not yet matured to encompass system-level considerations in a broad-based way. In this EFRI topic, researchers are encouraged to engage in compelling and challenging system-level problems, arriving at new approaches, frameworks, and enabling technologies by learning from other advanced mechanical and social systems and then taking a step back to integrate and generalize the knowledge gained before assessing and optimizing the path to an engineered solution. It is expected that the resulting knowledge will provide a viable means for responding to a broad range of problems, leading to revolutionary new autonomous engineered buildings that are self-sufficient and technologically transparent to occupants and operators. To develop these fundamental understandings, breakthrough research is needed to enable integrated multidisciplinary science, engineering, and systems research in areas of (a) Materials and Sensing, (b) Modeling and Simulation, and (c) Concepts for Autonomy and Interdependence. Proposals targeted at any one or an integration of more than one of these components will be accepted and considered.

The three interrelated scientific thrust areas for integrated multidisciplinary science, engineering and systems research for innovative, transformative buildings research are

Materials and Sensing - New synthetic multifunctional materials and sensors for intelligent building envelopes; adaptive, phase-changing curtain walls; multifunctional glazing (optical, thermal and moisture transport); multifunctional flooring, ceilings, partitions walls; biodegradable building materials; self-cleaning materials; multifunctional utility networks (conduits, wires, cables, pipes, ducts, vents); water and waste reuse and recirculation; human-scale light sensing; intelligent motion and indoor-air-quality sensors; waste recycling; "cogeneration" capabilities for buildings, on-site energy production, harvesting and storage.

Modeling and Simulation - New interoperable computational platforms for simulation and animation of energy, power, air, water and occupant systems and the complex interactions between them; design integration with real-time monitoring and adaptive control; lean construction management and contracting models; building information modeling (BIM); life-cycle assessment (LCA); decision making visualization; design optimization; system dynamics (SD), agent-based modeling (ABM), and triple-bottom-line (economic, environmental, social) modeling; sociological and psychological modeling; productivity modeling.

Concepts for Autonomy and Interdependence - New engineering concepts and design paradigms for "off-grid" self-powering (local wind and solar energy harvesting and storage), self-ventilating, self-heating, self-cooling (natural ventilation, geothermal), self-hydrating (closed-loop water systems), self-sensing, super-insulated, climate-controlled buildings; reconfigurable systems for rapid construction, deconstruction, disassembly; reliability and resiliency; disaster recovery; reducing complexity of building subsystems; interaction of sustainable buildings and infrastructure systems.

Required SEED Elements:

To advance the frontier within the proposed EFRI topic, proposals must address the following five elements:

S1) Define a unifying intellectual focus for synergistic innovation involving interdisciplinary research on the

EFRI SEED topic, or their integration;

S2) Provide a unique framework through which components of diverse disciplines can connect and relate to each other;

S3) Address the need for interdisciplinary research;

S4) Address the anticipated research outcome and questions on how the resulting new discoveries will provide answers to problems leading to transformative science for next-generation sustainable buildings; and

S5) Identify new motivations, new instruments and tools, and new validation vehicles for advanced sustainable buildings.

Proposals will be judged on the relevance of the engineering disciplines and their interfaces with architecture, and the physical, biological, and social sciences. A proposed study targeting incremental improvements or a proposed study along single disciplinary or traditional lines will not make a competitive proposal. The synthesis of diverse disciplinary knowledge, concepts, methodologies, and technologies must be clearly described and the quality of overall integration will be evaluated.

Future Collaborations:

In addition to the base amount awarded through this EFRI 2010 competition, this EFRI topic will be eligible for supplementary awards in years 2, 3, and 4 that will be funded by the Directorates of Mathematical and Physical Sciences (MPS), Social, Behavioral and Economic Sciences (SBE), and Computer and Information Science and Engineering (CISE) based on needs identified in the pursuit of the originally proposed research. In order to receive these supplements the PIs will need to make a convincing case that inclusion of scientistssupported byMPS, SBE or CISEwill significantly benefit the science of energy and environmental design of buildings.

Availability of EPA Laboratory Facilities:

EPA has a number of research laboratory facilities that proposing teams may access for their research projects. The facilities, when available for use, may charge fees to cover the costs of equipment maintenance, as authorized under 42 USC 4370. Research efforts must be in line with the mission of participating laboratories. While EPA scientists can answer factual questions about their laboratory facilities, they are not available to help draft proposals. More information on available laboratories can be found at: <http://www.epa.gov/epahome/locate3.htm>.

III. AWARD INFORMATION

Anticipated Type of Award: Standard Grant

Estimated Number of Awards: 14, 4-year awards

Anticipated Funding Amount: A total of \$29,000,000 in FY 2010 pending the availability of funds.

Anticipated Funding Level: It is anticipated that 14 or more standard grants will be made in FY 2010. Each project team may receive support of up to a total of \$500,000 per year for up to four years, pending the availability of funds. It is not expected that all awards will receive the maximum amount; the size of awards will depend upon the type of research program proposed.

IV. ELIGIBILITY INFORMATION

Organization Limit:

Proposals may only be submitted by the following:

- EFRI proposals may be submitted by a single organization or a group of organizations consisting of a lead organization in partnership with one or more partner organizations. Only U.S. academic institutions which perform research and with degree-granting education programs in disciplines normally supported by NSF are eligible to be the lead organization. Academic institutions are defined as universities and two- and four-year colleges (including community colleges) accredited in, and having a campus located in the United States, acting on behalf of their faculty members. Principal investigators are encouraged to form synergistic collaborations with government

laboratories, industrial researchers, and scientists and engineers at foreign organizations where appropriate, though no NSF funds will be provided to government labs, industry, or foreign organizations. For interaction with industry, when appropriate for the proposed research, the GOALI mechanism (Grant Opportunities for Academic Liaison with Industry http://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf09516) may be used.

PI Limit:

Principal Investigators (PI) must be at the faculty level as determined by the submitting organization. A minimum of one PI and two co-PIs must participate. For EFRI-SEED, at least one co-PI must be an engineer and at least one co-PI must be an architect.

Limit on Number of Proposals per Organization:

None Specified

Limit on Number of Proposals per PI:1

The principal investigator and co-principal investigators may participate in only one proposal submitted to this solicitation. It is the responsibility of the submitting institution to insure that the PI and all co-PIs are participating in only one proposal submitted to this solicitation.

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

Letters of Intent (required):

A one-page Letter of Intent is required. Letters of Intent are not reviewed but are used to judge the overall response and requirements for reviewers. The letter should be submitted via FastLane no later than the date specified in this solicitation. The subject heading of the letter should include a brief title of the proposal and the name of the lead institution. Each letter must include the following:

1. THE TITLE- Title of the EFRI proposal preceded by the words "EFRI-RESTOR" or "EFRI-SEED" as appropriate.
2. THE TEAM- Names, departmental and university affiliation, and expertise of the Principal Investigator and at least two co-Principal Investigators.
3. THE SYNOPSIS (GOALS)- Brief description of the specific goals of the proposal (maximum of 250 words).

These letters of intent help NSF anticipate review requirements for preliminary proposals. They are not used as pre-approval mechanisms for the submission of preliminary proposals and no feedback is provided to the submitters.

Letter of Intent Preparation Instructions:

When submitting a Letter of Intent through FastLane in response to this Program Solicitation please note the conditions outlined below:

- Sponsored Projects Office (SPO) Submission is not required when submitting Letters of Intent
- A Minimum of 2 and Maximum of 4 Other Senior Project Personnel are allowed
- A Minimum of 0 and Maximum of 3 Other Participating Organizations are allowed
- Submission of multiple Letters of Intent is not allowed

Preliminary Proposals (required): Preliminary proposals are required and must be submitted via the NSF FastLane system.

Preliminary proposals must be submitted via FastLane in accordance with the instructions below. Preliminary proposals that are not compliant with this solicitation will be returned without review. It is the submitting organization's responsibility to ensure that the proposal is compliant with all applicable requirements. If there is more than one university involved in a preliminary proposal, it must be submitted as a single proposal and not as multiple collaborative proposals. Preliminary proposals must contain the items listed below and strictly adhere to the specified page limitations. No additional information may be provided as an appendix or by links to web pages. Figures and tables must be included within the applicable page limit. All elements of the proposal, including legends and tables, must meet all formatting requirements for font size,

characters per inch as specified in the NSF Grant Proposal Guide (GPG).

Preliminary proposals will be reviewed by panels of outside experts. Based on the reviews, a limited number of PIs will be invited to submit full proposals. By early February of 2010, successful PIs should expect to receive an invitation from the EFRI Office to submit full proposals.

Preliminary proposals should provide a brief overview of the project and should include sufficient information to allow assessment of the main ideas and approaches and how it is appropriate as an EFRI proposal as opposed to existing programs. Preliminary proposals must include the following items:

Cover Sheet: Select the EFRI program solicitation number from the pull down list. Check the box indicated for preliminary proposal. Entries on the Cover Sheet are limited to the principal investigator and a maximum of four co-principal investigators. A minimum of two co-principal investigators must participate. Additional project leaders or senior personnel should be listed on the Project Summary page and entered into FastLane as senior investigators.

Title of Proposed Project: The title for the proposed EFRI project must begin, as appropriate, with **EFRI-RESTOR Preliminary Proposal:** or **EFRI-SEED Preliminary Proposal:**. The title must state clearly and succinctly the major emerging frontier in research and innovation that is the focus for the project.

Project Summary: May not be more than one page in length and must consist of three parts: (1) At the top of this page include the title of the project, the name of the PI and the lead institution and a list of co-PIs and senior personnel along with their institutions; (2) provide a succinct summary of the intellectual merit of the proposed project. This should include the transformative nature of the proposed research the significant leap or a paradigm shift in fundamental engineering knowledge it will achieve; and (3) describe the broader impacts of the proposed work including the potential long-term impact on national needs or a grand challenge. **Proposals that do not separately address in the project summary both intellectual merit and broader impacts will be returned without review.**

Project Description. Project Description of the Preliminary Proposals is limited to five pages and will include the following three sections:

1. Vision and Goals- Describe the vision and specific goals of the proposed research in approximately one page;

2. Approach and Methodology- Describe in approximately three pages the approach and methodology that will be used to achieve the vision and goals; and

3. Impact- Describe in approximately one page how the synergy of experts from different disciplines in the proposed research will achieve a significant advancement in fundamental engineering knowledge and will have a strong potential for long term impact on national needs or a grand challenge.

References Cited. Indicate with an asterisk any cited publications that resulted from prior research funded by NSF for the PI, or co-PI (s).

Biographical sketches. The standard NSF two-page biographical sketches must be prepared for the PI, co-PIs and other senior personnel listed on the Project Summary page.

Current and Pending Support for the PI, co-PIs, and senior personnel must be included.

Budget: The preliminary proposal will include a budget for each of the four years proposed. FastLane will automatically provide a cumulative budget. Preliminary proposals should not include any subcontracts; however the budget justification should include planned levels for subcontracts to any partner institution. Enter the anticipated total level of subcontract support on line G5, Subawards.

In the **Supplementary Docs** section, include the following:

1. List of key personnel involved (maximum one page), with a succinct description of what each person uniquely brings to the project and how they are integrated to produce positive synergies; and

2. A list, in a single alphabetized table, with the full names and institutional affiliations of all people with conflicts of interest for all senior personnel (PI and co-PI's) and any named personnel whose salary is requested in the project budget. Conflicts to be identified are (1) Ph.D thesis advisors or advisees, (2) collaborators or co-authors, including postdoctoral researchers, for the past 48 months, and (3) any other individuals with whom or institutions with which the PIs have financial ties (please specify type).

In addition to the FastLane instructions, the proposers must send the following two documents via email immediately after submission of their proposal. After receipt of the proposal number from FastLane, send an email to efri2010@nsf.gov. The subject heading of the email should note the proposal number and the lead institution. Attach the following documents

prepared on templates that will be available at <http://www.nsf.gov/eng/efri>:

(1) An Excel spreadsheet containing two lists: one lists the last names, first names and institutional affiliations of all senior personnel (PI and co-PI's) and any named personnel whose salary is requested in the project budget; the second one lists the full names and institutional affiliations of all people having conflicts of interest with any senior personnel (PI and co-PI's) or named personnel whose salary is requested in the project budget. These lists will be used by NSF to check for conflicts of interest in assembling the review community.

(2) A single Power Point slide summarizing the vision of the EFRI proposal. This will be used during review panel discussions.

Remember to email these two documents to efri2010@nsf.gov; do not use FastLane.

Full Proposal Instructions: Proposals submitted in response to this program solicitation should be prepared and submitted in accordance with the guidelines specified in the NSF Grant Proposal Guide (GPG). The complete text of the GPG is available electronically on the NSF website at: http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg. Paper copies of the GPG may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-PUBS (7827) or by e-mail from <mailto:pubs@nsf.gov>.

Based on the review of preliminary proposals, a limited number of PIs will be invited to submit full proposals. If there is more than one university involved in an invited full proposal, it must be submitted as a single full proposal, and not as multiple collaborative proposals.

The review of invited full proposals will include both *ad hoc* and panel reviews. The following exceptions and additions to the GPG apply to full proposals submitted to this Program:

Full proposals will be accepted only from PIs who have submitted preliminary proposals in the current review cycle. Submission of full proposals by PIs whose preliminary proposals received a review recommendation of 'Not Invited' will be returned without review.

Cover Sheet: Select the EFRI program solicitation number from the pull down list. Check the box indicated for full proposal. Entries on the cover sheet are limited to the principal investigator and a maximum of four co-principal investigators. Additional project leaders or senior personnel should be listed on the Project Summary page and entered into FastLane as senior investigators.

Title of Proposed Project: The title for the proposed EFRI project must begin, as appropriate, with **EFRI-RESTOR:** or **EFRI-SEED:**. The title must state clearly and succinctly the major emerging frontier in research and innovation that is the focus for the project.

Project Summary (one-page limit): Provide the following information: (1) the title of the project, the name of the PI and the lead institution or organization, and a list of co-PIs and senior personnel along with their institutions and organization or both; (2) a succinct summary of the intellectual merit of the proposed project. This should include the transformative nature of the proposed research, and the significant leap or a paradigm shift in fundamental engineering knowledge; and (3) the broader impacts of the proposed work, including the potential long-term impact on national needs and a grand challenge or both. Proposals that do not separately address in the project summary both intellectual merit and broader impacts will be returned without review.

Project Description (maximum 15 pages) must include the following subsections:

1. Results from Prior Research: Describe prior research of PI or co-PIs funded by NSF that is directly relevant to the proposed project; and

2. Proposed Research: Describe the vision and goals of the proposed research, approaches and methodologies to attain the goals, and the expected outcomes. The Project Description should address the "Required RESTOR Elements" for EFRI-RESTOR proposals or "Required SEED Elements" for EFRI-SEED proposals as applicable as listed in Section II. Program Description. The Project Description should end with a subsection labeled **Impact** that describes how the proposed project will lead to significant shift in fundamental engineering knowledge and have strong long term potential for significant impact on a national need or a grand challenge. Concisely articulate unifying and integrative aspects of the proposed research as well as the innovative ideas of the research.

References Cited. Indicate with an asterisk any cited publications that resulted from prior research funded by NSF for the PI, or co-PI(s).

Biographical Sketches for key personnel (PI, co-PIs, and each of the senior personnel listed on the Project Summary page). Use the standard format.

Current and Pending Support information must be provided for the PI and each of the co-PIs and Senior Personnel listed in

the Project Summary page.

Budget. Develop a realistic project budget that is consistent with the proposed activities. Provide detailed budget justifications separately for the lead institution's budget (up to three pages of budget justification), and for each subawardee budget (up to three pages of budget justification for each subaward). Proposed budgets must include funds for travel by at least one PI and at least one graduate student to attend an annual EFRI grantees' meeting.

Facilities and Equipment: Provide a description of available facilities and priorities for its use, if applicable. For EFRI projects requiring additional equipment, justify the need for these resources in the context of the innovative work proposed.

In the **Supplementary Docs** section, include the following:

1. List of key personnel involved (maximum three pages), with description of what each person uniquely brings to the project and how they are integrated to produce positive synergies;
2. Provide a detailed management plan (maximum three pages) including means of communication and data tracking or management within the group, management of intellectual property resulting from the project, and timeline of activities;
3. Proposals that would generate significant digital data for preservation must include a data management plan (maximum one page). The contents of the data management plan should include: (1) the types of data to be produced, (2) the standards that would be applied for data format and metadata content, and (3) access policies and provision;
4. For proposals that include support for post-doctoral researchers, provide a Post-Doc Mentoring Plan;
5. Means of sharing the outcome of the research with the rest of the scientific community, e.g. publications, web sites, and significant data bases, etc. (maximum two pages). The description should be specific and describe what, how, and when the community would have access to the outcome of the project. This is particularly important for the projects that will produce tangible research tools and resources; and
6. A list, in a single alphabetized table, with the full names and institutional affiliations of all people with conflicts of interest for all senior personnel (PI and co-PI's) and any named personnel whose salary is requested in the project budget. Conflicts to be identified are (1) Ph.D. thesis advisors or advisees, (2) collaborators or co-authors, including postdocs, for the past 48 months, and (3) any other individuals or institutions with which the investigator has financial ties (please specify type).

In addition, the proposers **must send the following two documents via email immediately after submission of their proposal**. After receipt of the proposal number from FastLane, send an email to efri2010@nsf.gov. The subject heading of the email should note the proposal number and the lead institution. Attach the following documents prepared on templates that will be available at <http://www.nsf.gov/eng/efri>:

(1) An Excel spreadsheet containing two lists: one lists the last names, first names and institutional affiliations of all senior personnel (PI and co-PI's) and any named personnel whose salary is requested in the project budget; the second one lists the full names and institutional affiliations of all people having conflicts of interest with any senior personnel (PI and co-PI's) or named personnel whose salary is requested in the project budget. These lists will be used by NSF to check for conflicts of interest in assembling the review community.

(2) A single PowerPoint slide summarizing the vision of the EFRI proposal. This will be used during review panel discussions.

Remember to email these two documents to efri2010@nsf.gov; do not use FastLane. Please submit these documents even if the information has not changed since submission of the preproposal.

Pre-submission Check List

- No principal investigator or co-principal investigator is listed as a principal investigator or co-principal investigator on any other EFRI proposal.
- The Lead PI must be at the faculty level, as determined by the submitting institution.
- For EFRI-SEED, one PI is an architect.
- If the proposal has multiple organizations it is not submitted as a collaborative proposal but as a single proposal with subawards.
- Proposal has a minimum number of 3 PI/Co-PIs and a maximum of 5 PI/Co-PIs.
- A Post Doc Mentoring Plan is included, if applicable.
- Annual budget does not exceed \$500,000 and duration of proposed research does not exceed 4 years.
- Immediately after submission, an E-mail is sent to efri2010@nsf.gov with (a) the Excel spreadsheet that includes COI information and (b) a one-page project summary as PowerPoint slide. The subject heading of the email should note the proposal number and the lead institution.

Proposers are reminded to identify the program solicitation number (Populated with NSF Number at Clearance) in the program solicitation block on the NSF Cover Sheet For Proposal to the National Science Foundation. Compliance with this

requirement is critical to determining the relevant proposal processing guidelines. Failure to submit this information may delay processing.

B. Budgetary Information

Cost Sharing: Cost sharing is not required under this solicitation.

C. Due Dates

- **Letter of Intent Due Date(s) (required)** (due by 5 p.m. proposer's local time):

October 09, 2009

- **Preliminary Proposal Due Date(s) (required)** (due by 5 p.m. proposer's local time):

November 13, 2009

- **Full Proposal Deadline(s)** (due by 5 p.m. proposer's local time):

March 31, 2010

D. FastLane Requirements

Proposers are required to prepare and submit all proposals for this program solicitation through use of the NSF FastLane system. Detailed instructions regarding the technical aspects of proposal preparation and submission via FastLane are available at: <http://www.fastlane.nsf.gov/a1/newstan.htm>. For FastLane user support, call the FastLane Help Desk at 1-800-673-6188 or e-mail fastlane@nsf.gov. The FastLane Help Desk answers general technical questions related to the use of the FastLane system. Specific questions related to this program solicitation should be referred to the NSF program staff contact (s) listed in Section VIII of this funding opportunity.

Submission of Electronically Signed Cover Sheets. The Authorized Organizational Representative (AOR) must electronically sign the proposal Cover Sheet to submit the required proposal certifications (see Chapter II, Section C of the [Grant Proposal Guide](#) for a listing of the certifications). The AOR must provide the required electronic certifications within five working days following the electronic submission of the proposal. Further instructions regarding this process are available on the FastLane Website at: <https://www.fastlane.nsf.gov/fastlane.jsp>.

VI. NSF PROPOSAL PROCESSING AND REVIEW PROCEDURES

Proposals received by NSF are assigned to the appropriate NSF program where they will be reviewed if they meet NSF proposal preparation requirements. All proposals are carefully reviewed by a scientist, engineer, or educator serving as an NSF Program Officer, and usually by three to ten other persons outside NSF who are experts in the particular fields represented by the proposal. These reviewers are selected by Program Officers charged with the oversight of the review process. Proposers are invited to suggest names of persons they believe are especially well qualified to review the proposal and/or persons they would prefer not review the proposal. These suggestions may serve as one source in the reviewer selection process at the Program Officer's discretion. Submission of such names, however, is optional. Care is taken to ensure that reviewers have no conflicts of interest with the proposal.

A. NSF Merit Review Criteria

All NSF proposals are evaluated through use of the two National Science Board (NSB)-approved merit review criteria: intellectual merit and the broader impacts of the proposed effort. In some instances, however, NSF will employ additional criteria as required to highlight the specific objectives of certain programs and activities.

The two NSB-approved merit review criteria are listed below. The criteria include considerations that help define them. These considerations are suggestions and not all will apply to any given proposal. While proposers must address both merit review criteria, reviewers will be asked to address only those considerations that are relevant to the proposal being considered and for which the reviewer is qualified to make judgements.

What is the intellectual merit of the proposed activity?

How important is the proposed activity to advancing knowledge and understanding within its own field or across different fields? How well qualified is the proposer (individual or team) to conduct the project? (If appropriate, the reviewer will comment on the quality of the prior work.) To what extent does the proposed activity suggest and explore creative, original, or potentially transformative concepts? How well conceived and organized is the proposed activity? Is there sufficient access to resources?

What are the broader impacts of the proposed activity?

How well does the activity advance discovery and understanding while promoting teaching, training, and learning? How well does the proposed activity broaden the participation of underrepresented groups (e.g., gender, ethnicity, disability, geographic, etc.)? To what extent will it enhance the infrastructure for research and education, such as facilities, instrumentation, networks, and partnerships? Will the results be disseminated broadly to enhance scientific and technological understanding? What may be the benefits of the proposed activity to society?

Examples illustrating activities likely to demonstrate broader impacts are available electronically on the NSF website at: <http://www.nsf.gov/pubs/gpg/broaderimpacts.pdf>.

Mentoring activities provided to postdoctoral researchers supported on the project, as described in a one-page supplementary document, will be evaluated under the Broader Impacts criterion.

NSF staff also will give careful consideration to the following in making funding decisions:

Integration of Research and Education

One of the principal strategies in support of NSF's goals is to foster integration of research and education through the programs, projects, and activities it supports at academic and research institutions. These institutions provide abundant opportunities where individuals may concurrently assume responsibilities as researchers, educators, and students and where all can engage in joint efforts that infuse education with the excitement of discovery and enrich research through the diversity of learning perspectives.

Integrating Diversity into NSF Programs, Projects, and Activities

Broadening opportunities and enabling the participation of all citizens -- women and men, underrepresented minorities, and persons with disabilities -- is essential to the health and vitality of science and engineering. NSF is committed to this principle of diversity and deems it central to the programs, projects, and activities it considers and supports.

Additional Review Criteria:

In addition to the two NSF review criteria (intellectual merit and broader impacts), the following criteria will be used in the review of all EFRI proposals:

- o **TRANSFORMATIVE** - Does the proposed research represent an opportunity for a significant leap or paradigm shift in fundamental engineering knowledge?
- o **NATIONAL NEED/GRAND CHALLENGE** - Is there potential for making significant progress on a current national need or grand challenge?
- o Responsiveness to "Required RESTOR Elements" for EFRI-RESTOR proposals or "Required SEED Elements" for EFRI-SEED proposals delineated in Section II. Program Description.
- o Effectiveness of the proposed plan for management and integration.

B. Review and Selection Process

Proposals submitted in response to this program solicitation will be reviewed by Ad hoc Review and/or Panel Review.

Reviewers will be asked to formulate a recommendation to either support or decline each proposal. The Program Officer assigned to manage the proposal's review will consider the advice of reviewers and will formulate a recommendation.

After scientific, technical and programmatic review and consideration of appropriate factors, the NSF Program Officer recommends to the cognizant Division Director whether the proposal should be declined or recommended for award. NSF is striving to be able to tell applicants whether their proposals have been declined or recommended for funding within six months. The time interval begins on the date of receipt. The interval ends when the Division Director accepts the Program Officer's recommendation.

A summary rating and accompanying narrative will be completed and submitted by each reviewer. In all cases, reviews are treated as confidential documents. Verbatim copies of reviews, excluding the names of the reviewers, are sent to the Principal Investigator/Project Director by the Program Officer. In addition, the proposer will receive an explanation of the decision to award or decline funding.

In developing its recommendations for awards, review panels as well as NSF staff will consider: the relative merit of the EFRI proposals using the criteria listed above, the potential national impact of the proposed activity, the balance of awards among scientific fields, geographical distribution, and the combined ability of the proposals to meet the objectives of the EFRI Office. The EFRI Office will not normally award more than one proposal from any one lead institution in this competition.

In all cases, after programmatic approval has been obtained, the proposals recommended for funding will be forwarded to the Division of Grants and Agreements for review of business, financial, and policy implications and the processing and issuance of a grant or other agreement. Proposers are cautioned that only a Grants and Agreements Officer may make commitments, obligations or awards on behalf of NSF or authorize the expenditure of funds. No commitment on the part of NSF should be inferred from technical or budgetary discussions with a NSF Program Officer. A Principal Investigator or organization that makes financial or personnel commitments in the absence of a grant or cooperative agreement signed by the NSF Grants and Agreements Officer does so at their own risk.

VII. AWARD ADMINISTRATION INFORMATION

A. Notification of the Award

Notification of the award is made to *the submitting organization* by a Grants Officer in the Division of Grants and Agreements. Organizations whose proposals are declined will be advised as promptly as possible by the cognizant NSF Program administering the program. Verbatim copies of reviews, not including the identity of the reviewer, will be provided automatically to the Principal Investigator. (See Section VI.B. for additional information on the review process.)

B. Award Conditions

An NSF award consists of: (1) the award letter, which includes any special provisions applicable to the award and any numbered amendments thereto; (2) the budget, which indicates the amounts, by categories of expense, on which NSF has based its support (or otherwise communicates any specific approvals or disapprovals of proposed expenditures); (3) the proposal referenced in the award letter; (4) the applicable award conditions, such as Grant General Conditions (GC-1); * or Research Terms and Conditions * and (5) any announcement or other NSF issuance that may be incorporated by reference in the award letter. Cooperative agreements also are administered in accordance with NSF Cooperative Agreement Financial and Administrative Terms and Conditions (CA-FATC) and the applicable Programmatic Terms and Conditions. NSF awards are electronically signed by an NSF Grants and Agreements Officer and transmitted electronically to the organization via e-mail.

*These documents may be accessed electronically on NSF's Website at http://www.nsf.gov/awards/managing/award_conditions.jsp?org=NSF. Paper copies may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from <mailto:pubs@nsf.gov>.

More comprehensive information on NSF Award Conditions and other important information on the administration of NSF awards is contained in the NSF *Award & Administration Guide* (AAG) Chapter II, available electronically on the NSF Website at http://www.nsf.gov/publications/pub_summ.jsp?ods_key=aag.

Special Award Conditions: Awardees must include in the proposal budget funds for travel by PI and one researcher or a student to attend an annual EFRI grantees' meeting.

C. Reporting Requirements

For all multi-year grants (including both standard and continuing grants), the Principal Investigator must submit an annual project report to the cognizant Program Officer at least 90 days before the end of the current budget period. (Some programs or awards require more frequent project reports). Within 90 days after expiration of a grant, the PI also is required to submit a final project report.

Failure to provide the required annual or final project reports will delay NSF review and processing of any future funding increments as well as any pending proposals for that PI. PIs should examine the formats of the required reports in advance to assure availability of required data.

PIs are required to use NSF's electronic project-reporting system, available through FastLane, for preparation and submission of annual and final project reports. Such reports provide information on activities and findings, project participants (individual and organizational) publications; and, other specific products and contributions. PIs will not be required to re-enter information previously provided, either with a proposal or in earlier updates using the electronic system. Submission of the report via FastLane constitutes certification by the PI that the contents of the report are accurate and complete.

Awardees will be required to attend and present their research results and plans annually at an annual EFRI grantees' conference for the duration for their award.

VIII. AGENCY CONTACTS

General inquiries regarding this program should be made to:

- Sohi Rastegar, Director, Office of Emerging Frontiers in Research and Innovation (EFRI), 505, telephone: (703) 292-8305, email: srastega@nsf.gov
- Johnetta E Lee, EFRI Program Specialist, NSF/EFRI, 505, telephone: (703) 292-8305, email: jlee@nsf.gov
- Christine Lottes, Science Assistant, NSF, 505, telephone: (703) 292-5392, email: clottes@nsf.gov
- TOPIC 1: RENEWABLE ENERGY STORAGE (RESTOR), telephone: see below, email: lesterow@nsf.gov
- Leon Esterowitz, Program Director, Biophotonics, NSF/ENG/CBET, telephone: (703) 292-7942, email: lesterow@nsf.gov
- Theodore L Bergman, Program Director, Thermal Transport Processes, NSF/ENG/CBET, 565, telephone: (703) 292-7494, email: tbergman@nsf.gov
- Carol Bessel, Program Director - MPS, Chemistry Division, telephone: (703)292-4945, email: cbessel@nsf.gov
- Shaochen Chen, Program Director, NanoManufacturing, NSF/ENG/CMMI, 545, telephone: (703) 292-7557, email: shchen@nsf.gov
- Tien Duong, Program Director, Department of Energy, telephone: (202) 287-1849, email: tien.duong@ee.doe.gov
- Barbara H Kenny, Program Director, Engineering Research Centers, NSF/ENG/EEC, 585, telephone: (703) 292-4667, email: bkenny@nsf.gov
- Pinaki Mazumder, Program Director, Power, Controls and Adaptive Networks, NSF/ENG/ECCS, 525, telephone: (703) 292-7898, email: pmazumde@nsf.gov
- Rose Wesson, Program Director, Chemical and Biological Separations, NSF/ENG/CBET, telephone: (703)292-7942, email: rwesson@nsf.gov
- Charles Ying, Program Director, Electronic and Photonic Materials (EPM), NSF/MPS/DMR, 1065 N, telephone: (703) 292-8428, email: cying@nsf.gov
- Cynthia Znati, Program Director, Small Business Innovation Research (SBIR/STT), NSF/ENG/IIP, 590, telephone: (703) 292-8374, email: cznati@nsf.gov
- TOPIC 2: SCIENCE IN ENERGY AND ENVIRONMENTAL DESIGN, (SEED): Engineering Sustainable Buildings, telephone: see below, email: lbank@nsf.gov
- Lawrence C Bank, Program Director, Structural Materials and Mechanics, NSF/ENG/CMMI, telephone: (703) 292-2162, email: lbank@nsf.gov
- Radhakishan Baheti, Program Director, Powers, Controls and Adaptive Networks (PCAN), NSF/ENG/ECCS, 525, telephone: (703) 292-8339, email: rbaheti@nsf.gov
- Gail F Bentkover, Director, Technology and Engineering Division, National Center for Environmental Research, US Environmental Protection Agency, telephone: 202-343-9511, email: Bentkover.Gail@epamail.epa.gov
- John H Cozzens, Program Director, Computing and Communication Foundation (CCF): Core Programs, NSF/CISE/CCF, 1115N, telephone: (703) 292-8910, email: jcozzens@nsf.gov
- Drury B Crawley, Commercial Building Team Lead, US Department of Energy, telephone: (202) 586-2344, email: Drury.Crawley@ee.doe.gov
- Bruce K Hamilton, Program Director, Environmental Sustainability, NSF/ENG/CBET, 565, telephone: (703) 292-8320, email: bhamilto@nsf.gov
- Barbara H Kenny, Program Director, Engineering Research Centers, NSF/ENG/EEC, 585, telephone: (703) 292-

4667, email: bkenny@nsf.gov

- Joy Pauschke, Program Director, Network for Earthquake Engineering Simulation (NEES), NSF/ENG/CMMI, 545, telephone: (703) 292-7024, email: jpauschk@nsf.gov
- Linda Sapochak, Program Director, Solid State and Materials Chemistry (SSMC), NSF/DMR, 1065 N, telephone: (703) 292-4932, email: lsapocha@nsf.gov
- Rita A Teutonico, Program Director, Decision Making Under Uncertainty Collaborative Groups (DMUU), NSF/SBE, 905N, telephone: (703) 292-7118, email: rteutoni@nsf.gov
- Cynthia Znati, Program Director, Small Business Innovation Research (SBIR/STTR), NSF/ENG/IPP, 590, telephone: (703) 292-8374, email: cznati@nsf.gov

For questions related to the use of FastLane, contact:

- FastLane Help Desk, telephone: 1-800-673-6188; e-mail: fastlane@nsf.gov.
- Johnetta E Lee, EFRI Program Specialist, NSF/EFRI, 505, telephone: (703) 292-8305, email: jlee@nsf.gov

IX. OTHER INFORMATION

The NSF Website provides the most comprehensive source of information on NSF Directorates (including contact information), programs and funding opportunities. Use of this Website by potential proposers is strongly encouraged. In addition, National Science Foundation Update is a free e-mail subscription service designed to keep potential proposers and other interested parties apprised of new NSF funding opportunities and publications, important changes in proposal and award policies and procedures, and upcoming NSF Regional Grants Conferences. Subscribers are informed through e-mail when new publications are issued that match their identified interests. Users can subscribe to this service by clicking the "Get NSF Updates by Email" link on the [NSF web site](#).

Grants.gov provides an additional electronic capability to search for Federal government-wide grant opportunities. NSF funding opportunities may be accessed via this new mechanism. Further information on Grants.gov may be obtained at <http://www.grants.gov/>.

ABOUT THE NATIONAL SCIENCE FOUNDATION

The National Science Foundation (NSF) is an independent Federal agency created by the National Science Foundation Act of 1950, as amended (42 USC 1861-75). The Act states the purpose of the NSF is "to promote the progress of science; [and] to advance the national health, prosperity, and welfare by supporting research and education in all fields of science and engineering."

NSF funds research and education in most fields of science and engineering. It does this through grants and cooperative agreements to more than 2,000 colleges, universities, K-12 school systems, businesses, informal science organizations and other research organizations throughout the US. The Foundation accounts for about one-fourth of Federal support to academic institutions for basic research.

NSF receives approximately 40,000 proposals each year for research, education and training projects, of which approximately 11,000 are funded. In addition, the Foundation receives several thousand applications for graduate and postdoctoral fellowships. The agency operates no laboratories itself but does support National Research Centers, user facilities, certain oceanographic vessels and Antarctic research stations. The Foundation also supports cooperative research between universities and industry, US participation in international scientific and engineering efforts, and educational activities at every academic level.

Facilitation Awards for Scientists and Engineers with Disabilities provide funding for special assistance or equipment to enable persons with disabilities to work on NSF-supported projects. See Grant Proposal Guide Chapter II, Section D.2 for instructions regarding preparation of these types of proposals.

The National Science Foundation has Telephonic Device for the Deaf (TDD) and Federal Information Relay Service (FIRS) capabilities that enable individuals with hearing impairments to communicate with the Foundation about NSF programs, employment or general information. TDD may be accessed at (703) 292-5090 and (800) 281-8749, FIRS at (800) 877-8339.

The National Science Foundation promotes and advances scientific progress in the United States by competitively awarding grants and cooperative agreements for research and education in the sciences, mathematics, and engineering.

To get the latest information about program deadlines, to download copies of NSF publications, and to access abstracts of awards, visit the NSF Website at <http://www.nsf.gov/>

- **Location:** 4201 Wilson Blvd. Arlington, VA 22230
- **For General Information** (NSF Information Center): (703) 292-5111
- **TDD (for the hearing-impaired):** (703) 292-5090
- **To Order Publications or Forms:**
 - Send an e-mail to: nsfpubs@nsf.gov
 - or telephone: (703) 292-7827
- **To Locate NSF Employees:** (703) 292-5111

PRIVACY ACT AND PUBLIC BURDEN STATEMENTS

The information requested on proposal forms and project reports is solicited under the authority of the National Science Foundation Act of 1950, as amended. The information on proposal forms will be used in connection with the selection of qualified proposals; and project reports submitted by awardees will be used for program evaluation and reporting within the Executive Branch and to Congress. The information requested may be disclosed to qualified reviewers and staff assistants as part of the proposal review process; to proposer institutions/grantees to provide or obtain data regarding the proposal review process, award decisions, or the administration of awards; to government contractors, experts, volunteers and researchers and educators as necessary to complete assigned work; to other government agencies or other entities needing information regarding applicants or nominees as part of a joint application review process, or in order to coordinate programs or policy; and to another Federal agency, court, or party in a court or Federal administrative proceeding if the government is a party. Information about Principal Investigators may be added to the Reviewer file and used to select potential candidates to serve as peer reviewers or advisory committee members. See Systems of Records, NSF-50, "Principal Investigator/Proposal File and Associated Records," 69 Federal Register 26410 (May 12, 2004), and NSF-51, "Reviewer/Proposal File and Associated Records," 69 Federal Register 26410 (May 12, 2004). Submission of the information is voluntary. Failure to provide full and complete information, however, may reduce the possibility of receiving an award.

An agency may not conduct or sponsor, and a person is not required to respond to, an information collection unless it displays a valid Office of Management and Budget (OMB) control number. The OMB control number for this collection is 3145-0058. Public reporting burden for this collection of information is estimated to average 120 hours per response, including the time for reviewing instructions. Send comments regarding the burden estimate and any other aspect of this collection of information, including suggestions for reducing this burden, to:

Suzanne H. Plimpton
Reports Clearance Officer
Division of Administrative Services
National Science Foundation
Arlington, VA 22230

